

VOLUME 1

THE WORKS OF
FRANCIS BACON



ESSAYS, SCIENTIFIC &
PHILOSOPHICAL WRITINGS



LORD VERULAM

LONDON: PRINTED FOR J. JOHNSON, &c.



FRANCISCVS BACON
*Vice-Comes S.^{to} Albani Baro Verulamii
Magnus Angliæ Cancellarius.*

Geo. Vertue Sculpsit 1728.

THE
W O R K S
O F
FRANCIS BACON,
BARON OF VERULAM,
VISCOUNT ST. ALBAN,
AND
Lord High Chancellor of England.

IN FIVE VOLUMES.

VOL. I.



L O N D O N:
Printed for A. MILLAR, in the Strand.
MDCCLXV.

TO
THE HONOURABLE
CHARLES YORKE,
ATTORNEY GENERAL TO HIS MAJESTY,
UNDER THE SANCTION OF WHOSE NAME
A SMALL PART OF THESE WRITINGS
OF THE LORD CHANCELLOR BACON
WERE FIRST PUBLISHED,
THIS EDITION OF THE INTIRE WORKS
OF THE GREAT AUTHOR
IS,
WITH PROPRIETY, AS WELL AS GRATITUDE AND ESTEEM,
INSCRIBED BY

THE EDITOR.

ADVERTISEMENT.

AS the present Edition of Lord Bacon's Works may claim to be more correct and complete, and nearer to a standard one, than even the last, it may be requisite to acquaint the Reader what Advantages it has to justify such a Pretension.

These are chiefly owing to two Gentlemen, now deceased, Robert Stephens, Esq; Historiographer Royal, and John Locker, Esq; Fellow of the Society of Antiquaries; both of whom had made a particular Study of Lord Bacon's Writings, and a great Object of their Industry the correcting from original or authentic Manuscripts, and the earliest and best Editions, whatever of his Works had been already published, and adding to them such, as could be recovered, that had never seen the Light.

Mr. Stephens dying in November, 1732, his Papers came into the Hands of Mr. Locker, whose Death, on the 30th of May 1760, prevented the World from enjoying the Fruits of his Labours, tho' he had actually finished his Correction of the fourth Volume of Mr. Blackburne's Edition, containing the Law-Tracts, Letters, &c. After his Decease his Collections, including those of Mr. Stephens's, were purchased by Dr. Birch; the Use of which he is glad of this Opportunity of giving to the Public.

With regard to the Letters formerly printed of Lord Bacon, the several Books or Manuscripts, from which they were taken, are respectively marked, and the Collection published by Dr. Birch in 1763 in octavo, with some considerable Additions by him, is added.

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The Disposition of the several Pieces in the last Edition is preserved in the present. The English are arranged in the following Order: 1. Philosophical: 2. Moral and Political: 3. Law: 4. Theological: 5. Letters. The Latin Pieces are separated from the rest, and placed in the Order pointed out by the Author himself, presenting at one View the several Parts of his admirable Plan for the great Instauration of the Sciences.

LONDON, May 4th, 1765.

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T H E
L I F E
O F
F R A N C I S B A C O N,
Lord High Chancellor of ENGLAND.

THE ancient Egyptians had a law, which ordained, that the actions and characters of their dead should be solemnly canvassed before certain judges; in order to regulate what was due to their memory. No quality, however exalted; no abilities, however eminent; could exempt the possessors from this last and impartial trial. To ingenuous minds this was a powerful incentive, in the pursuit of virtue; and a strong restraint on the most abandoned, in their career of vice. Whoever undertakes to write the life of any person, deserving to be remembered by posterity, ought to look upon this law as prescribed to him. He is fairly to record the faults as well as the good qualities, the failings as well as the perfections, of the dead; with this great view, to warn and improve the living. For this reason, though I shall dwell with pleasure on the shining part of my lord Bacon's character, as a writer; I shall not dare either to conceal or palliate his blemishes, as a man. It equally concerns the public to be made acquainted with both.

Sir Nicholas Bacon was the first lord Keeper of the seals invested with all the dignity, and trusted with all the power, of a lord Chancellor. This high employment he held under queen Elizabeth near twenty years: a minister considerably learned, of remarkable prudence and honesty; serving his country with the integrity of a good man, and preserving, through the whole course of his prosperity, that moderation and plainness of manners which adorn a great man. His second wife was a daughter of Sir Antony Cooke, who had been preceptor to Edward the sixth, and of whom historians have made honorable mention for his skill in the learned languages. Neither have they forgot to celebrate this lady on the same account. To the truth of which even an enemy bore testimony, while he reproached her with having translated, from the latin, bishop Jewel's apology for the church of England. Parsons the Jesuit.

1561. Such were the parents of Francis Bacon, whose life I am writing. Of two sons, by this marriage, he was the youngest: and born at York-house in the Strand, the twenty-second of January 1561. As he had the good fortune to come into the world at a period of time when arts and sciences were esteemed and cultivated, by the great and powerful, almost in the same degree they are now neglected; so he brought with him a capacity for every kind of knowledge, useful and ornamental. An original genius, formed not to receive implicit notions of thinking and reasoning from what was admitted and taught before him; but to prescribe laws himself, in the empire of learning, to his own and succeeding ages.

He gave marks, very early, of a pregnant and happy disposition, far above his years. We are told that queen Elizabeth took a particular delight in trying him with questions; and received so much satisfaction from the good sense and manliness of his answers, that she was wont to call him, in mirth, her young lord keeper. One saying of his deserves to be remembered. The queen having asked him his age, while he was yet a boy; he answered readily, that he was just two years younger than her happy reign.

16th of June
1573. Of his education I know no particulars, till he was sent to study in the university of Cambridge under Doctor Whitgift, afterwards archbishop of Canterbury: and I find he was entered of Trinity college in his twelfth year. The progress he made was rapid and uncommon: for he had run through the whole circle of the liberal arts, as they were then taught, before he was sixteen. But what is far more surprising; he began, even then, to see through the emptiness and futility of the philosophy in vogue: and to conjecture, that useful knowledge must be raised on other foundations, and built up with other materials, than had been employed through a tract of many centuries backward. In this, his own genius, aided by a singular discernment, must have been his only preceptor. In matters of reasoning, the authority of Aristotle was still acknowledged infallible in the schools; as much as that of the pope, in affairs of religion, had lately been acknowledged there and every where else. And our author may be justly styled the first great reformer of philosophy. He had the prepossessions, the voluminous and useless reading, nay he had the vanity of men grown old in contrary opinions, to struggle with: yet he lived to see a considerable revolution on his side. Another age brought over the learned of all nations to his party.

It may be justly wondered at, that the lord Keeper, a minister of great observation on men and things, should have sent his son to travel at the age of sixteen; as we find he did: for, by a letter from Sir Amias Powlet, then ambassador in France, it is certain that young Bacon was at Paris, and under his roof, in the year 1577. We need but look around us, to be convinced how little our youth of quality, who visit foreign countries about that age, are wont to profit either in taste, wisdom, or morals. But perhaps he discovered in his son a maturity of discretion and judgment beyond what is common to that early season of life. However that was, the ambassador conceived a very favourable opinion of Bacon; for he sent him over to the queen with a commission that required secrecy and dispatch: of which he acquitted himself with applause, and then returned to finish his travels. The native bent of his mind, strongly turned to reflection and inquiry, suffered him not to stop short at the study of languages, but led him higher to remark accurately on the customs and manners of those that spoke them; on the characters of their princes, and on the constitution of their several governments.

ments. In proof of this, there is still extant among his works, a paper of observations on the general state of Europe, written by him shortly after this time; as I have discovered by a circumstance mentioned in it*.

He was the youngest son; and seems to have been the favorite of his father; who had set apart a considerable sum of money to purchase an estate for him, in his absence. But before that kind intention could take effect, the lord Keeper died suddenly, by the following accident. He was under the hands of his barber, and, the weather being warmer than usual, had ordered a window before him to be thrown open. As he was become very corpulent, he presently fell asleep in the current of fresh air that was blowing in upon him; and awaked after some time distempered all over. Why, said he to the servant, did you suffer me to sleep thus expoied? The fellow replied, that he durit not presume to disturb him. Then, said the lord Keeper, by your civility I lose my life: and so removed into his bed-chamber, where he died a few days after. Thus there remained to his youngest son only the small proportion of a sum, which was to be divided among five brothers.

The narrowness of his circumstances obliged him to think of some profession for a subsistence: and he applied himself more through necessity, than choice, to the study of the common law. For that purpose, he placed himself in the society of Gray's Inn; where his superior talents rendered him the ornament of the house: as the gentleness and affability of his deportment won him the affection of all its members. In his profession, he quickly rose to so much eminence and reputation, that, at the age of twenty eight years, he was named by Elizabeth her learned council extraordinary: a distinction which he needed no assistance from his father's merit with her to deserve. It was however next to impossible that so noble a genius, born to embrace the whole compass of science, should confine its researches within the narrow and perplexed study of precedents and authorities; a study hedged round with brambles and thorns, dark and barbarous in its beginnings, and rendered in its progress still more obscure, by the learned dulness of commentators and compilers: men, for the most part, of indefatigable industry, and of no spirit or discernment. Accordingly we find that in this interval he often gave full scope to his conceptions; surveying the whole state of learning, observing its defects, and imagining the proper methods to supply them. This he first attempted in a treatise which he intitled *THE GREATEST BIRTH OF TIME*; as appears from a letter written after his retirement, to father Fulgentio the Venetian, in which he passes a kind of censure on the pompous and swelling title prefixed to it. Though the piece itself is lost, it appears to have been the first outlines of that amazing design, which he afterwards filled up and finished in his grand Instauration of the sciences. As there is not a more amusing, perhaps a more useful speculation, than that of tracing the history of the human mind, if I may so express myself, in its progression from truth to truth, and from discovery to discovery; the intelligent reader would doubtless have been pleased to see, in the tract I am speaking of, by what steps and gradations a spirit like Bacon's advanced in building up, for more than thirty years together, his new and universal theory. He thought himself born for the use of human kind: and, in the letter above mentioned, styles himself, the servant of posterity.

* He says that Henry III. of France was then 30 years old: now that king began his reign in 1574, at the age of 24 years. So that Bacon was then nineteen.

These few hints for filling up this first part of our author's life, trivial and unsatisfactory as they may appear, I have yet been obliged to glean here and there in the rubbish of several collections, where they lay scattered, without order or connection. But I shall now no longer regard Bacon as a mere philosopher; as a man of speculation who conversed only with books and his own thoughts, in the shade of retirement and leisure. The course of his fortunes produced him on the great theatre of the world, involved him in business, and complicated him with the most considerable persons of the age he lived in. He was honourably employed by one prince, and highly preferred under another. It will be therefore necessary, that this history may have its due extent and usefulness, to exhibit a general prospect of the two reigns in which Bacon flourished and fell, at least in their principal points of view. The characters of those with whom he had any connection will illustrate his, and shew it in a truer, as well as a fuller light.

I have yet another reason for enlarging this account beyond the ordinary limits. Our author's letters are written, many of them at least, on public occasions, and may be considered as the most authentic vouchers for several remarkable occurrences, in which he himself was an actor, and well acquainted with the secret motives on which others acted. But as those things are for the most part only hinted at, or no farther opened than to serve the present purpose of his letter; they will require to be developed at some length, and ranged into their proper places.

Elizabeth had a larger share of good sense and sound judgment, than is commonly to be met with among women; accompanied with a greatness of mind and steadiness of purpose that might do honor to the best of men. These her natural endowments received much, tho' severe, improvement from the dangers she was exposed to in the first part of her life. She grew up in a strict attention over her own actions, even over her looks and words, from the rigor of her father's temper, and particularly from the jealous cruelty of her sister's administration: a short but memorable period of time! when England beheld, under a female reign, such instances of merciless rage, such scenes of horror, as had of old startled the Roman world, under a Nero and a Domitian. The dreadful genius of that superstition to which she had devoted herself, then exerted its spirit undisguised, in betraying, tormenting, butchering, by the ministry of inhuman priests and inquisitors, whoever would not profess what he could not possibly believe. If we may credit historians, they had even doomed Elizabeth herself to die: and she escaped, miraculously, not by the kindness, but the policy of Philip; himself a tyrant, the coolest and most determined of these latter ages.

At her accession to the throne, she found her revenues anticipated or exhausted; her kingdom, through the sanguinary madness of her predecessor, disjointed and broken of its vigor within: at the same time unsupported by allies and without consideration abroad. Her good sense led her to see, by the errors of her father and her sister, that she could expect to reign with security, only by deserving the confidence and gaining the love of the nation: and that in order thereto, she must propose to herself no other end of ruling but the happiness and honour of all her people. This system of policy, so simple in itself, so glorious in its consequences, and yet by princes so seldom pursued, she adhered to steadily, almost uniformly, through a long and triumphant reign; for this very reason triumphant!

The reformation of religion she attempted and effected, at a season when her power was unconfirmed and in probable danger from intestine commotions. For revolutions in religion are apt to put the whole constitution of a society into ferment, even more strongly than alterations in government; as every individual is immediately and intimately actuated by what seems to him of highest and most lasting concern. She kept awake, and animated, with wonderful address, the divisions in Scotland, in France, in the Netherlands: and that with more justice on her part, than is usually observed by princes when they would do ill offices to their neighbours. The sovereigns of those countries, when they agreed in nothing else, were ever combined in a common enmity to her: at a time too when she had nothing to oppose against their pretensions, their conspiracies, their open attacks, but her own courage and the native strength of England alone. And yet, by helping forward the reformation in Scotland; by supporting the protestants in France; by the wise and well-managed supplies she sent to the Dutch, who were struggling hard for their lives and liberties with an unrelenting tyrant: by this series of conduct, steadily pursued, she triumphed over all opposition, and rendered herself the arbitress of Europe. For it may be affirmed, that her administration made a greater impression on all the states round her, than it received itself from any: an undoubted proof of its firmness and active vigor.

When she came to the crown, she found the nation four millions in debt: a sum then almost incredible! and yet her oeconomy alone enabled her to discharge it. The coin, which had been much embased by Henry the eighth, and by Mary wholly neglected, she quickly restored to its just standard; and therewith the public faith and credit. Her magazines she carefully replenished with arms, ammunition, warlike stores of every kind: and the youth all over England were ordered to be duly trained in military exercises. Her navy was fallen to decay, and almost abandoned. This she set herself to repair with an attention, which the great bulwark of this kingdom will ever deserve from a prince, who understands in what his own strength and that of his dominions naturally consist. Her fleet was at last a match for the mighty armada of Spain: that armada, which was boasted to be invincible, and was in truth a desperate effort of the whole power and resentment of her bitterest enemy. Her victory over him, as intire as it was glorious, gave security and renown to this island: and, whatever the partiality of foreign writers may have insinuated to the contrary, she owed it to her own heroic conduct, and the unexampled bravery of her subjects.

She was the first of our princes who pursued, in any considerable degree, the only sure method of making England great and powerful; by encouraging and extending our commerce: which, under her protection, grew high, and spread itself through the North and to both the Indies. In a word, such was her conduct, such her good fortune, in this island and on the continent, that her allies had the strongest confidence in her assistance and good faith: that her enemies stood in awe of her power, and were forced to an unwilling approbation of her prudence. The applause of such as think they have cause to hate, and distress us, is the sincerest, as it is the noblest praise. Her oeconomy was admirable. She husbanded the public money for her people's ease: she laid it out, on proper occasions, for their safety and honor. The undertakings of the government were never greater; the charge was never less. This gives the highest idea of her ministry, and places their characters, in general, above imputation or reproach.

THE LIFE OF THE

Of Sir Nicholas Bacon, our author's father, I have already given some account : and shall only add here, that he never aspired beyond the rank he brought with him to court. His moderation in all other respects was the same. When the queen visited him at his seat in Hertfordshire, she told him with an air of pleasantry, that his house was too little for him. No, replied the lord Keeper ; but your majesty has made me too great for my house.

Walsingham, in his private character, was of unblemished honesty. As a minister he had singular sagacity in procuring intelligence ; which he knew to apply, with great dexterity, to the purposes of government : devoting himself, with so generous a self-neglect, to the service of his country, that he gained a reputation for contempt of riches, which would have been highly revered in the best times of antiquity ; and will go near in these days, to be thought either folly or frenzy.

The lord treasurer Burleigh, for his consummate abilities as a statesman, was reckoned the first name of his age : and is still pointed out as a pattern, which we rather wish, than expect, to see fully copied by his successors in power. As he had strong natural parts, and was of unwearied application to business, his experience must have been universal and unequalled ; for he was at the head of the government almost forty years. He seems, in particular, to have been eminently possessed of that intrepidity of head, that civil courage, so necessary in a great minister : and without which no minister will ever do any thing truly noble, or of lasting utility to mankind. Inviolably attached to his mistress, he served her with equal fidelity and success : and had the singular felicity to promote the good of his country by the same arts that he employed to gratify the inclinations of his sovereign.

The glory of this princess will receive a new lustre by comparing the state of England with that of almost all other nations in Europe, at the same time. It must have been no common addition to the tranquillity and happiness of our ancestors, that they enjoyed both uninterrupted, for such a length of years ; while Scotland and France, Spain and Holland, were torn with continual divisions, and bleeding by the wounds of foreign and domestic wars. Her's too was the age of heroes both in arts and arms. Great captains, able statesmen, writers of the highest order arose, and under her influence flourished together. Thus Bacon had all the incentives that could kindle him up to a generous ambition, and quicken his emulation in the pursuit of knowledge and honest fame. And indeed his letters remain a proof, that if he courted the proper opportunities of raising his name, he lost none that might improve and enlarge his mind. As the lord treasurer had married his aunt, we find him frequent in his applications to that minister for some place of credit and service in the state. He professes too, that his views on this head are as moderate, as his aims another way are ambitious and vast ; for that he hath taken all philosophy for his province. My lord Burleigh interested himself so far on his behalf as to procure for him, against violent opposition, the office of register to the Star-chamber, worth about 1600*l.* a year : but it was only in reversion, and did not fall to him till near twenty years afterwards. Neither did he obtain any other preferment all this reign : though his winning address, his eloquence, his large and systematical learning had raised him to the admiration of the greatest men at court. He was particularly esteemed and patronized by Robert Devereux, the famous and unfortunate earl of Essex ; to whom he attached himself in his younger years, and by whose interest in the queen he flattered himself with the prospect of bettering his condition. Elizabeth herself shewed him several marks of distinction, admitted him

him often to her presence, and even consulted him on the state of her affairs: as her ministers sometimes made use of his pen in the vindication of her government. And yet, notwithstanding these fair appearances, he met with no preferment from that queen answerable to the idea we have of his merit, or her discernment in the distribution of favors. This deserves some explanation; as it will discover to us the true genius of those ministers, who, pretending to merit themselves, are jealous of it in all other men: who are equally poor-spirited and aspiring.

The whole court was at this time rent into factions, headed on one part by the earl of Essex; on the other by the Cecils, father and son. Essex was then in all the flower of his youth, and remarkable for the gracefulness of his person. In his nature brave, ambitious, popular: and what is uncommon, at once the favourite of the sovereign and of the nation. Fond of military glory; liberal to profusion; devoted intirely to his friends, and keeping no measures with his enemies; of competent learning himself, and a signal benefactor to learned men: One quality he had, which distinguishes him eminently from such as are personally beloved by princes: in the height of his favor he received the admonitions, the remonstrances of his friends with all gentleness; and was ever most patient of the truth. But then he wanted those arts which are most necessary in a courtier; and are indeed the only qualities which the rabble of courtiers value themselves upon; circumspection, cunning, affectation of secrecy, with a servile obsequiousness to the humours of their superiors, and a mean but anxious attention to their own interest, whether at the expence of their patrons, or of their country. A different turn of mind gave the earl's enemies great advantages against him. They failed not to represent to the queen, on several occasions, that this young lord, not satisfied with the distinction of being her favourite, pretended to be her master; and prescribed to her judgment on affairs of state, with a haughtiness ill becoming the distance betwixt a sovereign and the creature of her bounty. Such insinuations, as they were partly true, could not fail of making an impression on Elizabeth, who was naturally high-spirited, and infinitely jealous of her authority. Though she had a particular fondness for the earl, she took occasion every now and then to mortify his pride, by refusing to advance those friends of his whom he recommended for preferment. After his return from the expedition to Cadiz, in which he had behaved himself with much gallantry, she raised his enemy, Sir Robert Cecil, to be secretary of state; tho' he had earnestly solicited that post for another. He had often applied to her in behalf of Bacon, and asked for him, with all the warmth of friendship, the place of Solicitor General, but had been always refused. Cecil, who mortally hated Essex, and had entertained a secret jealousy of Bacon, on account of his superior talents, represented the latter to the queen as a man of mere speculation; as one wholly given up to philosophical inquiries, new indeed and amusing, but fanciful and unsolid: and therefore more likely to distract her affairs, than to serve her usefully and with proper judgment. Bacon however was this man's cousin-german; his father and the lord Burleigh having married two sisters: but ambition knows neither merit nor relation. This unworthy treatment from so near a kinsman carried Bacon into very free expostulations on his courtly artifices, as he endeavoured in secret to crush the man whom yet he pretended openly to serve: and these repeated disappointments sunk so deep into his spirit, that he was several times on the point of retiring for ever, and even of hiding his grief and resentment in some foreign country. Essex, who could but ill brook the mortification of a denial,

finding

finding himself unable to serve his friend in a public way, would needs make up the loss to him out of his own private fortune : and if we may believe Bushel, he bestowed upon him about this time Twickenham-Park and its garden of Paradise. Whether it was that or some other of his lands, the donation was so very considerable, that Bacon, as himself acknowledges in his Apology, sold it afterwards, even at an under price, for no less than eighteen hundred pounds. A bounty so noble, accompanied too, as we know it was, with all those agreeable distinctions that to a mind, delicately sensible, are more obliging than the bounty itself, must kindle in the breast of a good man the most ardent sentiments of gratitude, and create an inviolable attachment to such a benefactor. What then are we to think of Bacon, when we find him, after this nobleman's unhappy fate, publishing to all England a Declaration of the treasons of Robert earl of Essex? This behaviour drew upon him a heavy and general hatred at that time ; which was not extinguished even by his death, but continues still in the writings of more than one historian, an imputation on his memory. As this transaction is of importance to his moral character, I will lay it before the reader as impartially as I can.

Elizabeth had raised that young lord, through a series of honors, to be earl Marshal of England : and was every day giving him new proofs of a particular and uncommon esteem. This only served to exasperate his enemies. They were powerful, and closely united. But as they durst not attack him openly, they had recourse to dark and surer arts of vengeance ; against which his openness of temper, unsuspecting and improvident, was no wise guarded. In truth, his imperious humour, which he could seldom disguise, aided their designs ; for it often broke forth into downright abuse and scorn of those who thwarted his projects, or dissented from his opinions : and he once, in some dispute with the Queen herself, turned his back abruptly upon her with all the marks of disrespect and contempt. Provoked at this insolence, Elizabeth forgetting her sex, and the dignity of her character, struck the earl a box on the ear : which he on his part, with a meanness of passion yet less excuseable in a man, resented so highly as to lay his hand on his sword, against a woman and his sovereign. No subsequent favours could wear this imaginary affront out of his memory ; though she pardoned him the insult that occasioned it, and sent him shortly after into Ireland, as her vicegerent, with a commission almost unlimited. His conduct there has not escaped the censure of historians, who have remarked severely on the unjustifiable treaty he made with the arch-rebel Tyrone, on the private conference they held together, and on his precipitate return to England, against the queen's express orders. This last ill step he was betrayed into, if we may believe Osborn, by an artifice of Cecil : who first inflamed Elizabeth's suspicions of the earl, and then stopped all vessels that were to sail for Ireland, except one which he ordered thither on purpose with a feigned report of her death. Fatally deceived by this intelligence, Essex sailed away in a hurry for England, attended only by a few of his friends. The queen received him without any emotion either of anger or affection, and having confined him to his own house, ordered his conduct to be examined in the Star-Chamber. At this usage of him, however gracious and moderate, the people, whose idol he was, loudly exclaimed : and their unseasonable partiality, represented by his adversaries as of dangerous tendency to the state, kindled anew the queen's indignation against him. Thus that popularity he had so eagerly courted, and so much depended upon, served now only to hasten forward his destruction. He was sentenced by the council to be re-

removed

moved from his place at that board; to be suspended from his offices of earl Marshal and Master of the ordnance, and to be imprisoned during the queen's pleasure. Having humbled him thus far, she stopped short, forbidding his sentence to be entered on record, and still continuing him Master of the horse. She even gave him the full enjoyment of his liberty, upon his expressing a perfect resignation to her pleasure; but withal advised him to be his own keeper. His seeming repentance was of short duration; for upon the queen's refusal to grant him the farm of sweet wines, which he had very imprudently petitioned for, he returned out of the country, and again abandoned himself to all the impetuosity of his temper; or rather to the pernicious suggestions of his followers. Indeed the presumption that naturally grows out of successful ambition, and the interested counsels of those whose fortunes were involved with his, seem to have intirely turned his head: for his actions henceforward were the genuine effects of frenzy and despair. In conjunction with his friends, of several conditions, he meditated no less an attempt than to seize on the palace, to make himself master of the queen's person, and to banish from about her all those whom he reputed his enemies. Never was conspiracy so ill laid, or conducted with so little probability of success. The court was presently alarmed, his house invested, himself and his friends made prisoners, without any resistance on his part; for though he was embarked in a kind of rebellion, he knew not how to be a rebel. The particulars of his trial are foreign to my purpose. It was managed against him by Sir Edward Coke, the attorney general, and by Bacon as one of the queen's council. It ought not to be forgot that the former treated this unfortunate nobleman with a strain of petulant dulness and scurrility that makes us contemn his talent as a pleader, while we abhor the purpose to which he made it subservient. Bacon was moderate and decent. The crime was proved by a cloud of witnesses: and the unanimous suffrage of his peers found him guilty. After his sentence he appeared wholly indifferent to life or death: though the queen seemed still irresolute, or rather inclining to save him. He died with the tenderness of a penitent, and the firmness of a hero: though the marshal de Biron jested on his deportment in that last scene of life, as suiting rather a monk than a soldier.

State Trials,
Vol. I. p.
205.

The untimely fate of this nobleman, who died on a scaffold in the prime and vigor of his years, excited universal pity, and was murmured against by all conditions of people. Their reflections on the prevailing party at court, even on the queen herself, were so bold and injurious, that the administration thought it necessary to vindicate their conduct in a public appeal to the people. This task was assigned to Bacon, even then in high esteem for his excellencies as a writer. Some say it was by his enemies insidiously imposed on him, to divert the national resentment from themselves upon a particular person, who was known to have lived in friendship with Essex, and whom they intended to ruin in the public esteem. If such was their intention, they succeeded but too well in it. Never man incurred more universal or more lasting censure than Bacon by this writing. He was every where traduced as one who endeavoured to murder the good name of his benefactor, after the ministry had destroyed his person: his life was even threatened; and he went in daily hazard of assassination. This obliged him to publish, in his own defence, the Apology we find among his writings. It is long and elaborate; but not, perhaps, in every part satisfactory. Let us believe him on his own testimony, that he had never done that nobleman any ill offices with the queen; though she her-

V. A declarat.
of the trea-
sons of Rob.
earl of Essex.
Vol II.
p. 79.

Apology,
Vol. II. p. 124.

self had, it seems, insinuated the contrary: that on the other hand he had always, during the time of their intimacy, given him advice no less useful than sincere; that he had wished, nay endeavoured the earl's preservation even at last, purely from affection to him, without any regard to his own interest in that endeavour: let all this be allowed; some blemish will still remain on his character.

Essex deserved the fate he underwent: but he had paid his debt to justice: and the commonwealth had now nothing to fear from any of his party. The declaration above mentioned could therefore be intended, only to still the present clamors of the multitude; and though the matter of it might be true, Bacon was not the man who should have published those truths. He had been long and highly indebted to the earl's friendship, almost beyond the example even of that age. In another man this proceeding might not have been blameable: in him it cannot be excused. In the next reign Sir Henry Yelverton ventured on the displeasure both of the king and his minion, rather than do the ministry of his office, by pleading against the earl of Somerset, who had made him solicitor general. Had Bacon refused that invidious part, there were others, among the herd of aspiring and officious lawyers, ready enough to have performed it: and his very enemies must have thought more advantageously of him for declining a task, in itself of no essential importance to the state, and in him unjust to friendship, obligation, gratitude, the most sacred regards among men.

Anl. Coqui.
p. 126.

Osborn,
p. 450.
* He is the
first author
who men-
tions the sto-
ry of the ring.
1603.

Elizabeth survived her favorite about a year: and, if we may credit Osborn, grief and remorse for his fate accompanied her to the grave*. She died the twenty-fourth of March 1603, in the fulness of days and honor. Her reign had been long and triumphant: and she had through the whole course of it preserved, what she so justly merited, the love and veneration of her people; the truest glory, the rarest felicity of a sovereign! She was succeeded by James the sixth of Scotland, under whom Bacon ascended, by several steps, to the highest dignity of the law.

This prince, the most unwarlike that ever lived, was born in the midst of civil commotions; at a time when his whole kingdom was torn into factions, betwixt the party who had espoused the interests of his mother, and those who had declared for him. After he had taken the administration into his own hands, he was hardly ever his own master; suffering himself to be led implicitly by the cabal in whose power he then happened to be. The moment he thought himself at liberty from either, like a boy escaped from under the eye of a rigid preceptor, he forgot all his uneasinesses, and abandoned himself to his favorite amusements of hawking and hunting, as if his kingdom had been in the profoundest tranquillity. He grew up in an unaccountable fondness for favorites. The first, who took deep root with him, was likewise the worst; not only encouraging him in a total inapplication to business, but tincturing his youth with the poison of all debauchery. The name of this man was Stuart, afterwards earl of Arran; one who had great and dangerous vices, without a single virtue, private or public, to atone for them: an open scoffer at the obligations of morality, insolent, rapacious, sanguinary, hated by, and hating, all good men. The honest part of the nobility often remonstrated against the credit and pernicious influence of this minion: James acknowledged the justice of their remonstrances; banished him several times from court; and several times received him into new favour. He was at length shot by a private hand in revenge for the death of the earl of Morton, to which he had basely contributed.

Melvil's
Diem. p. 131.

Melvil,
p. 200.

James hated the church of Scotland; and confirmed its authority. He declared P. 137. the attempt of those lords, who had rescued him out of the hands of Arran and Lenox, to be just and serviceable: he afterwards banished them, and would have P. 139. confiscated their estates, on that very account. When they had made themselves masters of his person a second time, he pronounced them all traitors; and pardoned them. P. 169.

Elizabeth, who knew his genius perfectly, sent Mr. Wotton on an embassy to him in 1585. Her intention was to divert him from a marriage with the princess of Denmark, and to give his counsels what other turn her interests might require. The ambassador, a man of address and intrigue, had, by long habitude, learnt to personate all characters, and to assume, with an ease that seemed altogether unaffected, whatever shape might serve most effectually the purposes of his superiors. P. 161. At the age of twenty-one he had been employed to sound the intentions of the court of France: and had well nigh duped the famous constable de Montmorency, a minister grown gray in the observation of human fallhood and artifice. To his natural talent he had now added the experience of thirty years more. By accompanying king James in his sports; by falling in frankly, and as it were naturally, with all his passions; by making a jest of business; by entertaining him pleasantly with an account of foreign fashions and follies; this man gained an absolute ascendant not only over his understanding, but over his humour. His most faithful subjects, who had served him longest and best, who had even warned him against the subtilities of this stranger, he received with approbation or dislike just as Wotton inspired him. He was even brought by him to be seriously persuaded that the P. 164. king of Denmark was descended from a race of merchants: and that an alliance with his daughter was therefore infinitely beneath a king of Scotland's dignity.

Such was the prince who now mounted that throne, which Elizabeth had filled with so great capacity and reputation. The union of the two crowns in the person of one sovereign, was extremely dreaded by foreigners, and in particular by Henry An. 16-3. the fourth of France. The accession of a new kingdom to the native force of England, which even alone had been long formidable on the continent; the alliance of James with the most potent monarch of the North; his relation to the house of Lorraine, which had lately embroiled all France, rendered such fears very probable. But his conduct dissipated them for ever: and all Europe quickly saw, that no people but his own had any thing to apprehend from his power. At his arrival in England, he bestowed titles and honors with so wild a profusion, that there hardly remained any other mark of distinction but that of having escaped them. The public stood amazed: and patquinades were openly affixed, undertaking to assist weaker memories to a competent knowledge of the nobility. Wilson, p. 7. Sir Francis Bacon, who had been early in his homage, and application for favor, to the new sovereign, was knighted by him in person: and has left us the following picture of him, strongly touched in its most obvious features. "His speech, Bacon, Vol. III. Letter LXXIII. says he, is swift and curfory; and in the full dialect of his country: in matters of business, short; in general discourse, large. He affecteth popularity, by gracing such as he hath heard to be popular; not by any fashions of his own. He is thought somewhat general in his favors; and his easiness of access is rather because he is much abroad and in a croud, than that he giveth easy audience. He hatteneth to a mixture of both kingdoms and occasions faster, perhaps, than policy will well bear."

An. 1605.

Tennison's
Baconiana,
p. 25.

P. 27.

Stephens's
Collections,
p. ix.State Trials,
Vol. I. p.
287, &c.

In 1605, Sir Francis Bacon recommended himself to the king's particular notice, as well as to the general esteem of his cotemporaries, by publishing a work he had long meditated; *The Progress and Advancement of Learning*. The great aim of this treatise, no less original in the design than happy in the execution, was to survey accurately the whole state and extent of the intellectual world; what parts of it had been unsuccessfully cultivated; what lay still neglected, or unknown; and by what methods these might be discovered, and those improved to the farther advantage of society and human nature. By exposing the errors and imperfections of our knowledge, he led mankind into the only right way of supplying the one, and reforming the other: he taught them to know their wants. He even went farther, and himself pointed out to them the general methods of correction and improvement in the whole circle of arts and sciences. This work he first published in English: but to render it of more extensive use, he recommended a translation of it into Latin to Dr. Playfer of Cambridge. Playfer, with the scrupulous accuracy of a grammarian, was more attentive to fashion his style to purity and roundness of periods, made out of the phraseology he had gleaned from classic writers, than to render his author's meaning in clear and masculine language. After the sight of a specimen or two, Sir Francis did not encourage him to proceed in it. He himself, after his retirement, very much enlarged and corrected the original, and with the assistance of some friends, turned the whole into Latin. This is the edition of 1623; and stands as the first part to his great *Instauration of the Sciences*.

I have already observed that Cecil, now earl of Salisbury, opposed the progress of our author's fortune under Elizabeth: and he seems to have observed the same conduct towards him in the present reign, till he had fixed himself in the king's confidence so firmly as to be above all fear of a rival. Besides him, Sir Francis Bacon found a violent and lasting enemy in a man of his own profession, Sir Edward Coke; who, with great parts, had many and signal failings. The quarrel betwixt them seems to have been personal: and it lasted to the end of their lives. Coke was jealous of Bacon's reputation in many parts of knowledge: by whom, again, he was envied for the high reputation he had acquired in one; each aiming to be admired, particularly, for that in which the other excelled. This affectation in two extraordinary men has something in it very mean, and is not uncommon. The former was the greatest lawyer of his time; but could be nothing more. If the latter was not so, we can ascribe it only to his aiming at a more exalted character. The universality of his genius could not be confined within one inferior province of learning. If learning thus divided is not so proper to raise a singular name in one way, it serves to enlarge the understanding on every side, and to enlighten it in all its views. As the name of Sir Edward Coke will occur oftner than once in this history, and as he stood in particular competition to Bacon, I beg leave to dwell a little longer on his character. In his pleadings he was apt to insult over misery. Of this we have a detestable instance in his behaviour to Sir Walter Raleigh. He inveighed against that brave man on his trial with all the bitterness of cruelty, and in a style of such abandoned railing as bordered almost on fury: I wish I could not add, that this bitterness, this intemperance of tongue, seem to be the genuine effusions of his heart*. He conversed, it seems, more

* The offices of Attorney and Solicitor General have been rocks upon which many aspiring lawyers have made shipwreck of their virtue and human nature. Some of those gentlemen have acted at the bar

With

with books than men; and among the latter, with those only to whom he could dictate and give the law. The consequence of which was, that his conversation had all the air of a lecture; and that he retailed for new, a hundred stories that were either stale or trivial. He affected rallery, which was by no means his talent. His wit was often ill aimed, as it was always indelicate and vulgar; the rough horse-play of a pedant. Though he had accumulated immense wealth, in his profession and by several rich marriages, he was of a sordid avarice; a severe master, a griping landlord; in prosperity insolent, dejected and fawning in adversity: the same poorness of spirit influencing his behaviour in both conditions. One example of this may serve in place of several: After his disgrace, he submissively courted Buckingham's brother to a match with his daughter: in the height of his favor, he had rejected the same proposal with scorn. His profound skill in the common law has been universally allowed: and to this we cannot have a more unquestionable witness than Sir Francis Bacon; one every way fit to judge, and an enemy. He was raised to be Chief Justice of the Common Pleas in 1606, and of the King's Bench in 1613. On the bench he was above corruption: and had this saying frequently in his mouth, that a judge should neither give nor take a bribe. In the case of Peacham, in the business of Commendams, he behaved himself with the honesty and firmness of one who knew that a judge ought neither to be flattered nor menaced out of his integrity. Towards the latter part of his life, he struck in with the country party in parliament, and stood in the breach against the arbitrary measures of James and Charles. He died in the reign of the latter, aged 88 years.

Vol. II:
p. 512.

Bacon, Vol.
III. Letter
cxlv.

At length Sir Francis Bacon obtained the place he had so long expected: and in 1607 was declared Solicitor General. This preferment was the effect of many letters and much instance on his part, to the earl of Salisbury, the lord chancellor Egerton, and the king himself. Neither do I find that he was ever promoted to any post without repeated and earnest application to ministers and favorites: a reflection that may serve at once to mortify, and instruct an ambitious man of parts.

An. 1607.

James had, from the beginning of his reign, passionately desired an union of Scotland and England: but his unreasonable partiality to the former, reckoning it as an equal half of the island, rendered the design abortive. Though Sir Francis Bacon labored this argument with all the arts of wit and reason, his eloquence, powerful as it was, had no effect on the house of commons. The parliament even shewed itself averse to this union, in proportion as the court appeared zealous for it. The new sovereign's conduct had alarmed them. They saw, that, with a strong disposition to be profuse, he was absolutely in the power of favorites; and that some of the least valuable among his subjects were most in his favor. They saw farther, that he began already to propagate maxims of government destructive to liberty, and inconsistent with the whole tenor of the constitution. These things filled observing men with apprehensions for the future, which unhappily were but too well founded. The whole sum of his politics, both now and afterwards, was to distaste and alienate his subjects at home; to dishonor both himself and them

as if they thought themselves, by the duty of their places, absolved from all the obligations of truth, honor, and decency. But their names are upon record, and will be transmitted to after ages with those characters of reproach and abhorrence that are due to the worst sort of murderers; those that murder under the sanction of justice.

abroad.

abroad. It was a reign of embassies and negotiations, alike fruitless and expensive: a reign of favorites and proclamations, of idle amusements and arbitrary impositions. It was besides the great era of flattery. The ancient national simplicity of manners which ever accompanies magnanimity, and manly freedom of speech the noble effect of both, were now in a great measure lost; altered and effeminated into prostitute adulation and servile homage. This was become the fashionable language among the clergy as well as laity, and James heard himself daily addressed to, by the titles of sacred and divine: titles which discover the meanness rather than the dignity of human nature; and which, applied to him, were glaringly ridiculous. He had not one princely quality. The arts of governing a kingdom in peace he either did not, or would not understand: and his horror of war was constitutional and unconquerable. It may therefore seem unaccountable that a king of this temper should treat his parliaments with more haughtiness than any of his predecessors had ever done. But he had been told that England was neither to be exhausted nor provoked: and his actions shewed that he believed so, according to the letter. The truth is, that as pusillanimity will talk bigger on some occasions than true valor on any; he meant to make himself formidable to his people, that they might not discover how much he was afraid of them.

Though he did not succeed in the union of the kingdoms, he found his judges, in an affair of a similar kind, more complaisant than the great council of the nation had been: I mean the naturalization of all Scotsmen born since his accession to the throne of England. This was adjudged by Sir Edward Coke in the great case of Calvin; as it had been argued at large before all the judges by Sir Francis Bacon. The affair is now no longer of importance to either kingdom: but one assertion of our author, on that occasion, ought not to be forgot. He roundly affirms, that monarchies do not subsist like other governments, by a precedent law; and that submission to them is grounded upon nature.

Case of the
Peñonati,
Vol. II.
P. 514.

An. 1610.

In 1610 he published another treatise, intitled, *Of the Wisdom of the Ancients*. This work bears the same stamp of an original and inventive genius with his other performances. Resolving not to tread in the steps of those who had gone before him, men, according to his own expression, not learned beyond certain common places; he strikes out a new tract for himself, and enters into the most secret recesses of this wild and shadowy region; so as to appear new on a known and beaten subject. Upon the whole, if we cannot bring ourselves readily to believe that there is all the physical, moral, and political meaning veiled under those fables of antiquity, which he has discovered in them, we must own that it required no common penetration to be mistaken with so great an appearance of probability on his side. Though it still remains doubtful whether the ancients were so knowing as he attempts to shew they were, the variety and depth of his own knowledge are, in that very attempt, unquestionable.

An. 1613.

Hobart being advanced to the place of chief justice of the Common Pleas, Sir Francis Bacon succeeded him as Attorney General in 1613; about three months after the death of his kinsman and enemy the lord treasurer Salisbury: a minister fertile in expedients for supplying his master's wants, and well acquainted with the temper of England: a man of dexterity, craft, and intrigue, rather than a great man. The office that Bacon now entered upon was of exorbitant profit for that age. He owns, in one of his letters to the king, that it was worth to him 6000*l.* a year; and his employment of register to the Star-chamber, which I mentioned

above,

above, now brought him in 1600. a year more. By what fatality was it that so extraordinary a man did not add to his other virtues that of a reasonable oeconomy? Had he done so, it had preserved him from one transcendent fault: and the other blemishes on his moral name had been lost in the brightness of his intellectual qualities. But he was remarkably subject to the same weakness that so much dishonored his master. His dependents had him wholly in their power, and squandered his fortune away, shamefully and without measure. In a private family, this begot disorder, necessity, corruption: and all England beheld, from the same management in administering the public, the same effects; only more felt and fatal, as they were universal.

It was not however till the year 1611 that James abandoned himself to one sole favorite. About that time was brought to court Robert Car a Scotsman, then in the first bloom of his youth, and of distinguished beauty; by which he at once engaged the king's attention, and in a little while ingrossed all his affection. As he was wholly illiterate, James himself would needs be his preceptor: and it must have been a scene altogether new and ridiculous, to see the sovereign of three kingdoms daily instructing, in the first elements of grammar, the man who was shortly after to govern those kingdoms. In his bounty to this stripling, he observed no other measure but that of his passion, which was as extreme as it seemed unaccountable. Car, in four or five years of favor, from a mere adventurer was raised to be earl of Somerset: and amassed an enormous estate of nineteen thousand pounds a year in land; besides plate, money, and jewels to the amount of two hundred thousand pounds more. And yet he deserves a place in history, only for his scandalous amour with the countess of Essex; for procuring her to be divorced from her husband, and for combining with her to poison his friend, who had dissuaded him from that ill step. The fate of Sir Thomas Overbury; the dark and dreadful scene of guilt that ushered it in; and the part those two great criminals acted in that tragedy, are recounted by all historians. Though the horrible transaction lay yet wrapt up in darkness, and was not discovered till two years after, remorse and the upbraidings of conscience pursued Somerset every where. Through all the splendor of fortune and favor, the trouble of his mind was visible in his countenance, in his whole deportment. He grew by degrees to neglect his person and dress; his sprightliness of temper left him: and his conversation, from being gay and entertaining, was become cold, serious, and gloomy. This alteration in him was quickly followed by a change in the king's affections; which had no deeper or more solid foundation than these external and slight accomplishments. The courtiers, whom envy and interest render extremely sharp-sighted, quickly discovered this change, and improved it. Luckily for their designs, there now appeared at court another young man, fitted by nature to draw the curiosity of James, and to supplant the earl of Somerset in his favor. This was the famous George Villiers, the younger son of a good family in Leicestershire; afterwards duke of Buckingham. As the surprising elevation of this youth had a particular influence on the future fortunes, and even on the fall, of Sir Francis Bacon, his character will deserve a place at large in this history.

Truth
brought to
light, p. 89.

An. 1613.

Coke.

An. 1615.

Wilson,
p. 79.

His mother, who could not give him a fortune, bestowed on him such an education as might enable him to acquire one, especially in a court like this. The advantages he owed to nature, such as a handsome face, a body exactly proportioned, an ease and gracefulness in his motions, she had taken care to improve with

that elegance of manners, that artificial politeness, and skill of excelling in trifles, which are the last finishings of a French education. In a word, he was just returned from his travels, and accomplished in all those agreeable and frivolous arts, which were a certain recommendation to the favor of James. The earls of Pembroke and Bedford, with some other lords who were secret enemies to Somerset, after dressing out this youth with a studied exactness, placed him to advantage in the king's eye, at a comedy. That monarch was immediately smitten with his face, air, and appearance; which yet he endeavoured for some time to conceal. Nay he carried this dissimulation so far, that he would needs be solicited by the queen to receive Villiers into his bosom: imagining the world would be thus deceived into a belief that he rather followed her advice, in this matter, than his own inclination. Such was the kingcraft on which he so highly valued himself. The queen was not easily prevailed with to take this step; of which she foresaw all the consequences. At last, however, she yielded to the archbishop's importunity; telling him at the same time, that those who labored most to promote Villiers might be the first to feel his ingratitude. Upon this he was immediately knighted, and declared gentleman of the bed-chamber: the herd of courtiers rivalling each other in their offers of friendship and service to him. Some of them even descended to undertake his quarrels, and brave such as were still in Somerset's interest.

Rushworth of
Abbot, ch. 1.

Walsley,
p. 84.

Bacon, Vol.
II. p. 257.

Among those who courted the rising favorite, none was more zealous than Sir Francis Bacon; as none was able to serve him more nobly, or more usefully. Villiers had at this time sense enough to feel his inexperience in business, and therefore had recourse to our author for his advice: which he gave him fully in a letter, still extant among his works; written with so superior a judgment and so much honest freedom, that it does honour equally to his head and heart. He has ranged his thoughts under seven or eight principal topics of consideration, and entered into an accurate detail of what a minister ought to know and practise. In another letter to him, he has these remarkable words: "It is now time that you should refer your actions chiefly to the good of your sovereign, and your country. It is the life of a beast always to eat, and never to exercise. In this dedication of yourself to the public, I recommend to you principally that which I think was never done since I was born, and which, not done, hath bred almost a wilderness and solitude in the king's service: which is, that you countenance and encourage, and advance able and virtuous men in all kinds, degrees, and professions." This excellent advice the favorite received with thankfulness; and neglected.

An. 1616.

Walsley,
p. 81.

Though the king's passion was now wholly diverted upon a new object, he still affected to treat Somerset with kindness and distinction; even after the discovery of his being an accomplice in poisoning Sir Thomas Overbury had rendered this dissimulation not only mean but criminal. Yet he continued it to the last, embracing with fondness the man whom he had secretly ordered to be arrested: and intreating him to hasten his return, when he believed he should never see him more. In such trifles he was fond to exert his talent of political management. The earl's unhappy passion for the young countess of Essex was the source of all his misfortunes, and drew after it the most terrible consequences: ending, as I have already observed, in the murder of his friend; in the ruin of himself, and of her to whom he had treacherously sacrificed that friend. The whole affair is displayed at full length in our author's charges against those two prime agents in that

that infernal conspiracy. They were both found guilty, sentenced to die, and afterwards pardoned by the king, notwithstanding his solemn imprecations to the contrary, on himself and his posterity.

May 24. 25.
State trials,
Vol. I. p.
334. 343.

Certain historians have remarked, that there was something, in the behaviour of Somerset before his trial, singular and mysterious; and that his master likewise seemed to labor under a secret anxiety of mind, equally surprising. The earl, they pretend, said aloud in the Tower, that the king durst not bring him to a trial. Others reject this account as a downright calumny, invented merely to fix a black and cruel imputation on that prince's memory: or affirm at least that it was founded only in popular rumor and malicious conjecture. But that there was more in it than conjecture, may be proved by undoubted authority; by some original letters of Sir Francis Bacon, then Attorney General, and particularly employed in this very affair. Those letters have, I think, escaped the observation of all our writers: I shall therefore quote from them such passages as may serve to throw some light on this dark transaction, though not enough perhaps to discover the darker motives that influenced the king's and the earl's behaviour in it.

James himself selected certain persons to examine Somerset with all secrecy, and marked out to them the particular articles on which they were to interrogate him. They had withal orders to work upon his obstinate temper by every method of persuasion and terror: to give him now hopes of the king's compassion and mercy; and now to assure him that the evidence was full to convict him, so as there needed neither confession nor supply of examination. Bacon, who was one of them, adds that they found his deportment sober and modest, different apparently from other times. In another letter he has these remarkable words: "That the same little charm which may be secretly infused into Somerset's ear some hours before his trial, was excellently well thought of by his Majesty: only I could wish it a little enlarged; for if it be no more but to spare his blood, he hath a kind of proud humour that may over-work the medicine." All this was to be done with much caution and privacy; for the very serjeants, appointed to manage part of the trial, were not yet in the secret how the king would have it carried on: and therefore Bacon, to cover from them what he knew of the matter, desired that some general heads of direction might be sent to them all. From hence it appears that James shewed an extreme sollicitude about the earl's behaviour, and the event of this affair. To what can it be attributed? His affection for Somerset was extinguished: and he lay under the strongest obligations of public honor and justice not to screen, from the censure of the law, a man whose guilt was of the most crying enormity. The earl's standing mute, or denying that guilt, especially as the proofs of it were strong and pregnant, could bring no possible imputation on his name. Why then all this dark practice? all these artifices of the persons who examined him, only to make him submit to be tried, and to keep him in due temper during his trial? There is still more. James ordered his Attorney General to forecast and put in writing every possible case with regard to the trial, and accompany them with his own opinion on each; that no surprise might happen, but that things duly foreseen might have their directions and remedies in readiness. Accordingly Sir Francis Bacon sent a writing of that purport, on which there are several observations in the king's own hand. I will only quote one passage from it: "All these points of mercy and favour to Somerset are to be understood with this limitation; if he do not, by his contemptuous and insolent carriage at the bar, make himself in-

Bacon, Vol.
III. Letter
cxxxvi.

Vol III. Letter
cxxxix.

Letter
cxxxviii.

Court of K.
James I.
p. 105.

Cabala,
P. 264.
edit. 1691.

“capable and unworthy of them.” The king’s remark in the margin is in these words: “That danger is well to be foreseen, lest he upon the one part commit unpardonable errors; and I on the other part seem to punish him in the spirit of revenge.” Somerfet was not to be tried for any offence against the king; but for the barbarous murder of a private man and his friend. What then means the contemptuous carriage that is so much apprehended? What are the unpardonable errors it may lead him to commit? If he reflected on a master, to whom he had been so much obliged, only for giving him up to a fair and equal tryal, to a tryal by many circumstances rendered inevitable; that would, in the opinion of all mankind, only aggravate his crime, and furnish a new motive to that master for letting the sentence of justice pass upon him in all its rigor. After these particulars, I may venture to mention a fact related by Sir Antony Weldon, who says, that when the lieutenant of the Tower, Sir George More, came and told the earl he must prepare for his tryal on the morrow, he absolutely refused to appear unless they dragged him to it by violence; adding, that the king durst not bring him to tryal. Astonished at such rash and dangerous expressions, the lieutenant, though it was then midnight, went and demanded an audience of the king, to inform him of what had passed. James, upon hearing his story, burst into a passion of tears, and intreated More to use his utmost skill upon his prisoner and soothe him, by whatever means, into proper temper and submission. This More undertook to do, and by a stratagem effected it. Weldon affirms he had this story from the lieutenant’s own mouth: and tho’ he is a partial writer, and indulges himself in a humor of licentious scandal, the authentic vouchers I have produced, render his anecdote not improbable. Other circumstances, mentioned by those who have professedly written of this reign, I therefore omit, and shall only add, that there is in the Cabala a letter to king James from Somerfet after his condemnation, of a very peculiar turn. He desires that his estate may be continued to him intire, in a style rather of expostulation and demand than of humility and supplication: and through the affected obscurity of some expressions, one may discover, that there was an important secret in his keeping, of which the king dreaded a discovery. The issue was, that James continued to him a pension of four thousand pounds a year, as long as he lived.

Prince Henry died in the year 1612; universally lamented. His excellent qualities had endeared him to the love and expectations of all England. Germanicus was not more the darling of the Roman people: and the untimely end of both those princes was universally believed to have been procured by poison. He had expressed, on all occasions, an abhorrence of minions, and an utter contempt of Somerfet: he had even declared a firm resolution, to humble both him and the family into which he was allied, if ever he came to reign. Whether the unaccountable transaction I have been relating has any reference to the death of this amiable prince, or whether it does not point rather to an affair of a very different nature, the reader is left to determine.

Villiers, now without a rival in the king’s affections, was every day receiving new proofs of his bounty; at the same time that he more than shared with him the exercise of his authority. In the course of a few years he was made Gentleman of the bed-chamber, Master of the horse, Knight of the garter, earl, marquis and duke of Buckingham, Chief justice in eyre of all the forests, and lord High Admiral of England. One of those prodigies of fortune, who rise now and then upon

on the world, as the vulgar imagine of comets, at once to astonish and scourge it: a signal instance of the wantonness of sovereign power, and how far it may insult human kind in exalting and adorning what it should neglect or contemn. He drew up after him an obscure kindred, numerous and indigent, bestowed on them places of trust and profit, married them into the noblest families, and graced them all with dignities, which were to be supported at the common expence of a whole people; to whom if any one of them was merely harmless, it was his utmost praise. After having read, not only what the enemies of this favorite have said against him, but all that his partizans have alledged on his behalf, I do not find, during the whole time of his influence under two reigns, an influence supreme and unbounded, that he ever projected one scheme for the benefit of his country, or ever executed one undertaking to its honor; the only great criterion by which we ought to judge those men that administer the public. The breaking off the Spanish match at last was solely a sacrifice to his own vanity and resentment. On the caprice of this youth, however, the first and ablest men in the kingdom were to depend entirely, for their access at court, for their advancement, for any opportunity of being able to serve their country and their sovereign. Sir Francis Bacon was sensible of this, and courted his friendship with a particular application. But he must have felt all the fervitude and disagreeableness of his situation, when, to be well with the king, he found it necessary to turn steward to the estate newly bestowed on this young man; to study the ways and means of improving his lands, and of rendering his places most profitable to him. It is true he found his account in this service; as it proved the surest means of his own preferment: but, to a great and worthy mind, preferment so meanly obtained is disgrace, only a little disguised and gilded over.

Bacon, Vol.
III. Letter
CLXVI.

The lord chancellor Egerton, broken with age and infirmities, had often petitioned the king to be dismissed from his laborious employment. He was now seventy seven years old, and had presided in the court of chancery from the year 1596, with an unblemished reputation as a judge in private cases; but his public conduct had been always framed to the directions of the court with an obsequiousness, of dangerous example in one, who held so great and important a trust. To this high dignity Sir Francis Bacon privately aspired: and as it was the utmost scope of his ambition, he had aimed all his endeavours in the king's service to merit it at his hands. He took care, at the same time, to strengthen his pretensions by the credit of Buckingham. His ambition even made him descend to artifices, that are as common in courts, as they are mean and unwarrantable; for he endeavoured to ruin in the king's good opinion such men as the voice of the public might probably design to the same office, and whom he therefore considered as his rivals. He was particularly jealous of Sir Edward Coke, and represented him as one who abounded in his own sense; one who affected popularity, and likely to court the good will of the nation at the hazard of the prerogative. For himself, he placed his great merit in obedience and submission; in the interest he had among the Commons, and in being able to influence the lower house of parliament: a service which he magnifies as more important in a Chancellor, than to judge in equity between party and party. This opinion of his own popularity in the nation was not groundless. The parliament that met in 1614, though extremely out of humour with the ministers in general, distinguished him by an uncommon mark of favor and confidence. An objection having been started in the house

Cabal's,
p. 219.

Vol. III. Lett.
ter CXXVII.

Petyt's Placit.
i. a. ian.
p. 174.

of commons, that a feat there was incompatible with the office of Attorney General, which required his frequent attendance in the upper house: the commons, from their particular regard for Sir Francis Bacon, and for that time only, overruled the objection; and he was accordingly allowed to take his place among them. If I observe farther, that the king raised him to the dignity of a privy-counsellor while he was still in this very office, it will be instead of many instances to shew, with what an addressful prudence he steered his course betwixt the court and the nation. He was thus favored by a prince, who exacted from all his servants an implicit submission to his maxims of government: he gave no umbrage to a parliament whom these maxims had rendered jealous of the prince, and of almost every man in his favor. But to return.

An. 1617.



Vol. III. Letter CLXIX.

These insinuations had their desired effect. Upon the chancellor's voluntary resignation of the seals, they were given to Sir Francis Bacon, with the title of lord Keeper, on the seventh of March 1617. To what interest he more particularly owed this promotion we may learn from his letter of acknowledgement, written that very day, to the earl of Buckingham.

Bacon, Vol. II. Letter CLXXV.

A few days after he had the seals delivered to him, the king went a progress into Scotland, carrying with him the favorite, who was likewise his prime minister: for to him all business, public or private, was addressed; and, according to his fancy, for the most part determined. The great affair that employed the deliberations of his council about this time, and had a fatal influence on his conduct ever after, was the marriage of prince Charles with the Infanta of Spain. In this resolution, though contrary to all the rules of good policy, he persisted for seven years together; against his own interest, against the universal voice of his people: only to procure the imaginary honor of an alliance with a crowned head; for all other alliances he thought below his dignity. Sir Francis Bacon, who saw through the vanity and danger of this intention, but who wanted resolution to be greatly honest, contented himself with insinuating softly, that it would be necessary to have the council unanimous in their suffrage on the occasion, whatever might be their private sentiments. This hint was not sufficient to open the king's eyes. On the contrary, he run blindfold into the snare that Gundamor was spreading for him. That famous statesman, as much by his buffooneries as by his talent for intrigue, had gained an absolute ascendant over James, leading him on from error to error: till in the end he made him sacrifice his conscience to the pope, and his honor to the resentments of Philip, in the murder of his bravest subject Sir Walter Raleigh; the last terror of Spain, and the only surviving favorite of queen Elizabeth. The Dutch too made advantage of the king's weakness and necessities. As the cautionary towns were still in the hands of the English, the States were under some apprehensions that the Spanish ministry might prevail upon James, who could not possibly conceal his fondness for the match in treaty, to put those important places into their power. They knew at the same time that his treasury was exhausted, and that his courtiers were insatiable. To bring their purpose about, they ceased all at once to pay the English who garrisoned those places, as by their treaties they were obliged to do. Complaint being made of this to the Dutch envoy at London, he insinuated, as from himself, to some of the ministers, that if king James would desire it of the States, they would, out of consideration for him, take up money at an exorbitant interest, and in one payment discharge the whole debt due to the crown of England. This stratagem took effect. James wrote to the

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the States; and the matter was immediately put into negotiation. The pensionary Barneveldt, whom they sent over, conducted the affair with so much address, that the king agreed to deliver up the cautionary towns for less than three millions of florins, in lieu of eight millions they had engaged to pay Elizabeth, besides the interest that had been running on for eighteen years. Such are the events of this reign; fit only to depress the writer, and distaste the reader.

During the king's absence in Scotland there happened an affair, otherwise of small importance, but as it lets us into the true genius of those times, and serves to shew in what miserable subjection the favorite held all those who were in public employments. He was upon the point of ruining Sir Francis Bacon, the person he had just contributed to raise, not for any error or negligence in their master's service, but merely for an opinion given in a thing that only regarded his own family. Indeed such was the levity, such the insolence of his power, that the capricious removal of men from their places, became the prime distinction of his thirteen years favor: which, as bishop Hacket observes, was like a sweeping flood, that at every spring-tide takes from one land, to cast what it has taken upon another. The affair was this. The year before, my lord Coke had been removed from his place of Chief Justice and disgraced: the court having found him, in several instances, no friend to arbitrary will and pleasure, or to the prerogative, as it was called; but resolutely bent to maintain the integrity and honor of his post. One Peacham had been accused of inserting in a sermon several passages accounted treasonable, for it seems they reflected on the ministry; but in a sermon never preached, nor ever intended to be made public. The king, who was beyond measure jealous on this head, fearing the man might either be acquitted on his trial, or not condemned to capital punishment, had ordered his attorney general Bacon to sound the judges before-hand, and gather their opinions secretly and apart. My lord Coke obstinately refused to declare his; looking on this auricular taking of opinions, for so he named it, as not according to the custom of the realm, but new and of pernicious tendency. About the same time he had determined a cause at common law. The plaintiff, who thought himself injured, would not abide by his decisions, but applied to chancery for relief: where the defendant refused to appear, disclaiming the authority of that court: in which he was supported by the Chief Justice, who threatened the Chancellor with a premunire, grounded on a statute made 27th Ed. III. for thus invading the limits of his jurisdiction. The king, who thought his prerogative struck at anew in this attack on the court of his absolute power, as Bacon styles it, had the matter examined before the council; who condemned the Chief Justice for what he had done, and obliged him to make a submission on his knees. But what completed the distaste taken at him, was his behaviour in a cause of the bishop of Litchfield and Coventry, to whom the king had granted a vacant church in *commendam*. Serjeant Chiborne, who was counsel against the bishop, in arguing the case had maintained several positions, reckoned prejudicial and derogatory to the king's supreme and imperial power, which was affirmed to be distinct from, and of a higher nature than his ordinary authority. Informed of this, James, by his attorney general Bacon, ordered the judges to stay further proceedings in that business, till they had consulted with him. The judges assembled, and unanimously agreed, that they could not obey this order; that the letter they had received was contrary to law; that by their oath and the duty of their places they were not to delay justice; that they had therefore proceeded in

Life of Abp.
Williams,
part 2. p. 19.

Vol. III. Letter
CXII.

Bacon, Vol.
III. Letter
CXIII.
CXIV.

Letter CXV,
CXVI.

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the cause at the time fixed : and of this they certified the king in a writing under all their hands. Upon this remonstrance, he writ them an angry letter, and peremptorily commanded them to stay all proceedings, till his return to London. They were then summoned before the council, and sharply reprimanded for suffering the popular lawyers to question his prerogative, which was represented as sacred and transcendent, not to be handled or mentioned in vulgar argument. At last raising his voice to frighten them into submission, he put this question to them severally: " If, at any time, in a case depending before the judges, he conceived it to concern him either in profit or power, and thereupon required to consult with them, and that they should stay proceedings in the mean time; whether they ought not to stay them accordingly?" They all, the Chief Justice only excepted, acknowledged it their duty to do so. His answer deserves to be for ever remembered: " That when such a case happened, he would do that which should be fit for a judge to do."

Bacon, Vol.
III. Letter
CXLVIII.

Yet this great lawyer, who had the honest courage to resist the king to his face, wanted that independence of mind which alone enables a man to bear solitude, and an acquaintance with himself. His disgrace, which reflected more honor on him than all his preferments, he was unable to support; and therefore he soon after sued to be reinstated in the king's favor. To recover it, he meanly enough courted the favorite with an offer, which he would not hear of when it was formerly made to him. While in power, he had refused to give his daughter in marriage to Sir John Villiers, not without marks of disrespect: he now submissively intreated the same person to honor him with his alliance: and employed Secretary Winwood to inform the earl of Buckingham of his extreme concern for what had passed with regard to the earl's brother; that he now passionately wished the treaty might be renewed and accomplished: adding, that they should make their own terms of settlement, if his proposal was accepted. As the young lady was not only a celebrated beauty, but a great fortune, the person most interested made no difficulty to close with this proposal: and his mother recommended it to her second son with warmth. This alarmed the lord keeper Bacon. Ever jealous of Coke's reputation, and at odds with him, he dreaded his alliance with so powerful a family. His imagination suggested to him all the danger that threatened his present and future fortunes from this union: and he could not forget that he had lately treated his antagonist with a freedom that rather insulted than admonished him. These apprehensions made him cast about how to defeat the intended match, by raising such objections to it, as might touch the king and his favorite in point of public honor and advantage. His letters to both on that occasion, are written with the perplexity of a man who fears something he is unwilling to own; which yet his prudence passes over with a seeming unconcern, to enlarge only upon considerations that regard those whom he would be thought to serve. But this management proved ineffectual. It was refuted by the earl of Buckingham, and checked by a rough answer from the king. The lady Compton too, informed of the part he was acting, gave a loose to her tongue, and railed at him with a bitterness natural to women when they are thwarted in any favorite pursuit of interest or passion. Having thus, to prevent a distant and uncertain danger, involved himself in one that was real and immediate, he made no scruple to change sides at once; to go directly against his former opinion; and to offer unasked his interest in the young lady's mother for promoting the match he had just been laboring

Letter
CLXXV,
CLXXXI.

Letter
CCLII, to
L. Coke.

laboring to disappoint. On such trivial accidents do the fortunes of ministers depend: and to such little and shameful arts is ambition often obliged to stoop. Nor even thus did he presently regain his credit with Buckingham. The family continued to load him with reproaches: and he remained long under that agony of heart which an aspiring man must feel, when his power and dignity are at the mercy of a king's minion, young and giddy with his elevation, and who thinks himself offended. They were however reconciled at last; and their friendship, if obsequiousness in one to all the humours of the other deserves the name of friendship, continued without interruption for some years; while Buckingham went on daily to place and displace the great officers of the crown, as wantonness of fancy, or anger, or interest led him; to recommend or discountenance every private person who had a suit depending in any court, just as he was influenced; to authorize and protect every illegal project, that could serve most speedily to enrich himself or his kindred. In a word he became formidable even to the master who had raised him from the dust, and who should have still awed him by his authority: and this amidst the dissipation of a life, given up to idle amusements, or sullied with criminal pleasures.

Letter
CLXXXIV.

In the beginning of 1619, Sir Francis Bacon was created lord high Chancellor of England, and shortly after baron of Verulam; which title he exchanged the year following, for that of viscount St. Albans. Such events in his life as these may be passed over slightly: he was so great a man, that external honors could add no lustre to his name. Indeed had they been the immediate reward of those nobler services he had done, and was still meditating to do his country, they might deserve more particular notice, for the sake of him who bestowed them.

An. 1619.

Neither the weight and variety of business, nor the pomps of a court, could divert his attention from the study of philosophy. Those were his avocations and incumbrances; this was his beloved employment, and almost the only pleasure in which he indulged his freer and better hours. He gave to the public in 1620 his *Novum Organon*, as a second part to his grand Instauration of the Sciences: a work that for twelve years together he had been methodizing, altering, and polishing; till he had labored the whole into a series of aphorisms, as it now appears. Of all his writings this seems to have undergone the strictest revision, and to be finished with the severest judgment. Indeed the form into which it is cast admits of nothing foreign, of nothing merely ornamental. The lights and embellishments of imagination, the grace and harmony of style, are rejected here, as beauties either superfluous, or of an inferior nature. The author has, besides, made use of several terms in a new and peculiar sense, which may have discouraged some readers, as it has made others imagine them equally unintelligible with the horrors of a vacuum, the quiddities, and substantial forms, of the philosophy which he attempted to discredit: and therefore, of all his writings it has been the least read, or understood. It was intended as a more useful, a more extensive logic than the world had yet been acquainted with: an art not conversant about syllogisms, and modes of argumentation, that may be serviceable sometimes in arranging truths already known, or in detecting fallacies that lie concealed among our own reasonings and those of other men; but an art inventive of arts: productive of new discoveries, real, important, and of general use to human life. This he proposed, by turning our attention from notions to things; from those subtle and frivolous speculations that dazzle, not enlighten, the understanding, to a sober and sensible investigation of the

An. 1620.

the laws and powers of nature, in a way becoming sages who make truth and information the sole aim of their inquiries. In order to this, his first endeavour was to weed out of the mind such errors as naturally grow in it, or have been planted there by education, and cherished by the influence of men, whose writings had long claimed a right of prescription to rule and mislead mankind. To a mind thus prepared for instruction, he proposes the second and scientific part of his scheme, the true method of interpreting nature, by fact and observation; by sound and genuine induction, widely differing from that puerile art which till then had solely prevailed in philosophy. His requires a sufficient, an accurate collection of instances, gathered with sagacity and recorded with impartial plainness, on both sides of the question: from which, after viewing them in all possible lights, to be sure that no contradictory instances can be brought, some portion of useful truth, leading on to further discoveries, may be at last fairly deduced. In this way, experiments and reasonings grow up together, to support and illustrate each other mutually, in every part of science.

An. 1621.

As we are now approaching towards the most memorable event of our author's public life, which ended in a melancholy reverse of his fortune and honor, it will be necessary to trace, step by step, the causes that produced it: especially as the affair has not been hitherto considered in the point of view that renders it most interesting and instructive. It will, I believe, appear with evidence, that, whatever his crimes might be, he was sacrificed to the safety of another, far more criminal than himself: and that this was the act of an ill-judging master, with whom it was a greater merit to be amusing in any degree, than to be serviceable in the greatest.

Among the weaknesses of king James, his vanity was the most pernicious to his own family, and to the nation in general. He placed an infinite value on certain chimerical advantages that met in his person; on that inherent right by which, he pretended, the crown of England was devolved to him; on his long acquaintance with the prime mysteries of government, and on his uncommon accomplishments in learning. His favorite maxim was, that he who knows not how to dissemble, knows not how to reign: but he seems not to have heard of a second maxim, without which the first cannot be successful, even for a time; to conceal every appearance of cunning, and to deceive under the guise of candor and good faith. He, on the contrary, shewed his whole game at once, to his own subjects and to foreigners alike: so that in his attempts upon the former, in his negotiations with the latter, this Solomon was the only dupe. A great share of learning he certainly had, but of learning that a king ought not to be acquainted with; the very refuse of the schools, which served for little else but to furnish him with an impertinent fluency, on every subject: and he indulged himself in the sovereign pedantry of setting it to shew, on every occasion. On all these heads, he was extolled without measure by the most pestilent of flatterers, grave and reverend ecclesiastics: for which, and because they encouraged him in an unprincely application of his talent, he, on many occasions, made his power the mean instrument to gratify their passions and lust of dominion. They, in return, found out for him a title antecedent and superior to human laws, even a divine right of being weak or wicked, without control. And this doctrine, horrible as it is, they dared to derive from Scripture: where, if it could be found, which to affirm were blasphemy, it would be the triumph of infidelity, and demonstration that those sacred writings were

were inspired, not by God, but by some being, his opposite and the enemy of all goodness. This doctrine, meeting with his own perverted habits of thinking, made king James look upon his subjects as slaves; upon his parliaments as usurpers of a power to which they had no right, or at best a precarious one: and he had now, for seven years together, affected to govern without them; to set up an interest separate from that of his people, and to supply his wants by all ways and means, but such as the constitution prescribed. These methods were suggested to him by *Hacker*, the worst enemies of the commonwealth, the tribe of projectors and monopolists: p. 50. miscreants who sheltered themselves under the name and influence of Buckingham, and who repaid his protection extravagantly, at the expence of a people whom they were grinding and devouring. His mother too, now created a countess in her own right, a woman born for mischief, of a meddling spirit and insatiably greedy, was deep in the guilt of these transactions; forwarding every bad project that brought her in money; and, by the mighty power she had over her son, succeeding in every scandalous job she undertook. Under an administration like this, when England was in effect governed by a dissolute youth, himself in the hands of an intriguing, rapacious woman, it cannot be surprising that the people were vexed and plundered by illegal patents, by monopolies, by other mischievous projects, calculated to enrich a few, and to ruin thousands. To all these patents, however procured, the chancellor had readily, almost implicitly, affixed the seal, as the mere creature of Buckingham: or if he ever ventured to insinuate that any of them were contrary to law, his remonstrance was too fearful and unsupported to produce any effect. This is the great stain on his character, that he deserted, or neglected, the post of honor where providence had placed him, on the frontier, if I may so speak, betwixt Prerogative and Liberty; that, if he did not encourage, he at least connived at, the invasions that were every day making into the latter. Yet this was against his inclination, as well as against his better sense of things; for as he knew well that his master's true interest lay in a good understanding with his people, he had often advised him to call frequent parliaments, and to throw himself on the affections of the nation for the support of his government. Though such advice was repugnant to all the maxims by which that monarch wished to establish his power; though he had resolved to lay parliaments aside for ever, as daring encroachers upon his prerogative, who made themselves greater and their prince less than became either: yet he was now prevailed upon to meet the two houses once more. Indeed the exigency of his affairs rendered it necessary. His subjects, it is true, were harassed and pillaged; but he was still in extreme want of money: those wretches, to whom he delegated his authority, leaving to him little else besides the public hatred, occasioned by their rapines committed in his name. Add to this, that the juncture appeared favorable for obtaining large supplies from the commons. As the whole body of the nation expressed an uncommon zeal for recovering the Palatinate to his unfortunate son-in-law, he had reason to expect, that, on assurance of his entering heartily into a war, they would vote him considerable aids of money; which he might afterwards divert, as he actually did, to other purposes that better suited his genius and notions.

A parliament was accordingly summoned: and it met on the 20th of January 1621. The king was not wholly mistaken in his conjecture: for the commons immediately voted him two intire subsidies; but went at the same time into a strict inquiry into those arbitrary impositions, that, in a period of seven years, were be-

come insupportable to the people. Among the monopolies, in particular, there were three of flagrant injustice and oppression. Certain persons had obtained patents from the king, which impowered them to set an annual fine on such as kept inns or alehouses throughout England. Without a licence from the patentees, no man could hold either: and whoever would not readily pay the sum, at which those low instruments of power thought fit to excise him, was sure of being harassed and plundered, or thrown into a jail. This proved a fruitful source of vexations, and fell heavy on the poorer sort. The third was yet more enormous; a patent for the sole making and vending of gold and silver lace, which had been granted to two infamous tools of the favorite, Mompeffon and Michel; the Dudley and Empson of that age. The first a man of fortune, whose sole ambition was to make himself considered, though but by his crimes: the other an obscure justice of the peace, who, in a remote quarter of the town, picked up a fordid maintenance from the stews. They had, it seems, shamefully abused the power their exclusive patent gave them, by putting off, for true, great quantities of counterfeit lace, wrought up and embased with copper, or other materials of a poisonous nature: and whoever presumed to make or sell any other was cruelly punished, by fine and imprisonment. In these outrages they were the more daring, because Sir Edward Villiers, half-brother to the favorite, was associated into their patent, though not named in it. These, with many other grievances, were laid open in parliament, and severely censured. But the commons did not stop here. They were for carrying their search up to the prime cause of all grievances, in order to discover by whose influence the several patents had been procured, and how they had passed the seals. Complaints were brought into the house, about the same time, of corrupt practices even in the high court of Equity. This alarmed the king for his chancellor, and still more for his minion: as private intimation had been sent to Buckingham, of a severe scrutiny that was making into all his management, and of frequent meetings that were held, with great secrecy, by certain members of the lower house; in order to fix on him the guilt of whatever was most unjustifiable and oppressive. Buckingham's creatures, anxious and alarmed at this intelligence, persuaded him that he could secure impunity to himself and them, only by bringing his master forthwith to dissolve the parliament: and James had certainly been frightened into that rash and hazardous step, but for the sober remonstrances of Williams dean of Westminster. That politic courtier advised him to cancel at once, by proclamation, all monopolies and vexatious grants; to sacrifice inferior criminals to the public resentment, and to soothe the parliament with an assurance that this reformation was first proposed by his favorite, on finding how much he had been abused by designing and knavish projectors. This counsel the king resolved to follow; but it did not wholly free him from the perplexity he was under. The chancellor, whom his interest led him to preserve, was openly accused of corruption: the favorite, whom his tendernefs could not resign, was secretly, and therefore more dangerously attacked; as the encourager, if not the author, of whatever was deemed most illegal and oppressive. To save both, at this juncture, would be impossible: and he found he must either part with the object of his inclinations, or with the oracle of his counsels. How such a prince would determine, is easy to guess. His passion prevailed over his reason: and my lord St. Albans was made the scape-goat of Buckingham. He was even obliged to abandon his defence. As he had gained universal esteem by his learning; and as his eloquence

Hatchet, p.
49. Wilson.

Cabala,
Letter 11.

Bushel's
Abridg. Post.
p. 3.

eloquence was equal to his parts, superior and commanding, the king would not hazard his appearing before the lords to plead his own cause. In the course of such an inquiry, he might have diverted the public odium from himself, by laying open the long series of bad administration to which he had been privy; the many illegal patents he had been compelled to pass: and all this came full home to Buckingham, the great object of national vengeance. The faults too, imputed to himself, he might have extenuated so far as to procure a great mitigation of the censure, that must otherwise fall upon him in its utmost rigor. All this he foresaw and felt; but the king absolutely commanded him not to be present at his trial: promising on his royal word, to screen him in the last determination; or if that could not be, to reward him afterwards with ample retribution of protection and favor. He obeyed, and was undone.

On the twelfth of March, a committee for inspecting into the abuses of the courts of justice was appointed by the commons. Some days after, Sir Robert Philips, a gentleman eminent for public spirit and humanity, reported from thence to the house, that complaints had been brought before them, by two persons, against the lord Chancellor, for bribery and corruption. This report he made, not only without bitterness, but in terms of great regard and tenderness for the accused; moving that the business might be presented to the peers, singly and without exaggeration. At a conference, on the nineteenth, between certain members of both houses, the lords agreed to take the matter into their speedy consideration. As soon as this affair was become the public talk, a new croud of accusers appeared, and charged home the unhappy chancellor with other and flagrant instances of bribery; such persons especially as had courted him with presents, and afterwards received a judgment unfavorable to their expectations: animated more by that disappointment, than by the iniquity of his decisions; for it does not appear that any of his decrees were ever reversed. He was all this while confined to his house by an indisposition, real or pretended; but, if his body was in health, what must have been the condition of his mind, in this interval of suspense and anxiety? a great mind, already self-convicted, yet exquisitely sensible to good fame, which it has long enjoyed, and is upon the point of losing for ever! His reflections, whether he looked back on the past, or forward to the prospect before him, must have been terrible: as they were at the same time inflamed by peculiar circumstances of shame and confusion; that he was now, at the age of sixty-one, falling a victim to the rapine and insolence of his domestics, which he had weakly connived at, rather than to any faults of his own.

On the twenty-sixth of March, the king came to the house of peers; and in expressions of studied popularity, owned the errors of his government, exclaimed against the patents complained of, frankly gave up to justice the lesser criminals concerned in them: and all this for the sake of his favorite, whom in the end he endeavoured to screen, by the poorest reasons imaginable. Indeed, no good reasons could be alledged in defence of him, who was the greatest criminal; and without whose concurrence the wretches in question could not have been guilty. The lords were not imposed upon by this speech: however, thinking it sufficient to have reduced their sovereign to the necessity of an apology, they feigned to be of his opinion. Thus, Buckingham escaped for the present; to accumulate new guilt, and to fall at last, ignobly, by a private hand: after he had been devoted, by the curses of a whole people, and more solemnly still by the denunciations of their re-

presentatives. After a recess of three weeks, the house met again : but the weight of their indignation fell singly, and therefore without mercy, on the chancellor. They were not satisfied with his letter of general confession, though delivered to them by the prince of Wales; in which he renounced all justification of himself, and sued for no other favor, "but that his penitent submission might be his sentence, and the loss of the seals his punishment." He was obliged to put in a particular answer to every point of his accusation : which he did on the first of May, 1621; acknowledging, in the most explicit words, the corruption charged upon him in twenty eight several articles, and throwing his cause entirely on the compassion of his judges. His sentence was, "to undergo a fine of forty thousand pounds; to be imprisoned in the Tower during the king's pleasure; to be for ever incapable of any office, place, or employment in the commonwealth; and never to sit again in parliament, or come within the verge of the court." Thus he lost the great privilege of his peerage; a severity unusual except in cases of treason and attainder.

Wilson.
Fisher's
Abridg. Fol.
p. 2.

The last article of his charge furnishes matter for much reflection. It alleges, "that he had given way to great exactions in his servants, both in respect of private seals, and otherwise for sealing injunctions." This indulgence to his domestics, which was certainly extreme, has been generally, and I believe truly, reckoned the principal cause of those irregularities that drew on his disgrace. Liberal in his own temper, or rather profuse beyond the condition of a man who means to preserve his integrity, he allowed his family in every kind of extravagance : and as many of his retinue were young, dissipated, giddy in the pursuit of pleasure, they squandered without measure, where they were indulged without control*. Whether he did not discover this error till it was too late, or whether a soul like his, lost in the greatness and immensity of its own views, could not attend to that detail of little and disagreeable particulars, which yet oeconomy requires; however that was, to support his ordinary train of living, he fell into corruption himself, and connived at it in his dependents. Thus we behold him, a memorable example of all that is great and exalted, of all that is little and low, in man. Such inconsistencies in our human nature cannot but alarm and terrify even those who are most confirmed in a habit of virtue.

Cabala,
p. 263.
Ed. 16, t.

After a short confinement in the Tower, the king restored him to his liberty, and forgave the fine in which the parliament had amerced him. As this fine was very considerable, he managed so as to have it assigned over to some of his friends, under the notion of being his creditors : and we find Williams, his successor in the seals, complaining heavily of this stratagem; as if he thereby intended to defraud those persons to whom he was really in debt, who were many and in danger of being ruined by his fall. But I am inclined to hope, that he made use of this artifice with a more innocent view; namely, to procure himself a short respite from their importunities, till he could settle his private affairs, extremely perplexed by former ill management, and now by the loss of his employments rendered desperate. That I may not be obliged to mention any more an affair, alike ungrateful to the reader and writer, I will observe here, that about three years after this, he

* One day, during his trial, as he was passing through a room where several of his domestics were sitting; upon their getting up to salute him, Sit down, my masters, he cried; your rise hath been my fall.

petitioned

petitioned king James for a total remission of his censure: "to the end that this blot of ignominy might be removed from him, and from his memory with posterity." What lay in a king's power, James readily granted, a full and entire pardon of his whole sentence †. Posterity likewise, to which he appealed, has seemed unwilling to remember that he ever offended: and those who recorded his failings, like those who have made observations on the spots in the sun, neither pretend to diminish his real brightness in himself, nor deny his universal influence on the world of learning. Thus he withdrew from the glare of a public station into the shade of retirement and studious leisure; often lamenting, that ambition and false glory had so long diverted him from the noblest as well as the most useful employments of a reasonable being: mortified, no doubt, into these sentiments, by a severe conviction, in his own person, of the instability and emptiness of all human grandeur.

Bacon, Vol. III. Letter ccc. iv. Cabala, p. 249.

Buſhe's Abridg. Poſt. p. 3.

Hitherto we have followed him through the bustle and obliquity of business. We shall find him henceforth in a more pleasing, though a less conspicuous situation; freed from the servitude of a court; from an intolerable attendance there, on the vices and follies of men every way his inferiors (for in this reign no one could rise to power on more honorable terms:) in a condition now to pursue the native bent of his genius; to live to himself, and for the advantage, not of one age, or one people only, but of all mankind, and all times to come.

The first considerable work he engaged in, after his retirement, was the history of Henry the seventh; which he undertook at the desire of king James, and published in the year 1622. Whatever some writers may have insinuated of his melancholy and dejection, we find every where, in this performance, evident traces of a spirit unbroken by age, and unsubdued by misfortunes. It has been highly applauded, and as much condemned: a proof that it has more than common merit. And we may venture to affirm, that, whatever its faults are, they arise from no want of vigor in the understanding, or of warmth in the imagination of the writer. King James affected to consider his great grandfather Henry as a perfect model for the imitation of other monarchs: and as his was the reign of flattery, this quickly grew to be the prevalent and fashionable opinion at court. Though in truth, that prince's character was, in every part of it, unamiable; and his conduct, on many occasions, weak or wicked. If my lord Bacon has not wholly escaped the infection of his age; if he has here and there attempted to brighten the imperfections, and throw in shades the bad features of the original he was drawing; yet, through these softenings, we can easily see this king as he was, and in all his genuine deformity. Suspicion and avarice, his own historian acknowledges, were the chief ingredients in his composition: and therefore his politics, both at home and abroad, were narrow, selfish, and false. Void of all great and extensive prudence, he endeavoured to supply that want by temporary shifts, and the little expedients of cunning. By these he commonly had the luck to extricate himself out of difficulties, which a wiser man would have timely foreseen, and a better man have wholly prevented. But as his genius was unsociable and solitary, the darkness in his temper passed on mankind for depth and sagacity in his understanding. His avarice too, was sordid and shameless. Nothing seemed mean, nothing unjust in his eyes, that could fill his coffers: and merely to fill them, for of wealth he had no

An. 1622.

Bacon, Vol. III. p. 30.

p. 272.

† Accordingly he was summoned to the first parliament of king Charles.

enjoyment,

enjoyment, he descended to arts of rapine no less scandalous than they were oppressive.

I have acknowledged that my lord Bacon's history has been taxed of partiality, and I will not dissemble that his style has been objected to, as full of affectation, full of false eloquence. But that was the vice, not of the man, but of the times he lived in: and particularly of a court, that, after the sovereign's example, delighted in the tinsel of wit and writing, in the poor ingenuity of punning and quibbling.

Lettres sur
le Anglois,
1786.

His *Essays* have, of all his works, been most current, and are still very justly esteemed. Towards the close of his life he greatly enlarged them both in number and weight; and published them anew, not only in English, but in a more universal language, which, he imagined, may preserve them as long as books shall last. As they are intended not to amuse but instruct; as they are neither a satire on human nature, nor the school of scepticism; Monsieur de Voltaire observes, that they have been less popular than the *Maxims* of Rochefoucault, or the *Essays* of Montagne. A remark that does my lord Bacon honor; who was too great a man to court a reputation from the multitude, by sacrificing to that malignity, or indulging that curious extravagance, which too many readers, I am afraid, expect to find gratified, even in writings of a moral kind.

Of the other works which he composed in this last scene of his life, I forbear to make mention here: they will be all enumerated in another place. Let me only observe, that nothing can give a more exalted idea of the fruitfulness and vigor of his genius, than the number and nature of those writings. Under the discouragement of a public censure, broken in his health, broken in his fortunes, he enjoyed his retirement not above five years: a little portion of time! yet he found means to crowd into it what might have been the whole business, and the glory too, of a long and fortunate life. Some of his former pieces he methodized and enriched: several new ones he composed, no less considerable for the greatness and variety of the arguments he treated, than for his manner of treating them. Nor are they works of mere erudition and labor, that require little else but strength of constitution and obstinate application: they are original efforts of genius and reflection, on subjects either new, or handled in a manner that makes them so. His notions he drew from his own fund: and they were solid, comprehensive, systematical; the disposition of his whole plan throwing light and grace on all the particular parts. In considering every subject, he seems to have placed himself in a point of view so advantageous and elevated, that he could from thence discover a whole country round him, and mark out the several spots of it, distinctly and with ease. These characters are equally due to the works in which he made some progress, and to those he could only attempt.

Wilson.

His supposed poverty has been much insisted on, not only by our own writers, but by foreigners. Some of the former have asserted, that he languished out a solitary being in obscurity and indigence: and among the latter, Le Clerc, who was led into the same notion by a passage in one of Howel's letters, has animadverted with an honest indignation on the meanness of that prince, who could leave such a man as he was to struggle, in his declining age, both with penury and affliction. I believe the matter has been exaggerated. Perhaps he did not enjoy affluence or entire ease of fortune: but his ordinary income must have placed him above sordid want and anxiety. Dr. Rawley, who lived long in his family, affirms that the
king

king had given him, out of the Broad Seal and Alienation office, to the value of eighteen hundred pounds a year; which, with his own lands amounting to a third part more, he retained to his death. But then he had treasured up nothing in his prosperous condition against the day of adversity: and his pension was not only precarious, but ill-paid, by a king, who, instead of husbanding his revenues for great or good purposes, was daily lavishing them away, in fruitless negotiations, or on the least deserving of his subjects. Add to these things, that my lord Bacon lay all this time under the incumbrance of a vast debt; and that he had doubtless expended very considerable sums in procuring or making experiments. Even those, whom we see close and sparing on every other occasion, are yet profuse in gratifying a favorite passion. From all which arose that distress and those difficulties into which he was often plunged. That they were many and great, we can entertain no doubt*. It is but too strongly confirmed to us by some unusual expressions in his letters to king James; where we find him pouring out his heart in complaints and supplications of such a strain, as every one who reveres his memory will wish he had never uttered. Those who insist on the meanness, those who plead for the dignity, of human nature, may, in this one man, find abundant matter to support their several opinions. But, let us draw a veil over imperfections, and at the same time acknowledge, that a very ordinary penetration may serve to discover remarkable blemishes and failings in the most comprehensive minds, in the greatest characters, that ever adorned mortality.

Bacon, Vol.
III. Letter
CCLXXVI.

King James died in 1625; after an inglorious and a fatal reign of three and twenty years: despised by foreigners, despised and hated by his own subjects. The mischievous notions he broached, the perverse conduct he held, gave rise to those divisions that quickly after involved his kingdoms in all the guilt and misery of a civil war: that shook the British constitution to its foundations, and in the end overturned it; tho' apparently framed to last for ages, as it had been ages in building up and perfecting.

An. 1625.

His unfortunate chancellor survived him something above a year. The multiplicity of business and study in which he had been long engaged, but above all the anguish of mind he secretly labored under, had undermined and broken into his health. After having been for some time infirm and declining, he owed his death at last to an excess, not unbecoming a philosopher; in pursuing, with more application than his strength could bear, certain experiments touching the conservation of bodies. He was so suddenly struck in his head and stomach, that he found himself obliged to retire into the earl of Arundel's house at Highgate, near which he then happened to be. There he sickened of a fever, attended with a defluxion on his breast; and, after a week's illness, expired; on the ninth of April, in the sixty-sixth year of his age. How he bore this indisposition, or what discourses he held at the nearer approaches of death, no account is to be found; an omission which every reader must feel and regret: as nothing can awaken the attention, nothing affect the heart of man more strongly than the behaviour of eminent personages in their last moments; in that only scene of life wherein we are all sure, later or sooner, to resemble them. There remains only a letter, the last he ever wrote, addressed to that nobleman under whose roof he died; in which he compares himself

An. 1626.

Bacon, Vol.
III. Letter
ccc.

* It appears by a letter of Buckingham to him, that he asked for the provostship of Eaton college, and was refused it.

to a celebrated philosopher of antiquity, Pliny the elder; who lost his life by inquiring, with too dangerous a curiosity, into the first great eruption of Vesuvius.

Thus lived and died the lord chancellor Bacon †.

Sir Thomas
Meautys.

He was buried privately in St. Michael's church near St. Alban's. The spot that contains his remains lay obscure and undistinguished, till the gratitude of a private man, formerly his servant, erected a monument to his name and memory. In another country, in a better age, his monument would have stood a public proof in what veneration the whole society held a citizen, whose genius did them honor, and whose writings will instruct their latest posterity.

Baconiana,
p. 203.

One passage in his will is remarkable. After bequeathing his soul and body in the usual form, he adds, "my name and memory I leave to foreign nations; and to mine own countrymen, after some time be passed over." As to the former, he was, even in his life-time, looked upon with admiration by the most eminent men that France and Italy could then boast of; and by some of them visited, as one whose talents were an ornament, not only to his age, but to human nature itself. When the marquis D'Effiat brought into England the princess Henrietta-Maria, wife to Charles the first, he paid a visit to my lord Bacon; who, being then sick in bed, received him with the curtains drawn. "You resemble the angels, said that minister to him: we hear those beings continually talked of, we believe them superior to mankind, and we never have the consolation to see them." Among his countrymen, the names, alone, of those who have adopted his notions, and proceeded on his plan, are his highest encomium. To pass over a long line of philosophers, all illustrious; he reckons in the list of his followers a Boyle, a Locke, a Newton himself.

Voltaire,
Lettres sur
les Anglois,
p. 82.

Rawley's Life
of Bacon.

One singularity there was in his temperament, not easily to be accounted for: in every eclipse of the moon, whether he observed it or not, he was certainly seized with a sudden fit of fainting; which left him without any remaining weakness, as soon as the eclipse ended. He was of a middling stature; his forehead spacious and open, early impressed with the marks of age; his eye lively and penetrating; his whole appearance venerably pleasing: so that the beholder was insensibly drawn to love, before he knew how much reason there was to admire him. In this respect, we may apply to my lord Bacon what Tacitus finely observes of his father in law, Agricola: a good man you would readily have judged him to be, and been pleased to find him a great man.

Evelyn of
Medals,
p. 540.

Those talents that commonly appear single in others, and they too men of reputation, shone forth in him united and eminent. All his cotemporaries, even

† He continued single till after forty, and then took to wife a daughter of alderman Barnham of London, with whom he received a plentiful fortune, but had by her no children: and she out-lived him upwards of twenty years. Such readers as have any curiosity to know what regimen he observed, may take the following account of it in the words of his chaplain. "His diet was rather plentiful and liberal than restrained. In his younger years he was much given to the finer and lighter sorts of meats: but afterwards he preferred the stronger, such as the shambles afforded; as those which bred the more firm and substantial juices, and less dissipable. He did not, you may be sure, neglect that himself, which he so much extolled to others in his writings, the frequent use of nitre; whereof he took the quantity of about three grains in thin warm broth every morning, for thirty years together. His ordinary physic was a maceration of rhubarb, infused into a draught of white wine and beer mingled together for the space of half an hour, once in six or seven days, immediately before his meal, whether dinner or supper: that it might dry the body less. His receipt for the gout, which constantly gave him ease within two hours, is set down in the end of the Natural History." See Vol. I. p. 430.

those

those who hated the courtier, stand up and bear witness together to the superior abilities of the writer and pleader, of the philosopher and companion. In conversation, he could assume the most differing characters, and speak the language proper to each, with a facility that was perfectly natural; or the dexterity of the habit concealed every appearance of art: a happy versatility of genius, which all men wish to arrive at, and one or two, once in an age, are seen to possess. In public, he commanded the attention of his hearers, and had their affections wholly in his power. As he accompanied what he spoke with all the expression and grace of action, his pleadings, that are now perhaps read without emotion, never failed to awaken in his audience the several passions he intended they should feel. This is not a picture of him drawn from fancy: it is copied, and that but in miniature, after another taken by one who knew him well; a good judge of merit, and seldom known to err, at least in heightening a favorable likeness. As a philosopher, it is scarce hyperbolic to say of him, in Mr. Addison's words, that he had the sound, distinct, comprehensive knowledge of Aristotle, with all the beautiful lights, graces, and embellishments of Cicero. To this commendation of his talents, the learned throughout Europe have given their common sanction, and own him for the father of the only valuable philosophy, that of fact and observation.

Csborn's Advice to a son.

B. Johnson, in his Discoveries.

It remains then to consider him, more particularly than we have hitherto done, in this most known and conspicuous part of his character; where his merit is unquestionably great and entirely his own. For, to the writings of the ancients he was not, he could not, be obliged. They had either mistaken the right road to natural knowledge; or if any of them struck into it by chance, finding the way difficult, obscure, and tedious, they soon abandoned it for ever. He owed to himself alone, to a certain intellectual sagacity, that beam of true discernment which shewed him at once, and as it were by intuition, what the most painful inquirers, for more than twenty ages backward, had searched after in vain. And here let me observe towards him the same impartiality I have hitherto aimed at: and, in order to know what he really did as a philosopher, place before the reader a short view of the state of learning in Europe, from the dark period of Gothicism down to the sixteenth century. But let me at the same time acknowledge, that this account will be only a rude and imperfect sketch: consisting of a few detached particulars, without much order or method.

Although the great era of ignorance has been fixed, justly enough, to those times when the northern nations, like a mighty inundation, overspread the face of Europe; yet it is no less certain that barbarism and corruption were entered into arts and sciences ere the savages had made any impression on the Roman empire. Under them indeed, that darkness which had been long growing on the world, and gradually extinguishing every light of knowledge, soon became total, and threatened to be perpetual. In the eighth century, we find that the highest ambition of the clergy was to vie with one another in chanting the public service, which yet they hardly understood. This important emulation run so high between the Latin and French priesthood, that Charlemagne, who was then at Rome, found it necessary to interpose, and decide the controversy in person. The monk, who relates this affair with a most circumstantial exactness, adds, that the emperor intreated pope Adrian to procure him certain persons, who might teach his subjects the first principles of grammar and arithmetic; arts that were then utterly unknown in his dominions. This warlike monarch, though his own education had been so far neglected

An. 787.

*Ioannis Leun-
clouii Op. t.
iv. p. 2.*

lected that he had never learned to write, discovered by his natural good sense, the value of knowledge, and set himself to be its promoter and patron. He even allowed a public school to be opened in the imperial palace, under the direction of our famous countryman Alcuin; on whom he chiefly relied for introducing into France some tincture of that philosophy which was still remaining in Britain. But how slow and ineffectual the progress of any learning must have been, we may guess from an edict of the council of Chalons, in the next century; which earnestly exhorts all monasteries to be careful in having their manuals of devotion correctly transcribed: lest, while they piously mean to ask of God one thing, some inaccurate manuscript may betray them into praying for the quite contrary.

813.

Launcii, p. 3.

Hist. et antiq.
univer. Oxon.
p. 13.

As to Britain, if learning had still some footing there in the eighth century, it was so totally exterminated from thence in the ninth; that, throughout the whole kingdom of the West-Saxons, no man could be found who was scholar enough to instruct our king Alfred, then a child, even in the first elements of reading: so that he was in his twelfth year before he could name the letters of the alphabet. When that renowned prince ascended the throne, he made it his study to draw his people out of the sloth and stupidity in which they lay: and became, as much by his own example, as by the encouragement he gave to learned men, the great restorer of arts in his dominions. And here we are called upon to observe, that as France had been formerly obliged to England in the person of Alcuin, who planted the sciences there under Charlemagne; our island now received the same friendly assistance from thence by Grimbold, whom king Alfred had invited hither, and made chancellor of Oxford. Such events as these are too considerable, in the literary history of the ninth age, to be passed over unobserved. The rise of a noted grammarian, the voyage of an applauded doctor, are recorded by the chroniclers of that century, with the same reverence that an ancient writer would mention the appearance of a Lycurgus, or a Timoleon; of a lawgiver who new-models a state, or a hero who rescues a whole people from slavery.

879.

Giannone,
Ebor. di Na-
poli, l. 5.

But these fair appearances were of short duration. A night of thicker darkness quickly overspread the intellectual world: and in the moral, followed a revolution still more deplorable. To common sense and piety, succeeded dreams and fables, visionary legends and ridiculous penances. The clergy, now utter strangers to all good learning, instead of guiding a rude and vicious laity by the precepts of the gospel, which they no longer read, amused them with forged miracles, or overawed them by the ghostly terrors of demons, spectres and chimeras. This was more easy, and more profitable too, than the painful example of a virtuous life. The profound depravity that was spread through all conditions of men, ecclesiastic and secular, appears in nothing more plain than in the reasons assigned for calling several councils about this time. In one, new canons were to be made, forbidding adultery, incest, and the practice of pagan superstitions: as if these things had not till then been accounted criminal. In another, it was found necessary to declare, that a number of angels worshipped universally under certain names were altogether unknown: and that the church could not warrant the particular invocation of more than three. A third, which the empress Irene had summoned for the reformation of discipline, ordained, that no prelate should thenceforth convert his episcopal palace into a common inn; nor in consideration only of any sum of money given him by one man, curse and excommunicate another. A fourth and fifth censure the indecency of avowed concubinage:

binage: and enjoin that friers and nuns should no longer converse or live promiscuously in the same convent.

The See of Rome, which should have been a pattern to the rest, was of all christian churches the most licentious*; and the pontifical chair often filled with men, who, instead of adorning their sacred character, made human nature itself detestable: a truth by many catholic writers acknowledged and lamented. Several popes were by their successors excommunicated, their acts abrogated, and the sacraments administered by them pronounced invalid. No less than six were expelled by others who usurped their seat; two were assassinated: and the infamous Theodora, infamous even in that age, by her credit in the holy city obtained the triple crown for the most avowed of her gallants, who assumed the name of John the tenth. Another of the same name was called to govern the christian world at the age of twenty one; a bastard son of Pope Sergius who died eighteen years before. If such were the men who arrogated to themselves titles and attributes peculiar to the Deity, can we wonder at the greatest enormities among lay-men? Their stupidity kept pace with the dissolution of their manners, which was extreme: they still preserved, for the very clergy we have been speaking of, a reverence they no longer had for their God. The most abandoned among them, miscreants, familiar with crimes that humanity startles at, would yet, at the hazard of their lives, defend the immunities of a church, a consecrated utensil, or a donation made to a convent. In such times as those, it were in vain to look for useful learning and philosophy. Not only the light of science, but of reason, seems to have been well-nigh extinguished.

It was not till late, after the sack of Constantinople by the Turks, that the writings of Aristotle began to be universally known and studied. They were then, by certain fugitive Greeks, who had escaped the fury of the Ottoman arms, brought away and dispersed through the Western parts of Europe. Some particular treatises of his, it is true, had been long made public; but chiefly in translations from the Arabic, done by men who, far from rendering faithfully the author's sense, hardly understood his language. These however gave birth to the scholastic philosophy; that motley offspring of error and ingenuity; and to speak freely, the features of both parents were all along equally blended in the complexion of the daughter. To trace at length the rise, progress, and variations of this philosophy, would be an undertaking not only curious but instructive, as it would unfold to us all the mazes in which the force, the subtlety, the extravagance of human wit can lose themselves: till not only profane learning but divinity itself was at last, by the refined frenzy of those who taught both, subtilized into mere notion and air.

* The book intitled, *The tax of the Roman Chancery*, published first at Rome, in the year 1514, furnishes us with a flagrant instance of this in the following passage, which I choose not to translate. "Absolutio a lapsu carnis super quocunque actu libidinoso commisso per Clericum, etiam cum monialibus, intra et extra septa monasterii; aut cum conjugibus vel affinis, aut filia spiritali, aut quibusdam aliis, sive ab unoquoque de per se, sive simul ab omnibus ab. dicitur petatur, cum *off. officiorum* ad ordines et beneficia, cum inhibitione, tur. 3. duc. 3. Si vero cum illis petatur *absolutio* etiam a crimine commisso *contra naturam, vel cum brutis, cum dispensatione, ut supra, et cum inhibitione, tur. 60. duc. 12. carl. 16. Si vero* petatur tantum absolute a crimine *contra naturam, vel cum brutis, cum dispensatione et inhibitione, turon. 36. duc. 9. Absolutio pro* *Mariæ*, quare se per nihil *pietas* cognosci intra et extra septa monasterii, cum *rescribitur* ad *deontatis* illius ordinis, etiam *abbatiales*, turon. 36. duc. 9." In the edition of Boisle-duc, there is "Absolutio pro *eo*, qui *interfuit* patrem, matrem, sororem, uxorem.... g. 5. vel 7." Vide Bayle, art. BANC.

Their philosophy was neither that of Aristotle entirely, nor altogether differing from his. Whatever opinions the first founders of it had been able to draw, from Boetius his Latin commentator, or from the wretched translations abovementioned, these they methodized and illustrated, each according to his several talent, and the genius of the age he lived in. But this, instead of producing one regular and consistent body of science, even from wrong principles, ended in a monster, made up of parts every where misshapen and dissimilar. Add to this, that they left natural knowledge wholly uncultivated; to hunt after occult qualities, abstract notions, and questions of impertinent curiosity, by which they rendered the very logic their labours chiefly turned upon intricate, usefess, unintelligible.

An. 1050.

An. 1320.

Polyhistor.
Tom. II.
p. 73, etc.

Alstedius, in his chronology of the schoolmen, has divided their history into three principal periods or successions: the first beginning with Lanfranc, archbishop of Canterbury, who flourished about the middle of the eleventh century; and ending with Albert the Great two ages later: the second, that commences from him, determining in Durand; as the third and last ended in Luther, at the reformation. Morhoff, however, strenuously contends, that Rucelinus, an Englishman, was properly the father of the schoolmen: and that to him the sect of the Nominalists owed its rise and credit. He adds, that it revived afterwards in the person of Occam, another of our countrymen, and the perpetual antagonist of Duns Scotus, who had declared for the Realists, and was reckoned their ablest champion. The learned reader needs not be told, that the scholastic doctors were all distinguished into these two sects; formidable party-names which are now as little known or mentioned as the controversies that once occasioned them. It is sufficient to say, that, like all other parties, they hated each other heartily; treated each other as heretics in logic: and that their disputes were often sharp and bloody; ending not only in the metaphorical destruction of common sense and language, but in the real mutilation and death of the combatants. For, to the disgrace of human reason, mankind in all their controversies, whether about a notion or a thing, a predicament or a province, have made their last appeal to brute force and violence. The titles* with which these leaders were honored by their followers, on account of the sublime reveries they taught, are at once magnificent and absurd: and prove rather the superlative ignorance of those times, than any transcendent merit in the men to whom they were applied. From this censure we ought nevertheless to except one, who was a prodigy of knowledge for the age he lived in, and is acknowledged as such by the age to which I am writing. I mean the renowned frier Bacon, who shone forth singly through the profound darkness of those times; but rather dazzled than enlightened the weaker eyes of his cotemporaries. As if the name of Bacon were auspicious to philosophy, this man, not only without assistance or encouragement, but insulted and persecuted, by the unconquerable force of his genius penetrated far into the mysteries of nature, and made so many new discoveries in astronomy and perspective, in mechanics and chemistry, that the most sober writers even now cannot mention them without some marks of emotion and wonder. It is Dr. Friend's observation, that he was almost the only astronomer of his age: and the reformation of the calendar, by him attempted and in a manner perfected, is a noble proof of his skill in that science. The construction of

* The profound, the subtle, the marvellous, the indefatigable, the irrefragable, the angelic, the seraphic, the fountain of life, light of the world, etc.

spectacles, of telescopes, of all sorts of glasses that magnify or diminish objects, the composition of gunpowder (which Bartholdus Swartz is thought to have first hit upon almost a century later) are some of the many inventions with justice ascribed to him. For all which, he was in his life-time calumniated, imprisoned, oppressed: and after his death wounded in his good name, as a magician who had dealt in arts, infernal and abominable. He tells us, that there were but four persons then in Europe who had made any progress in the mathematics; and in chemistry yet fewer: that those who undertook to translate Aristotle were every way unequal to the task: and that his writings, which, rightly understood, Bacon considered as the fountain of all knowledge, had been lately condemned and burned, in a synod held at Paris.

The works of that celebrated ancient have, in truth, more exercised the hatred and admiration of mankind, than those of all the other philosophers together: Launoy enumerates no less than thirty-seven fathers of the church who have stigmatized his name, and endeavoured to reprobate his doctrines. Morhoff has reckoned up a still greater number of his commentators, who were at the same time implicitly his disciples: and yet both these authors are far from having given a complete list either of his friends or enemies. In his life-time he was suspected of irreligion, and, by the pagan priesthood, marked out for destruction: the successors of those very men were his partizans and admirers. His works met with much the same treatment from the christian clergy: sometimes proscribed for heretical; sometimes triumphant and acknowledged the great bulwark of orthodoxy. Launoy has written a particular treatise on the subject, and mentioned eight different revolutions in the fortune and reputation of Aristotle's philosophy. To pass over the intermediate changes, I will just mention two, that make a full and ridiculous contrast. In the above-mentioned council held at Paris about the year 1209, the bishops there censured his writings, without discrimination, as the pestilent sources of error and heresy; condemned them to the flames, and commanded all persons, on pain of excommunication, not to read, transcribe, or keep any copies of them. They went farther, and delivered over to the secular arm no less than ten persons, who were burned alive, for certain tenets, drawn, as those learned prelates had heard, from the pernicious books in question. In the sixteenth century, those very books were not only read with impunity, but every where taught with applause: and whoever disputed their orthodoxy, I had almost said their infallibility, was persecuted as an infidel and miscreant. Of this the sophister Ramus is a memorable instance. Certain animadversions of his on the peripatetic philosophy occasioned a general commotion in the learned world. The university of Paris took the alarm hotly, and cried out against this attempt as destructive of all good learning, and of fatal tendency to religion itself. The affair was brought before the parliament; and appeared of so much consequence to Francis the first, that he would needs take it under his own immediate cognisance. The edict is still extant, which declares Ramus insolent, impudent, and a liar. His books are thereby forever condemned, suppressed, abolished: and what is a strain of unexamined severity, the miserable author is solemnly interdicted from transcribing, even from reading his own compositions!

Lib. de varia
Arit. fortuna,
Tom. IV.

Polyhistor.
Tom. II.

Launoy, ubi
supra.

Launoy, tom.
IV. p. 206.

10th of May,
An. 1543.

We might from hence be led to imagine, that when the authority of an ancient philosopher was held so sacred, philosophy itself must have been thoroughly understood, and cultivated with uncommon success; but the attachment of those doc-

tors

Bacon's Apo-
strophe.

tors was to a name, not to truth, or valuable science: and our author very justly compares them to the olympic wrestlers, who abstained from necessary labors, that they might be fit for such as were not so. Under their management, it was a philosophy of words and notions, that seemed to exclude the study of nature; that, instead of inquiring into the properties of bodies, into the laws of motion by which all effects are produced, was conversant only in logical definitions, distinctions, and abstractions, utterly barren and unproductive of any advantage to mankind. The great aim of those solemn triflers was rather to perplex a dispute, than to clear up any point of useful disquisition; to triumph over an enemy, than to enlarge the knowledge, or better the morals of their followers. So that this captious philosophy was a real obstacle to all advances in sound learning, human and divine. After it had been adopted into the christian Theology, far from being of use to explain and ascertain mysteries, it served to darken and render doubtful the most necessary truths; by the chicanery of argumentation with which it supplied each sect, in defence of their peculiar and favorite illusions. To so extravagant a height did they carry their idolatry of Aristotle, that some of them discovered, or imagined they discovered in his writings, the doctrine of the Trinity; that others published formal dissertations to prove the certainty of his salvation, though a heathen: and that a patriarch of Venice is said to have called up the devil expressly, in order to learn from him the meaning of a hard word in Aristotle's *Physics*. But the crafty demon, who perhaps did not understand it himself, answered in a voice so low and inarticulate, that the good prelate knew not a word he said. This was the famous Hermolaus Barbaro: and the Greek word, that occasioned his taking so extraordinary a step, is the *Entelechia* of the *Peripatetics*; from whence the schoolmen raised their substantial forms, and which Leibnitz, towards the end of the last century, attempted to revive in his theory of motion.

Bayle, art.
BARBARO.

The reformation itself, that diffused a new light over Europe, that set men upon inquiring into errors and prepossessions of every kind, served only to confirm the dominion of this philosophy: protestants as well as papists entrenching themselves behind the authority of Aristotle, and defending their several tenets by the weapons with which he furnished them. This unnatural alliance of theology with the peripatetic doctrines rendered his opinions not only venerable but sacred: they were reckoned as the land-marks of both faith and reason, which to pull up or remove would be daring and impious. Innovations in philosophy, it was imagined, would gradually sap the very foundations of religion, and in the end lead to downright atheism. If that veil of awful obscurity, which then covered the face of nature, should be once drawn; the rash curiosity of mankind would lead them to account for all appearances in the visible world, by second causes, by the powers of matter and mechanism: and thus they might come insensibly to forget or neglect the great original cause of all. This kind of reasoning convinced the multitude, over-awed the wiser few, and effectually put a stop to the progress of useful knowledge.

Such, in general, were the dispositions of mankind when Sir Francis Bacon came into the world; whom we will not consider as the founder of a new sect, but as the great assertor of human liberty; as one who rescued reason and truth from the slavery in which all sects alike had, till then, held them. As a plausible hypothesis, a shining theory, are more amusing to the imagination, and a shorter way to fame, than the patient and humble method of experimenting, of pursuing nature through

all her labyrinths by fact and observation ; a philosophy built on this principle, could not, at first, make any sudden or general revolution in the learned world. But its progress, like that of time, quiet, slow, and sure, has in the end been mighty and universal. He was not however the first among the moderns who ventured to dissent from Aristotle. Ramus, Patricius, Bruno, Severinus, to name no more, had already attacked the authority of that tyrant in learning, who had long reigned as absolutely over the opinions of men, as his restless pupil had of old affected to do over their persons. But these writers invented little that was valuable themselves, however justly they might reprehend many things in him. And as to the real improvements made in some parts of natural knowledge before our author appeared, by Gilbert, Harvey, Copernicus, father Paul, and some few others, they are well known, and have been deservedly celebrated. Yet there was still wanting one great and comprehensive plan, that might embrace the almost infinite varieties of science, and guide our inquiries aright in all. This Sir Francis Bacon first conceived, in its utmost extent ; to his own lasting honor, and to the general utility of mankind. If we stand surpris'd at the happy imagination of such a system, our surpris'e redoubles upon us when we reflect, that he invented and methodized this system, perfected so much, and sketched out so much more of it, amidst the drudgery of business and the civil tumults of a court. Nature seems to have intended him peculiarly for this province, by bestowing on him with a liberal hand all the qualities requisite : a fancy voluble and prompt to discover the similitudes of things ; a judgment steady and intent to note their subtlest differences ; a love of meditation and enquiry ; a patience in doubting ; a slowness and diffidence in affirming ; a facility of retracting ; a careful anxiety to plan and dispose. A mind of such a cast, that neither affected novelty, nor idolized antiquity, that was an enemy to all imposture, must have had a certain congeniality and relation to truth. These characters, which, with a noble confidence, he has applied to himself, are obvious and eminent in his *Instauration of the Sciences* : a work by him designed, not as a monument to his own fame, but a perpetual legacy to the common benefit of others. He has divided the whole of it into six capital parts ; with a short account of which we shall close this imperfect relation of his life and writings.

Bacon. Vol.
IV. P. 4. 5.

1. The first part of this *Instauration* proposes a general survey of human knowledge : and this he executed in that admirable treatise intitled, *The Advancement of Learning*. As he intended to raise a new and lasting structure of philosophy, founded not in arbitrary opinions or specious conjectures, but in truth and experience ; it was absolutely necessary to his design, first to review accurately the state of learning as it then stood, through all its provinces and divisions. To do this effectually required, with an uncommon measure of knowledge, a discernment not only exquisite but universal : the whole intellectual world was subjected to its examination and censure. That he might not lose himself on a subject so vast and of such variety ; he has, according to the three faculties of the soul, memory, fancy, understanding, ranged the numerous train of arts under three great classes, history, poetry, philosophy. These may be considered as the principal trunks from which shoot forth, in prodigious diversity, the lesser parts and branches of science. Whatever is deficient, erroneous, or still wanting in each, he has pointed out at large : together with the properest means for amending the defects, for rectifying the errors, and for supplying the omissions in all. Upon the whole, he was not only well acquainted with every thing that had been discovered in books before

De augmentis
Scientiarum.

before his time, and able to pronounce critically on those discoveries: he saw clearly, and at the end of this treatise has marked out in one general chart, the several tracts of science that lay still neglected or unknown. And to say truth, some of the most valuable improvements since made have grown out of the hints and notices scattered through this work: from which the moderns have selected, each according to his fancy, one or more plants to cultivate and bring to perfection.

Novum Or-
ganon.

2. The design of the Novum Organon, which stands as the second part to his Instauration, and may be reckoned the most considerable, was to raise and enlarge the powers of the mind, by a more useful application of its reasoning faculty to all the different objects that philosophy considers. In this place, our author offers to the world a new and better logic; calculated not to supply arguments for controversy, but arts for the use of mankind; not to triumph over an enemy by the sophistry of disputation, but to subdue nature itself by experiment and inquiry. As it differs from the vulgar logic in its aim, it varies no less from that captious art in the form of demonstrating: for it generally rejects syllogism, as an instrument rather hurtful than serviceable to the investigation of nature, and uses in its stead a severe and genuine induction. Not the trivial method of the schools, that, proceeding on a simple and superficial enumeration, pronounces at once from a few particulars, exposed to the danger of contradictory instances: but an induction that examines scrupulously the experiment in question, views it in all possible lights, rejects and excludes whatever does not necessarily belong to the subject, then, and not till then, concluding from the affirmatives left. A croud of instances might be brought to shew how greatly this method of inquiry has prospered in the hands of the moderns; and how fruitful it has been of new discoveries, unknown and unimagined by antiquity. But I will only mention one that may stand in place of many; the Optics of our immortal Newton: where, in a variety of experiments, he has analysed the nature and properties of light itself, of the most subtle of all bodies, with an accuracy, a precision, that could hardly have been expected from examining the grossest and most palpable. From whence, by the method of induction, he has raised the noblest theory that any age or country can shew.

Phaenomena
natura.

3. It has been the fate of almost every considerable scheme for the good of mankind to be treated, at first, as visionary, or impracticable, merely for being new. This our author foresaw, and endeavoured to obviate, in the third part of his Instauration; by furnishing materials himself towards a natural and experimental history; a work which he thought so indispensably necessary, that without it the united endeavours of all mankind, in all ages, would be insufficient to rear and perfect the great structure of the sciences. He was aware too, that even men of freer and more extensive notions, who relished his new logic, might be deterred from reducing it to practice, by the difficulties they would meet with in experimenting, according to the rules by him prescribed. He therefore led the way to other inquirers, in his *Sylva Sylvarum*, or history of nature: which, however imperfect in many respects, ought to be looked upon as extensive and valuable for that age, when the whole work was to be begun. This collection, which did not appear till after his death, has been generally considered as detached from, and independent on his general plan: and therefore his design in making and recording these experiments has not been duly attended to by the reader. They are a com-

mon

mon repository or store-house of materials, not arranged for ornament and show, but thrown loofely together for the fervice of the philofopher: who may from thence felect fuch as fit his prefent purpofe; and with them, by the aid of that organ or engine already defcribed, build up fome part of an axiomatical philofophy, which is the crown and completion of this fyftem. The phaenomena of the uni-
 verfe he ranges under three principal divifions; the hiftory of generations or the
 production of all fpecies according to the common laws of nature; that of preter-
 generations or of births deviating from the ftated rule; and thirdly, the hiftory of
 nature as confined or affifted, changed or tortured by the art of man: which laft
 difclofes to us a new face of things, and as it were another world of appearances.
 The ufe of fuch a hiftory he reckons two-fold; either the knowledge of quali-
 ties in themfelves: or to ferve for the firft matter of a true and ufeful philofophy.
 With this view only did our author make and gather together the mifcellaneous
 collection I am fpeaking of. That many particular experiments have been found
 doubtful or falfe, cannot be wondered at: the whole was then a tract of fci-
 ence uncultivated and defert. If feveral confiderable men, treading in the path he
 ftruck out for them, have gone farther and furveyed it more exactly than he did,
 yet to him is the honor of their difcoveries in a manner due. It was Columbus
 alone who imagined there might be a new world; and who had the noble boldnefs
 to go in fearch of it, through an ocean unexplored and immense. He fucceeded
 in the attempt; and led his followers into a fpacious continent, rich and fruitful.
 If fucceeding adventurers have penetrated farther than he into its feveral regions,
 marked out and diftinguifhed them with more accuracy; the refult of thefe difcoveries
 has lefs extended their fame than it has raifed and enlarged his.

4. After thefe preparations, nothing feems wanting but to enter at once on the
 laft and moft exalted kind of philofophy: but the author judged, that, in an af-
 fair fo complicated and important, fome other things ought to precede, partly for in-
 ftruction, and partly for prefent ufe. He therefore interpolated a fourth and fifth part:
 the former of which he named *Scala Intellectus*, or a feries of fteps by which the
 underftanding might regularly afcend in its philofophical refearches. For this pur-
 pofe, he propofed examples of inquiry and inveftigation, agreeable to his own
 method, in certain fubjects; felecting fuch efpecially as are of the nobleft order,
 and moft widely differing from one another; that inftances of every fort might not
 be wanting. The fourth part then was to contain a particular application and il-
 luftration of the fecond. In this light we choofe to confider the fix monthly hifto-
 ries which he propofed to write on fix principal topics in natural hiftory: namely,
 of winds; of life and death; of rarefaction and condenfation; of the three chemi-
 cal principles, falt, fulphur, mercury; of bodies heavy and light; of fympathy
 and antipathy. The firft three, in the order I have here placed them, he profecuted
 at fome length; and in a manner that fhews with what a happy fagacity
 he could apply his own rules to the interpretation of nature. The wonder is, that
 other inquirers fince his time have done fo little towards perfecting the two firft
 mentioned, things of fo great concern to human fociety, and to every individual.
 As to the three laft, we have only a fhort introduction to each: death having pre-
 vented him from writing any thing on the fubjects themfelves. Such is our con-
 dition here: whoever is capable of planning ufeful and extenfive fchemes dies al-
 ways too foon for mankind, even in the moft advanced age.

Anticipa-
tiones philof.
fecundae.

Philofophia
prima, five
activa.

5. Of the fifth part he has left nothing but the title and scheme. It was indeed to be only a temporary structure, raised with such materials as he himself had either invented, or tried, or improved; not according to the due form of genuine induction, but by the same common use of the understanding that others had employed. And this was to remain no longer than till he had raised,

6. The sixth and sublimest part of this grand Instauration, to which all the precedent are merely subservient: a philosophy purely axiomatical and scientific; flowing from that just, castigated, genuine manner of inquiry, which the author first invented and applied. But this he despaired of being able to accomplish: and the learned of all countries from his days have been only laboring some separate or lesser parts of this amazing edifice, which ages to come may not see finished according to the model left them by this one man.

Such, and so unlimited were his views for the universal advancement of science; the noble aim to which he directed all his philosophic labors. What Cæsar said, in compliment, to Tully may, with strict justice, be applied to him; that it was more glorious to have extended the limits of human wit, than to have enlarged the bounds of the Roman world. Sir Francis Bacon really did so: a truth acknowledged not only by the greatest private names in Europe, but by all the public societies of its most civilized nations. France, Italy, Germany, Britain, I may add even Russia, have taken him for their leader, and submitted to be governed by his institutions. The empire he has erected in the learned world is as universal as the free use of reason: and one must continue, till the other is no more.



PHILOSOPHICAL
WORKS.

THE
TWO BOOKS
OF
FRANCIS BACON,
OF THE
PROFICIENCY and ADVANCEMENT
OF
LEARNING,
DIVINE and HUMAN.

TO THE KING.



THE
FIRST BOOK
OF
FRANCIS BACON:
OF THE
PROFICIENCE and ADVANCEMENT
OF
LEARNING,
DIVINE and HUMAN.
TO THE KING.

THERE were under the law, excellent king, both daily sacrifices, and free-will offerings: the one proceeding upon ordinary observance, the other upon a devout cheerfulness: in like manner there belongeth to kings from their servants, both tribute of duty, and presents of affection. In the former of these, I hope I shall not live to be wanting, according to my most humble duty, and the good pleasure of your majesty's employments: for the latter, I thought it more respective to make choice of some oblation, which might rather refer to the propriety and excellency of your individual person, than to the business of your crown and state.

Wherefore representing your majesty many times unto my mind, and beholding you not with the inquisitive eye of presumption, to discover that which the Scripture telleth me is inscrutable, but with the observant eye of duty and admiration: leaving aside the other parts of your virtue and fortune, I have been touched, yea,

and possessed with an extreme wonder at those your virtues and faculties, which the philosophers call intellectual : the largeness of your capacity, the faithfulness of your memory, the swiftness of your apprehension, the penetration of your judgment, and the facility and order of your elocution : and I have often thought, that of all the persons living that I have known, your majesty were the best instance to make a man of Plato's opinion, that all knowledge is but remembrance, and that the mind of man by nature knoweth all things, and hath but her own native and original notions (which by the strangeness and darkness of this tabernacle of the body are sequestered) again revived and restored : such a light of nature I have observed in your majesty, and such a readiness to take flame, and blaze from the least occasion presented, or the least spark of another's knowledge delivered. And as the Scripture saith of the wisest king, *That his heart was as the sands of the sea* ; which though it be one of the largest bodies, yet it consisteth of the smallest and finest portions : so hath God given your majesty a composition of understanding admirable, being able to compass and comprehend the greatest matters, and nevertheless to touch and apprehend the least ; whereas it should seem an impossibility in nature, for the same instrument to make itself fit for great and small works. And for your gift of speech, I call to mind what Cornelius Tacitus saith of Augustus Caesar ; *Augusto profluens, et quae principem deceret, eloquentia fuit* : For, if we note it well, speech that is uttered with labour and difficulty, or speech that savoureth of the affectation of art and precepts, or speech that is framed after the imitation of some pattern of eloquence, though never so excellent ; all this hath somewhat servile, and holding of the subject. But your majesty's manner of speech is indeed prince-like, flowing as from a fountain, and yet streaming and branching itself into nature's order, full of facility and felicity, imitating none, and inimitable by any. And as in your civil estate there appeareth to be an emulation and contention of your majesty's virtue with your fortune ; a virtuous disposition with a fortunate regiment ; a virtuous expectation, when time was, of your greater fortune, with a prosperous possession thereof in the due time ; a virtuous observation of the laws of marriage, with most blessed and happy fruit of marriage ; a virtuous and most christian desire of peace, with a fortunate inclination in your neighbour princes thereunto : so likewise, in these intellectual matters, there seemeth to be no less contention between the excellency of your majesty's gifts of nature, and the universality and perfection of your learning. For I am well assured, that this which I shall say is no amplification at all, but a positive and measured truth ; which is, that there hath not been since Christ's time any king or temporal monarch, which hath been so learned in all literature and erudition, divine and human. For let a man seriously and diligently revolve and peruse the succession of the emperors of Rome, of which Caesar the dictator, who lived some years before Christ, and Marcus Antoninus, were the best learned ; and so descend to the emperors of Graecia, or of the West ; and then to the lines of France, Spain, England, Scotland, and the rest, and he shall find this judgment is truly made. For it seemeth much in a king, if, by the compendious extractions of other mens wits and labours, he can take hold of any superficial ornaments and shews of learning, or if he countenance and prefer learning and learned men : but to drink indeed of the true fountains of learning, nay, to have such a fountain of learning in himself, in a king, and in a king born, is almost a miracle. And the more, because there is met in your majesty a rare conjunction, as well of divine and sacred literature, as of profane and human ; so as your majesty standeth invested of that triplicity, which in great veneration

ration was ascribed to the ancient Hermes: the power and fortune of a king, the knowledge and illumination of a priest, and the learning and universality of a philosopher. This propriety, inherent and individual attribute in your majesty, deserveth to be expressed, not only in the fame and admiration of the present time, nor in the history or tradition of the ages succeeding; but also in some solid work, fixed memorial, and immortal monument, bearing a character or signature, both of the power of a king, and the difference and perfection of such a king.

Therefore I did conclude with myself, that I could not make unto your majesty a better oblation, than of some treatise tending to that end, whereof the sum will consist of these two parts: the former, concerning the excellency of learning and knowledge, and the excellency of the merit and true glory in the augmentation and propagation thereof: the latter, what the particular acts and works are, which have been embraced and undertaken for the advancement of learning; and again, what defects and undervalues I find in such particular acts: to the end, that though I cannot positively or affirmatively advise your majesty, or propound unto you framed particulars; yet I may excite your princely cogitations to visit the excellent treasure of your own mind, and thence to extract particulars for this purpose, agreeable to your magnanimity and wisdom.

IN the entrance to the former of these, to clear the way, and, as it were, to make silence, to have the true testimonies concerning the dignity of learning to be better heard, without the interruption of tacit objections; I think good to deliver it from the discredits and disgraces which it hath received, all from ignorance, but ignorance severally disguised; appearing sometimes in the zeal and jealousy of divines, sometimes in the severity and arrogancy of politicians, and sometimes in the errors and imperfections of learned men themselves.

I hear the former sort say, that knowledge is of those things which are to be accepted of with great limitation and caution; that the aspiring to overmuch knowledge, was the original temptation and sin, whereupon ensued the fall of man; that knowledge hath in it somewhat of the serpent, and therefore where it entereth into a man it makes him swell; *Scientia inflat*: that Solomon gives a censure, *That there is no end of making books, and that much reading is a weariness of the flesh*; and again in another place, *That in spacious knowledge there is much contristation, and that he that increaseth knowledge increaseth anxiety*; that St. Paul gives a caveat, *That we be not spoiled through vain philosophy*; that experience demonstrates how learned men have been arch-heretics, how learned times have been inclined to atheism, and how the contemplation of second causes, doth derogate from our dependence upon God who is the first cause.

To discover then the ignorance and error of this opinion, and the misunderstanding in the grounds thereof, it may well appear these men do not observe or consider, that it was not the pure knowledge of nature and universality, a knowledge by the light whereof man did give names unto other creatures in paradise, as they were brought before him according unto their proprieties, which gave occasion to the fall; but it was the proud knowledge of good and evil, with an intent in man to give law unto himself, and to depend no more upon God's commandments, which was the form of the temptation. Neither is it any quantity of knowledge, how great soever, that can make the mind of man to swell; for nothing can fill, much less extend the soul of man, but God, and the contemplation of God; and therefore Solomon,

speaking of the two principal senses of inquisition, the eye and the ear, affirmeth that the eye is never satisfied with seeing, nor the ear with hearing; and if there be no fulness, then is the continent greater than the content: so of knowledge itself, and the mind of man, whereto the senses are but reporters, he defineth likewise in these words, placed after that calendar or ephemerides, which he maketh of the diversities of times and seasons for all actions and purposes; and concludeth thus: *God hath made all things beautiful, or decent, in the true return of their seasons: Also he hath placed the world in man's heart, yet cannot man find out the work which God worketh from the beginning to the end*: declaring, not obscurely, that God hath framed the mind of man as a mirror, or glass, capable of the image of the universal world, and joyful to receive the impression thereof, as the eye joyeth to receive light; and not only delighted in beholding the variety of things, and vicissitude of times, but raised also to find out and discern the ordinances and decrees, which throughout all those changes are infallibly observed. And although he doth insinuate, that the supreme or summary law of nature, which he calleth, *The work which God worketh from the beginning to the end, is not possible to be found out by man*; yet that doth not derogate from the capacity of the mind, but may be referred to the impediments, as of shortness of life, ill conjunction of labours, ill tradition of knowledge over from hand to hand, and many other inconveniencies, whereunto the condition of man is subject. For that nothing parcel of the world is denied to man's inquiry and invention, he doth in another place rule over, when he saith, *The spirit of man is as the lamp of God, wherewith he searcheth the inwardness of all secrets*. If then such be the capacity and receipt of the mind of man, it is manifest, that there is no danger at all in the proportion or quantity of knowledge, how large soever, lest it should make it swell or out-compass itself; no, but it is merely the quality of knowledge, which be it in quantity more or less, if it be taken without the true corrective thereof, hath in it some nature of venom or malignity, and some effects of that venom, which is ventosity or swelling. This corrective spice, the mixture whereof maketh knowledge so sovereign, is charity, which the apostle immediately addeth to the former clause; for so he saith, *knowledge bloweth up, but charity buildeth up*; not unlike unto that which he delivereth in another place: *If I spake, saith he, with the tongues of men and angels, and had not charity, it were but as a tinkling cymbal*; not but that it is an excellent thing to speak with the tongues of men and angels, but because, if it be sever'd from charity, and not referred to the good of men and mankind, it hath rather a sounding and unworthy glory, than a meriting and substantial virtue. And as for that censure of Solomon, concerning the excess of writing and reading books, and the anxiety of spirit which redoundeth from knowledge; and that admonition of St. Paul, *That we be not seduced by vain philosophy*; let those places be rightly understood, and they do indeed excellently set forth the true bounds and limitations, whereby human knowledge is confined and circumscribed; and yet without any such contracting or coarctation, but that it may comprehend all the universal nature of things: for these limitations are three: the first, that we do not so place our felicity in knowledge, as to forget our mortality. The second, that we make application of our knowledge, to give ourselves repose and contentment, and not distaste or repining. The third, that we do not presume by the contemplation of nature to attain to the mysteries of God. For as touching the first of these, Solomon doth excellently expound himself in another place of the same book, where he saith; *I saw well that knowledge recedeth as far from ignorance, as light doth from dark-*
ness;

ness ; and that the wise man's eyes keep watch in his head, whereas the fool roundeth about in darkness : but withal I learned, that the same mortality involveth them both. And for the second, certain it is, there is no vexation or anxiety of mind which resulteth from knowledge, otherwise than merely by accident ; for all knowledge, and wonder (which is the seed of knowledge) is an impression of pleasure in itself : but when men fall to framing conclusions out of their knowledge, applying it to their particular, and ministering to themselves thereby weak fears, or vast desires, there groweth that carefulness and trouble of mind which is spoken of : for then knowledge is no mote *Lumen siccum*, whereof Heraclitus the profound said, *Lumen siccum optima anima* ; but it becometh *Lumen madidum*, or *maceratum*, being steeped and infused in the humours of the affections. And as for the third point, it deserveth to be a little stood upon, and not to be lightly passed over : for if any man shall think by view and inquiry into these sensible and material things to attain that light, whereby he may reveal unto himself the nature or will of God ; then indeed is he spoiled by vain philosophy : for the contemplation of God's creatures and works produceth (having regard to the works and creatures themselves) knowledge ; but having regard to God, no perfect knowledge, but wonder, which is broken knowledge. And therefore it was most aptly said by one of Plato's school, " That the sense of man carrieth a resemblance with the sun, which, as we see, openeth and revealeth all the terrestrial globe ; but then again it obscureth and concealeth the stars and celestial globe : so doth the sense discover natural things, but it darkeneth and shutteth up divine." And hence it is true, that it hath proceeded, that divers great learned men have been heretical, whilst they have sought to fly up to the secrets of the Deity by the waxen wings of the senses : and as for the conceit, that too much knowledge should incline a man to atheism, and that the ignorance of second causes, should make a more devout dependence upon God who is the first cause : First, it is good to ask the question which Job asked of his friends : *Will you lie for God, as one man will do for another, to gratify him ?* For certain it is, that God worketh nothing in nature but by second causes ; and if they would have it otherwise believed, it is mere imposture, as it were in favour towards God ; and nothing else but to offer to the author of truth the unclean sacrifice of a lye. But farther, it is an assured truth, and a conclusion of experience, that a little or superficial knowledge of philosophy may incline the mind of man to atheism, but a farther proceeding therein doth bring the mind back again to religion ; for in the entrance of philosophy, when the second causes, which are next unto the senses, do offer themselves to the mind of man, if it dwell and stay there, it may induce some oblivion of the highest cause ; but when a man passeth on farther, and seeth the dependence of causes, and the works of providence ; then, according to the allegory of the poets, he will easily believe that the highest link of nature's chain must needs be tied to the foot of Jupiter's chair. To conclude therefore : let no man, upon a weak conceit of sobriety, or an ill-applied moderation, think or maintain, that a man can search too far, or be too well studied in the book of God's word, or in the books of God's works ; divinity or philosophy ; but rather let men endeavour an endless progress, or proficience in both ; only let men beware that they apply both to charity, and not to swelling ; to use, and not to ostentation ; and again, that they do not unwisely mingle, or confound these learnings together.

And as for the disgraces which learning receiveth from politicians, they be of this nature ; that learning doth soften mens minds, and makes them more unapt for the honour

honour and exercise of arms ; that it doth mar and pervert mens dispositions for matter of government and policy, in making them too curious and irresolute by variety of reading, or too peremptory or positive by strictness of rules and axioms, or too immoderate and overweening by reason of the greatness of examples, or too incompatible and differing from the times, by reason of the dissimilitude of examples ; or at least, that it doth divert mens travels from action and business, and bringeth them to a love of leisure and privateness ; and that it doth bring into states a relaxation of discipline, whilst every man is more ready to argue, than to obey and execute. Out of this conceit, Cato, surnamed the Censor, one of the wisest men indeed that ever lived, when Carneades the philosopher came in embassage to Rome, and that the young men of Rome began to flock about him, being allured with the sweetness and majesty of his eloquence and learning, gave counsel in open senate, that they should give him his dispatch with all speed, lest he should infect and enchant the minds and affections of the youth, and at unawares bring in an alteration of the manners and customs of the state. Out of the same conceit, or humour, did Virgil, turning his pen to the advantage of his country, and the disadvantage of his own profession, make a kind of separation between policy and government, and between arts and sciences, in the verses so much renowned, attributing and challenging the one to the Romans, and leaving and yielding the other to the Grecians ; *Tu regere imperio populos, Romane, memento, Hæc tibi erunt artes, etc.* So likewise we see that Anytus, the accuser of Socrates, laid it as an article of charge and accusation against him, that he did, with the variety and power of his discourses and disputations, withdraw young men from due reverence to the laws and customs of their country ; and that he did profess a dangerous and pernicious science, which was, to make the worst matter seem the better, and to suppress truth by force of eloquence and speech.

But these, and the like imputations, have rather a countenance of gravity, than any ground of justice : for experience doth warrant, that both in persons and in times, there hath been a meeting and concurrence in learning and arms, flourishing and excelling in the same men, and the same ages. For, as for men, there cannot be a better, nor the like instance, as of that pair, Alexander the Great and Julius Cæsar the dictator ; whereof the one was Aristotle's scholar in philosophy, and the other was Cicero's rival in eloquence : or if any man had rather call for scholars that were great generals, than generals that were great scholars, let him take Epaminondas the Theban, or Xenophon the Athenian ; whereof the one was the first that abated the power of Sparta, and the other was the first that made way to the overthrow of the monarchy of Persia. And this concurrence is yet more visible in times than in persons, by how much an age is a greater object than a man. For both in Ægypt, Assyria, Persia, Graecia, and Rome, the same times that are most renowned for arms, are likewise most admired for learning ; so that the greatest authors and philosophers, and the greatest captains and governors, have lived in the same ages. Neither can it otherwise be : for as, in man, the ripeness of strength of the body and mind cometh much about an age, save that the strength of the body cometh somewhat the more early ; so in states, arms and learning, whereof the one correspondeth to the body the other to the soul of man, have a concurrence or near sequence in times.

And for matter of policy and government, that learning should rather hurt, than enable thereunto, is a thing very improbable : we see it is accounted an error to commit a natural body to empiric physicians, which commonly have a few pleas-

ing receipts, whereupon they are confident and adventurous, but know neither the causes of diseases, nor the complexions of patients, nor peril of accidents, nor the true method of cures : we see it is a like error to rely upon advocates or lawyers which are only men of practice, and not grounded in their books, who are many times easily surpris'd, when matter falleth out besides their experience, to the prejudice of the causes they handle : so, by like reason, it cannot be but a matter of doubtful consequence, if states be managed by empiric statesmen, not well mingled with men grounded in learning. But contrariwise, it is almost without instance contradictory, that ever any government was disastrous that was in the hands of learned governors. For howsoever it hath been ordinary with politic men to extenuate and disable learned men by the names of pedants ; yet in the records of time it appeareth, in many particulars, that the governments of princes in minority (notwithstanding the infinite disadvantage of that kind of state) have nevertheless excelled the government of princes of mature age, even for that reason which they seek to traduce, which is, that by that occasion the state hath been in the hands of pedants : for so was the state of Rome for the first five years, which are so much magnified, during the minority of Nero, in the hands of Seneca, a pedant : so it was again, for ten years space or more, during the minority of Gordianus the younger, with great applause and contentation in the hands of Mithreus, a pedant : so was it before that, in the minority of Alexander Severus, in like happiness, in hands not much unlike, by reason of the rule of the women, who were aided by the teachers and preceptors. Nay, let a man look into the government of the bishops of Rome, as by name, into the government of Pius Quintus, and Sextus Quintus, in our times, who were both at their entrance esteemed but as pedantical friers, and he shall find that such popes do greater things, and proceed upon truer principles of state, than those which have ascended to the papacy from an education and breeding in affairs of state and courts of princes ; for although men bred in learning are perhaps to seek in points of convenience, and accommodating for the present, which the Italians call *ragioni di stato*, whereof the same Pius Quintus could not hear spoken with patience, terming them inventions against religion and the moral virtues ; yet on the other side, to recompense that, they are perfect in those same plain grounds of religion, justice, honour, and moral virtue, which if they be well and watchfully pursued, there will be seldom use of those other, no more than of physic in a sound or well-dieted body. Neither can the experience of one man's life furnish examples and precedents for the events of one man's life : for as it happeneth sometimes that the grandchild, or other descendent, resembleth the ancestor more than the son ; so many times occurrences of present times may sort better with ancient examples, than with those of the later or immediate times : and lastly, the wit of one man can no more countervail learning, than one man's means can hold way with a common purse.

And as for those particular seducements, or indispositions of the mind for policy and government, which learning is pretended to insinuate ; if it be granted that any such thing be, it must be remembered withal, that learning ministreth in every of them greater strength of medicine or remedy, than it offereth cause of indisposition or infirmity : for if, by a secret operation, it makes men perplexed and irresolute, on the other side, by plain precept, it teacheth them when and upon what ground to resolve ; yea, and how to carry things in suspense without prejudice, till they resolve : if it make men positive and regular, it teacheth them what things are in
their

their nature demonstrative, and what are conjectural; and as well the use of distinctions and exceptions, as the latitude of principles and rules. If it mislead by disproportion, or dissimilitude of examples, it teacheth men the force of circumstances, the errors of comparisons, and all the cautions of application; so that in all these it doth rectify more effectually than it can pervert. And these medicines it conveyeth into mens minds much more forcibly by the quickness and penetration of examples. For let a man look into the errors of Clement the seventh, so lively described by Guicciardine, who served under him, or into the errors of Cicero, painted out by his own pencil in his epistles to Atticus, and he will fly apace from being irresolute. Let him look into the errors of Phocion, and he will beware how he be obstinate or inflexible. Let him but read the fable of Ixion, and it will hold him from being vaporous or imaginative. Let him look into the errors of Cato the second, and he will never be one of the Antipodes, to tread opposite to the present world.

And for the conceit, that learning should dispose men to leisure and privateness, and make men slothful; it were a strange thing if that, which accustometh the mind to a perpetual motion and agitation, should induce slothfulness; whereas contrariwise it may be truly affirmed, that no kind of men love business for itself, but those that are learned: for other persons love it for profit; as an hireling, that loves the work for the wages; or for honour, as because it beareth them up in the eyes of men, and refresheth their reputation, which otherwise would wear; or because it putteth them in mind of their fortune, and giveth them occasion to pleasure and displeasure; or because it exerciseth some faculty wherein they take pride, and so entertaineth them in good humour and pleasing conceits toward themselves; or because it advanceth any other their ends. So that, as it is said of untrue valours, that some mens valours are in the eyes of them that look on; so such mens industries are in the eyes of others, or at least in regard of their own designments: only learned men love business, as an action according to nature, as agreeable to health of mind, as exercise is to health of body, taking pleasure in the action itself, and not in the purchase: so that of all men they are the most indefatigable, if it be towards any business which can hold or detain their mind.

And if any man be laborious in reading and study, and yet idle in business and action, it groweth from some weakness of body, or softness of spirit; such as Seneca speaketh of: *Quidam tam sunt umbratiles, ut putent in turbido esse, quicquid in luce est*; and not of learning: well may it be, that such a point of a man's nature may make him give himself to learning, but it is not learning that breedeth any such point in his nature.

And that learning should take up too much time or leisure: I answer; the most active or busy man, that hath been or can be, hath, no question, many vacant times of leisure, while he expecteth the tides and returns of business (except he be either tedious and of no dispatch, or lightly and unworthily ambitious to meddle in things that may be better done by others:) and then the question is but, how those spaces and times of leisure shall be filled and spent; whether in pleasures, or in studies; as was well answered by Demosthenes to his adversary Æschines, that was a man given to pleasure, and told him, that his orations did smell of the lamp: "Indeed, said Demosthenes, there is a great difference between the things that you and I do by lamp-light." So as no man need doubt, that learning will expulse business; but rather it will keep and defend the possession of the mind against idleness

idleness and pleasure, which otherwise at unawares may enter, to the prejudice of both.

Again, for that other conceit, that learning should undermine the reverence of laws and government, it is assuredly a mere depravation and calumny, without any shadow of truth. For to say, that a blind custom of obedience should be a surer obligation, than duty taught and understood; it is to affirm, that a blind man may tread surer by a guide, than a seeing man can by a light. And it is without all controversy, that learning doth make the minds of men gentle, generous, amiable, and pliant to government; whereas ignorance makes them churlish, thwarting, and mutinous: and the evidence of time doth clear this assertion, considering that the most barbarous, rude, and unlearned times have been most subject to tumults, seditions, and changes.

And as to the judgment of Cato the Censor, he was well punished for his blasphemy against learning, in the same kind wherein he offended; for when he was past threescore years old, he was taken with an extreme desire to go to school again, and to learn the Greek tongue, to the end to peruse the Greek authors; which doth well demonstrate, that his former censure of the Grecian learning was rather an affected gravity, than according to the inward sense of his own opinion. And as for Virgil's verses, though it pleased him to brave the world in taking to the Romans the art of empire, and leaving to others the arts of subjects; yet so much is manifest, that the Romans never ascended to that height of empire, till the time they had ascended to the height of other arts. For in the time of the two first Cæsars, which had the art of government in greatest perfection, there lived the best poet, Virgilius Maro; the best historiographer, Titus Livius; the best antiquary, Marcus Varro; and the best, or second orator, Marcus Cicero, that to the memory of man are known. As for the accusation of Socrates, the time must be remembered when it was prosecuted; which was under the thirty tyrants, the most base, bloody, and envious persons that have governed; which revolution of state was no sooner over, but Socrates, whom they had made a person criminal, was made a person heroical, and his memory accumulate with honours divine and human: and those discourses of his, which were then termed corrupting of manners, were after acknowledged for sovereign medicines of the mind and manners, and so have been received ever since till this day. Let this therefore serve for answer to politicians, which, in their humorous severity, or in their feigned gravity, have presumed to throw imputations upon learning; which redargution, nevertheless (save that we know not whether our labours may extend to other ages) were not needful for the present, in regard of the love and reverence towards learning, which the example and countenance of two so learned princes, queen Elizabeth, and your majesty, being as Castor and Pollux, *lucida sidera*, stars of excellent light and most benign influence, hath wrought in all men of place and authority in our nation.

Now therefore we come to that third sort of discredit, or diminution of credit, that groweth unto learning from learned men themselves, which commonly cleaveth fastest: it is either from their fortune, or from their manners, or from the nature of their studies. For the first, it is not in their power; and the second is accidental; the third only is proper to be handled: but because we are not in hand with true measure, but with popular estimation and conceit, it is not amiss to speak somewhat of the two former. The derogations therefore, which grow to learning from

the fortune or condition of learned men, are either in respect of scarcity of means, or in respect of privateness of life, and meanness of employments.

Concerning want, and that it is the case of learned men usually to begin with little, and not to grow rich so fast as other men, by reason they convert not their labours chiefly to lucre and increase: It were good to leave the common place in commendation of poverty to some frier to handle, to whom much was attributed by Machiavel in this point; when he said, "That the kingdom of the clergy had been long before at an end, if the reputation, and reverence towards the poverty of friers had not borne out the scandal of the superfluities and excesses of bishops and prelates." So a man might say, that the felicity and delicacy of princes and great persons had long since turned to rudeness and barbarism, if the poverty of learning had not kept up civility and honour of life: but, without any such advantages, it is worthy the observation, what a reverend and honoured thing poverty of fortune was, for some ages, in the Roman state, which nevertheless was a state without paradoxes: for we see what Titus Livius saith in his introduction: *Caeterum aut me amor negotii suscepti fallit, aut nulla unquam respublica nec major, nec sanctior, nec bonis exemplis ditior fuit; nec in quam tam serae avaritia luxuriaque immigraverint; nec ubi tantus ac tam diu paupertati ac parsimoniae honos fuerit.* We see likewise, after that the state of Rome was not itself, but did degenerate, how that person, that took upon him to be counsellor to Julius Cæsar after his victory, where to begin his restoration of the state, maketh it of all points the most summary to take away the estimation of wealth: *Verumbaec, et omnia mala pariter cum honore pecuniae desinent, si neque magistratus, neque alia vulgo cupienda, venalia erunt.* To conclude this point, as it was truly said, that *rubor est virtutis color*, though sometimes it comes from vice: so it may be fitly said that *paupertas est virtutis fortuna*; though sometimes it may proceed from misgovernment and accident. Surely Solomon hath pronounced it both in censure, *Qui festinat ad divitias, non erit insons*; and in precept; *Buy the truth, and sell it not*; and so of wisdom and knowledge; judging that means were to be spent upon learning, and not learning to be applied to means. And as for the privateness, or obscureness (as it may be in vulgar estimation accounted) of life of contemplative men; it is a theme so common, to extol a private life not taxed with sensuality and sloth, in comparison, and to the disadvantage of a civil life, for safety, liberty, pleasure, and dignity, or at least freedom from indignity, as no man handleth it, but handleth it well: such a consonancy it hath to mens conceits in the expressing, and to mens consents in the allowing. This only I will add, that learned men forgotten in states, and not living in the eyes of men, are like the images of Cassius and Brutus in the funeral of Junia; of which not being represented, as many others were, Tacitus saith, *Eo ipso graefulgebant, quod non visebantur.*

And for meanness of employment, that which is most traduced to contempt, is, that the government of youth is commonly allotted to them; which age, because it is the age of least authority, it is transferred to the disesteeming of those employments wherein youth is conversant, and which are conversant about youth. But how unjust this traducement is (if you will reduce things from popularity of opinion to measure of reason) may appear in that, we see men are more curious what they put into a new vessel, than into a vessel seasoned; and what mould they lay about a young plant, than about a plant corroborate; so as the weakest terms and times of all things use to have the best applications and helps. And will you hearken

to the Hebrew Rabbins? *Your young men shall see visions, and your old men shall dream dreams*: say they, youth is the worthier age, for that visions are nearer apparitions of God, than dreams. And let it be noted, that howsoever the condition of life of pedants hath been scorned upon theatres, as the ape of tyranny; and that the modern looseness or negligence hath taken no due regard to the choice of schoolmasters and tutors; yet the ancient wisdom of the best times did always make a just complaint, that states were too busy with their laws, and too negligent in point of education: which excellent part of ancient discipline hath been in some sort revived of late times, by the colleges of the jesuits; of whom, although in regard of their superstition I may say, *quo meliores, eo deteriores*; yet in regard of this, and some other points concerning human learning and moral matters, I may say, as Agesilaus said to his enemy Pharnabazus, *Talis quum sis, utinam noster esses*. And thus much touching the discredits drawn from the fortunes of learned men.

As touching the manners of learned men, it is a thing personal and individual: and no doubt there be amongst them, as in other professions, of all temperatures; but yet so as it is not without truth, which is said, that *abeunt studia in mores*, studies have an influence and operation upon the manners of those that are conversant in them.

But upon an attentive and indifferent review, I, for my part, cannot find any disgrace to learning can proceed from the manners of learned men not inherent to them as they are learned; except it be a fault (which was the supposed fault of Demosthenes, Cicero, Cato the second, Seneca, and many more) that, because the times they read of are commonly better than the times they live in, and the duties taught better than the duties practised, they contend sometimes too far to bring things to perfection, and to reduce the corruption of manners to honesty of precepts, or examples of too great height. And yet hereof they have caveats enough in their own walks. For Solon, when he was asked whether he had given his citizens the best laws, answered wisely, "Yea, of such as they would receive:" and Plato, finding that his own heart could not agree with the corrupt manners of his country, refused to bear place or office; saying, "That a man's country was to be used as his parents were, that is, with humble persuasions, and not with contestations." And Caesar's counsellor put in the same caveat, *Non ad vetera instituta revocans, quae jampridem corruptis moribus ludibrio sunt*: and Cicero noteth this error directly in Cato the second, when he writes to his friend Atticus; *Cato optime sentit, sed nocet interdum reipublicae; loquitur enim tanquam in republica Platonis, non tanquam in faece Romuli*. And the same Cicero doth excuse and expugn the philosophers for going too far, and being too exact in their precepts, when he saith, *Isti ipsi praeceptores virtutis, et magistri videntur fines officiorum paulo longius, quam natura vellet, protulisse, ut cum ad ultimum animo contendissemus, ibi tamen, ubi oportet, confisteremus*: and yet himself might have said, *Monitis sum minor ipse meis*; for it was his own fault, though not in so extreme a degree.

Another fault likewise much of this kind hath been incident to learned men; which is, that they have esteemed the preservation, good and honour of their countries or masters, before their own fortunes or safeties. For so saith Demosthenes unto the Athenians: "If it please you to note it, my counsels unto you are not such, whereby I should grow great amongst you, and you become little amongst the Grecians: but they be of that nature, as they are sometimes not good for me to give, but are always good for you to follow." And to Seneca,

after he had consecrated that *Quinquennium Neronis* to the eternal glory of learned governors, held on his honest and loyal course of good and free counsel, after his master grew extremely corrupt in his government. Neither can this point otherwise be ; for learning endueth mens minds with a true sense of the frailty of their persons, the casualty of their fortunes, and the dignity of their soul and vocation : so that it is impossible for them to esteem that any greatness of their own fortune can be a true or worthy end of their being and ordainment ; and therefore are desirous to give their account to God, and so likewise to their masters under God (as kings and the states that they serve) in these words ; *Ecce tibi lucre feci*, and not *Ecce mihi lucre feci* : whereas the corrupter sort of mere politicians, that have not their thoughts established by learning in the love and apprehension of duty, nor ever look abroad into universality, do refer all things to themselves, and thrust themselves into the centre of the world, as if all lines should meet in them and their fortunes ; never caring, in all tempests, what becomes of the ship of state, so they may save themselves in the cockboat of their own fortune ; whereas men that feel the weight of duty, and know the limits of self-love, use to make good their places and duties, though with peril. And if they stand in seditious and violent alterations, it is rather the reverence which many times both adverse parties do give to honesty, than any versatile advantage of their own carriage. But for this point of tender sense, and fast obligation of duty, which learning doth endue the mind withal, howsoever fortune may tax it, and many in the depth of their corrupt principles may despise it, yet it will receive an open allowance, and therefore needs the less disproof or excusation.

Another fault incident commonly to learned men, which may be more probably defended than truly denied, is, that they fail sometimes in applying themselves to particular persons : which want of exact application ariseth from two causes ; the one, because the largeness of their mind can hardly confine itself to dwell in the exquisite observation or examination of the nature and customs of one person : for it is a speech for a lover, and not for a wise man : *Satis magnum alter alteri theatrum sumus*. Nevertheless I shall yield, that he that cannot contract the sight of his mind, as well as disperse and dilate it, wanteth a great faculty. But there is a second cause, which is no inability, but a rejection upon choice and judgment : for the honest and just bounds of observation, by one person upon another, extend no farther, but to understand him sufficiently, whereby not to give him offence, or whereby to be able to give him faithful counsel, or whereby to stand upon reasonable guard and caution, in respect of a man's self : but to be speculative into another man, to the end to know how to work him, or wind him, or govern him, proceedeth from a heart that is double and cloven, and not entire and ingenuous ; which as in friendship it is want of integrity, so towards princes or superiors is want of duty. For the custom of the Levant, which is, that subjects do forbear to gaze or fix their eyes upon princes, is in the outward ceremony barbarous, but the moral is good : for men ought not, by cunning and bent observations, to pierce and penetrate into the hearts of kings, which the Scripture hath declared to be inscrutable.

There is yet another fault (with which I will conclude this part) which is often noted in learned men, that they do many times fail to observe decency and discretion in their behaviour and carriage, and commit errors in small and ordinary points of action, so as the vulgar sort of capacities do make a judgment of them in greater matters,

matters, by that which they find wanting in them is smaller. But this consequence doth often deceive men, for which I do refer them over to that which was said by Themistocles, arrogantly and uncivilly being applied to himself out of his own mouth; but, being applied to the general state of this question, pertinently and justly; when, being invited to touch a lute, he said, "he could not fiddle, but he could make a small town a great state." So, no doubt, many may be well seen in the passages of government and policy, which are to seek in little and punctual occasions. I refer them also to that which Plato said of his master Socrates, whom he compared to the gallypots of apothecaries, which on the outside had apes and owls, and antiques, but contained within sovereign and precious liquors and confections; acknowledging, that to an external report he was not without superficial levities and deformities, but was inwardly replenished with excellent virtues and powers. And so much touching the point of manners of learned men.

But in the mean time I have no purpose to give allowance to some conditions and courtes base and unworthy, wherein divers professors of learning have wronged themselves, and gone too far; such as were those trencher philosophers, which in the later age of the Roman state were usually in the houses of great persons, being little better than solemn parasites; of which kind, Lucian maketh a merry description of the philosopher that the great lady took to ride with her in her coach, and would needs have him carry her little dog, which he doing officiously, and yet uncomely, the page scoffed, and said, "That he doubted, the philosopher of a Stoic would turn to be a Cynic." But above all the rest, the gross and palpable flattery, whereunto many, not unlearned, have abused and abused their wits and pens, turning, as Du Bartas saith, Hecuba into Helena, and Faustina into Lucretia, hath most diminished the price and estimation of learning. Neither is the modern dedication of books and writings, as to patrons to be commended: for that books, such as are worthy the name of books, ought to have no patrons, but truth and reason. And the ancient custom was, to dedicate them only to private and equal friends, or to intitle the books with their names; or if to kings and great persons, it was to some such as the argument of the book was fit and proper for: but these and the like courses may deserve rather reprehension than defence.

Not that I can tax or condemn the morigeration or application of learned men to men in fortune. For the answer was good that Diogenes made to one that asked him in mockery, "How it came to pass that philosophers were the followers of rich men, and not rich men of philosophers?" He answered soberly, and yet sharply, "Because the one sort knew what they had need of, and the other did not." And of the like nature was the answer which Aristippus made, when having a petition to Dionysius, and no ear given to him, he fell down at his feet; whereupon Dionysius stay'd, and gave him the hearing, and granted it; and afterward some person, tender on the behalf of Philosophy, reproved Aristippus, that he would offer the profession of philosophy such an indignity, as for a private suit to fall at a tyrant's feet. But he answered, "It was not his fault, but it was the fault of Dionysius that he had his ears in his feet." Neither was it accounted weakness, but discretion in him that would not dispute his best with Adrianus Cæsar; excusing himself, "That it was reason to yield to him that commanded thirty legions." These and the like applications, and stooping to points of necessity and convenience, cannot be disallowed: for though they may have some outward baseness,

ness, yet in a judgment truly made, they are to be accounted submissions to the occasion, and not to the person.

Now I proceed to those errors and vanities, which have intervened amongst the studies themselves of the learned, which is that which is principal and proper to the present argument; wherein my purpose is not to make a justification of the errors, but, by a censure and separation of the errors, to make a justification of that which is good and sound, and to deliver that from the aspersions of the other. For we see, that it is the manner of men to scandalize and deprave that which retaineth the state and virtue, by taking advantage upon that which is corrupt and degenerate; as the heathens in the primitive church used to blemish and taint the Christians with the faults and corruptions of heretics. But nevertheless I have no meaning at this time to make any exact animadversion of the errors and impediments in matters of learning, which are more secret and remote from vulgar opinion, but only to speak unto such as do fall under, or near unto, a popular observation.

There be therefore chiefly three vanities in studies, whereby learning hath been most traduced. For those things we do esteem vain, which are either false or frivolous, those which either have no truth, or no use: and those persons we esteem vain, which are either credulous or curious; and curiosity is either in matter, or words: so that in reason as well as in experience, there fall out to be these three distempers, as I may term them, of learning: the first fantastical learning; the second, contentious learning; and the last delicate learning; vain imaginations, vain altercations, and vain affectations; and with the last I will begin.

Martin Luther, conducted no doubt by an higher providence, but in discourse of reason, finding what a province he had undertaken against the bishop of Rome, and the degenerate traditions of the church, and finding his own solitude, being no ways aided by the opinions of his own time, was enforced to awake all antiquity, and to call former times to his succour, to make a party against the present time. So that the ancient authors, both in divinity, and in humanity, which had long time slept in libraries, began generally to be read and revolved. This by consequence did draw on a necessity of a more exquisite travel in the languages original, wherein those authors did write, for the better understanding of those authors, and the better advantage of pressing and applying their words. And thereof grew again a delight in their manner of style and phrase, and an admiration of that kind of writing; which was much furthered and precipitated by the enmity and opposition, that the propounders of those primitive, but seeming new, opinions had against the schoolmen, who were generally of the contrary part, and whose writings were altogether in a differing stile and form, taking liberty to coin, and frame new terms of art to express their own sense, and to avoid circuit of speech, without regard to the pureness, pleasantness, and, as I may call it, lawfulness, of the phrase or word. And again, because the great labour then was with the people, of whom the Pharisees were wont to say, *Execrabilis ista turba, quae non novit legem*; for the winning and persuading of them, there grew of necessity in chief price and request, eloquence and variety of discourse, as the fittest and forciblest access into the capacity of the vulgar sort: so that these four causes concurring, the admiration of ancient authors, the hate of the schoolmen, the exact study of languages, and the efficacy of preaching, did bring in an

an affected study of eloquence, and *copia* of speech, which then began to flourish. This grew speedily to an excess; for men began to hunt more after words than matter; and more after the choiceness of the phrase, and the round and clean composition of the sentence, and the sweet falling of the clauses, and the varying and illustration of their works with tropes and figures, than after the weight of matter, worth of subject, soundness of argument, life of invention, or depth of judgment. Then grew the flowing and watry vein of Olorius, the Portugal bishop, to be in price. Then did Sturmius spend such infinite and curious pains upon Cicero the orator, and Hermogenes the rhetorician, besides his own books of periods, and imitation, and the like. Then did Car of Cambridge, and Ascham, with their lectures and writings, almost deify Cicero and Demosthenes, and allure all young men, that were studious, unto that delicate and polished kind of learning. Then did Erasmus take occasion to make the scoffing echo; *Decem annos consumpsi in legendo Cicerone*: and the echo answered in Greek, *Ὀὐε, Ἀσινε*. Then grew the learning of the schoolmen to be utterly despised as barbarous. In sum, the whole inclination and bent of those times was rather towards *copia*, than weight.

Here therefore is the first distemper of learning, when men study words, and not matter: whereof though I have represented an example of late times, yet it hath been, and will be *secundum majus et minus* in all time. And how is it possible but this should have an operation to discredit learning, even with vulgar capacities, when they see learned mens works like the first letter of a patent, or limned book; which though it hath large flourishes, yet it is but a letter? It seems to me that Pygmalion's frenzy is a good emblem or portraiture of this vanity: for words are but the images of matter, and except they have life of reason and invention, to fall in love with them is all one, as to fall in love with a picture.

But yet, notwithstanding, it is a thing not hastily to be condemned, to clothe and adorn the obscurity, even of philosophy itself, with sensible and plausible elocution; for hereof we have great examples in Xenophon, Cicero, Seneca, Plutarch, and of Plato also in some degree; and hereof likewise there is great use: for surely, to the severe inquisition of truth, and the deep progress into philosophy, it is some hindrance; because it is too early satisfactory to the mind of man, and quenqueth the desire of farther search, before we come to a just period: but then, if a man be to have any use of such knowledge in civil occasions, of conference, counsel, persuasion, discourse, or the like; then shall he find it prepared to his hands in those authors which write in that manner. But the excess of this is so justly contemptible, that as Hercules, when he saw the image of Adonis, Venus's minion, in a temple, said in disdain, *Nil sacri es*; so there is none of Hercules's followers in learning, that is, the more severe and laborious sort of inquirers into truth, but will despite those delicacies and affectations, as indeed capable of no divineness. And thus much of the first disease or distemper of learning.

The second, which followeth, is in nature worse than the former: for as substance of matter is better than beauty of words, so, contrariwise, vain matter is worse than vain words; wherein it seemeth the reprehension of St. Paul was not only proper for those times, but prophetic for the times following; and not only respective to divinity, but extensive to all knowledge: *Devita profanas vocum novitates, et oppositiones falsi nominis scientiae*. For he assigneth two marks and badges of suspected and falsified science: the one, the novelty and strangeness of terms; the other, the strictness of positions, which of necessity doth induce oppositions, and so

fo questions and altercations. Surely, like as many substances in nature which are solid, do putrify and corrupt into worms; so it is the property of good and sound knowledge, to putrify and dissolve into a number of subtle, idle, unwholsom, and, as I may term them, vermiculate questions, which have indeed a kind of quickness, and life of spirit, but no soundness of matter, or goodness of quality. This kind of degenerate learning did chiefly reign amongst the schoolmen, who, having sharp and strong wits, and abundance of leisure, and small variety of reading; but their wits being shut up in the cells of a few authors, chiefly Aristotle their dictator, as their persons were shut up in the cells of monasteries and colleges, and knowing little history, either of nature or time, did out of no great quantity of matter, and infinite agitation of wit, spin out unto us those laborious webs of learning, which are extant in their books. For the wit and mind of man, if it work upon matter, which is the contemplation of the creatures of God, worketh according to the stuff, and is limited thereby: but if it work upon itself, as the spider worketh his web, then it is endless, and brings forth indeed cobwebs of learning, admirable for the fineness of thread and work, but of no substance or profit.

This same unprofitable subtilty or curiosity is of two sorts; either in the subject itself that they handle, when it is a fruitless speculation, or controversy, whereof there are no small number both in divinity and philosophy, or in the manner or method of handling of a knowledge, which amongst them was this; upon every particular position or assertion to frame objections, and to those objections, solutions; which solutions were for the most part not confutations, but distinctions: whereas indeed the strength of all sciences is, as the strength of the old man's faggot, in the band. For the harmony of a science, supporting each part the other, is and ought to be the true and brief confutation and suppression of all the smaller sort of objections. But, on the other side, if you take out every axiom, as the sticks of the faggot, one by one, you may quarrel with them, and bend them, and break them at your pleasure: so that as was said of Seneca, *Verborum minutiis rerum frangit pondera*; so a man may truly say of the schoolmen, *Quaestionum minutiis scientiarum frangunt soliditatem*. For were it not better for a man in a fair room, to set up one great light, or branching candlestick of lights, than to go about with a small watch candle into every corner? And such is their method, that rests not so much upon evidence of truth proved by arguments, authorities, similitudes, examples, as upon particular confutations and solutions of every scruple, cavillation, and objection; breeding for the most part one question, as fast as it solveth another; even as in the former resemblance, when you carry the light into one corner, you darken the rest: so that the fable and fiction of *Scylla* seemeth to be a lively image of this kind of philosophy or knowledge, who was transformed into a comely virgin for the upper parts; but then, *Candida succinctam, latrantibus inguina monstribus*: so the generalities of the schoolmen are for a while good and proportionable; but then, when you descend into their distinctions and decisions, instead of a fruitful womb, for the use and benefit of man's life, they end in monstrous altercations, and barking questions. So as it is not possible but this quality of knowledge must fall under popular contempt, the people being apt to condemn truth upon occasion of controversies and altercations, and to think they are all out of their way which never meet: and when they see such digladiation about subtilties, and matters of no use or moment, they easily fall upon that judgment of Dionysius of Syracuse, *Verba ista sunt senum otioforum*.

Notwith-

Notwithstanding, certain it is that if those schoolmen to their great thirst of truth, and unwearied travel of wit, had joined variety and universality of reading and contemplation, they had proved excellent lights, to the great advancement of all learning and knowledge; but as they are, they are great undertakers indeed, and fierce with dark keeping: but as in the inquiry of the divine truth, their pride inclined to leave the oracle of God's word, and to vanish in the mixture of their own inventions; so in the inquisition of nature, they ever left the oracle of God's works, and adored the deceiving and deformed images, which the unequal mirror of their own minds, or a few received authors or principles, did represent unto them. And thus much for the second disease of learning.

For the third vice or disease of learning, which concerneth deceit or untruth, it is of all the rest the foulest; as that which doth destroy the essential form of knowledge; which is nothing but a representation of truth; for the truth of being, and the truth of knowing are one, differing no more than the direct beam, and the beam reflected. This vice therefore brancheth itself into two sorts; delight in deceiving, and aptness to be deceived; imposture and credulity; which although they appear to be of a diverse nature, the one seeming to proceed of cunning, and the other of simplicity; yet certainly they do for the most part concur: for as the verse noteth,

Percontatorem fugito, nam garrulus idem est:

an inquisitive man is a prattler: so upon the like reason, a credulous man is a deceiver: as we see it in fame, that he that will easily believe rumours, will as easily augment rumours, and add somewhat to them of his own; which Tacitus wisely noteth, when he saith, *Fingunt simul creduntque*: so great an affinity hath fiction and belief.

This facility of credit, and accepting or admitting things weakly authorized or warranted, is of two kinds, according to the subject: for it is either a belief of history, as the lawyers speak, matter of fact; or else of matter of art and opinion: as to the former, we see the experience and inconvenience of this error in ecclesiastical history, which hath too easily received and registered reports and narrations of miracles wrought by martyrs, hermits, or monks of the desert, and other holy men, and their relicks, shrines, chapels, and images: which though they had a passage for time, by the ignorance of the people, the superstitious simplicity of some, and the politic toleration of others, holding them but as divine poesies: yet after a period of time, when the mist began to clear up, they grew to be esteemed but as old wives fables, impostures of the clergy, illusions of spirits, and badges of antichrist, to the great scandal and detriment of religion.

So in natural history, we see there hath not been that choice and judgment used as ought to have been, as may appear in the writings of Plinius, Cardanus, Albertus, and divers of the Arabians, being fraught with much fabulous matter, a great part not only untried, but notoriously untrue, to the great derogation of the credit of natural philosophy with the grave and sober kind of wits: wherein the wisdom and integrity of Aristotle is worthy to be observed, that, having made so diligent and exquisite a history of living creatures, hath mingled it sparingly with any vain or feigned matter; and yet, on the other side, hath cast all prodigious narrations, which he thought worthy the recording, into one book: excellently discerning that matter of manifest truth, such, whereupon observation and rule was to be built, was not to be mingled or weakened with matter of doubtful credit; and yet

again, that rarities and reports that seem incredible, are not to be suppressed or denied to the memory of men.

And as for the facility of credit which is yielded to arts and opinions, it is likewise of two kinds, either when too much belief is attributed to the arts themselves, or to certain authors in any art. The sciences themselves which have had better intelligence and confederacy with the imagination of man, than with his reason, are three in number: astrology, natural magic, and alchemy; of which sciences, nevertheless, the ends or pretences are noble. For astrology pretendeth to discover that correspondence, or concatenation, which is between the superior globe and the inferior. Natural magic pretendeth to call and reduce natural philosophy from variety of speculations to the magnitude of works; and alchemy pretendeth to make separation of all the unlike parts of bodies, which in mixtures of nature are incorporate. But the derivations and prosecutions to these ends, both in the theories, and in the practices, are full of error and vanity; which the great professors themselves have fought to veil over and conceal by enigmatical writings, and referring themselves to auricular traditions and such other devices, to save the credit of impostors: and yet surely to alchemy this right is due, that it may be compared to the husbandman whereof Æsop makes the fable; that, when he died, told his sons, that he had left unto them gold buried under ground in his vineyard; and they digged over all the ground, and gold they found none; but by reason of their stirring and digging the mould about the roots of their vines, they had a great vintage the year following: so assuredly the search and stir to make gold hath brought to light a great number of good and fruitful inventions and experiments, as well for the disclosing of nature, as for the use of man's life.

And as to the overmuch credit that hath been given unto authors in sciences, in making them dictators, that their words should stand; and not consuls to give advice; the damage is infinite that sciences have received thereby, as the principal cause that hath kept them low, at a stay, without growth or advancement. For hence it hath come, that in arts mechanical, the first deviser comes shortest, and time addeth and perfecteth: but in sciences, the first author goeth farthest, and time loseth and corrupteth. So we see, artillery, sailing, printing, and the like, were grossly managed at the first, and by time accommodated and refined: but contrariwise the philosophies and sciences of Aristotle, Plato, Democritus, Hippocrates, Euclides, Archimedes, of most vigour at the first, are by time degenerate and imbas'd; whereof the reason is no other, but that in the former many wits and industries have contributed in one; and in the latter, many wits and industries have been spent about the wit of some one, whom many times they have rather depraved than illustrated. For as water will not ascend higher than the level of the first spring-head from whence it descendeth, so knowledge derived from Aristotle, and exempted from liberty of examination, will not rise again higher than the knowledge of Aristotle. And therefore although the position be good, *Oportet discipulum credere*; yet it must be coupled with this, *Oportet doctum judicare*: for disciples do owe unto masters only a temporary belief, and a suspension of their own judgment till they be fully instructed, and not an absolute resignation, or perpetual captivity: and therefore, to conclude this point, I will say no more; but so let great authors have their due, as time, which is the author of authors, be not deprived of his due, which is, farther and farther to discover truth. Thus I have gone over these three diseases of learning; besides the which, there

are some other rather peccant humours than formed diseases, which nevertheless are not so secret and intrinsic, but that they fall under a popular observation and traducement, and therefore are not to be passed over.

The first of these is the extreme affecting of two extremities: the one antiquity, the other novelty; wherein it seemeth the children of time do take after the nature and malice of the father. For as he devoureth his children, so one of them seeketh to devour and suppress the other, while antiquity envieth there should be new additions, and novelty cannot be content to add, but it must deface; surely, the advice of the prophet is the true direction in this matter, *State super vias antiquas, et videte quatenam sit via recta, et bona, et ambulate in ea.* Antiquity deserveth that reverence, that men should make a stand thereupon, and discover what is the best way; but when the discovery is well taken, then to make progression. And to speak truly, *Antiquitas sæculi, juvenus mundi.* These times are the ancient times when the world is ancient, and not those which we account ancient *ordine retrogrado*, by a computation backward from ourselves.

Another error, induced by the former, is a distrust that any thing should be now to be found out, which the world should have missed and passed over so long time; as if the same objection were to be made to time, that Lucian maketh to Jupiter, and other the heathen gods, of which he wondereth that they begot so many children in old time, and begot none in his time; and asketh whether they were become septuagenary, or whether the law Papia, made against old mens marriages, had restrained them. So it seemeth men doubt, lest time is become past children and generation; wherein, contrariwise, we see commonly the levity and inconstancy of mens judgments, which till a matter be done, wonder that it can be done; and, as soon as it is done, wonder again that it was no sooner done; as we see in the expedition of Alexander into Asia, which at first was prejudged as a vast and impossible enterprise: and yet afterwards it pleaseth Livy to make no more of it than this; *Nil aliud, quam bene ausus est vana contemnere:* and the same happened to Columbus in the western navigation. But in intellectual matters it is much more common; as may be seen in most of the propositions of Euclid, which till they be demonstrated, they seem strange to our assent; but being demonstrated, our mind accepteth of them by a kind of relation, as the lawyers speak, as if we had known them before.

Another error that hath also some affinity with the former, is a conceit, that of former opinions or sects, after variety and examination, the best hath still prevailed, and suppressed the rest: so as, if a man should begin the labour of a new search, he were but like to light upon somewhat formerly rejected, and by rejection brought into oblivion; as if the multitude, or the wisest, for the multitude's sake, were not ready to give passage, rather to that which is popular and superficial, than to that which is substantial and profound: for the truth is, that time seemeth to be of the nature of a river or stream, which carrieth down to us that which is light and blown up, and sinketh and drowneth that which is weighty and solid.

Another error, of a diverse nature from all the former, is the over early and peremptory reduction of knowledge into arts and methods; from which time commonly sciences receive small or no augmentation. But as young men, when they knit and shape perfectly, do seldom grow to a farther stature: so knowledge, while it is in aphorisms and observations, it is in growth; but when it once is comprehended in exact methods, it may perchance be farther polished and illustrated,

and accommodated for use and practice; but it increaseth no more in bulk and substance.

Another error which doth succeed that which we last mentioned, is, that after the distribution of particular arts and sciences, men have abandoned universality, or *philosophia prima*; which cannot but cease, and stop all progression. For no perfect discovery can be made upon a flat or a level: neither is it possible to discover the more remote, and deeper parts of any science, if you stand but upon the level of the same science, and ascend not to a higher science.

Another error hath proceeded from too great a reverence, and a kind of adoration of the mind and understanding of man: by means whereof, men have withdrawn themselves too much from the contemplation of nature, and the observations of experience, and have tumbled up and down in their own reason and conceits. Upon these intellectualists, which are, notwithstanding, commonly taken for the most sublime and divine philosophers, Heraclitus gave a just censure, saying, "Men sought truth in their own little worlds, and not in the great and common world;" for they disdain to spell, and so by degrees to read in the volume of God's works; and contrariwise, by continual meditation and agitation of wit, do urge and as it were invoke their own spirits to divine, and give oracles unto them, whereby they are deservedly deluded.

Another error that hath some connexion with this latter, is, that men have used to infect their meditations, opinions, and doctrines, with some conceits which they have most admired, or some sciences which they have most applied; and given all things else a tincture according to them, utterly untrue and improper. So hath Plato intermingled his philosophy with theology, and Aristotle with logic; and the second school of Plato, Proclus, and the rest, with the mathematics. For these were the arts which had a kind of primogeniture with them severally. So have the alchemists made a philosophy out of a few experiments of the furnace; and Gilbertus, our countryman, hath made a philosophy out of the observations of a loadstone. So Cicero, when, reciting the several opinions of the nature of the soul, he found a musician, that held the soul was but a harmony, saith pleasantly, *Hic ab arte sua non recessit, etc.* But of these conceits Aristotle speaketh seriously and wisely, when he saith, *Qui respiciunt ad pauca, de facili pronuntiant.*

Another error is an impatience of doubt, and haste to assertion without due and mature suspension of judgment. For the two ways of contemplation are not unlike the two ways of action, commonly spoken of by the ancients: the one plain and smooth in the beginning, and in the end impassable; the other rough and troublesome in the entrance, but after a while fair and even: so it is in contemplation; if a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties.

Another error is in the manner of the tradition and delivery of knowledge, which is for the most part magisterial and peremptory; and not ingenuous and faithful, in a sort, as may be soonest believed; and not easiest examined. It is true, that in compendious treatises for practice, that form is not to be disallowed. But in the true handling of knowledge, men ought not to fall either, on the one side, into the vein of Velleius the Epicurean: *Nil tam metuens, quam ne dubitare aliqua de re videretur*: nor, on the other side, into Socrates his ironical doubting of all things; but to propound things sincerely, with more or less asseveration, as they stand in a man's own judgment proved more or less.

Other

Other errors there are in the scope that men propound to themselves, whereunto they bend their endeavours: for whereas the more constant and devote kind of professors of any science ought to propound to themselves to make some additions to their science, they convert their labours to aspire to certain second prizes; as to be a profound interpreter, or commentator; to be a sharp champion or defender; to be a methodical compounder or abridger: and so the patrimony of knowledge cometh to be sometimes improved, but seldom augmented.

But the greatest error of all the rest, is the mistaking or misplacing of the last or farthest end of knowledge: for men have entered into a desire of learning and knowledge, sometimes upon a natural curiosity, and inquisitive appetite; sometimes to entertain their minds with variety and delight; sometimes for ornament and reputation; and sometimes to enable them to victory of wit and contradiction; and most times for lucre and profession; and seldom sincerely to give a true account of their gift of reason, to the benefit and use of men: as if there were sought in knowledge a couch, whereupon to rest a searching and restless spirit; or a terrace, for a wandering and variable mind to walk up and down with a fair prospect; or a tower of state, for a proud mind to raise itself upon; or a fort or commanding ground, for strife and contention; or a shop, for profit, or sale; and not a rich storehouse, for the glory of the Creator, and the relief of man's estate. But this is that which will indeed dignify and exalt knowledge, if contemplation and action may be more nearly and straitly conjoined and united together than they have been; a conjunction like unto that of the two highest planets, Saturn, the planet of rest and contemplation, and Jupiter, the planet of civil society and action: howbeit, I do not mean, when I speak of use and action, that end before-mentioned of the applying of knowledge to lucre and profession; for I am not ignorant how much that diverteth and interrupteth the prosecution and advancement of knowledge, like unto the golden ball thrown before Atalanta, which while she goeth aside and stoopeth to take up, the race is hinder'd;

Declinant cursus, aurumque volubile tollit.

Neither is my meaning, as was spoken of Socrates, to call philosophy down from heaven to converse upon the earth; that is, to leave natural philosophy aside, and to apply knowledge only to manners and policy. But as both heaven and earth do conspire and contribute to the use and benefit of man; so the end ought to be, from both philosophies to separate and reject vain speculations, and whatsoever is empty and void, and to preserve and augment whatsoever is solid and fruitful: that knowledge may not be, as a courtesan, for pleasure and vanity only, or as a bond-woman, to acquire and gain to her master's use; but as a spouse, for generation, fruit, and comfort.

Thus have I described and opened, as by a kind of dissection, those peccant humours, the principal of them, which have not only given impediment to the proficience of learning, but have given also occasion to the traducement thereof: wherein if I have been too plain, it must be remember'd, *Fidelia vulnera amantis, sed dolosa oscula malignantis.*

This, I think, I have gained, that I ought to be the better believed in that which I shall say pertaining to commendation; because I have proceeded so freely in that which concerneth censure. And yet I have no purpose to enter into a laudative of learning, or to make a hymn to the muses, though I am of opinion that it is long since their rites were duly celebrated: but my intent is, without varnish

or

or amplification, justly to weigh the dignity of knowledge in the balance with other things, and to take the true value thereof by testimonies and arguments divine and human.

FIRST therefore, let us seek the dignity of knowledge in the archetype or first platform, which is in the attributes and acts of God, as far as they are revealed to man, and may be observed with sobriety; wherein we may not seek it by the name of learning; for all learning is knowledge acquired, and all knowledge in God is original: and therefore we must look for it by another name, that of wisdom or sapience, as the Scriptures call it.

It is so then, that in the work of the creation we see a double emanation of virtue from God; the one referring more properly to power, the other to wisdom; the one expressed in making the subsistence of the matter, and the other in disposing the beauty of the form. This being supposed, it is to be observed, that, for any thing which appeareth in the history of the creation, the confused mass and matter of heaven and earth was made in a moment; and the order and disposition of that chaos, or mass, was the work of six days; such a note of difference it pleased God to put upon the works of power, and the works of wisdom: wherewith concurrerth, that in the former it is not set down that God said, *Let there be heaven and earth*, as it is set down of the works following; but actually, that God made heaven and earth: the one carrying the stile of a manufacture, and the other of a law, decree, or council.

To proceed to that which is next in order, from God to spirits. We find, as far as credit is to be given to the celestial hierarchy of that supposed Dionysius the senator of Athens, the first place or degree is given to the angels of love, which are termed Seraphim; the second, to the angels of light, which are termed Cherubim; and the third, and so following places, to thrones, principalities, and the rest, which are all angels of power and ministry; so as the angels of knowledge and illumination are placed before the angels of office and domination.

To descend from spirits and intellectual forms to sensible and material forms; we read the first form that was created was light, which hath a relation and correspondence in nature and corporal things to knowledge in spirits and incorporeal things.

So in the distribution of days, we see, the day wherein God did rest, and contemplate his own works, was blessed above all the days wherein he did effect and accomplish them.

After the creation was finished, it is set down unto us, that man was placed in the garden to work therein; which work, so appointed to him, could be no other than work of contemplation; that is, when the end of work is but for exercise and experiment, not for necessity; for there being then no reluctance of the creature, nor sweat of the brow, man's employment must of consequence have been matter of delight in the experiment, and not matter of labour for the use. Again, the first acts which man performed in paradise, consisted of the two summary parts of knowledge; the view of creatures, and the imposition of names. As for the knowledge which induced the fall, it was, as was touched before, not the natural knowledge of creatures, but the moral knowledge of good and evil; wherein the supposition was, that God's commandments or prohibitions were not the originals of good and evil, but

but that they had other beginnings, which man aspired to know, to the end to make a total defection from God, and to depend wholly upon himself.

To pass on : in the first event or occurrence after the fall of man, we see, as the Scriptures have infinite mysteries, not violating at all the truth of the story or letter, an image of the two estates, the contemplative state, and the active state, figured in the two persons of Abel and Cain, and in the two simplest and most primitive trades of life, that of the shepherd, who, by reason of his leisure, rest in a place, and living in view of heaven, is a lively image of a contemplative life ; and that of the husbandman : where we see again, the favour and election of God went to the shepherd, and not to the tiller of the ground.

So in the age before the flood, the holy records within those few memorials, which are there enter'd and register'd, have vouchsafed to mention, and honour the name of the inventors and authors of music, and works in metal. In the age after the flood, the first great judgment of God upon the ambition of man was the confusion of tongues : whereby the open trade and intercourse of learning and knowledge was chiefly imbarred.

To descend to Moses the lawgiver, and God's first pen : he is adorned by the Scriptures with this addition and commendation, that he was *seen in all the learning of the Egyptians* ; which nation, we know, was one of the most ancient schools of the world : for so Plato brings in the Ægyptian priest saying unto Solon ; “ You Grecians are ever children, you have no knowledge of antiquity, nor antiquity of knowledge.” Take a view of the ceremonial law of Moses ; you shall find, besides the prefiguration of Christ, the badge or difference of the people of God, the exercise and impression of obedience, and other divine uses and fruits thereof, that some of the most learned Rabbins have travelled profitably, and profoundly to observe, some of them a natural, some of them a moral sense, or reduction of many of the ceremonies and ordinances. As in the law of the leprosy, where it is said, *If the whiteness have overspread the flesh, the patient may pass abroad for clean ; but if there be any whole flesh remaining, he is to be shut up for unclean* : one of them noteth a principle of nature, that putrefaction is more contagious before maturity, than after : and another noteth a position of moral philosophy, that men, abandoned to vice do not so much corrupt manners, as those that are half-good and half-evil. So in this, and very many other places in that law, there is to be found, besides the theological sense, much asperision of philosophy.

So likewise in that excellent book of Job, if it be revolved with diligence, it will be found pregnant, and swelling with natural philosophy ; as for example, cosmography, and the roundness of the world : *Qui extendit aquilonem super vacuum, et appendit terram super nihilum* ; wherein the pensileness of the earth, the pole of the north, and the finiteness or convexity of heaven are manifestly touched. So again, matter of astronomy ; *Spiritus ejus ornavit coelos, et obstetricante manu ejus educus est Coluber tortuosus*. And in another place ; *Nunquid conjungere valebis micantes stellas Pleiadas, aut gyrum Arcturi poteris dissipare ?* Where the fixing of the stars, ever standing at equal distance, is with great elegancy noted. And in another place, *Qui facit Arcturum, et Oriona, et Hyadas, et interiora Austri* ; where again he takes knowledge of the depression of the southern pole, calling it the secrets of the south, because the southern stars were in that climate unseen. Matter of generation, *Armen sicut lac mulsisti me, et sicut caseum coagulasti me, etc.* Matter of minerals, *Haber argentum*.

argentum venarum suarum principia : et auro locus est in quo conflatur, ferrum de terra tollitur, et lapis solutus calore in aes vertitur : and so forwards in that chapter.

So likewise in the person of Solomon the king, we see the gift or endowment of wisdom and learning, both in Solomon's petition, and in God's assent thereunto, preferred before all other terrene and temporal felicity. By virtue of which grant or donative of God, Solomon became enabled, not only to write those excellent parables, or aphorisms, concerning divine and moral philosophy; but also to compile a natural history of all verdure, from the cedar upon the mountain to the moss upon the wall, which is but a rudiment between putrefaction and an herb, and also of all things that breathe or move. Nay, the same Solomon the king, although he excelled in the glory of treasure and magnificent buildings, of shipping and navigation, of service and attendance, of fame and renown, and the like, yet he maketh no claim to any of those glories, but only to the glory of inquisition of truth; for so he saith expressly, *The glory of God is to conceal a thing, but the glory of the king is to find it out*; as if, according to the innocent play of children, the Divine Majesty took delight to hide his works, to the end to have them found out; and as if kings could not obtain a greater honour than to be God's playfellows in that game, considering the great commandment of wits and means, whereby nothing needeth to be hidden from them.

Neither did the dispensation of God vary in the times after our Saviour came into the world; for our Saviour himself did first shew his power to subdue ignorance, by his conference with the priests and doctors of the law, before he shewed his power to subdue nature by his miracles. And the coming of the Holy Spirit was chiefly figured and expressed in the similitude and gift of tongues, which are but *vehicula scientiae*.

So in the election of those instruments, which it pleased God to use for the plantation of the faith, notwithstanding that at the first he did employ persons altogether unlearned, otherwise than by inspiration, more evidently to declare his immediate working, and to abase all human wisdom or knowledge; yet, nevertheless, that counsel of his was no sooner performed, but in the next vicissitude and succession, he did send his divine truth into the world, waited on with other learnings, as with servants or handmaids: for so we see St. Paul, who was only learned amongst the apostles, had his pen most used in the Scriptures of the New Testament.

So again, we find that many of the ancient bishops and fathers of the Church were excellently read, and studied in all the learning of the heathen; insomuch, that the edict of the emperor Julianus, whereby it was interdicted unto Christians to be admitted into schools, lectures, or exercises of learning, was esteemed and accounted a more pernicious engine and machination against the Christian faith, than were all the sanguinary prosecutions of his predecessors; neither could the emulation and jealousy of Gregory the first of that name, bishop of Rome, ever obtain the opinion of piety or devotion; but contrariwise received the censure of humour, malignity, and pusillanimity, even amongst holy men; in that he designed to obliterate and extinguish the memory of heathen antiquity and authors. But contrariwise it was the Christian church, which, amidst the inundations of the Scythians on the one side from the north-west, and the Saracens from the east, did preserve, in the sacred lap and bosom thereof, the precious relics even of heathen learning, which otherwise had been extinguished, as if no such thing had ever been.

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And we see before our eyes, that in the age of ourselves and our fathers, when it pleased God to call the church of Rome to account for their degenerate manners and ceremonies, and sundry doctrines obnoxious, and framed to uphold the same abuses; at one and the same time it was ordained by the divine providence, that there should attend withal a renovation, and new spring of all other knowledges: and, on the other side, we see the Jesuits, who partly in themselves, and partly by the emulation and provocation of their example, have much quickened and strengthened the state of learning: we see, I say, what notable service and reparation they have done to the Roman see.

Wherefore, to conclude this part, let it be observed, that there be two principal duties and services, besides ornament and illustration, which philosophy and human learning do perform to faith and religion. The one, because they are an effectual inducement to the exaltation of the glory of God. For as the Psalms and other Scriptures do often invite us to consider, and magnify the great and wonderful works of God; so if we should rest only in the contemplation of the exterior of them, as they first offer themselves to our senses, we should do a like injury unto the majesty of God, as if we should judge or construe of the store of some excellent jeweller, by that only which is set out toward the street in his shop. The other, because they minister a singular help and preservative against unbelief and error: for our Saviour saith, *You err, not knowing the Scriptures, nor the power of God*; laying before us two books or volumes to study, if we will be secured from error; first, the Scriptures, revealing the will of God; and then the creatures, expressing his power: whereof the latter is a key unto the former; not only opening our understanding to conceive the true sense of the Scriptures, by the general notions of reason and rules of speech; but chiefly opening our belief, in drawing us into a due meditation of the omnipotency of God, which is chiefly signed and engraven upon his works. Thus much therefore for divine testimony and evidence, concerning the true dignity and value of learning.

As for human proofs, it is so large a field, as, in a discourse of this nature and brevity, it is fit rather to use choice of those things which we shall produce, than to embrace the variety of them. First therefore, in the degrees of human honour amongst the heathen, it was the highest, to obtain to a veneration and adoration as a God. This unto the Christians is as the forbidden fruit. But we speak now separately of human testimony; according to which, that which the Grecians call *apothēosis*, and the Latins, *relatio inter divos*, was the supreme honour which man could attribute unto man; especially when it was given, not by a formal decree or act of state, as it was used among the Roman emperors, but by an inward assent and belief. Which honour being so high, had also a degree of middle term: for there were reckoned above human honours, honours heroical and divine: in the attribution and distribution of which honours, we see, antiquity made this difference: that whereas founders and uniters of states and cities, lawgivers, extirpers of tyrants, fathers of the people, and other eminent persons in civil merit, were honoured but with the titles of worthies or demi-gods; such as were Hercules, Theseus, Minos, Romulus, and the like: on the other side, such as were inventors and authors of new arts, endowments, and commodities towards man's life, were ever consecrated amongst the gods themselves: as were Ceres, Bacchus, Mercurius, Apollo, and others; and justly: for the merit of the former is confined within the circle of an age or a nation; and is like fruitful showers, which though they

be profitable and good, yet serve but for that season, and for a latitude of ground where they fall : but the other is indeed like the benefits of heaven, which are permanent and universal. The former, again, is mixed with strife and perturbation ; but the latter hath the true character of divine presence, coming *in aura leni*, without noise or agitation.

Neither is certainly that other merit of learning, in repressing the inconveniences which grow from man to man, much inferior to the former, of relieving the necessities which arise from nature ; which merit was lively set forth by the ancients in that feigned relation of Orpheus's theatre, where all beasts and birds assembled, and, forgetting their several appetites, some of prey, some of game, some of quarrel, stood all sociably together listening to the airs and accords of the harp ; the sound whereof no sooner ceased, or was drowned by some louder noise, but every beast returned to his own nature : wherein is aptly described the nature and condition of men, who are full of savage and unreclaimed desires of profit, of lust, of revenge ; which as long as they give ear to precepts, to laws, to religion, sweetly touched with eloquence and persuasion of books, of sermons, of harangues, so long is society and peace maintained : but if these instruments be silent, or that sedition and tumult make them not audible, all things dissolve into anarchy and confusion.

But this appeareth more manifestly, when kings themselves, or persons of authority under them, or other governors in commonwealths and popular estates, are endued with learning. For although he might be thought partial to his own profession, that said, " Then should people and estates be happy, when either kings " were philosophers, or philosophers kings ;" yet so much is verified by experience, that under learned princes and governors there have been ever the best times : for howsoever kings may have their imperfections in their passions and customs ; yet if they be illuminated by learning, they have those notions of religion, policy, and morality, which do preserve them ; and refrain them from all ruinous and peremptory errors and excesses, whispering evermore in their ears, when counsellors and servants stand mute and silent. And senators, or counsellors likewise, which be learned, do proceed upon more safe and substantial principles, than counsellors which are only men of experience ; the one sort keeping dangers afar off, whereas the other discover them not till they come near hand, and then trust to the agility of their wit to ward off or avoid them.

Which felicity of times under learned princes, to keep still the law of brevity, by using the most eminent and selected examples, doth best appear in the age which passed from the death of Domitian the emperor, until the reign of Commodus ; comprehending a succession of six princes, all learned, or singular favourers and advancers of learning ; which age, for temporal respects, was the most happy and flourishing that ever the Roman empire, which then was a model of the world, enjoyed ; a matter revealed and prefigured unto Domitian in a dream the night before he was slain ; for he thought there was grown behind upon his shoulders a neck and a head of gold : which came accordingly to pass in those golden times which succeeded ; of which princes we will make some commemoration ; wherein although the matter will be vulgar, and may be thought fitter for a declamation, than agreeable to a treatise enfolded as this is ; yet because it is pertinent to the point in hand, *neque semper arcum tendit Apollo*, and to name them only were too naked and cursory, I will not omit it altogether.

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The first was Nerva, the excellent temper of whose government is by a glance in Cornelius Tacitus touched to the life: *Postquam divus Nerva res olim insociabiles miscuisset, imperium et libertatem.* And in token of his learning, the last act of his short reign, left to memory, was a missive to his adopted son Trajan, proceeding upon some inward discontent at the ingratitude of the times, comprehended in a verse of Homer's;

Telis, Phoebe, tuis lacrymas ulciscere nostras.

Trajan, who succeeded, was for his person not learned: but if we will hearken to the speech of our Saviour, that saith, *He that receiveth a prophet in the name of a prophet, shall have a prophet's reward,* he deserveth to be placed amongst the most learned princes; for there was not a greater admirer of learning, or benefactor of learning; a founder of famous libraries, a perpetual advancer of learned men to office, and a familiar converser with learned professors and preceptors, who were noted to have then most credit in court. On the other side, how much Trajan's virtue and government was admired and renowned, surely no testimony of grave and faithful history doth more lively set forth, than that legend tale of Gregorius Magnus, bishop of Rome, who was noted for the extreme envy he bore towards all heathen excellency; and yet he is reported, out of the love and estimation of Trajan's moral virtues, to have made unto God passionate and fervent prayers for the delivery of his soul out of hell; and to have obtained it, with a caveat, that he should make no more such petitions. In this prince's time also, the persecutions against the Christians received intermission, upon the certificate of Plinius Secundus, a man of excellent learning, and by Trajan advanced.

Adrian, his successor, was the most curious man that lived, and the most universal inquirer; insomuch as it was noted for an error in his mind, that he desired to comprehend all things, and not to reserve himself for the worthiest things; falling into the like humour that was long before noted in Philip of Macedon, who when he would needs over-rule and put down an excellent musician, in an argument touching music, was well answered by him again, "God forbid, Sir, saith he, that your fortune should be so bad, as to know these things better than I." It pleased God likewise to use the curiosity of this emperor, as an inducement to the peace of his church in those days. For having Christ in veneration, not as a God or Saviour, but as a wonder or novelty; and having his picture in his gallery, matched it with Apollonius, with whom, in his vain imagination he thought he had some conformity; yet it served the turn to allay the bitter hatred of those times against the christian name, so as the church had peace during his time. And for his government civil, although he did not attain to that of Trajan's, in the glory of arms, or perfection of justice; yet in deserving of the weal of the subject he did exceed him. For Trajan erected many famous monuments and buildings, insomuch as Constantine the Great in emulation was wont to call him *Parietaria*, wall-flower, because his name was upon so many walls: but his buildings and works were more of glory and triumph than use and necessity. But Adrian spent his whole reign, which was peaceable, in a perambulation, or survey of the Roman empire; giving order, and making assignation where he went, for re-edifying of cities, towns, and forts decayed, and for cutting of rivers and streams, and for making bridges and passages, and for policying of cities and commonalties with new ordinances and constitutions, and granting new franchises and incorporations; so that his whole time was a very reiteration of all the lapses and decayes of former times.

Antoninus Pius, who succeeded him, was a prince excellently learned ; and had the patient and subtle wit of a schoolman ; infomuch as in common speech, which leaves no virtue untaxed, he was called *cymini sector*, a carver, or a divider of cumin-feed, which is one of the least seeds ; such a patience he had and settled spirit, to enter into the least and most exact differences of causes ; a fruit no doubt of the exceeding tranquillity and serenity of his mind ; which being no ways charged or incumbered, either with fears, remorse or scruples, but having been noted for a man of the purest goodness, without all fiction or affectation, that hath reigned or lived, made his mind continually present and intire. He likewise approached a degree nearer unto christianity, and became, as Agrippa said unto St. Paul, *half a Christian* ; holding their religion and law in good opinion, and not only ceasing persecution, but giving way to the advancement of Christians.

There succeeded him the first *divi fratres*, the two adoptive brethren, Lucius Commodus Verus, son to Ælius Verus, who delighted much in the softer kind of learning, and was wont to call the poet Martial his Virgil : and Marcus Aurelius Antoninus, whereof the latter, who obscured his colleague, and survived him long, was named the philosopher ; who as he excelled all the rest in learning, so he excelled them likewise in perfection of all royal virtues ; infomuch as Julianus the emperor, in his book, intitled *Cæsares*, being as a pasquil or satire to deride all his predecessors, feigned, that they were all invited to a banquet of the gods, and Silenus the Jester sat at the nether end of the table, and bestowed a scoff on every one as they came in ; but when Marcus Philosophus came in, Silenus was gravelled, and out of countenance, not knowing where to carp at him, save at the last he gave a glance at his patience towards his wife. And the virtue of this prince, continued with that of his predecessor, made the name of Antoninus so sacred in the world, that though it were extremely dishonoured in Commodus, Caracalla, and Heliogabalus, who all bore the name ; yet when Alexander Severus refused the name, because he was a stranger to the family, the senate with one acclamation said, *Quo modo Augustus, sic et Antoninus*. In such renown and veneration was the name of these two princes in those days, that they would have had it as a perpetual addition in all the emperors stiles. In this emperor's time also, the church for the most part was in peace ; so as in this sequence of six princes, we do see the blessed effects of learning in sovereignty, painted forth in the greatest table of the world.

But for a tablet, or picture of smaller volume, not presuming to speak of your majesty that liveth, in my judgment the most excellent is that of queen Elizabeth your immediate predecessor in this part of Britain ; a princess that, if Plutarch were now alive to write lives by parallels, would trouble him, I think, to find for her a parallel amongst women. This lady was endued with learning in her sex singular, and great even amongst masculine princes ; whether we speak of learning, of language, or of science, modern or ancient, divinity or humanity : and unto the very last year of her life, she accustomed to appoint set hours for reading ; scarcely any young student in an university, more daily, or more duly. As for her government, I assure myself, I shall not exceed, if I do affirm, that this part of the island never had forty-five years of better times ; and yet not through the calmness of the season, but through the wisdom of her regimen.

For if there be considered of the one side, the truth of religion established ; the constant peace and security ; the good administration of justice ; the temperate use of the prerogative, not slackened, nor much strained ; the flourishing state of
learning,

learning, so comfortable to so excellent a patroness; the convenient estate of wealth and means, both of crown and subject; the habit of obedience, and the moderation of discontents: and there be considered, on the other side, the differences of religion, the troubles of neighbour countries, the ambition of Spain, and opposition of Rome; and then, that she was solitary, and of herself: these things, I say, considered, as I could not have chosen an instance so recent and so proper, so, I suppose, I could not have chosen one more remarkable or eminent to the purpose now in hand, which is concerning the conjunction of learning in the prince, with felicity in the people.

Neither hath learning an influence and operation only upon civil merit and moral virtue, and the arts or temperance of peace and peaceable government; but likewise it hath no less power and efficacy in enablement towards martial and military virtue and prowess; as may be notably represented in the examples of Alexander the great, and Cæsar the dictator, mentioned before, but now in fit place to be resumed; of whose virtues and acts in war there needs no note or recital, having been the wonders of time in that kind: but of their affections towards learning, and perfections in learning, it is pertinent to say somewhat.

Alexander was bred and taught under Aristotle the great philosopher, who dedicated divers of his books of philosophy unto him: he was attended with Callithenes, and divers other learned persons, that followed him in camp, throughout his journeys and conquests. What price and estimation he had learning in, doth notably appear in these three particulars: first, in the envy he used to express that he bore towards Achilles, in this, that he had so good a trumpet of his praises as Homer's verses: secondly, in the judgment or solution he gave touching that precious cabinet of Darius, which was found amongst his jewels, whereof question was made what thing was worthy to be put into it, and he gave his opinion for Homer's works: thirdly in his letter to Aristotle, after he had set forth his books of nature, wherein he expostulateth with him for publishing the secrets or mysteries of philosophy; and gave him to understand that himself esteemed it more to excel other men in learning and knowledge, than in power and empire. And what use he had of learning doth appear, or rather shine in all his speeches and answers, being full of science and use of science, and that in all variety.

And here again it may seem a thing scholastical, and somewhat idle, to recite things that every man knoweth; but yet, since the argument I handle leadeth me thereunto, I am glad that men shall perceive I am as willing to flatter, if they will so call it, an Alexander, or a Cæsar, or an Antoninus, that are dead many hundred years since, as any that now liveth: for it is the displaying the glory of learning in sovereignty that I propound to myself, and not an humour of declaiming in any man's praises. Observe then the speech he used of Diogenes, and see if it tend not to the true state of one of the greatest questions of moral philosophy; whether the enjoying of outward things, or the contemning of them, be the greatest happiness: for when he saw Diogenes so perfectly contented with so little, he said to those that mocked at his condition; "Were I not Alexander, I would wish to be Diogenes." But Seneca inverteth it, and saith; *Plus erat, quod hic nollet accipere, quam quod ille posset dare.* "There were more things which Diogenes would have refused, than those were, which Alexander could have given or enjoyed."

Observe again that speech which was usual with him, "That he felt his mortality chiefly in two things, sleep and lust;" and see if it were not a speech extracted

out of the depth of natural philosophy, and liker to have come out of the mouth of Aristotle, or Democritus, than from Alexander.

See again that speech of humanity and poesy ; when upon the bleeding of his wounds, he called unto him one of his flatterers, that was wont to ascribe to him divine honour, and said, “ Look, this is very blood ; this is not such liquor as “ Homer speaketh of, which ran from Venus’s hand, when it was pierced by “ Diomedes.”

See likewise his readiness in reprehension of logic, in the speech he used to Cassander, upon a complaint that was made against his father Antipater : for when Alexander happened to say, “ Do you think these men would have come from so “ far to complain, except they had just cause of grief ? ” And Cassander answered, “ Yea, that was the matter, because they thought they should not be disproved.” Said Alexander laughing : “ See the subtilties of Aristotle, to take a matter both ways, *pro et contra*,” etc.

But note again how well he could use the same art, which he reprehended, to serve his own humour, when bearing a secret grudge to Callisthenes, because he was against the new ceremony of his adoration, feasting one night, where the same Callisthenes was at the table, it was moved by some after supper, for entertainment sake, that Callisthenes, who was an eloquent man, might speak of some theme or purpose, at his own choice : which Callisthenes did ; choosing the praise of the Macedonian nation for his discourse, and performing the same with so good manner, as the hearers were much ravished : whereupon Alexander, nothing pleased, said, “ It was easy to be eloquent upon so good a subject. But,” saith he, “ turn “ your stile, and let us hear what you can say against us : ” which Callisthenes presently undertook, and did with that sting and life, that Alexander interrupted him, and said, “ The goodness of the cause made him eloquent before, and despite “ made him eloquent then again.”

Consider farther, for tropes of rhetoric, that excellent use of a metaphor or translation, wherewith he taxed Antipater, who was an imperious and tyrannous governor : for when one of Antipater’s friends commended him to Alexander for his moderation, that he did not degenerate, as his other lieutenants did, into the Persian pride in use of purple, but kept the ancient habit of Macedon, of black : “ True, saith Alexander, but Antipater is all purple within.” Or that other, when Parmenio came to him in the plain of Arbela, and shewed him the innumerable multitude of his enemies, especially as they appeared by the infinite number of lights, as it had been a new firmament of stars, and thereupon advised him to assail them by night : whereupon he answered, “ That he would not steal “ the victory.”

For matter of policy weigh that significant distinction, so much in all ages embraced, that he made between his two friends, Hephæstion and Craterus, when he said, “ That the one loved Alexander, and the other loved the king : ” describing the principal difference of princes best servants, that some in affection love their person, and others in duty love their crown.

Weigh also that excellent taxation of an error, ordinary with counsellors of princes, that they counsel their masters according to the model of their own mind and fortune, and not of their masters ; when, upon Darius’s great offers, Parmenio had said, “ Surely I would accept these offers, were I as Alexander ; ” saith Alexander, “ So “ would I, were I as Parmenio.”

Lastly, weigh that quick and acute reply, which he made when he gave so large gifts to his friends and servants, and was asked what he did reserve for himself, and he answered, "Hope:" weigh, I say, whether he had not cast up his account right, because hope must be the portion of all that resolve upon great enterprises. For this was Cæsar's portion when he went first into Gaul, his estate being then utterly overthrown with largesses. And this was likewise the portion of that noble prince, howsoever transported with ambition, Henry duke of Guise, of whom it was usually said, that he was the greatest usurer in France, because he had turned all his estate into obligations.

To conclude therefore: as certain critics are used to say hyperbolically, "That if all sciences were lost, they might be found in Virgil;" so certainly this may be said truly, there are the prints and footsteps of all learning in those few speeches, which are reported of this prince: the admiration of whom, when I consider him not as Alexander the great, but as Aristotle's scholar, hath carried me too far.

As for Julius Cæsar, the excellency of his learning needeth not to be argued from his education, or his company, or his speeches; but in a farther degree doth declare itself in his writings and works; whereof some are extant and permanent, and some unfortunately perished. For, first, we see, there is left unto us that excellent history of his own wars, which he intitled only a commentary, wherein all succeeding times have admired the solid weight of matter, and the real passages, and lively images of actions and persons, expressed in the greatest propriety of words and perspicuity of narration that ever was; which that it was not the effect of a natural gift, but of learning and precept, is well witnessed by that work of his, intitled, *De analogia*, being a grammatical philosophy, wherein he did labour to make this same *vox ad placitum* to become *vox ad licitum*, and to reduce custom of speech to congruity of speech; and took, as it were, the picture of words from the life of reason.

So we receive from him, as a monument both of his power and learning, the then reformed computation of the year; well expressing, that he took it to be as great a glory to himself to observe and know the law of the heavens, as to give law to men upon the earth.

So likewise in that book of his, *Anti-Cato*, it may easily appear that he did aspire as well to victory of wit as victory of war; undertaking therein a conflict against the greatest champion with the pen that then lived, Cicero the orator.

So again in his book of *Apophthegms*, which he collected, we see that he esteemed it more honour to make himself but a pair of tables, to take the wise and pithy words of others, than to have every word of his own to be made an apophthegm, or an oracle; as vain princes, by custom of flattery, pretend to do. And yet if I should enumerate divers of his speeches, as I did those of Alexander, they are truly such as Solomon noteth, when he saith, *Verba sapientum tanquam aculei, et tanquam clavi in altum defixi*: whereof I will only recite three, not so delectable for elegancy, but admirable for vigour and efficacy.

As first, it is reason he be thought a master of words, that could with one word appease a mutiny in his army, which was thus: The Romans, when their generals did speak to their army, did use the word *Milites*, but when the magistrates spake to the people, they did use the word *Quirites*. The soldiers were in tumult, and seditiously prayed to be cashiered; not that they so meant, but by expostulation thereof to draw Cæsar to other conditions; wherein he being resolute not to give way,
after

after some silence, he began his speech, *Ego, Quirites*: which did admit them already cashiered; wherewith they were so surpris'd, cross'd, and confus'd, as they would not suffer him to go on in his speech, but relinquish'd their demands, and made it their suit, to be again call'd by the name of *Milites*.

The second speech was thus: Cæsar did extremely affect the name of king; and some were set on, as he pass'd by, in popular acclamation to salute him king: whereupon, finding the cry weak and poor, he put it off thus, in a kind of jest, as if they had mistak'n his surname; *Non rex sum, sed Cæsar*; a speech, that if it be search'd, the life and fulness of it can scarce be express'd: for, first, it was a refusal of the name, but yet not serious: again, it did signify an infinite confidence and magnanimity, as if he presum'd Cæsar was the greater title, as by his worthiness it is come to pass till this day; but chiefly, it was a speech of great allurem't toward his own purpose; as if the state did strive with him but for a name, whereof mean families were vest'd; for Rex was a surname with the Romans, as well as King is with us.

The last speech which I will mention, was us'd to Metellus; when Cæsar, after war declared, did possess himself of the city of Rome, at which time entering into the inner treasury to take the money there accumulated, Metellus, being tribune, forb'd him: whereto Cæsar said, "That if he did not desist, he would lay him dead in the place." And presently taking himself up, he added, "Young man, it is harder for me to speak it, than to do it:" *Adolescens, durius est mihi hoc dicere, quàm facere*. A speech compounded of the greatest terror and greatest clemency that could proceed out of the mouth of man.

But to return, and conclude with him: it is evident, himself knew well his own perfection in learning, and took it upon him; as appeared when, upon occasion that some spake what a strange resolution it was in Lucius Sylla to resign his dictatorship; he scoffing at him, to his own advantage, answer'd, "That Sylla could not skill of letters, and therefore knew not how to dictate."

And here it were fit to leave this point, touching the concurrence of military virtue and learning, for what example would come with any grace, after those two of Alexander and Cæsar? were it not in regard of the rareness of circumstance, that I find in one other particular, as that which did so suddenly pass from extreme scorn to extreme wonder; and it is of Xenophon the philosopher, who went from Socrates's school into Asia, in the expedition of Cyrus the younger, against king Artaxerxes. This Xenophon at that time was very young, and never had seen the wars before; neither had any command in the army, but only followed the war as a voluntary, for the love and conversation of Proxenus his friend: He was present when Falinus came in message from the great king to the Grecians, after that Cyrus was slain in the field, and they a handful of men left to themselves in the midst of the king's territories, cut off from their country by many navigable rivers, and many hundred miles. The message import'd, that they should deliver up their arms, and submit themselves to the king's mercy. To which message before answer was made, divers of the army confer'd familiarly with Falinus: and amongst the rest Xenophon happen'd to say, "Why, Falinus, we have now but these two things left, our arms and our virtue; and if we yield up our arms, how shall we make use of our virtue?" Whereto Falinus, smiling on him, said, "If I be not deceiv'd, young gentleman, you are an Athenian, and, I believe, you study philosophy, and it is pretty that you say; but you are much abus'd, if you think your
"virtue

“virtue can withstand the king’s power.” Here was the scorn: the wonder followed; which was, that this young scholar, or philosopher, after all the captains were murdered in parley by treason, conducted those ten thousand foot, through the heart of all the king’s high countries, from Babylon to Græcia in safety, in despite of all the king’s forces, to the astonishment of the world, and the encouragement of the Grecians in times succeeding to make invasion upon the kings of Persia; as was after purposed by Jason the Thessalian, attempted by Agésilæus the Spartan, and atchieved by Alexander the Macedonian, all upon the ground of the act of that young scholar.

To proceed now from imperial and military virtue to moral and private virtue: first, it is an assured truth, which is contained in the verses;

*Scilicet ingenuas didicisse fideliter artes,
Emollit mores, nec sinit esse feros.*

It taketh away the wildness and barbarism, and fierceness of mens minds: but indeed the accent had need be upon *fideliter*: for a little superficial learning doth rather work a contrary effect. It taketh away all levity, temerity, and insolency, by copious suggestion of all doubts and difficulties, and acquainting the mind to balance reasons on both sides, and to turn back the first offers and conceits of the mind, and to accept of nothing but examined and tried. It taketh away vain admiration of any thing, which is the root of all weakness: for all things are admired, either because they are new or because they are great. For novelty, no man that wadeth in learning or contemplation throughly, but will find that printed in his heart, *Nil novi super terram*. Neither can any man marvel at the play of puppets, that goeth behind the curtain, and adviseth well of the motion. And for magnitude, as Alexander the great, after that he was used to great armies, and the great conquests of the spacious provinces in Asia, when he received letters out of Greece, of some fights and services there, which were commonly for a passage, or a fort, or some walled town at the most, he said, “It seemed to him, that he was advertised “of the battle of the frogs and the mice, that the old tales went of.” So certainly, if a man meditate upon the universal frame of nature, the earth with men upon it, the divineness of souls excepted, will not seem much other than an ant-hill, where some ants carry corn, and some carry their young, and some go empty, and all to and fro a little heap of dust. It taketh away or mitigateth fear of death, or adverse fortune; which is one of the greatest impediments of virtue and imperfections of manners. For if a man’s mind be deeply seasoned with the consideration of the mortality and corruptible nature of things, he will easily concur with Epictetus, who went forth one day, and saw a woman weeping for her pitcher of earth that was broken; and went forth the next day, and saw a woman weeping for her son that was dead; and thereupon said, *Heri vidi fragilem frangi, hodie vidi mortalem mori*. And therefore Virgil did excellently and profoundly couple the knowledge of causes, and the conquest of all fears together, as *concomitantia*:

*Felix, qui potuit rerum cognoscere causas,
Quique metus omnes, et inexorabile fatum
Subjecit pedibus, strepitumque Acherontis ævari.*

It were too long to go over the particular remedies which learning doth minister to all the diseases of the mind, sometimes purging the ill humours, sometimes opening the obstructions, sometimes helping digestion, sometimes increasing appetite, sometimes healing the wounds and exulcerations thereof, and the like; and therefore

I will conclude with that which hath *rationem totius*, which is, that it disposeth the constitution of the mind not to be fixed or settled in the defects thereof, but still to be capable and susceptible of growth and reformation. For the unlearned man knows not what it is to descend into himself, or to call himself to account; nor the pleasure of that *suavissima vita, indies sentire se fieri meliorem*. The good parts he hath, he will learn to shew to the full, and use them dexterously, but not much to increase them: the faults he hath, he will learn how to hide and colour them, but not much to amend them: like an ill mower, that mows on still, and never whets his scythe. Whereas with the learned man it fares otherwise, that he doth ever intermix the correction and amendment of his mind, with the use and employment thereof. Nay, farther, in general and in sum certain it is, that *veritas* and *bonitas* differ but as the seal and the print: for truth prints goodness; and they be the clouds of error, which descend in the storms of passions and perturbations.

From moral virtue let us pass on to matter of power and commandment, and consider whether in right reason there be any comparable with that, wherewith knowledge investeth and crowneth man's nature. We see the dignity of the commandment is according to the dignity of the commanded: to have commandment over beasts, as herdmen have, is a thing contemptible; to have commandment over children, as schoolmasters have, is a matter of small honour; to have commandment over galley-slaves, is a disparagement, rather than an honour. Neither is the commandment of tyrants much better, over people which have put off the generosity of their minds: and therefore it was ever holden, that honours in free monarchies and commonwealths had a sweetness more than in tyrannies, because the commandment extendeth more over the wills of men, and not only over their deeds and services. And therefore, when Virgil putteth himself forth to attribute to Augustus Cæsar, the best of human honours, he doth it in these words:

Victorque volentes

Per populos dat jura, viamque affertat Olympo.

But yet the commandment of knowledge is higher than the commandment over the will; for it is a commandment over the reason, belief and understanding of man, which is the highest part of the mind, and giveth law to the will itself: for there is no power on earth, which setteth up a throne, or chair of state, in the spirits and souls of men, and in their cogitations, imaginations, opinions, and beliefs, but knowledge and learning. And therefore we see the detestable and extreme pleasure that arch-heretics, and false prophets, and impostors are transported with, when they once find in themselves that they have a superiority in the faith and conscience of men; so great, as, if they have once tasted of it, it is seldom seen that any torture or persecution can make them relinquish or abandon it. But as this is what the author of the *Revelation* calleth *the depth*, or profoundness, of *Satan*; so, by argument of contraries, the just and lawful sovereignty over mens understanding, by force of truth rightly interpreted, is that which approacheth nearest to the similitude of the divine rule.

As for fortune and advancement, the beneficence of learning is not so confined to give fortune only to states and commonwealths, as it doth not likewise give fortune to particular persons. For it was well noted long ago, that Homer hath given more men their livings, than either Sylla, or Cæsar, or Augustus ever did, notwithstanding their great largesses and donatives, and distributions of lands to so many legions; and no doubt it is hard to say, whether arms, or learning have advanced

vanced greater numbers. And in case of sovereignty we see, that if arms or descent have carried away the kingdom, yet learning hath carried the priesthood, which ever hath been in some competition with empire.

Again, for the pleasure and delight of knowledge and learning, it far surpasseth all other in nature: for, shall the pleasures of the affections so exceed the pleasures of the senses, as much as the obtaining of desire or victory exceedeth a song or a dinner; and must not, of consequence, the pleasures of the intellect, or understanding, exceed the pleasures of the affections? We see in all other pleasures there is satiety, and after they be used, their verdure departeth; which sheweth well they be but deceits of pleasure, and not pleasures; and that it was the novelty which pleased, and not the quality: and therefore we see that voluptuous men turn friers, and ambitious princes turn melancholy. But of knowledge there is no satiety, but satisfaction and appetite are perpetually interchangeable; and therefore appeareth to be good in itself simply, without fallacy or accident. Neither is that pleasure of small efficacy and contentment to the mind of man, which the poet Lucretius describeth elegantly,

Suave mari magno, turbantibus æquora ventis, etc.

“ It is a view of delight, saith he, to stand or walk upon the shore side, and to see a ship tossed with tempest upon the sea; or to be in a fortified tower, and to see two battles join upon a plain: but it is a pleasure incomparable, for the mind of man to be settled, landed, and fortified in the certainty of truth, and from thence to descry and behold the errors, perturbations, labours, and wanderings up and down of other men.”

Lastly, leaving the vulgar arguments, that by learning man excelleth man in that wherein man excelleth beasts; that by learning man ascendeth to the heavens and their motions, where in body he cannot come, and the like: let us conclude with the dignity and excellency of knowledge and learning in that whereunto man's nature doth most aspire, which is, immortality or continuance: for to this tendeth generation, and raising of houses and families; to this tend buildings, foundations, and monuments; to this tendeth the desire of memory, fame, and celebration, and in effect the strength of all other human desires. We see then how far the monuments of wit and learning are more durable than the monuments of power, or of the hands. For have not the verses of Homer continued twenty-five hundred years, or more, without the loss of a syllable or letter; during which time, infinite palaces, temples, castles, cities, have been decayed and demolished? It is not possible to have the true pictures or statues of Cyrus, Alexander, and Cæsar; no, nor of the kings or great personages of much later years; for the originals cannot last, and the copies cannot but lose of the life and truth. But the images of mens wits and knowledges remain in books, exempted from the wrong of time, and capable of perpetual renovation. Neither are they fitly to be called images, because they generate still, and cast their seeds in the minds of others, provoking and causing infinite actions and opinions in succeeding ages: so that, if the invention of the ship was thought so noble, which carrieth riches and commodities from place to place, and conjoiceth the most remote regions in participation of their fruits; how much more are letters to be magnified, which, as ships pass through the vast seas of time, and make ages so distant to participate of the wisdom, illuminations, and inventions, the one of the other? Nay farther, we see, some of the philosophers which were least divine, and most immersed in the senses, and denied generally the immortality of the soul;

yet came to this point, that whatsoever motions the spirit of man could act and perform without the organs of the body, they thought, might remain after death, which were only those of the understanding, and not of the affections, so immortal and incorruptible a thing did knowledge seem unto them to be. But we, that know by divine revelation, that not only the understanding, but the affections purified; not only the spirit but the body changed, shall be advanced to immortality, do disclaim these rudiments of the senses. But it must be remembered both in this last point, and so it may likewise be needful in other places, that in probation of the dignity of knowledge or learning, I did in the beginning separate divine testimony from human, which method I have pursued, and so handled them both apart.

Nevertheless I do not pretend, and I know it will be impossible for me, by any pleading of mine to reverse the judgment, either of Æsop's cock, that preferred the barley-corn before the gem; or of Midas, that being chosen judge between Apollo, president of the Muses, and Pan, god of the flocks, judged for plenty; or of Paris, that judged for beauty and love, against wisdom and power; or of Agrippina, *occidat matrem, modo imperet*, that preferred empire with any condition never so detestable; or of Ulysses, *qui vetulam prætulit immortalitati*, being a figure of those which prefer custom and habit before all excellency; or of a number of the like popular judgments. For these things must continue as they have been: but so will that also continue whereupon learning hath ever relied, and which faileth not: *justificata est Sapientia à filiis suis.*

T H E
 S E C O N D B O O K
 O F
F R A N C I S B A C O N:
 O F T H E
 P R O F I C I E N C E and A D V A N C E M E N T
 O F
 L E A R N I N G,
 D I V I N E and H U M A N.

 T O T H E K I N G.

IT might seem to have more convenience, though it come often otherwise to pass, excellent king, that those, which are fruitful in their generations, and have in themselves the foresight of immortality in their descendents, should likewise be more careful of the good estate of future times, unto which they know they must transmit and commend over their dearest pledges. Queen Elizabeth was a sojourner in the world, in respect of her unmarried life, and was a blessing to her own times; and yet so as the impresson of her good government, besides her happy memory, is not without some effect which doth survive her. But to your majesty, whom God hath already blessed with so much royal issue, worthy to continue and represent you for ever; and whose youthful and fruitful bed doth yet promise many the like renovations; it is proper and agreeable to be conversant, not only in the transitory parts of good government, but in those acts also which are in their nature permanent and perpetual: among the which, if affection do not transport me, there is not any more worthy, than the farther endowment of the world with sound and fruitful knowledge. For why should a few received authors stand up like Hercules's columns; beyond which there should be no sailing or discovering, since we have so bright and benign a star as your majesty, to conduct and prosper us? To return therefore where we left, it remaineth to consider of what kind those acts are, which have been undertaken and performed by kings and others for the increase and advancement of learning, wherein I purpose to speak actively, without digressing or dilating.

L. e. t

Let this ground therefore be laid, that all works are overcome by amplitude of reward, by soundness of direction, and by the conjunction of labours. The first multiplieth endeavour, the second preventeth error, and the third supplieth the frailty of man; but the principal of these is direction: for *claudus in via antevertit cursorem extra viam*; and Solomon excellently setteth it down, *If the iron be not sharp, it requireth more strength; but wisdom is that which prevaileth*: signifying, that the invention or election of the mean is more effectual than any inforcement or accumulation of endeavours. This I am induced to speak, for that, not derogating from the noble intention of any that have been deservers towards the state of learning, I do observe, nevertheless, that their works and acts are rather matters of magnificence and memory, than of progression and proficience, and tend rather to augment the mass of learning, in the multitude of learned men, than to rectify or raise the sciences themselves.

The works or acts of merit towards learning are conversant about three objects: the places of learning, the books of learning, and the persons of the learned. For as water, whether it be the dew of heaven, or the springs of the earth, doth scatter and lose itself in the ground, except it be collected into some receptacle, where it may by union comfort and sustain itself, and for that cause the industry of man hath made and framed spring-heads, conduits, cisterns, and pools, which men have accustomed likewise to beautify and adorn with accomplishments of magnificence and state, as well as of use and necessity; so this excellent liquor of knowledge, whether it descend from divine inspiration; or spring from human sense, would soon perish and vanish to oblivion, if it were not preserved in books, traditions, conferences, and places appointed; as universities, colleges, and schools, for the receipt and comforting of the same.

The works, which concern the seats and places of learning, are four; foundations and buildings, endowments with revenues, endowments with franchises and privileges, institutions and ordinances for government; all tending to quietness and privateness of life, and discharge of cares and troubles; much like the stations which Virgil prescribeth for the living of bees:

*Principio sedes apibus statioque petenda,
Quo neque sit ventis aditus, etc.*

The works touching books are two; first libraries, which are as the shrines where all the relicks of the ancient saints, full of true virtue, and that without delusion or imposture, are preserved and reposed: secondly, new editions of authors, with more correct impressions, more faithful translations, more profitable glosses, more diligent annotations, and the like.

The works pertaining to the persons of learned men, besides the advancement and countenancing of them in general, are two: the reward and designation of readers in sciences already extant and invented; and the reward and designation of writers and inquirers concerning any parts of learning not sufficiently laboured and prosecuted.

These are summarily the works and acts, wherein the merits of many excellent princes and other worthy personages have been conversant. As for any particular commemorations, I call to mind what Cicero said, when he gave general thanks; *Difficile non aliquem, ingratum quenquam praeterire*. Let us rather, according to the Scriptures, look unto that part of the race which is before us, than look back to that which is already attained.

First

First therefore, amongst so many great foundations of colleges in Europe, I find strange that they are all dedicated to professions, and none left free to arts and sciences at large. For if men judge that learning should be referred to action, they judge well; but in this they fall into the error described in the ancient fable, in which the other parts of the body did suppose the stomach had been idle, because it neither performed the office of motion, as the limbs do, nor of sense, as the head doth; but yet, notwithstanding, it is the stomach that digesteth and distributeth to all the rest: so if any man think philosophy and universality to be idle studies, he doth not consider that all professions are from thence served and supplied. And this I take to be a great cause, that hath hinder'd the progression of learning, because these fundamental knowledges have been studied but in passage. For if you will have a tree bear more fruit than it hath used to do, it is not any thing you can do to the boughs, but it is the stirring of the earth, and putting new mould about the roots, that must work it. Neither is it to be forgotten, that this dedicating of foundations and donations to professory learning, hath not only had a malign aspect and influence upon the growth of sciences, but hath also been prejudicial to states and governments. For hence it proceedeth that princes find a solitude in regard of able men to serve them in causes of state, because there is no education collegiate which is free, where such as were so disposed might give themselves to histories, modern languages, books of policy and civil discourse, and other the like enablements unto service of state.

And because founders of colleges do plant, and founders of lectures do water, it followeth well in order, to speak of the defect which is in public lectures; namely, in the smallness and meanness of the salary or reward which in most places is assigned unto them; whether they be lectures of arts, or of professions. For it is necessary to the progression of sciences, that readers be of the most able and sufficient men, as those which are ordained for generating and propagating of sciences, and not for transitory use. This cannot be, except their condition and endowment be such as may content the ablest man to appropriate his whole labour, and continue his whole age in that function and attendance, and therefore must have a proportion answerable to that mediocrity or competency of advancement, which may be expected from a profession, or the practice of a profession. So as, if you will have sciences flourish, you must observe David's military law, which was, "That those which staid with the carriage, should have equal part with those which were in the action;" else will the carriages be ill attended. So readers in sciences are indeed the guardians of the stores and provisions of sciences, whence men in active courses are furnished, and therefore ought to have equal entertainment with them; otherwise if the fathers in sciences be of the weakest sort, or be ill-maintained,

Et patrum invalidi referent juvenia nata.

Another defect I note, wherein I shall need some alchemist to help me, who call upon men to sell their books, and to build furnaces, quitting and forsaking Minerva and the Muses as barren virgins, and relying upon Vulcan. But certain it is, that unto the deep, fruitful, and operative study of many sciences, especially natural philosophy and physic, books be not only the instrumentals wherein also the beneficence of men hath not been altogether wanting: for, we see, spheres, globes, astrolabes, maps, and the like, have been provided as appurtenances to astronomy and cosmography, as well as books; we see likewise, that some places instituted for physic have annexed the commodity of gardens for simples of all sorts,
and

and do likewise command the use of dead bodies for anatomies. But these do respect but a few things. In general, there will hardly be any main proficience in the disclosing of nature, except there be some allowance for expences about experiments; whether they be experiments appertaining to Vulcanus or Dædalus, furnace or engine, or any other kind: and therefore as secretaries and spies of princes and states bring in bills for intelligence, so you must allow the spies and intelligencers of nature to bring in their bills, or else you shall be ill advertised.

And if Alexander made such a liberal assignation to Aristotle of treasure for the allowance of hunters, fowlers, fishers, and the like, that he might compile an history of nature, much better do they deserve it that travel in arts of nature.

Another defect which I note, is an intermission or neglect, in those which are governors in universities, of consultation; and in princes, or superior persons, of visitation: to enter into account and consideration, whether the readings, exercises, and other customs appertaining unto learning, anciently begun, and since continued, be well instituted or no, and thereupon to ground an amendment or reformation in that which shall be found inconvenient. For it is one of your majesty's own most wise and princely maxims, "That in all usages and precedents, the times be consider'd wherein they first began, which if they were weak or ignorant, it derogateth from the authority of the usage, and leaveth it for suspect." And therefore in as much as most of the usages and orders of the universities were derived from more obscure times, it is the more requisite they be re-examined. In this kind I will give an instance or two, for example sake, of things that are the most obvious and familiar: the one is a matter, which though it be ancient and general, yet I hold it to be an error, which is, that scholars in universities come too soon and too unripe to logic and rhetoric, arts fitter for graduates than children and novices; for these two, rightly taken, are the gravest of sciences, being the arts of arts, the one for judgment, the other for ornament. And they be the rules and directions how to set forth and dispose matter; and therefore for minds empty and unfraught with matter, and which have not gathered that which Cicero calleth *sylva* and *supellex*, stuff and variety, to begin with those arts, as if one should learn to weigh, or to measure, or to paint the wind, doth work but this effect, that the wisdom of those arts, which is great and universal, is almost made contemptible, and is degenerate into childish sophistry and ridiculous affectation. And farther, the untimely learning of them hath drawn on, by consequence, the superficial and unprofitable teaching and writing of them, as fittest indeed to the capacity of children. Another, is a lack I find in the exercises used in the universities, which do make too great a divorce between invention and memory; for their speeches are either premeditate *in verbis conceptis*, where nothing is left to invention; or merely extemporal, where little is left to memory; whereas in life and action there is least use of either of these, but rather of intermixtures of premeditation and invention, notes and memory; so as the exercise fitteth not the practice, nor the image the life; and it is ever a true rule in exercises, that they be framed as near as may be to the life of practice, for otherwise they do pervert the motions and faculties of the mind, and not prepare them. The truth whereof is not obscure, when scholars come to the practices of professions, or other actions of civil life, which when they set into, this want is soon found by themselves, and sooner by others. But this part, touching the amendment of the institutions and orders of universities, I will conclude with the clause of Cæsar's letter to Appius and Balbus, *Hoc quem-*

admodum

admodum fieri possit, nonnulla mihi in mentem veniunt, et multa reperiri possunt: de iis rebus rogo vos, ut cogitationem suscipiatis.

Another defect, which I note, ascendeth a little higher than the precedent: for as the proficiencie of learning consisteth much in the orders and institutions of universities in the same states and kingdoms, so it would be yet more advanced, if there were more intelligence mutual between the universities of Europe than now there is. We see there be many orders and foundations, which though they be divided under severall sovereignties and territories, yet they take themselves to have a kind of contract, fraternity, and correspondence one with another, insomuch as they have provincials and generals. And surely as nature createth brotherhood in families, and arts mechanical contract brotherhoods in commonalties, and the anointment of God superinduceth a brotherhood in kings and bishops: so in like manner there cannot but be a fraternity in learning and illumination, relating to that paternity which is attributed to God, who is called the father of illuminations or lights.

The last defect which I will note is, that there hath not been, or very rarely been, any public designation of writers or inquirers concerning such parts of knowledge, as may appear not to have been already sufficiently laboured or undertaken: unto which point it is an inducement to enter into a view and examination what parts of learning have been profecuted, and what omitted; for the opinion of plenty is amongst the causes of want, and the great quantity of books maketh a shew rather of superfluity than lack; which surcharge, nevertheless, is not to be remedied by making no more books, but by making more good books, which, as the serpent of Moses, might devour the serpents of the enchanters.

The removing of all the defects formerly enumerated, except the last, and of the active part also of the last, which is the designation of writers, are *opera besilica*; towards which the endeavours of a private man may be but as an image in a cross way, that may point at the way, but cannot go it. But the inducing part of the latter, which is the survey of learning, may be set forward by private travel: wherefore I will now attempt to make a general and faithful perambulation of learning, with an inquiry what parts thereof lie fresh and waste, and not improved and converted by the industry of man; to the end that such a plot, made and recorded to memory, may both minister light to any public designation, and also serve to excite voluntary endeavours: wherein nevertheless, my purpose is at this time to note only omissions and deficiencies, and not to make any redargution of errors, or incomplete profecutions: for it is one thing to set forth what ground lieth unmanured, and another thing to correct ill husbandry in that which is manured.

In the handling and undertaking of which work I am not ignorant what it is that I do now move and attempt, nor insensible of mine own weakness to sustain my purpose: but my hope is, that if my extreme love to learning carry me too far, I may obtain the excuse of affection; for that "it is not granted to man to love " and to be wise." But, I know well, I can use no other liberty of judgment than I must leave to others; and I, for my part, shall be indifferently glad either to perform myself, or accept from another, that duty of humanity; *Nam qui erranti comiter monstrat viam, etc.* I do foresee likewise, that of those things which I shall enter and register, as deficiencies and omissions, many will conceive and censure,

that some of them are already done and extant; others to be but curiosities, and things of no great use; and others to be of too great difficulty, and almost impossibility to be compassed and effected: but for the two first, I refer myself to the particulars; for the last, touching impossibility, I take it, those things are to be held possible which may be done by some person, though not by every one; and which may be done by many, though not by any one; and which may be done in succession of ages, though not within the hour-glass of one man's life; and which may be done by public designation, though not by private endeavour.

But, notwithstanding, if any man will take to himself rather that of Solomon, *Dicit piger, Leo est in via*, than that of Virgil, *Possunt quia posse videntur*: I shall be content that my labours be esteemed but as the better sort of wishes; for as it asketh some knowledge to demand a question not impertinent, so it requireth some sense to make a wish not absurd.

THE parts of human learning have reference to the three parts of man's Understanding, which is the seat of learning; History to his Memory, Poesy to his Imagination, and Philosophy to his Reason. Divine learning receiveth the same distribution, for the spirit of man is the same, though the revelation of oracle and sense be diverse: so as theology consisteth also of history of the church; of parables, which is divine poesy; and of holy doctrine or precept: for as for that part which seemeth supernumerary, which is prophecy, it is but divine history; which hath that prerogative over human, as the narration may be before the fact, as well as after.

Historia literarum.

HISTORY is *Natural, Civil, Ecclesiastical, and Literary*; whereof the three first I allow as extant, the fourth I note as deficient. For no man hath propounded to himself the general state of learning to be described and represented from age to age, as many have done the works of nature, and the state civil and ecclesiastical; without which the history of the world seemeth to me to be as the statue of Polyphemus with his eye out, that part being wanting which doth most shew the spirit and life of the person: And yet I am not ignorant, that in divers particular sciences, as of the juriconsults, the mathematicians, the rhetoricians, the philosophers, there are set down some small memorials of the schools, authors and books; and so likewise some barren relations touching the invention of arts or usages.

But a just story of learning, containing the antiquities and originals of knowledges and their sects, their inventions, their traditions, their diverse administrations and managings, their flourishing, their oppositions, decays, depressions, oblivions, removes, with the causes and occasions of them, and all other events concerning learning, throughout the ages of the world, I may truly affirm to be wanting.

The use and end of which work, I do not so much design for curiosity, or satisfaction of those that are the lovers of learning, but chiefly for a more serious and grave purpose, which is this in few words, that it will make learned men wise in the use and administration of learning. For it is not St. Augustine's nor St. Ambrose's works that will make so wise a divine, as ecclesiastical history thoroughly read and observed; and the same reason is of learning.

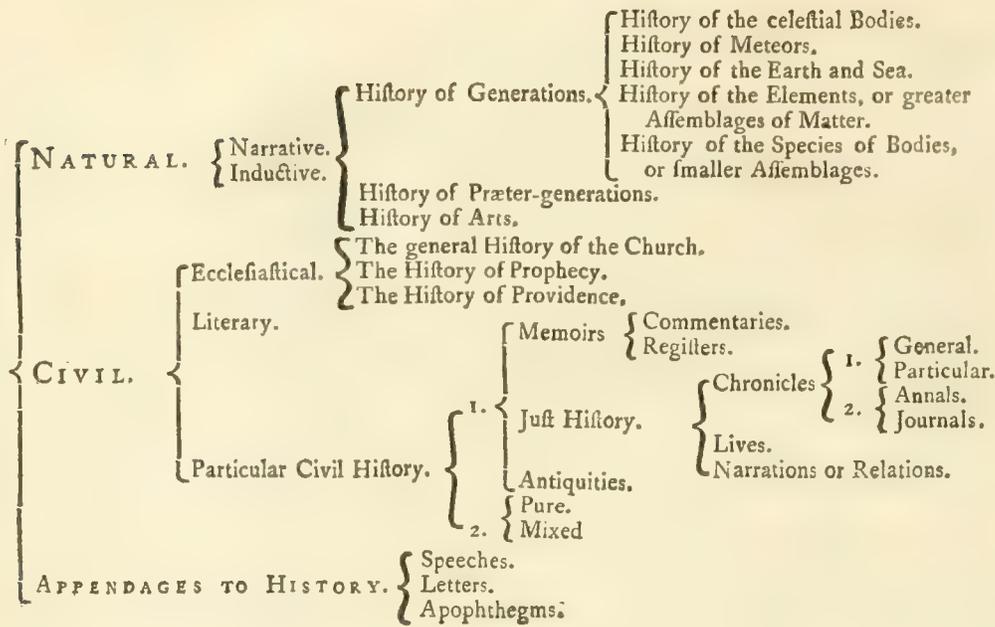


THE GENERAL DISTRIBUTION

MEMORY.

IMAGINATION.

HISTORY



POETRY { NARRATIVE. DRAMATIC. ALLEGORICAL.

OF HUMAN KNOWLEDGE.

REASON.

INSPIRED THEOLOGY, or DIVINITY. Its Division left to Divines.

Three Appendages to Inspired Theology. { The true Use of human Reason in Theology.
 { A Discourse upon the Degrees of Unity in the City of God.
 { The first Flowings of the Scriptures.

DIVINE PHILOSOPHY, or NATURAL THEOLOGY.

Appendage both to Inspired and Natural Theology. — The Science of Angels and Spirits.

NATURAL PHILOSOPHY.

- PRIMARY PHILOSOPHY.** { The common Axioms of all Sciences.
 { The Transcendental Conditions of Things.
- SPECULATIVE.**
 - Particular Physics { The Doctrine of the Principles of Things.
 { The Doctrine of the Formation of Things.
 { The Doctrine of the Variety of Things { Concrete Physics; *divided in* Nat. History.
 - Appendages to Physics { The Measure of Motions. { Abstract Physics. { The Scheme of Matter,
 { Natural Problems. { Appetites and Motions.
 - Metaphysics { The Opinions of the ancient Philosophers.
 { The Investigation of Forms.
 { The Doctrine of final Causes.
- PRACTICAL.**
 - Mechanics
 - Natural Magic
 - Appendages to Practical Philoſophy. { An Inventory of Human Knowledge.
 { A Calendar of leading Experiments.
 - Appendage to Speculative and Practical Philoſophy. — Mathematics. { Pure { Geometry.
 { Arithmetic. — Algebra.
 { Mixed { Perspective.
 { Mufic.
 { Aftronomy.
 { Cosmography.
 { Architecture.
 { Enginery.

PHILOSOPHY.

THE GENERAL SCIENCE OF THE NATURE AND STATE OF MAN. { The Doctrine of the human Perſon. { The Miſeries of Mankind.
 { The Doctrine of Union. { The Prerogatives of Mankind.
 { Notices or Indication. { Phyſognomy.
 { Impreſſion. { Interpretation of Dreams.

THE DOCTRINE OF THE HUMAN BODY.

- Medicine. { Prefervation of Health.
 { Cure of Diſeaſes.
 { Prolongation of Life.
- Cofmetics. { Civil.
 { Effeminate.
- Athletics. { Arts of Activity.
 { Arts of Endurance.
- Arts of Elegance. { Painting.
 { Muſic, etc.

The Doctrine of the inspired Substance.
 The Doctrine of the ſenſitive Soul. { The Doctrine of voluntary Motion.
 { The Doctrine of Senſe and Senſibility.
 The Doctrine of the Substance and Faculties of the Soul.
 Two Appendages to this Doctrine. { Divination.
 { Fafcination.

THE DOCTRINE OF THE HUMAN SOUL.

- Art of Invention. { The Invention of Arts { The Proceſs from Experiment to Experiment,
 { or Learned Experience.
 { The Proceſs from Experiments to Axioms,
 { or the Art of Induction.
- Art of Judging. { Judgment by Induction. { Promptuary.
 { Judgment by Syllogiſm. { Topical { Genera.
 { Reduction direct. { Particular.
 { Reduction inverſe.
 { Analytics.
 { Doctrine of Confutations. { Confutat. of Sophiſms.
 { Confutat. of Interpretation.
 { Conf. of Idols or falſe Notions.
- Appendix to the Art of Judging.—The Aſſignation of Demonſtrations according to the Nature of the Subject.
- Art of Cuſtody. { The Doctrine of Helps for the Memory.
 { The Doctrine of the Memory itſelf. { Prenotion.
 { Emblem.

LOGICS.

- The Doctrine of the Organ of Speech, or Literary Grammar. { The Doctrine of the Marks of Things. { Hieroglyphics and Geſtures.
 { Art of Speaking. — Sound. Measure. Accent. { Real Characters.
 { Art of Writing. { Alphabet.
 { Cypher. Decyphering.
- Philoſophical Grammar.
- Doctrine of Tradition. { Method of Speech, or Doctrine of traditive Prudence. { Doctrinal and initiative.
 { Open and concealed.
 { Aphoriſtical and regular.
 { Queſtion and Answer.
 { Method of conquering Prejudice.
 { The Diſpoſition of a whole Work.
 { The Limitation of Propoſitions.
- Method has two Parts. { The Doctrine of the Illuſtration of Speech, or Rhetoric.
- Three Appendages to this Doctrine. { A Collection of Sophiſms.
 { A Collection of ſtudied Antithetiſs.
 { A Collection of leſſer Forms of Speech.

Two Appendages to the Doctrine of Tradition. { The Art of Criticiſm.
 { School learning.

ETHICS.

- The Exemplar of Good. { Simple. { Individual or Self Good. { Active.
 { Good of Communion. { Paſſive. { Conſervative.
 { Compound. { Duties of Man in common.
 { Reſpective Duties.
- The Cultivation of the Mind. { The Doctrine of Mens Natures and Diſpoſitions.
 { The Inquiry into the Affections.
 { The Doctrine of Remedies.

Appendix to the Cultivation of the Mind.—The Relation between the Good of the Mind and the Good of the Body.

CIVIL KNOWLEDGE.

- Prudence in Converſation.
- Prudence in Buſineſs { The Doctrine of various Occaſions.
 { The Doctrine of riſing in Life.
- Prudence in Government. { The Doctrine of enlarging the Bounds of Empire.
 { The Doctrine of univerſal Juſtice.

HISTORY of *Nature* is of three sorts; of nature in course, of nature erring or varying, and of nature altered or wrought; that is, history of creatures, history of marvels, and history of arts.

The first of these, no doubt, is extant, and that in good perfection; the two latter are handled so weakly and unprofitably, as I am moved to note them as deficient.

For I find no sufficient or competent collection of the works of nature, which have a digression and deflexion from the ordinary course of generations, productions, and motions, whether they be singularities of place and region, or the strange events of time and chance, or the effects of yet unknown properties, or the instances of exception to general kinds: it is true, I find a number of books of fabulous experiments and secrets, and frivolous impostures for pleasure and strangeness: but a substantial and severe collection of the heteroclitics, or irregulars of nature, well examined and described, I find not, especially not with due rejection of fables, and popular errors: for as things now are, if an untruth in nature be once on foot, what by reason of the neglect of examination and countenance of antiquity, and what by reason of the use of the opinion in similitudes and ornaments of speech, it is never called down.

*Historia
naturae
errantis.*

The use of this work, honoured with a precedent in Aristotle, is nothing less than to give contentment to the appetite of curious and vain wits, as the manner of mirabilaries is to do: but for two reasons, both of great weight: the one, to correct the partiality of axioms and opinions, which are commonly framed only upon common and familiar examples; the other, because from the wonders of nature is the nearest intelligence and passage towards the wonders of art: for it is no more, but by following, and as it were hounding nature in her wanderings, to be able to lead her afterwards to the same place again.

Neither am I of opinion, in this history of marvels, that superstitious narrations of forceries, witchcrafts, dreams, divinations, and the like, where there is an assurance and clear evidence of the fact, be altogether excluded. For it is not yet known in what cases, and how far effects attributed to superstition do participate of natural causes: and therefore howsoever the practice of such things is to be condemned, yet from the speculation and consideration of them light may be taken; not only for the discerning of the offences, but for the farther disclosing of nature. Neither ought a man to make scruple of entering into these things for inquisition of truth, as your majesty hath shewed in your own example; who with the two clear eyes of religion and natural philosophy have looked deeply and wisely into these shadows, and yet proved yourself to be of the nature of the sun, which passeth through pollutions, and itself remains as pure as before.

But this I hold fit, that these narrations, which have mixture with superstition, be sorted by themselves, and not to be mingled with the narrations, which are merely and sincerely natural.

But as for the narrations touching the prodigies and miracles of religions, they are either not true, or not natural; and therefore impertinent for the story of nature.

For history of nature wrought, or mechanical, I find some collections made of agriculture, and likewise of manual arts, but commonly with a rejection of experiments familiar and vulgar.

*Historia
mechanica.*

For it is esteemed a kind of dishonour unto learning, to descend to inquiry or meditation upon matters mechanical, except they be such as may be thought secrets, rarities, and special subtilties; which humour of vain and supercilious arrogancy is justly derided in Plato; where he brings in Hippias, a vaunting sophist, disputing with Socrates, a true and unfeigned inquisitor of truth; where the subject being touching beauty, Socrates, after his wandering manner of inductions, put first an example of a fair virgin, and then of a fair horse, and then of a fair pot well glazed, whereat Hippias was offended; and said, "More than for courtesy's sake, he did think much to dispute with any that did alledge such base and fordid instances:" whereunto Socrates answered, "You have reason, and it becomes you well, being a man so trim in your vestments," *etc.* And so goeth on in irony.

But the truth is, they be not the highest instances that give the securest information; as may be well expressed in the tale so common of the philosopher, that while he gazed upwards to the stars fell into the water; for if he had looked down he might have seen the stars in the water, but looking aloft, he could not see the water in the stars. So it cometh often to pass, that mean and small things discover great, better than great can discover the small: and therefore Aristotle noteth well, "that the nature of every thing is best seen in his smallest portions." And for that cause he inquireth the nature of a commonwealth, first in a family, and the simple conjugations of man and wife, parent and child, master and servant, which are in every cottage. Even so likewise the nature of this great city of the world, and the policy thereof, must be first sought in mean concordances and small portions. So we see how that secret of nature, of the turning of iron touched with the loadstone towards the north, was found out in needles of iron, not in bars of iron.

But if my judgment be of any weight, the use of History Mechanical is of all others the most radical and fundamental towards natural philosophy; such natural philosophy as shall not vanish in the fume of subtile, sublime, or delectable speculation, but such as shall be operative to the endowment and benefit of man's life: for it will not only minister and suggest for the present many ingenious practices in all trades, by a connection and transferring of the observations of one art to the use of another, when the experiences of several mysteries shall fall under the consideration of one man's mind; but farther, it will give a more true and real illumination concerning causes and axioms than is hitherto attained.

For like as a man's disposition is never well known till he be crossed, nor Proteus ever changed shapes till he was straitened and held fast; so the passages and variations of nature cannot appear so fully in the liberty of nature, as in the trials and vexations of art.

For *Civil History*, it is of three kinds, not unfitly to be compared with the three kinds of pictures or images: for of pictures or images, we see, some are unfinished, some are perfect, and some are defaced. So of histories we may find three kinds, Memorials, Perfect Histories, and Antiquities; for memorials are history unfinished, or the first or rough draughts of history; and antiquities are history defaced, or some remnants of history which have casually escaped the shipwreck of time.

Memorials,

Memorials, or preparatory history, are of two sorts, whereof the one may be termed Commentaries, and the other Registers. Commentaries are they which set down a continuance of the naked events and actions, without the motives or designs, the counsels, the speeches, the pretexts, the occasions, and other passages of action: for this is the true nature of a Commentary, though Cæsar, in modesty mixed with greatness, did for his pleasure apply the name of a Commentary to the best history of the world. Registers are collections of public acts, as decrees of council, judicial proceedings, declarations and letters of state, orations and the like, without a perfect continuance or contexture of the thread of the narration.

Antiquities, or remnants of history, are, as was said, *tanquam tabula naufragii*, when industrious persons, by an exact and scrupulous diligence and observation, out of monuments, names, words, proverbs, traditions, private records and evidences, fragments of stories, passages of books that concern not story, and the like, do save and recover somewhat from the deluge of time.

In these kinds of imperfect histories I do assign no deficiency, for they are *tanquam imperfecte mista*, and therefore any deficiency in them is but their nature.

As for the corruptions and moths of history, which are Epitomes, the use of them deserveth to be banished, as all men of sound judgment have confessed, as those that have fretted and corroded the sound bodies of many excellent histories, and wrought them into base and unprofitable dregs.

History, which may be called *Just* and *Perfect History*, is of three kinds, according to the object which it propoundeth, or pretendeth to represent: for it either representeth a time, or a person, or an action. The first we call Chronicles, the second Lives, and the third Narrations, or Relations.

Of these, although the first be the most complete and absolute kind of history, and hath most estimation and glory, yet the second excelleth it in profit and use, and the third in verity and sincerity. For history of times representeth the magnitude of actions, and the public faces and deportments of persons, and passeth over in silence the smaller passages and motions of men and matters.

But such being the workmanship of God, as he doth hang the greatest weight upon the smallest wires, *maxima è minimis suspendens*, it comes therefore to pass, that such histories do rather set forth the pomp of business than the true and inward resorts thereof. But Lives if they be well written, propounding to themselves a person to represent, in whom actions both greater and smaller, public and private, have a commixture, must of a necessity contain a more true, native, and lively representation. So again narrations and relations of actions, as the War of Peloponnesus, the Expedition of Cyrus Minor, the Conspiracy of Catiline, cannot but be more purely and exactly true, than histories of times, because they may choose an argument comprehensible within the notice and instructions of the writer: whereas he that undertaketh the story of a time, especially of any length, cannot but meet with many blanks and spaces, which he must be forced to fill up out of his own wit and conjecture.

For the *History of Times*, I mean of civil history, the providence of God hath made the distribution: for it hath pleased God to ordain and illustrate two exemplar states of the world of arms, learning, moral virtue, policy, and laws. The state of Græcia, and the state of Rome; the histories whereof occupying the middle part of time, have, more ancient to them, histories which may by one common name be termed

termed the Antiquities of the world ; and after them, histories which may be likewise called by the name of Modern History.

Now to speak of the deficiencies. As to the heathen antiquities of the world, it is in vain to note them for deficient : deficient they are no doubt, consisting mostly of fables and fragments, but the deficiency cannot be holpen ; for antiquity is like fame, *caput inter nubila condit*, her head is muffled from our sight. For the history of the exemplar states, it is extant in good perfection. Not but I could wish there were a perfect course of history for Græcia from Theseus to Philopœmen, what time the affairs of Græcia were drowned and extinguished in the affairs of Rome ; and for Rome from Romulus to Justinianus, who may be truly said to be *ultimus Romanorum*. In which sequences of story the text of Thucydides and Xenophon in the one, and the text of Livius, Polybius, Salustius, Cæsar, Appianus, Tacitus, Herodianus, in the other, to be kept intire without any diminution at all, and only to be supplied and continued. But this is matter of magnificence, rather to be commended than required : and we speak now of parts of learning supplemental, and not of supererogation.

But for Modern Histories, whereof there are some few very worthy, but the greater part beneath mediocrity, leaving the care of foreign stories to foreign states, because I will not be *curiosus in aliena republica*, I cannot fail to represent to your majesty the unworthiness of the history of England in the main continuance thereof, and the partiality and obliquity of that of Scotland, in the latest and largest author that I have seen ; supposing that it would be honour for your majesty, and a work very memorable, if this island of Great Britain, as it is now joined in monarchy for the ages to come, so were joined in one history for the times passed, after the manner of the sacred history, which draweth down the story of the ten tribes, and of the two tribes, as twins, together. And if it shall seem that the greatness of this work may make it less exactly performed, there is an excellent period of a smaller compass of time, as to the story of England ; that is to say, from the uniting of the roses to the uniting of the kingdoms : a portion of time, wherein, to my understanding, there hath been the rarest varieties, that, in like number of successions of any hereditary monarchy hath been known : for it beginneth with the mixed adeption of a crown by arms and title ; an entry by battle, an establishment by marriage ; and therefore times answerable, like waters after a tempest, full of working and swelling, though without extremity of storm ; but well passed through by the wisdom of the pilot, being one of the most sufficient kings of all the number. Then followeth the reign of a king, whose actions, howsoever conducted, had much intermixture with the affairs of Europe, balancing and inclining them variably ; in whose time also began that great alteration in the state ecclesiastical, an action which seldom cometh upon the stage. Then the reign of a minor : then an offer of an usurpation, though it was but as *febris ephemera* : then the reign of a queen matched with a foreigner : then of a queen that lived solitary and unmarried, and yet her government so masculine, as it had greater impression and operation upon the states abroad than it any ways received from thence. And now last, this most happy and glorious event, that this island of Britain, divided from all the world, should be united in itself : and that oracle of rest, given to Æneas, *Antiquam exquirite matrem*, should now be performed and fulfilled upon the nations of England and Scotland, being now reunited in the ancient mother name of Britain, as a full period of all instability

bility and peregrinations: so that as it cometh to pass in massive bodies, that they have certain trepidations and waverings before they fix and settle; so it seemeth that by the providence of God this monarchy, before it was to settle in your majesty and your generations, in which, I hope, it is now established for ever, it had these prelusive changes and varieties.

For *Lives*; I do find strange that these times have so little esteemed the virtues of the times, as that the writing of lives should be no more frequent. For although there be not many sovereign princes or absolute commanders, and that states are most collected into monarchies, yet there are many worthy personages that deserve better than dispersed report or barren elogies. For herein the invention of one of the late poets is proper, and doth well enrich the ancient fiction; for he feigneth, that at the end of the thread or web of every man's life there was a little medal containing the person's name, and that Time waited upon the shears; and as soon as the thread was cut, caught the medals, and carried them to the river of Lethe; and about the bank there were many birds flying up and down, that would get the medals, and carry them in their beak a little while, and then let them fall into the river: only there were a few swans, which if they got a name, would carry it to a temple, where it was consecrated.

And though many men, more mortal in their affections than in their bodies, do esteem desire of name and memory but as a vanity and ventosity,

Animi nil magnae laudis egentes;

which opinion cometh from the root, *non prius laudes contempimus, quam laudanda facere deservimus*: yet that will not alter Solomon's judgment, *Memoria justi cum laudibus, et impiorum nomen putrescet*: the one flourisheth, the other either consumeth to pre- sent oblivion, or turneth to an ill odour.

And therefore in that stile or addition, which is and hath been long well received and brought in use, *felicitis memoriae, piae memoriae, bonae memoriae*, we do acknowledge that which Cicero saith, borrowing it from Demosthenes, that *bona fama propria possessio defunctorum*; which possession I cannot but note, that in our times it lieth much waste, and that therein there is a deficiency.

For *Narrations* and *Relations* of particular actions, there were also to be wished a greater diligence therein; for there is no great action but hath some good pen which attends it.

And because it is an ability not common to write a good history, as may well appear by the small number of them; yet if particularity of actions memorable were but tolerably reported as they pass, the compiling of a complete history of times might be the better expected, when a writer should arise that were fit for it; for the collection of such relations might be as a nursery garden, whereby to plant a fair and stately garden, when time should serve.

There is yet another partition of history which Cornelius Tacitus maketh, which is not to be forgotten, especially with that application which he accoupleth it withal, *Annals* and *Journals*; appropriating to the former, matters of state; and to the latter, acts and accidents of a meaner nature. For giving but a touch of certain magnificent buildings, he addeth, *Cum ex dignitate populi Romani repertum sit, res illustres annalibus, talia diurnis urbis actis mandare*. So as there is a kind of contemplative heraldry, as well as civil. And as nothing doth derogate from the dignity of a state more than confusion of degrees: so it doth not a little embase the authority of an history, to intermingle matters of triumph, or matters of ceremony, or matters

of

of novelty, with matters of state. But the use of a journal hath not only been in the history of time, but likewise in the history of persons, and chiefly of actions; for princes in ancient time had, upon point of honour and policy both, journals kept of what passed day by day: for we see the Chronicle which was read before Ahasuerus, when he could not take rest, contained matter of affairs indeed, but such as had passed in his own time, and very lately before: but the journal of Alexander's house expressed every small particularity, even concerning his person and court; and it is yet an use well received in enterprises memorable, as expeditions of war, navigations, and the like, to keep diaries of that which passeth continually.

I cannot likewise be ignorant of a form of writing, which some grave and wise men have used, containing a scattered history of those actions which they have thought worthy of memory, with politic discourse and observation thereupon; not incorporated into the history, but separately, and as the more principal in their intention; which kind of ruminated history I think more fit to place amongst books of policy, whereof we shall hereafter speak, than amongst books of history: for it is the true office of history to represent the events themselves together with the counsels, and to leave the observations and conclusions thereupon to the liberty and faculty of every man's judgment: but mixtures are things irregular, whereof no man can define.

So also is there another kind of history manifoldly mixed, and that is History of Cosmography, being compounded of natural history, in respect of the regions themselves; of history civil, in respect of the habitations, regimens, and manners of the people; and the mathematics, in respect of the climates and configurations towards the heavens: which part of learning of all others, in this latter time, hath obtained most proficience. For it may be truly affirmed to the honour of these times, and in a virtuous emulation with antiquity, that this great building of the world had never thorough lights made in it, till the age of us and our fathers: for although they had knowledge of the antipodes,

*Nosque ubi primus equis oriens afflavit anhelis,
Illic sera rubens accendit lumina Vesper:*

yet that might be by demonstration, and not in fact; and if by travel, it requireth the voyage but of half the globe. But to circle the earth, as the heavenly bodies do, was not done or enterprised till these latter times: and therefore these times may justly bear in their word, not only *plus ultra* in precedence of the ancient *non ultra*, and *imitabile fulmen*, in precedence of the ancient *non imitabile fulmen*,

Demens qui nimbos et non imitabile fulmen, etc.

but likewise *imitabile coelum*: in respect of the many memorable voyages, after the manner of heaven, about the globe of the earth.

And this proficience in navigation and discoveries may plant also an expectation of the farther proficience and augmentation of all sciences; because, it may seem, they are ordained by God to be coevals, that is, to meet in one age. For so the prophet Daniel, speaking of the latter times, foretelleth; *Plurimi pertransibunt, et multiplex erit scientia*; as if the openness and thorough passage of the world, and the increase of knowledge, were appointed to be in the same ages, as we see it is already performed in great part; the learning of these latter times not much giving place to the former two periods or returns of learning, the one of the Grecians, the other of the Romans.

HISTORY ecclesiastical receiveth the same divisions with history civil; but farther, in the propriety thereof, may be divided into the history of the church, by a general name; History of prophecy; and History of providence.

The first describeth the times of the militant church, whether it be fluctuant, as the ark of Noah; or moveable as the ark in the wilderness; or at rest, as the ark in the temple; that is, the state of the church in persecution, in remove, and in peace. This part I ought in no sort to note as deficient, only I would that the virtue and sincerity of it were according to the mass and quantity. But I am not now in hand with censures, but with omissions.

The second, which is history of prophecy, consisteth of two relatives, the pro-^{Historic}phesy, and the accomplishment; and therefore the nature of such a work ought ^{Prophetic.} to be, that every prophecy of the scripture be sorted with the event fulfilling the same, throughout the ages of the world; both for the better confirmation of faith, and for the better illumination of the church touching those parts of prophecies which are yet unfulfilled: allowing nevertheless that latitude which is agreeable and familiar unto divine prophecies, being of the nature of their author, with whom a thousand years are but as one day, and therefore are not fulfilled punctually at once, but have springing and germinant accomplishment throughout many ages; though the height or fulness of them may refer to some one age.

This is a work which I find deficient, but is to be done with wisdom, sobriety, and reverence, or not at all.

The third, which is History of providence, containeth that excellent correspondence which is between God's revealed will and his secret will: which though it be so obscure, as for the most part it is not legible to the natural man; no, nor many times to those who behold it from the tabernacle: yet at some times it pleaseth God, for our better establishment, and the confuting of those which are as without God in the world, to write it in such text and capital letters, that, as the prophet saith, *be that runneth by may read it*; that is, mere sensual persons, which hasten by God's judgments, and never bend or fix their cogitations upon them, are nevertheless in their passage and race urged to discern it. Such are the notable events and examples of God's judgments, chastisements, deliverances, and blessings: and this is a work which hath passed through the labours of many, and therefore I cannot present as omitted.

There are also other parts of learning which are Appendices to history: for all the exterior proceedings of man consist of words and deeds; whereof history doth properly receive and retain in memory the deeds; and if words, yet but as inducements and passages to deeds: so are there other books and writings, which are appropriated to the custody and receipt of words only, which likewise are of three sorts; Orations, Letters, and brief Speeches or Sayings.

Orations are pleadings, speeches of counsel, laudatives, invectives, apologies, reprehensions; orations of formality or ceremony, and the like.

Letters are according to all the variety of occasions, advertisements, advices, directions, propositions, petitions, commendatory, exhortatory, satisfactory; of compliment, of pleasure, of discourse, and all other passages of action. And such as are written from wise men, are of all the words of man, in my judgment, the best; for they are more natural than orations and public speeches, and more advised than conferences or present speeches. So again letters of affairs from such as manage them,

or are privy to them, are of all others the best instructions for history, and to a diligent reader the best histories in themselves.

For Apophthegms, it is a great loss of that book of Cæsar's ; for as his history, and those few letters of his which we have, and those apophthegms which were of his own, excel all mens else, so I suppose would his collection of apophthegms have done ; for as for those which are collected by others, either I have no taste in such matters, or else their choice hath not been happy. But upon these three kinds of writings I do not insist, because I have no deficiencies to propound concerning them.

Thus much therefore concerning history, which is that part of learning which answereth to one of the cells, domiciles, or offices of the mind of man, which is that of the memory.

POESY is a part of learning in measure of words for the most part restrained, but in all other points extremely licensed, and doth truly refer to the imagination ; which, being not tied to the laws of matter, may at pleasure join that which nature hath severed, and sever that which nature hath joined, and so make unlawful matches and divorces of things ; *Pictoribus atque poetis, etc.* It is taken in two senses, in respect of words, or matter ; in the first sense it is but a character of stile, and belongeth to arts of speech, and is not pertinent for the present : in the latter, it is, as hath been said, one of the principal portions of learning, and is nothing else but feigned history, which may be stiled as well in prose as in verse.

The use of this feigned history hath been to give some shadow of satisfaction to the mind of man in those points wherein the nature of things doth deny it, the world being in proportion inferior to the soul ; by reason whereof there is, agreeable to the spirit of man, a more ample greatness, a more exact goodness, and a more absolute variety, than can be found in the nature of things. Therefore, because the acts or events of true history have not that magnitude which satisfieth the mind of man, poesy feigneth acts and events greater and more heroical : because true history propoundeth the successes and issues of actions not so agreeable to the merits of virtue and vice, therefore poesy feigns them more just in retribution, and more according to revealed providence : because true history representeth actions and events more ordinary, and less interchanged ; therefore poesy endueth them with more rareness, and more unexpected and alternative variations : so as it appeareth that poesy serveth and conferreth to magnanimity, morality, and to delectation. And therefore it was ever thought to have some participation of divineness, because it doth raise and erect the mind, by submitting the shews of things to the desires of the mind ; whereas reason doth buckle and bow the mind unto the nature of things.

And we see, that by these insinuations and congruities with man's nature and pleasure, joined also with the agreement and consort it hath with music, it hath had access and estimation in rude times and barbarous regions, where other learning stood excluded.

The division of poesy, which is aptest in the propriety thereof, besides those divisions which are common unto it with history ; as feigned chronicles, feigned lives, and the appendices of history, as feigned epistles, feigned orations, and the rest, is into Poesy Narrative, Representative, and Allusive.

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The Narrative is a mere imitation of history, with the excesses before remembered, choosing for subject commonly wars and love ; rarely state, and sometimes pleasure or mirth.

Representative is as a visible history, and is an image of actions as if they were present, as history is of actions in nature as they are, that is past.

Allusive or parabolical, is a narration applied only to express some special purpose or conceit : which latter kind of parabolical wisdom was much more in use in the ancient times, as by the fables of Æsop, and the brief sentences of the Seven, and the use of hieroglyphics, may appear. And the cause was, for that it was then of necessity to express any point of reason, which was more sharp or subtle than the vulgar, in that manner, because men in those times wanted both variety of examples and subtilty of conceit : and as hieroglyphics were before letters, so parables were before arguments. And nevertheless now, and at all times, they do retain much life and vigour, because reason cannot be so sensible, nor examples so fit.

But there remaineth yet another use of poesy parabolical, opposite to that which we last mentioned : for that tendeth to demonstrate and illustrate that which is taught or delivered, and this other to retire and obscure it : that is, when the secrets and mysteries of religion, policy, or philosophy, are involved in fables and parables.

Of this in divine poesy, we see, the use is authorized. In heathen poesy, we see, the exposition of fables doth fall out sometimes with great felicity, as in the fable that the giants being overthrown in their war against the gods, the Earth their mother, in revenge thereof, brought forth Fame :

*Illam terra parens ira irritata deorum,
Extremam, ut perhibent, Cœco Enceladoque sororem
Prægenit.*

Expounded, that when princes and monarchies have suppressed actual and open rebels, then the malignity of people, which is the mother of rebellion, doth bring forth libels and slanders, and taxations of the states, which is of the same kind with rebellion, but more feminine. So in the fable, that the rest of the gods having conspired to bind Jupiter, Pallas called Briareus with his hundred hands to his aid : expounded, that monarchies need not fear any curbing of their absoluteness by mighty subjects, as long as by wisdom they keep the hearts of the people, who will be sure to come in on their side. So in the fable, that Achilles was brought up under Chiron the Centaur, who was part a man and part a beast, expounded ingeniously, but corruptly by Machiavel, that it belongeth to the education and discipline of princes, to know as well how to play the part of the lion in violence, and the fox in guile, as of the man in virtue and justice.

Nevertheless in many the like encounters, I do rather think that the fable was first, and the exposition devised, than that the moral was first, and thereupon the fable framed. For I find it was an ancient vanity in Chrysippus that troubled himself with great contention to fasten the assertions of the Stoics upon fictions of the ancient poets : but yet that all the fables and fictions of the poets were but pleasure and not figure, I interpose no opinion.

Surely of those poets which are now extant, even Homer himself, notwithstanding he was made a kind of Scripture by the latter schools of the Grecians, yet I should without any difficulty pronounce, that his fables had no such inwardness in

his own meaning; but what they might have upon a more original tradition, is not easy to affirm, for he was not the inventor of many of them.

In this third part of learning, which is poesy, I can report no deficiency. For being as a plant that cometh of the lust of the earth, without a formal feed, it hath sprung up, and spread abroad more than any other kind: but to ascribe unto it that which is due, for the expression of affections, passions, corruptions, and customs, we are beholden to poets more than to the philosophers works; and for wit and eloquence, not much less than to orators harangues. But it is not good to stay too long in the theatre. Let us now pass to the judicial place or palace of the mind, which we are to approach and view with more reverence and attention.

THE knowledge of man is as the waters, some descending from above, and some springing from beneath; the one informed by the light of nature, the other inspired by divine revelation.

The light of nature consisteth in the notions of the mind, and the reports of the senses; for as for knowledge which man receiveth by teaching, it is cumulative and not original, as in a water, that, besides his own spring-head, is fed with other springs and streams. So then, according to these two differing illuminations or originals, knowledge is first of all divided into Divinity and Philosophy.

In Philosophy, the contemplations of man do neither penetrate unto God, or are circumferred to nature, or are reflected or reverted upon himself. Out of which several inquiries there do arise three knowledges, Divine philosophy, Natural philosophy, and Human philosophy or humanity. For all things are marked and stamped with this triple character, of the power of God; the difference of nature, and the use of man. But because the distributions and partitions of knowledge are not like several lines that meet in one angle, and so touch but in a point; but are like branches of a tree, that meet in a stem, which hath a dimension and quantity of intireness and continuance, before it come to discontinue and break itself into arms and boughs; therefore it is good, before we enter into the former distribution, to erect and constitute one universal science, by the name of *Philosophia prima*, primitive or summary philosophy, as the main and common way, before we come where the ways part and divide themselves; which science, whether I should report as deficient or no, I stand doubtful.

For I find a certain rhapsody of natural theology, and of divers parts of logic; and of that other part of natural philosophy, which concerneth the principles; and of that other part of natural philosophy, which concerneth the soul or spirit; all these strangely commixed and confused; but being examined, it seemeth to me rather a depredation of other sciences, advanced and exalted unto some height of terms, than any thing solid or substantial of itself.

Nevertheless I cannot be ignorant of the distinction which is current, that the same things are handled but in several respects. As for example, that logic considereth of many things as they are in notion; and this philosophy, as they are in nature; the one in appearance, the other in existence: but I find this difference better made than pursued. For if they had considered quantity, similitude, diversity, and the rest of those external characters of things, as philosophers, and in nature; their inquiries must of force have been of a far other kind than they are.

For doth any of them, in handling quantity, speak of the force of union, how,
and

and how far it multiplieth virtue ? Doth any give the reason, why some things in nature are so common and in so great maſs, and others so rare, and in so small quantity ? Doth any, in handling similitude and diversity, assign the cause why iron should not move to iron, which is more like, but move to the loadstone which is less like ? Why, in all diversities of things, there should be certain participles in nature, which are almost ambiguous, to which kind they should be referred ? But there is a mere and deep silence touching the nature and operation of those common adjuncts of things, as in nature ; and only a resumming and repeating of the force and use of them in speech or argument.

Therefore because in a writing of this nature I avoid all subtilty, my meaning touching this original or universal philosophy is thus, in a plain and gross description by negative ; “ That it be a receptacle for all such profitable observations and “ axioms, as fall not within the compass of any of the special parts of philosophy “ or sciences, but are more common and of a higher stage.”

Now that there are many of that kind, need not to be doubted. For example ; is not the rule *Si inaequalibus aequalia addas, omnia erunt inaequalia*, an axiom as well of justice as of the mathematics ? And is there not a true coincidence between commutative and distributive justice, and arithmetical and geometrical proportion ? Is not that other rule, *Quae in eodem tertio conveniunt, et inter se conveniunt*, a rule taken from the mathematics, but so potent in logic, as all syllogisms are built upon it ? Is not the observation, *Omnia mutantur, nil interit*, a contemplation in philosophy thus, that the *quantum* of nature is eternal ? in natural theology thus ; that it requireth the same omnipotence to make something nothing, which at the first made nothing something ; according to the scripture, *Didici quod omnia opera, quae fecit Deus, perseverent in perpetuum ; non possumus eis quicquam addere, nec auferre.*

Is not the ground, which Machiavel wisely and largely discourseth concerning governments, that the way to establish and preserve them, is to reduce them *ad principia* ; a rule in religion and nature, as well as in civil administration ? Was not the Persian magic a reduction or correspondence of the principles and architectures of nature, to the rules and policy of governments ? Is not the precept of a musician, to fall from a discord or harsh accord upon a concord or sweet accord, alike true in affection ? Is not the trope of music, to avoid or slide from the close or cadence, common with the trope of rhetoric, of deceiving expectation ? Is not the delight of the quavering upon a stop in music, the same with the playing of light upon the water ?

Splendet tremulo sub lumine pontus.

Are not the organs of the senses of one kind with the organs of reflection, the eye with a glass, the ear with a cave or strait determined and bounded ? Neither are these only similitudes, as men of narrow observation may conceive them to be, but the same footsteps of nature, treading or printing upon several subjects or matters.

This science therefore, as I understand it, I may justly report as deficient ; for I see sometimes the profounder sort of wits, in handling some particular argument, will now and then draw a bucket of water out of this well for their present use ; but the spring-head thereof seemeth to me not to have been visited ; being of so excellent use, both for the disclosing of nature, and the abridgment of art.

Philosophia
prima, sive de
fontibus scientiarum.

This

This science being therefore first placed as a common parent, like unto Berecynthia, which had so much heavenly issue, *Omnes coelicolas, omnes supera alta tenentes*, we may return to the former distribution of the three philosophies, divine, natural, and human.

And as concerning divine philosophy, or Natural Theology, it is that knowledge or rudiment of knowledge concerning God, which may be obtained by the contemplation of his creatures; which knowledge may be truly termed divine, in respect of the object, and natural in respect of the light.

The bounds of this knowledge are, that it sufficeth to convince atheism, but not to inform religion: and therefore there was never miracle wrought by God to convert an atheist, because the light of nature might have led him to confess a God: but miracles have been wrought to convert idolaters and the superstitious, because no light of nature extendeth to declare the will and true worship of God.

For as all works do shew forth the power and skill of the workman, and not his image, so it is of the works of God, which do shew the omnipotency and wisdom of the maker, but not his image: and therefore therein the heathen opinion differeth from the sacred truth; for they supposed the world to be the image of God, and man to be an extract or compendious image of the world: but the Scriptures never vouchsafe to attribute to the world that honour, as to be the image of God, but only the work of his hands; neither do they speak of any other image of God, but man: wherefore by the contemplation of nature, to induce and enforce the acknowledgement of God, and to demonstrate his power, providence and goodness, is an excellent argument, and hath been excellently handled by divers.

But on the other side, out of the contemplation of nature or ground of human knowledges, to induce any verity or persuasion concerning the points of faith, is in my judgment not safe: *Da fidei, quae fidei sunt*. For the heathens themselves conclude as much in that excellent and divine fable of the golden chain; "That men and gods were not able to draw Jupiter down to the earth; but contrariwise, Jupiter was able to draw them up to heaven."

So as we ought not to attempt to draw down or submit the mysteries of God to our reason; but contrariwise, to raise and advance our reason to the divine truth. So as in this part of knowledge, touching divine philosophy, I am so far from noting any deficiency, as I rather note an excess; whereunto I have digressed, because of the extreme prejudice which both religion and philosophy have received, and may receive, by being commixed together; as that which undoubtedly will make an heretical religion, and an imaginary and fabulous philosophy.

Otherwise it is of the nature of angels and spirits, which is an appendix of theology, both divine and natural, and is neither inscrutable nor interdicted: for although the Scripture saith, *Let no man deceive you in sublime discourse touching the worship of angels, pressing into that he knoweth not*, etc. yet, notwithstanding, if you observe well that precept, it may appear thereby that there be two things only forbidden, adoration of them, and opinion fantastical of them, either to extol them farther than appertaineth to the degree of a creature, or to extol a man's knowledge of them farther than he hath ground. But the sober and grounded inquiry, which may arise out of the passages of holy Scriptures, or out of the gradations of nature, is not restrained. So of degenerate and revolted spirits, the conversing with them, or the employment of them, is prohibited, much more any veneration towards them. But the contemplation or science of their
nature,

nature, their power, their illusions, either by Scripture or reason, is a part of spiritual wisdom. For so the apostle saith, *We are not ignorant of his stratagems.* And it is no more unlawful to inquire the nature of evil spirits, than to inquire the force of poisons in nature, or the nature of sin and vice in morality. But this part, touching angels and spirits, I cannot note as deficient, for many have occupied themselves in it : I may rather challenge it, in many of the writers thereof, as fabulous and fantastical.

LEAVING therefore divine philosophy or natural theology, not divinity, or inspired theology, which we reserve for the last of all, as the haven and sabbath of all man's contemplations, we will now proceed to Natural Philosophy.

If then it be true that Democritus said, " That the truth of nature lieth hid in " certain deep mines and caves:" and if it be true likewise that the alchemists do so much inculcate, that Vulcan is a second nature, and imitateth that dexterously and compendiously, which nature worketh by ambages and length of time; it were good to divide natural philosophy into the mine and the furnace, and to make two professions or occupations of natural philosophers, some to be pioneers, and some smiths; some to dig, and some to refine and hammer: and surely I do best allow of a division of that kind, though in more familiar and scholastical terms: namely, that these be the two parts of natural philosophy, the inquisition of causes, and the production of effects; speculative, and operative; natural science, and natural prudence.

For as in civil matters there is a wisdom of discourse, and a wisdom of direction; so is it in natural. And here I will make a request, that for the latter, or at least for a part thereof, I may revive and redintegrate the misapplied and abused name of natural magic, which, in the true sense, is but natural wisdom, or natural prudence; taken according to the ancient acceptation, purged from vanity and superstition.

Now although it be true, and I know it well, that there is an intercourse between causes and effects, so as both these knowledges, speculative and operative, have a great connection between themselves; yet because all true and fruitful natural philosophy hath a double scale or ladder, ascendent and descendent; ascending from experiments, to the invention of causes; and descending from causes, to the invention of new experiments; therefore I judge it most requisite that these two parts be severally considered and handled.

Natural science, or theory, is divided into Physic and Metaphysic; wherein I desire it may be conceived, that I use the word metaphysic in a differing sense from that that is received: and, in like manner, I doubt not but it will easily appear to men of judgment, that in this and other particulars, wheresoever my conception and notion may differ from the ancient, yet I am studious to keep the ancient terms.

For hoping well to deliver myself from mistaking, by the order and perspicuous expressing of that I do propound; I am otherwise zealous and affectionate to recede as little from antiquity, either in terms or opinions, as may stand with truth, and the proficience of knowledge.

And herein I cannot a little marvel at the philosopher Aristotle, that did proceed in such a spirit of difference and contradiction towards all antiquity, undertaking not only to frame new words of science at pleasure, but to confound and extinguish all ancient wisdom: insomuch as he never nameth or mentioneth an ancient author or

opinion, but to confute and reprove ; wherein for glory, and drawing followers and disciples, he took the right course.

For certainly there cometh to pass, and hath place in human truth, that which was noted and pronounced in the highest truth ; *Veni in nomine Patris, nec recipitis me ; si quis venerit in nomine suo, eum recipietis.* But in this divine aphorism, considering to whom it was applied, namely to Antichrist, the highest deceiver, we may discern well, that the coming in a man's own name, without regard of antiquity or paternity, is no good sign of truth, although it be joined with the fortune and success of an *Eum recipietis.*

But for this excellent person, Aristotle, I will think of him, that he learned that humour of his scholar, with whom, it seemeth, he did emulate, the one to conquer all opinions, as the other to conquer all nations : wherein nevertheless, it may be, he may at some mens hands, that are of a bitter disposition, get a like title as his scholar did.

*Felix terrarum praedo, non utile mundo
Editus exemplum, etc.*

So

Felix doctrinae praedo.

But to me, on the other side, that do desire as much as lieth in my pen to ground a sociable intercourse between antiquity and proficience, it seemeth best to keep way with antiquity *usque ad aras* ; and therefore to retain the ancient terms, though I sometimes alter the uses and definitions ; according to the moderate proceeding in civil government, where, although there be some alteration, yet that holdeth which Tacitus wisely noteth, *eadem magistratum vocabula.*

To return therefore to the use and acceptation of the word metaphysic, as I do now understand the word ; it appeareth, by that which hath been already said, that I intend *philosophia prima*, summary philosophy, and metaphysic, which heretofore have been confounded as one, to be two distinct things. For, the one I have made as a parent, or common ancestor, to all knowledge ; and the other I have now brought in, as a branch, or descendent of natural science. It appeareth likewise that I have assigned to summary philosophy the common principles and axioms which are promiscuous and indifferent to several sciences : I have assigned unto it likewise the inquiry touching the operation of the relative and adventitious characters of essences, as quantity, similitude, diversity, possibility, and the rest ; with this distinction and provision ; that they be handled as they have efficacy in nature, and not logically. It appeareth likewise, that natural theology, which heretofore hath been handled confusedly with metaphysic, I have inclosed and bounded by itself.

It is therefore now a question, what is left remaining for metaphysic ; wherein I may without prejudice preserve thus much of the conceit of antiquity, that physick should contemplate that which is inherent in matter, and therefore transitory ; and metaphysic, that which is abstracted and fixed.

And again, that physick should handle that which supposeth in nature only a being and moving ; and metaphysic should handle that which supposeth farther in nature, a reason, understanding, and platform. But the difference perspicuously expressed, is most familiar and sensible.

For as we divided natural philosophy in general into the inquiry of causes, and productions of effects ; so that part which concerneth the inquiry of causes, we do subdivide according to the received and sound division of causes ; the one part,
which

which is phisic, inquireth and handleth the material and efficient causes ; and the other, which is metaphisic, handleth the formal and final causes.

Phisic, taking it according to the derivation, and not according to our idiom for medicine, is situate in a middle term, or distance, between natural history and metaphisic. For natural history describeth the variety of things, phisic the causes, but variable or respective causes ; and metaphisic, the fixed and constant causes.

*Limus ut hic durefcit, et haec ut cera liquefcit,
Uno eodemque igne.*

Fire is the cause of induration but respective to clay : fire is the cause of colliquation but respective to wax. But fire is no constant cause either of induration or colliquation : fo then the physical causes are but the efficient and the matter.

Phisic hath three parts, whereof two respect nature united or collected, the third contemplateth nature diffused or distributed.

Nature is collected either into one intire total, or else into the same principles or seeds. So as the first doctrine is touching the contexture or configuration of things, *as de mundo, de universitate rerum.*

The second is the doctrine concerning the principles or originals of things.

The third is the doctrine concerning all variety and particularity of things ; whether it be of the differing substances, or their differing qualities and natures : whereof there needeth no enumeration, this part being but as a gloss, or paraphrase, that attendeth upon the text of natural history.

Of these three I cannot report any as deficient. In what truth or perfection they are handled, I make not now any judgment : but they are parts of knowledge not deferred by the labour of man.

For Metaphisic, we have assigned unto it the inquiry of formal and final causes ; which assignation, as to the former of them, may seem to be nugatory and void, because of the received and inveterate opinion, that the inquisition of man is not competent to find out essential forms or true differences : of which opinion we will take this hold, that the invention of forms is of all other parts of knowledge the worthiest to be sought, if it be possible to be found.

As for the possibility, they are ill discoverers that think there is no land, when they can see nothing but sea.

But it is manifest, that Plato, in his opinion of ideas, as one that had a wit of elevation situate as upon a cliff, did descry, “ That forms were the true object of “ knowledge ;” but lost the real fruit of his opinion, by considering of forms as absolutely abstracted from matter, and not confined and determined by matter ; and so turning his opinion upon theology, wherewith all his natural philosophy is infected.

But if any man shall keep a continual watchful and severe eye upon action, operation, and the use of knowledge, he may advise and take notice what are the forms, the disclosures whereof are fruitful and important to the state of man. For as to the forms of substances, man only except, of whom it is said, *Formavit hominem de limo terrae, et spiravit in faciem ejus spiraculum vitae,* and not as of all other creatures, *Producant aquae, producat terra,* the forms of substances: I say, as they are now by compounding and transplanting multiplied, are so perplexed, as they are not to be inquired ; no more than it were either possible or to purpose, to seek in gross the

forms of those sounds which make words, which by composition and transposition of letters are infinite.

But, on the other side, to inquire the form of those sounds or voices which make simple letters, is easily comprehensible; and being known, induceth and manifesteth the forms of all words, which consist and are compounded of them. In the same manner to inquire the form of a lion, of an oak, of gold; nay, of water, of air, is a vain pursuit: but to inquire the forms of sense, of voluntary motion, of vegetation, of colours, of gravity and levity, of density, of tenuity, of heat, of cold, and all other natures and qualities, which, like an alphabet, are not many, and of which the essences, upheld by matter, of all creatures do consist: to inquire, I say, the true forms of these, is that part of metaphysic which we now define of.

Not but that physick doth make inquiry, and take consideration of the same natures: but how? Only as to the material and efficient causes of them, and not as to the forms. For example; if the cause of whiteness in snow or froth be enquired, and it be rendered thus; that the subtile intermixture of air and water is the cause, it is well rendered; but nevertheless, is this the form of whiteness? No; but it is the efficient, which is ever but *vehiculum formae*.

Metaphysica, .
five de formis
et finibus re-
rum.

This part of metaphysic I do not find laboured and performed, whereat I marvel not: because I hold it not possible to be invented by that course of invention which hath been used, in regard that men, which is the root of all error, have made too untimely a departure, and too remote a recess from particulars.

But the use of this part of metaphysic which I report as deficient, is of the rest the most excellent in two respects: the one, because it is the duty and virtue of all knowledge to abridge the infinity of individual experience, as much as the conception of truth will permit, and to remedy the complaint of *vita brevis, ars longa*; which is performed by uniting the notions and conceptions of sciences: for knowledges are as pyramids, whereof history is the basis. So of natural philosophy, the basis is natural history; the stage next the basis is physick; the stage next the vertical point is metaphysic. As for the vertical point, *Opus, quod operatur Deus à principio usque ad finem*, the summary law of nature, we know not whether man's inquiry can attain unto it. But these three be the true stages of knowledge, and are to them that are depraved no better than the giants hills.

*Ter sunt conati imponere Pelio Ossam
Scilicet, atque Ossae frondosum involvere Olympum.*

But to those which refer all things to the glory of God, they are as the three acclamations, *Sancte, sancte, sancte*; holy in the description, or dilatation of his works; holy in the connection or concatenation of them; and holy in the union of them in a perpetual and uniform law.

And therefore the speculation was excellent in Parmenides and Plato, although but a speculation in them, that all things by scale did ascend to unity. So then always that knowledge is worthiest, which is charged with least multiplicity; which appeareth to be metaphysic, as that which considereth the simple forms or differences of things, which are few in number, and the degrees and co-ordinations whereof make all this variety.

The second respect which valueth and commendeth this part of metaphysic, is, that it doth enfranchise the power of man unto the greatest liberty and possibility of
works

works and effects. For physic carrieth men in narrow and restrained ways, subject to many accidents of impediments, imitating the ordinary flexuous courses of nature ; but *latae undique sunt sapientibus viae*: to sapience, which was anciently defined to be *rerum divinarum et humanarum scientia*, there is ever choice of means : for physical causes give light to new invention *in simili materia*. But whosoever knoweth any form, knoweth the utmost possibility of super-inducing that nature upon any variety of matter, and so is less restrained in operation, either to the basis of the matter, or the condition of the efficient : which kind of knowledge Solomon likewise, though in a more divine sense, elegantly describeth ; *Non ardebunt gressus tui, et currens non habebis offendiculum*. They of sapience are not much liable either to particularity or chance.

The second part of metaphysic is the inquiry of final causes, which I am moved to report, not as omitted, but as misplaced ; and yet if it were but a fault in order, I would not speak of it : for order is matter of illustration, but pertaineth not to the substance of sciences. But this misplacing hath caused a deficiency, or at least a great improficiency in the sciences themselves. For the handling of final causes, mixed with the rest in physical inquiries, hath intercepted the severe and diligent inquiry of all real and physical causes, and given men the occasion to stay upon these satisfactory and specious causes, to the great arrest and prejudice of farther discovery.

For this I find done not only by Plato, who ever anchoreth upon that shore, but by Aristotle, Galen, and others, which do usually likewise fall upon these flats of discoursing causes. For to say that the hairs of the eyelids are for a quickset and fence about the sight ; or, that the firmness of the skins and hides of living creatures is to defend them from the extremities of heat or cold ; or that the bones are for the columns or beams, whereupon the frame of the bodies of living creatures is built ; or, that the leaves of the trees are for protecting of the fruit ; or, that the clouds are for watering of the earth ; or, that the solidity of the earth is for the station and mansion of living creatures, and the like, is well inquired and collected in metaphysic ; but in physic they are impertinent. Nay, they are indeed but remoras and hinderances to stay and slug the ship from farther sailing, and have brought this to pass, that the search of the physical causes hath been neglected, and passed in silence.

And therefore the natural philosophy of Democritus, and some others, who did not suppose a mind or reason in the frame of things, but attributed the form thereof, able to maintain itself, to infinite essays or proofs of nature, which they term fortune ; seemeth to me, as far as I can judge by the recital and fragments which remain unto us, in particularities of physical causes, more real and better inquired than that of Aristotle and Plato ; whereof both intermingled final causes, the one as a part of theology, and the other as a part of logic, which were the favourite studies respectively of both those persons. Not because those final causes are not true, and worthy to be inquired, being kept within their own province ; but because their excursions into the limits of physical causes hath bred a vastness and solitude in that track. For, otherwise, keeping their precincts and borders, men are extremely deceived if they think there is an enmity or repugnancy at all between them. For, the cause rendered, that the hairs about the eye-lids are for the safe-guard of the sight, doth not impugn the cause rendered, that pilosity is incident to orifices of moisture ; *Muscofi fontes, etc.* Nor the cause rendered, that the firmness of hides

is for the armour of the body against extremities of heat and cold, doth not impugn the cause rendered, that contraction of pores is incident to the outwardest parts, in regard of their adjacence to foreign or unlike bodies; and so of the rest: both causes being true and compatible, the one declaring an intention, the other a consequence only.

Neither doth this call in question, or derogate from divine providence, but highly confirms and exalts it. For as in civil actions he is the greater and deeper politician, that can make other men the instruments of his will and ends, and yet never acquaint them with his purpose, so as they shall do it, and yet not know what they do; than he that imparteth his meaning to those he employeth: so is the wisdom of God more admirable, when nature intendeth one thing, and providence draweth forth another; than if he had communicated to particular creatures, and motions, the characters and impressions of his providence. And thus much for metaphysic; the latter part whereof I allow as extant, but wish it confined to its proper place.

Nevertheless there remaineth yet another part of natural philosophy, which is commonly made a principal part, and holdeth rank with physic special, and metaphysic, which is mathematic; but I think it more agreeable to the nature of things, and to the light of order, to place it as a branch of metaphysic: for the subject of it being quantity, not quantity indefinite, which is but a relative, and belongeth to *philosophia prima*, as hath been said, but quantity determined, or proportionable; it appeareth to be one of the essential forms of things; as that that is causative in nature of a number of effects; insomuch as we see, in the schools both of Democritus and of Pythagoras, that the one did ascribe Figure to the first seeds of things, and the other did suppose Numbers to be the principles and originals of things: and it is true also, that of all other forms, as we understand forms, it is the most abstracted and separable from matter, and therefore most proper to metaphysic; which hath likewise been the cause why it hath been better laboured and inquired, than any of the other forms, which are more immersed into matter.

For it being the nature of the mind of man, to the extreme prejudice of knowledge, to delight in the spacious liberty of generalities, as in a champain region, and not in the inclosures of particularity; the mathematics of all other knowledge were the goodliest fields to satisfy that appetite.

But for the placing of these sciences, it is not much material; only we have endeavoured, in these our partitions, to observe a kind of perspective, that one part may cast light upon another.

The Mathematics are either pure or mixed. To the pure mathematics are those sciences belonging which handle quantity determinate, merely severed from any axioms of natural philosophy; and these are two, Geometry, and Arithmetic; the one handling quantity continued, and the other dissevered.

Mixed hath for subject some axioms or parts of natural philosophy, and considereth quantity determined, as it is auxiliary and incident unto them.

For many parts of nature can neither be invented with sufficient subtilty, nor demonstrated with sufficient perspicuity, nor accommodated unto use with sufficient dexterity, without the aid and intervening of the mathematics: of which sort are perspective, music, astronomy, cosmography, architecture, enginery, and divers others.

In the mathematics I can report no deficiency, except it be that men do not sufficiently

ficiently understand the excellent use of the pure mathematics, in that they do remedy and cure many defects in the wit and faculties intellectual. For, if the wit be too dull, they sharpen it ; if too wandering, they fix it ; if too inherent in the sense, they abstract it. So that as tennis is a game of no use in itself, but of great use in respect it maketh a quick eye, and a body ready to put itself into all postures ; so in the mathematics, that use which is collateral and intervenient, is no less worthy than that which is principal and intended.

And as for the mixed mathematics, I may only make this prediction, that there cannot fail to be more kinds of them, as nature grows further disclosed.

Thus much of natural science, or the part of nature speculative.

For Natural Prudence, or the part operative of natural philosophy, we will divide it into three parts, experimental, philosophical and magical ; which three parts active have a correspondence and analogy with the three parts speculative, natural history, phisic, and metaphysic : for many operations have been invented, sometimes by a casual incidence and occurrence, sometimes by a purposed experiment : and of those which have been found by an intentional experiment, some have been found out by varying, or extending the same experiment, some by transferring and compounding divers experiments the one into the other, which kind of invention an empiric may manage.

Again, by the knowledge of physical causes, there cannot fail to follow many indications and designations of new particulars, if men in their speculation will keep an eye upon use and practice. But these are but coastings along the shore, *pre-mendo littus iniquum* : for, it seemeth to me, there can hardly be discovered any radical or fundamental alterations and innovations in nature, either by the fortune and effects of experiments, or by the light and direction of physical causes.

If therefore we have reported metaphysic deficient, it must follow, that we do the like of natural magic, which hath relation thereunto. For as for the natural magic whereof now there is mention in books, containing certain credulous and superstitious conceits and observations of sympathies, and antipathies, and hidden properties, and some frivolous experiments, strange rather by disguisement, than in themselves : it is as far differing in truth of nature from such a knowledge as we require, as the story of king Arthur of Britain, or Hugh of Bourdeaux, differs from Cæsar's commentaries in truth of story. For it is manifest that Cæsar did greater things *de vero*, than those imaginary heroes were feigned to do ; but he did them not in that fabulous manner. Of this kind of learning the fable of Ixion was a figure, who designed to enjoy Juno, the goddess of power ; and instead of her had copulation with a cloud, of which mixture were begotten centaurs and chimeras.

Naturalis magia sive physica operativa major.

So whosoever shall entertain high and vaporous imaginations, instead of a laborious and sober inquiry of truth, shall beget hopes and beliefs of strange and impossible shapes. And therefore we may note in these sciences, which hold so much of imagination and belief, as this degenerate natural magic, alchemy, astrology, and the like, that, in their propositions, the description of the means is ever more monstrous, than the pretence or end.

For it is a thing more probable, that he that knoweth well the natures of weight, of colour, of pliant and fragile in respect of the hammer, of volatile and fixed in respect of the fire, and the rest, may superinduce upon some metal the nature and form of gold by such mechanic as belongeth to the production of the natures afore rehearsed, than that some grains of the medicine projected, should in a few moments

ments

ments of time turn a sea of quicksilver, or other material, into gold : so it is more probable, that he, that knoweth the nature of arefaction, the nature of assimilation, of nourishment to the thing nourished, the manner of increase and clearing of spirits, the manner of the depredations which spirits make upon the humours and solid parts; shall, by ambages of diets, bathings, anointings, medicines, motions, and the like, prolong life, or restore some degree of youth or vivacity, than that it can be done with the use of a few drops, or scruples of a liquor or receipt. To conclude therefore, the true natural magic, which is that great liberty and latitude of operation, which dependeth upon the knowledge of forms, I may report deficient, as the relative thereof is; to which part, if we be serious, and incline not to vanities and plausible discourse, besides the deriving and deducing the operations themselves from metaphysic, there are pertinent two points of much purpose, the one by way of preparation, the other by way of caution : the first is, that there be made a kalendar resembling an inventory of the estate of man, containing all the inventions, being the works or fruits of nature or art, which are now extant, and whereof man is already possessed, out of which doth naturally result a note, what things are yet held impossible or not invented : which kalendar will be the more artificial and serviceable, if to every reputed impossibility you add what thing is extant, which cometh the nearest in degree to that impossibility; to the end, that by these optatives and potentials man's inquiry may be the more awake in deducing direction of works from the speculation of causes : and secondly, that those experiments be not only esteemed which have an immediate and present use, but those principally which are of most universal consequence for invention of other experiments, and those which give most light to the invention of causes; for the invention of the mariners needle, which giveth the direction, is of no less benefit for navigation, than the invention of the sails, which give the motion.

Thus have I passed through natural philosophy, and the deficiencies thereof, wherein if I have differed from the ancient and received doctrines, and thereby shall move contradiction; for my part, as I affect not to dissent, so I purpose not to contend. If it be truth,

Non canimus surdis, respondent omnia sylvæ :

The voice of nature will consent, whether the voice of man do or no. And as Alexander Borgia was wont to say of the expedition of the French for Naples, that they came with chalk in their hands to mark up their lodgings, and not with weapons to fight : so I like better that entry of truth, which cometh peaceably with chalk to mark up those minds which are capable to lodge and harbour it, than that which cometh with pugnacity and contention.

But there remaineth a division of natural philosophy according to the report of the inquiry, and nothing concerning the matter or subject; and that is positive and considerative; when the inquiry reporteth either an assertion, or a doubt. These doubts, or *non liquets*, are of two sorts, particular and total. For the first, we see a good example thereof in Aristotle's *Problems*, which deserved to have had a better continuance; but so, nevertheless, as there is one point whereof warning is to be given and taken. The registering of doubts hath two excellent uses : The one, that it saveth philosophy from errors and falsehoods, when that which is not fully appearing, is not collected into assertion, whereby error might draw error, but reserved in doubt. The other, that the entry of doubts are as so many suckers or spunges to draw use of knowledge; inasmuch, as that which, if doubts had not preceded, a

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man should never have advised, but passed it over without note, by the suggestion and solicitation of doubts is made to be attended and applied. But both these commodities do scarcely countervail an inconvenience which will intrude itself, if it be not debarred; which is, that, when a doubt is once received, men labour rather how to keep it a doubt still, than how to solve it, and accordingly bend their wits. Of this we see the familiar example in lawyers and scholars, both which, if they have once admitted a doubt, it goeth ever after authorised for a doubt. But that use of wit and knowledge is to be allowed, which laboureth to make doubtful things certain, and not those which labour to make certain things doubtful. Therefore these kalendars of doubts I commend as excellent things, so that there be this caution used, that when they be thoroughly sifted and brought to resolution, they be from thenceforth omitted, discarded, and not continued to cherish and encourage men in doubting. To which kalendar of doubts or problems, I advise to be annexed another kalendar, as much or more material, which is a kalendar of popular errors; I mean chiefly in natural history, such as pass in speech and conceit, and are nevertheless apparently detected and convicted of untruth, that man's knowledge be not weakened nor imbased by such dross and vanity.

Continuatio
problematum
in natura.

Catalogus fal-
sificatum gra-
fantium in his-
toria naturae.

As for the doubts or *non liquets* general or in total, I understand those differences of opinions touching the principles of nature, and the fundamental points of the same, which have caused the diversity of sects, schools, and philosophies, as that of Empedocles, Pythagoras, Democritus, Parmenides, and the rest. For although Aristotle, as though he had been of the race of the Ottomans, thought he could not reign, except the first thing he did he killed all his brethren; yet to those that seek truth and not magistrality, it cannot but seem a matter of great profit, to see before them the several opinions touching the foundations of nature: not for any exact truth that can be expected in those theories; for as the same phaenomena in astronomy are satisfied by the received astronomy of the diurnal motion, and the proper motions of the planets, with their eccentrics, and epicycles; and likewise by the theory of Copernicus, who supposed the earth to move, and the calculations are indifferently agreeable to both: so the ordinary face and view of experience is many times satisfied by several theories and philosophies; whereas to find the real truth requireth another manner of severity and attention. For, as Aristotle saith, that children at the first will call every woman mother, but afterward they come to distinguish according to truth: so experience, if it be in childhood, will call every philosophy mother, but when it cometh to ripeness, it will discern the true mother; so as in the mean time it is good to see the several glosses and opinions upon nature, whereof it may be every one in some one point hath seen clearer than his fellows; therefore I wish some collection to be made painfully and understandingly *de antiquis philosophiis*, out of all the possible light which remaineth to us of them: which kind of work I find deficient. But here I must give warning, that it be done distinctly and severally, the philosophies of every one throughout by themselves, and not by titles packed and fagotted up together, as hath been done by Plutarch. For it is the harmony of a philosophy in itself which giveth it light and credence; whereas if it be singled and broken, it will seem more foreign and dissonant. For as when I read in Tacitus the actions of Nero or Claudius, with circumstances of times, inducements and occasions, I find them not so strange; but when I read them in Suetonius Tranquillus, gathered into titles and bundles, and not in order of time, they seem more monstrous and incredible; so is it of any philosophy reported intire,

De antiquis
philosophiis.

and

and dismembered by articles. Neither do I exclude opinions of latter times to be likewise represented in this kalendar of sects of philosophy, as that of Theophrastus Paracelsus, eloquently reduced into an harmony by the pen of Severinus the Dane, and that of Tilesius, and his scholar Donius, being as a pastoral philosophy, full of sense, but of no great depth : and that of Fracastorius, who though he pretended not to make any new philosophy, yet did use the absoluteness of his own sense upon the old : and that of Gilbertus, our countryman, who revived, with some alterations and demonstrations, the opinions of Xenophanes : and any other worthy to be admitted.

Thus have we now dealt with two of the three beams of man's knowledge, that is, *Radius directus*, which is referred to nature ; *Radius refractus*, which is referred to God, and cannot report truly because of the inequality of the medium ; there resteth *Radius reflexus*, whereby man beholdeth and contemplateth himself.

WE come therefore now to that knowledge whereunto the ancient oracle directeth us, which is the knowledge of ourselves ; which deserveth the more accurate handling, by how much it toucheth us more nearly. This knowledge, as it is the end and term of natural philosophy in the intention of man, so, notwithstanding, it is but a portion of natural philosophy in the continent of nature ; and generally let this be a rule, that all partitions of knowledges be accepted rather for lines and veins, than for sections and separations ; and that the continuance and intireness of knowledge be preserved. For the contrary hereof hath made particular sciences to become barren, shallow, and erroneous, while they have not been nourished and maintained from the common fountain. So we see Cicero the orator complained of Socrates and his school, that he was the first that separated philosophy and rhetoric, whereupon rhetoric became an empty and verbal art. So we may see, that the opinion of Copernicus touching the rotation of the earth, which astronomy itself cannot correct, because it is not repugnant to any of the phaenomena, yet natural philosophy may correct. So we see also that the science of medicine, if it be destitute and forsaken by natural philosophy, it is not much better than an empirical practice.

With this reservation therefore we proceed to Human Philosophy, or humanity, which hath two parts : The one considereth man segragate or distributively : the other congregate or in society. So as human philosophy is either simple and particular, or conjugate and civil. Humanity particularly consisteth of the same parts whereof man consisteth, that is of knowledges which respect the body, and of knowledges that respect the mind ; but before we distribute so far, it is good to constitute. For I do take the consideration in general, and at large, of human nature to be fit to be emancipated and made a knowledge by itself ; not so much in regard of those delightful and elegant discourses which have been made of the dignity of man, of his miseries, of his state and life, and the like adjuncts of his common and undivided nature ; but chiefly in regard of the knowledge concerning the sympathies and concordances between the mind and body, which being mixed, cannot be properly assigned to the sciences of either.

This knowledge hath two branches : for as all leagues and amities consist of mutual intelligence and mutual offices, so this league of mind and body hath these two parts

parts, how the one discloseth the other, and how the one worketh upon the other ; Discovery, and Impression.

The former of these hath begotten two arts, both of prediction or prenotation, whereof the one is honoured with the inquiry of Aristotle, and the other of Hippocrates. And although they have of later time been used to be coupled with superstitious and fantastical arts, yet being purged and restored to their true state, they have both of them a solid ground in nature, and a profitable use in life. The first is physiognomy, which discovereth the disposition of the mind by the lineaments of the body. The second is the exposition of natural dreams, which discovereth the state of the body by the imaginations of the mind. In the former of these I note a deficiency, for Aristotle hath very ingeniously and diligently handled the features of the body, but not the gestures of the body, which are no less comprehensible by art, and of greater use and advantage. For the lineaments of the body do disclose the disposition and inclination of the mind in general ; but the motions of the countenance and parts do not only so, but do farther disclose the present humour and state of the mind and will. For, as your majesty saith most aptly and elegantly, “ As the tongue speaketh to the ear, so the gesture speaketh to the eye.” And therefore a number of subtle persons, whose eyes do dwell upon the faces and fashions of men, do well know the advantage of this observation, as being most part of their ability ; neither can it be denied, but that it is a great discovery of dissimulations, and a great direction in business.

Pars physiognomiae, de gestu sive motu corporis.

The latter branch touching impression, hath not been collected into art, but hath been handled dispersedly ; and it hath the same relation or antitrophe that the former hath. For the consideration is double ; “ Either how, and how far the humours and effects of the body do alter or work upon the mind ; or again, How, and how far the passions or apprehensions of the mind do alter or work upon the body.” The former of these hath been inquired and considered, as a part and appendix of medicine, but much more as a part of religion or superstition : for the physician prescribeth cures of the mind in frensies and melancholy passions, and pretendeth also to exhibit medicines to exhilarate the mind, to confirm the courage, to clarify the wits, to corroborate the memory, and the like : but the scruples and superstitions of diet, and other regimen of the body, in the sect of the Pythagoreans, in the heresy of the Manicheans, and in the law of Mahomet, do exceed : So likewise the ordinances in the ceremonial law, interdicting the eating of the blood and fat, distinguishing between beasts clean and unclean for meat, are many and strict. Nay the faith itself, being clear and serene from all clouds of ceremony, yet retaineth the use of fastings, abstinences, and other macerations and humiliations of the body, as things real and not figurative. The root and life of all which prescripts is, besides the ceremony, the consideration of that dependency, which the affections of the mind are submitted unto upon the state and disposition of the body. And if any man of weak judgment do conceive, that this suffering of the mind from the body, doth either question the immortality, or derogate from the sovereignty of the soul, he may be taught in easy instances, that the infant in the mother’s womb is compatible with the mother, and yet separable : and the most absolute monarch is sometimes led by his servants, and yet without subjection. As for the reciprocal knowledge, which is the operation of the conceits and passions of the mind upon the body ; we see all wise physicians, in the prescriptions of their regimens to their patients, do ever consider *accidentia animi*, as of great force to further or hinder re-
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dies or recoveries ; and more especially it is an inquiry of great depth and worth concerning imagination, how, and how far it altereth the body proper of the imaginant. For although it hath a manifest power to hurt, it followeth not it hath the same degree of power to help ; no more than a man can conclude, that because there be pestilent airs, able suddenly to kill a man in health, therefore there should be sovereign airs, able suddenly to cure a man in sickness. But the inquisition of this part is of great use, though it needeth, as Socrates said, “ a Delian diver,” being difficult and profound. But unto all this knowledge *de communi vinculo*, of the concordances between the mind and the body, that part of inquiry is most necessary, which considereth of the seats and domiciles, which the several faculties of the mind do take and occupate in the organs of the body ; which knowledge hath been attempted, and is controverted, and deserveth to be much better inquired. For the opinion of Plato, who placed the understanding in the brain, animosity (which he did unfitly call anger, having a greater mixture with pride) in the heart, and concupiscence or sensuality in the liver, deserveth not to be despised, but much less to be allowed. So then we have constituted, as in our own wish and advice, the inquiry touching human nature intire, as a just portion of knowledge to be handled apart.

The knowledge that concerneth man’s Body, is divided as the good of man’s body is divided, unto which it referreth. The good of man’s body is of four kinds, health, beauty, strength, and pleasure : So the knowledges are medicine, or art of cure ; art of decoration, which is called cosmetic ; art of activity, which is called athletic ; and art voluptuary, which Tacitus truly calleth *eruditus luxus*. This subject of man’s body is of all other things in nature most susceptible of remedy ; but then that remedy is most susceptible of error. For the same subtilty of the subject doth cause large possibility, and easy failing ; and therefore the inquiry ought to be the more exact.

To speak therefore of medicine, and to resume that we have said, ascending a little higher ; the ancient opinion that man was *microcosmus*, an abstract or model of the world, hath been fantastically strained by Paracelsus and the alchemists, as if there were to be found in man’s body certain correspondences and parallels, which should have respect to all varieties of things, as stars, planets, minerals, which are extant in the great world. But thus much is evidently true, that of all substances which nature hath produced, man’s body is the most extremely compounded : For we see herbs and plants are nourished by earth and water ; beasts for the most part by herbs and fruits ; man by the flesh of beasts, birds, fishes, herbs, grains, fruits, water, and the manifold alterations, dressings, and preparations of these several bodies, before they come to be his food and aliment. Add hereunto, that beasts have a more simple order of life, and less change of affections to work upon their bodies ; whereas man in his mansion, sleep, exercise, passions, hath infinite variations ; and it cannot be denied, but that the body of man of all other things is of the most compounded mass. The soul on the other side is the simplest of substances, as is well expressed :

Purumque reliquit

Aethereum sensum, atque aurai simplicis ignem.

So that it is no marvel though the soul so placed enjoy no rest, if that principle be true, that *Motus rerum est rapidus extra locum, placidus in loco*. But to the purpose : this variable composition of man’s body hath made it as an instrument easy to distemper,

distemper, and therefore the poets did well to conjoin music and medicine in Apollo, because the office of medicine is but to tune this curious harp of man's body, and to reduce it to harmony. So then the subject being so variable, hath made the art by consequence more conjectural; and the art being conjectural, hath made so much the more place to be left for imposture. For almost all other arts and sciences are judged by acts or master-pieces, as I may term them, and not by the successes and events. The lawyer is judged by the virtue of his pleading, and not by the issue of the cause. The master of the ship is judged by the directing his course aright, and not by the fortune of the voyage. But the physician, and perhaps the politician, hath no particular acts demonstrative of his ability, but is judged most by the event; which is ever but as it is taken: for who can tell, if a patient die or recover, or if a state be preserved or ruined, whether it be art or accident? And therefore many times the impostor is prized, and the man of virtue taxed. Nay, we see the weakness and credulity of men is such, as they will often prefer a mountebank or witch before a learned physician. And therefore the poets were clear-sighted in discerning this extreme folly, when they made Æsculapius and Circe brother and sister, both children of the sun, as in the verses; Æn. vii. 772.

*Ipsæ repertorem medicinae talis et artis
Fulmine Phœbigenam Stygias detrusit ad undas :*

And again,

Dives inaccesfos ubi Solis filia lucos, etc. Æn. vii. 111.

For in all times, in the opinion of the multitude, witches, and old women, and impostors, have had a competition with physicians. And what followeth? Even this; that physicians say to themselves, as Solomon expresseth it upon an higher occasion; *If it befall to me, as befalleth to the fools, why should I labour to be more wise?* And therefore I cannot much blame physicians, that they use commonly to intend some other art or practice, which they fancy more than their profession. For you shall have of them, antiquaries, poets, humanists, statesmen, merchants, divines, and in every of these better seen than in their profession; and no doubt, upon this ground, that they find that mediocrity and excellency in their art maketh no difference in profit or reputation towards their fortune; for the weakness of patients, and sweetness of life, and nature of hope, maketh men depend upon physicians with all their defects. But, nevertheless, these things, which we have spoken of, are courses begotten between a little occasion, and a great deal of sloth and default; for if we will excite and awake our observation, we shall see, in familiar instances, what a predominant faculty the subtilty of spirit hath over the variety of matter or form: nothing more variable than faces and countenances, yet men can bear in memory the infinite distinctions of them; nay, a painter with a few shells of colours, and the benefit of his eye, and habit of his imagination, can imitate them all that ever have been, are, or may be, if they were brought before him. Nothing more variable than voices, yet men can likewise discern them personally; nay, you shall have a buffoon, or *pantomimus*, will express as many as he pleaseth. Nothing more variable than the differing sounds of words, yet men have found the way to reduce them to a few simple letters. So that it is not the insufficiency or incapacity of man's mind, but it is the remote standing or placing thereof, that breedeth these mazes and incomprehensions: for as the sense afar off is full of mistaking, but is exact at hand, so it is of the understanding; the remedy whereof is not to quicken or strengthen the organ, but to go nearer to the object; and therefore there is no

doubt, but if the physicians will learn and use the true approaches and avenues of nature, they may assume as much as the poet saith :

*Et quoniam variant morbi, variabimus artes ;
Mille mali species, mille salutis erunt.*

Which that they should do, the nobleness of their art doth deserve, well shadowed by the poets, in that they made Æsculapius to be the son of the Sun, the one being the fountain of life, the other as the second stream ; but infinitely more honoured by the example of our Saviour, who made the body of man the object of his miracles, as the soul was the object of his doctrine. For we read not that ever he vouchsafed to do any miracle about honour or money, except that one for giving tribute to Cæsar, but only about the preserving, sustaining, and healing the body of man.

Medicine is a science which hath been, as we have said, more professed than laboured, and yet more laboured than advanced ; the labour having been, in my judgment, rather in circle than in progression. For I find much iteration, but small addition. It considereth the causes of diseases, with the occasions or impulsions ; the diseases themselves, with the accidents ; and the cures, with the preservations. The deficiencies which I think good to note, being a few of many, and those such as are of a more open and manifest nature, I will enumerate and not place.

Narrationes
medicinales.

The first is the discontinuance of the ancient and serious diligence of Hippocrates, who used to set down a narrative of the special cases of his patients, and how they proceeded, and how they were judged by recovery or death. Therefore having an example proper in the father of the art, I shall not need to alledge an example foreign, of the wisdom of the lawyers, who are careful to report new cases and decisions for the direction of future judgments. This continuance of Medicinal History I find deficient, which I understand neither to be so infinite as to extend to every common case, nor so reserved, as to admit none but wonders ; for many things are new in the manner, which are not new in the kind ; and if men will intend to observe, they shall find much worthy to observe.

Anatomia
comparata.

In the inquiry which is made by anatomy, I find much deficiency : for they inquire of the parts, and their substances, figures, and collocations ; but they inquire not of the diversities of the parts, the secrecies of the passages, and the seats or nestling of the humours, nor much of the footsteps and impressions of diseases ; the reason of which omission I suppose to be, because the first inquiry may be satisfied in the view of one or a few anatomies ; but the latter being comparative and casual, must arise from the view of many. And as to the diversity of parts, there is no doubt but the facture or framing of the inward parts is as full of difference as the outward, and in that is the cause continent of many diseases, which not being observed, they quarrel many times with the humours, which are not in fault, the fault being in the very frame and mechanic of the part, which cannot be moved by medicine alterative, but must be accommodated and palliated by diets and medicines familiar. And for the passages and pores, it is true, which was anciently noted, that the more subtle of them appear not in anatomies, because they are shut and latent in dead bodies, though they be open and manifest in live : which being supposed, though the inhumanity of *anatomia vivorum* was by Celsus justly reprovèd ; yet in regard of the great use of this observation, the inquiry needed not by him so slightly to have been relinquished altogether, or referred to the casual practices of surgery, but might have been well diverted upon the dissection of beasts alive, which,

which, notwithstanding the dissimilitude of their parts, may sufficiently satisfy this inquiry. And for the humours, they are commonly passed over in anatomies as purgaments, whereas it is most necessary to observe, what cavities, nests, and receptacles the humours do find in the parts, with the differing kind of the humour so lodged and received. And as for the footsteps of diseases, and their devastations of the inward parts, impostumations, exulcerations, discontinuations, putrefactions, consumptions, contractions, extensions, convulsions, dislocations, obstructions, repletions, together with all preternatural substances, as stones, carnosities, excrescences, worms, and the like; they ought to have been exactly observed by multitude of anatomies, and the contribution of mens several experiences, and carefully set down, both historically, according to the appearances, and artificially, with a reference to the diseases and symptoms which resulted from them, in case where the anatomy is of a defunct patient; whereas now upon opening of bodies, they are passed over slightly and in silence.

In the inquiry of diseases they do abandon the cures of many, some as in their nature incurable and others as past the period of cure; so that Sylla and the triumvirs never proscribed so many men to die, as they do by their ignorant edicts, whereof numbers do escape with less difficulty, than they did in the Roman proscriptions. Therefore I will not doubt to note as a deficiency, that they inquire not the perfect cures of many diseases, or extremities of diseases, but pronouncing them incurable, do enact a law of neglect, and exempt ignorance from discredit.

Inquisitio ulterio-
rior de mor-
bis insanabili-
tus.

Nay farther, I esteem it the office of a physician not only to restore health, but to mitigate pain and dolours, and not only when such mitigation may conduce to recovery, but when it may serve to make a fair and easy passage: for it is no small felicity which Augustus Cæsar was wont to wish to himself, that same *euthanasia*, and which was specially noted in the death of Antoninus Pius, whose death was after the fashion and semblance of a kindly and pleasant sleep. So it is written of Epicurus, that after his disease was judged desperate, he drowned his stomach and senses with a large draught and ingurgitation of wine; whereupon the epigram was made, *Hinc Stygias ebrius hausit aquas*: he was not sober enough to taste any bitterness of the Stygian water. But the physicians, contrariwise, do make a kind of scruple and religion to stay with the patient after the disease is deplored; whereas, in my judgment, they ought both to inquire the skill, and to give the attendances for the facilitating and asswaging of the pains and agonies of death.

De euthanasia
extrema.

In the consideration of the cures of diseases, I find a deficiency in the receipts of propriety, respecting the particular cures of diseases: for the physicians have frustrated the fruit of tradition and experience by their magistralties, in adding, and taking out, and changing *quid pro quo*, in their receipts, at their pleasures, commanding so over the medicine, as the medicine cannot command over the disease; for except it be treacle and Mithridatum, and of late diascordium, and a few more, they tie themselves to no receipts severely and religiously: for as to the confections of sale which are in the shops, they are for readiness and not for propriety; for they are upon general intentions of purging, opening, comforting, altering, and not much appropriated to particular diseases; and this is the cause why empirics and old women are more happy many times in their cures than learned physicians, because they are more religious in holding their medicines. Therefore here is the deficiency which I find, that physicians have not, partly out of their own practice, partly out of their constant probations reported in books, and partly out of the traditions of empirics, set down
and

Medicinae ex-
perimentales.

and delivered over certain experimental medicines for the cure of particular diseases, besides their own conjectural and magisterial descriptions. For as they were the men of the best composition in the state of Rome, which either being consuls inclined to the people, or being tribunes inclined to the senate ; so in the matter we now handle, they be the best physicians, which being learned, incline to the traditions of experience, or being empirics, incline to the methods of learning.

Imitatio naturae in balneis, et aquis medicinalibus.

In preparation of medicines, I do find strange, especially considering how mineral medicines have been extolled, and that they are safer for the outward than inward parts, that no man hath sought to make an imitation by art of natural baths, and medicinable fountains ; which nevertheless are confessed to receive their virtues from minerals ; and not so only, but discerned and distinguished from what particular mineral they receive tincture, as sulphur, vitriol, steel, or the like ; which nature, if it may be reduced to compositions of art, both the variety of them will be increased, and the temper of them will be more commanded.

Filum medicinale. five de vicibus medicinalium.

But lest I grow to be more particular than is agreeable, either to my intention or to proportion ; I will conclude this part with the note of one deficiency more, which seemeth to me of greatest consequence ; which is, that the prescripts in use are too compendious to attain their end ; for to my understanding, it is a vain and flattering opinion to think any medicine can be so sovereign, or so happy, as that the receipt or use of it can work any great effect upon the body of man : it were a strange speech, which spoken, or spoken oft, should reclaim a man from a vice to which he were by nature subject ; it is order, pursuit, sequence, and interchange of application, which is mighty in nature ; which although it require more exact knowledge in prescribing, and more precise obedience in observing, yet is recompensed with the magnitude of effects. And although a man would think by the daily visitations of the physicians, that there were a pursuance in the cure ; yet let a man look into their prescripts and ministrations, and he shall find them but inconstancies, and every day's devices without any settled providence or project ; not that every scrupulous or superstitious prescript is effectual, no more than every strait way is the way to heaven, but the truth of the direction must precede severity of observance.

For Cosmetic, it hath parts civil, and parts effeminate : for cleanness of body was ever esteemed to proceed from a due reverence to God, to society, and to ourselves. As for artificial decoration, it is well worthy of the deficiencies which it hath ; being neither fine enough to deceive, nor handsome to use, nor wholesome to please.

For Athletic, I take the subject of it largely, that is to say, for any point of ability, whereunto the body of man may be brought, whether it be of activity, or of patience ; whereof activity hath two parts, strength and swiftness : and patience likewise hath two parts, hardness against wants and extremities, and indurance of pain or torment, whereof we see the practices in tumblers, in savages, and in those that suffer punishment : nay, if there be any other faculty which falls not within any of the former divisions, as in those that dive, that obtain a strange power of containing respiration, and the like, I refer it to this part. Of these things the practices are known, but the philosophy that concerneth them is not much inquired ; the rather, I think, because they are supposed to be obtained, either by an aptness of nature, which cannot be taught, or only by continual custom, which is soon prescribed ; which though it be not true, yet I forbear to note any deficiencies, for the Olympian games are down long since, and the mediocrity of these things is for use ;

as for the excellency of them, it serveth for the most part but for mercenary ostentation.

For arts of Pleasure sensual, the chief deficiency in them is of laws to repress them. For as it hath been well observed, that the arts which flourish in times while virtue is in growth, are military, and while virtue is in state, are liberal, and while virtue is in declination, are voluptuary; so I doubt, that this age of the world is somewhat upon the descent of the wheel. With arts voluptuary I couple practices jocular; for the deceiving of the senses is one of the pleasures of the senses. As for games of recreation, I hold them to belong to civil life and education. And thus much of that particular human philosophy which concerns the body, which is but the tabernacle of the mind.

FOR Human Knowledge, which concerns the Mind, it hath two parts, the one that inquireth of the substance or nature of the soul or mind, the other that inquireth of the faculties or functions thereof.

Unto the first of these, the considerations of the original of the soul, whether it be native or adventive, and how far it is exempted from laws of matter, and of the immortality thereof, and many other points, do appertain; which have been not more laboriously inquired than variously reported; so as the travel therein taken, seemeth to have been rather in a maze than in a way. But although I am of opinion, that this knowledge may be more really and soundly inquired even in nature than it hath been; yet I hold, that in the end it must be bounded by religion, or else it will be subject to deceit and delusion: for as the substance of the soul in the creation was not extracted out of the mass of heaven and earth, by the benediction of a *product*, but was immediately inspired from God; so it is not possible that it should be, otherwise than by accident, subject to the laws of heaven and earth, which are the subject of philosophy; and therefore the true knowledge of the nature, and state of the soul, must come by the same inspiration that gave the substance. Unto this part of knowledge touching the soul there be two appendixes, which, as they have been handled, have rather vapoured forth fables than kindled truth, divination, and fascination.

Divination hath been anciently and fitly divided into artificial and natural; whereof artificial is, when the mind maketh a prediction by argument, concluding upon signs and tokens: natural is, when the mind hath a presention by an internal power, without the inducement of a sign. Artificial is of two sorts, either when the argument is coupled with a derivation of causes, which is rational; or when it is only grounded upon a coincidence of the effect, which is experimental; whereof the latter for the most part is superstitious: such as were the heathen observations upon the inspection of sacrifices, the flights of birds, the swarming of bees, and such as were the Chaldean astrology, and the like. For artificial divination, the several kinds thereof are distributed amongst particular knowledges. The astronomer hath his predictions, as of conjunctions, aspects, eclipses, and the like. The physician hath his predictions, of death, of recovery, of the accidents and issues of diseases. The politician hath his predictions; *O urbem venalem, et cito perituram, si emptorem invenerit!* which stayed not long to be performed in Sylla first, and after in Cæsar; so as these predictions are now impertinent, and to be referred over. But the divination which springeth from the internal nature of the soul, is that which we now speak of, which hath been made to be of two sorts, primitive and by influxion.

Primitive

Primitive is grounded upon the supposition, that the mind, when it is withdrawn and collected into itself, and not diffused into the organs of the body, hath some extent and latitude of prenotion, which therefore appeareth most in sleep, in extasies, and near death, and more rarely in waking apprehensions; and is induced and furthered by those abstinences and observances which make the mind most to consist in itself. By influxion, is grounded upon the conceit that the mind, as a mirror or glass should take illumination from the foreknowledge of God and spirits; unto which the same regimen doth likewise conduce. For the retiring of the mind within itself, is the state which is most susceptible of divine influxions, save that it is accompanied in this case with a fervency and elevation, which the ancients noted by fury, and not with a repose and quiet, as it is in the other.

Fascination is the power and act of imagination intensive upon other bodies than the body of the imaginant; for of that we spake in the proper place; wherein the school of Paracelsus, and the disciples of pretended natural magic, have been so intemperate, as that they have exalted the power of the imagination to be much one with the power of miracle-working faith: others, that draw nearer to probability, calling to their view the secret passages of things, and especially of the contagion that passeth from body to body, do conceive it should likewise be agreeable to nature, that there should be some transmissions and operations from spirit to spirit, without the mediation of the senses: whence the conceits have grown, now almost made civil, of the mastering spirit, and the force of confidence, and the like. Incident unto this is the inquiry how to raise and fortify the imagination; for if the imagination fortified have power, then it is material to know how to fortify and exalt it. And herein comes in crookedly and dangerously, a palliation of a great part of ceremonial magic. For it may be pretended, that ceremonies, characters, and charms, do work, not by any tacit or sacramental contract with evil spirits, but serve only to strengthen the imagination of him that useth it; as images are said by the Roman church, to fix the cogitations; and raise the devotions of them that pray before them. [But for mine own judgment, if it be admitted that imagination hath power, and that ceremonies fortify imagination, and that they be used sincerely and intentionally for that purpose; yet I should hold them unlawful, as opposing to that first edict which God gave unto man, *In sudore vultus comedes panem tuum*. For they propound those noble effects, which God hath set forth unto man to be bought at the price of labour, to be attained by a few easy and slothful observances. Deficiencies in these knowledges I will report none, other than the general deficiency, that it is not known how much of them is verity, and how much vanity.

The knowledge which respecteth the faculties of the mind of man, is of two kinds; the one respecting his understanding and reason, and the other his will, appetite and affection; whereof the former produceth position or decree, the latter action or execution. It is true that the imagination is an agent or *nuncius* in both provinces, both the judicial and the ministerial. For sense sendeth over to imagination before reason have judged, and reason sendeth over to imagination before the decree can be acted: for imagination ever precedeth voluntary motion, saving that this Janus of imagination hath differing faces; for the face towards reason hath the print of truth, but the face towards action hath the print of good, which nevertheless are faces,

Quales decet esse fororum.

Neither is the imagination simply and only a messenger, but is invested with, or at leastwise

leastwise usurpeth no small authority in itself, besides the duty of the message. For it was well said by Aristotle, "That the mind hath over the body that commandment, which the lord hath over a bondman; but that reason hath over the imagination that commandment, which a magistrate hath over a free citizen," who may come also to rule in his turn. For we see, that in matters of faith and religion, we raise our imagination above our reason, which is the cause why religion sought ever access to the mind by similitudes, types, parables, visions, dreams. And again, in all persuasions that are wrought by eloquence, and other impressions of like nature, which do paint and disguise the true appearance of things, the chief recommendation unto reason is from the imagination. Nevertheless, because I find not any science that doth properly or fitly pertain to the imagination, I see no cause to alter the former division. For as for poesy, it is rather a pleasure, or play of imagination, than a work or duty thereof. And if it be a work, we speak not now of such parts of learning as the imagination produceth, but of such sciences as handle and consider of the imagination; no more than we shall speak now of such knowledges as reason produceth, for that extendeth to all philosophy, but of such knowledges as do handle and inquire of the faculty of reason; so as poesy had its true place. As for the power of the imagination in nature, and the manner of fortifying the same, we have mentioned it in the doctrine *De anima*, whereunto most fitly it belongeth: and lastly, for imaginative or insinuating reason, which is the subject of rhetoric, we think it best to refer it to the arts of reason. So therefore we content ourselves with the former division, that Human Philosophy, which respecteth the faculties of the mind of man, hath two parts, Rational and Moral.

The part of Human Philosophy which is Rational, is of all knowledges, to the most wits, the least delightful, and seemeth but a net of subtilty and spinosity: for as it was truly said, that knowledge is *pabulum animi*; so in the nature of mens appetite to this food, most men are of the taste and stomach of the Israelites in the desert, that would fain have returned *ad ollas carnium*, and were weary of manna; which though it were celestial, yet seemed less nutritive and comfortable. So generally men taste well knowledges that are drenched in flesh and blood, civil history, morality, policy, about the which mens affections, praises, fortunes, do turn and are convertant; but this same *lumen seculum* doth parch and offend most mens watry and soft natures. But to speak truly of things as they are in worth, *rational knowledges* are the keys of all other arts; for as Aristotle saith aptly and elegantly, "That the hand is the instrument of instruments, and the mind is the form of forms;" so these be truly said to be the art of arts; neither do they only direct, but likewise confirm and strengthen: even as the habit of shooting doth not only enable to shoot a nearer shoot, but also to draw a stronger bow.

The arts intellectual are four in number, divided according to the ends whereunto they are referred; for man's labour is to invent that which is sought or propounded; or to judge that which is invented; or to retain that which is judged; or to deliver over that which is retained. So as the arts must be four; art of inquiry or invention; art of examination or judgment; art of custody or memory; and art of elocution or tradition.

Invention is of two kinds, much differing; the one of arts and sciences, and the other of speech and arguments. The former of these I do report deficient; which seemeth to me to be such a deficiency, as if in the making of an inventory, touching the state of a defunct, it should be set down, That there is no ready money. For

as money will fetch all other commodities, so this knowledge is that which should purchase all the rest. And like as the West-Indies had never been discovered, if the use of the mariner's needle had not been first discovered, though the one be vast regions, and the other a small motion: so it cannot be found strange, if sciences be no farther discovered, if the art itself of invention and discovery hath been passed over.

That this part of knowledge is wanting to my judgment, standeth plainly confessed: for first, logic doth not pretend to invent sciences, or the axioms of sciences, but passeth it over with a *cuique in sua arte credendum*. And Celsus acknowledgeth it gravely, speaking of the empirical and dogmatical sects of physicians, "That medicines and cures were first found out, and then after the reasons and causes were discourf'd; and not the causes first found out, and by light from them the medicines and cures discovered." And Plato in his *Theætetus*, noteth well, "That particulars are infinite, and the higher generalities give no sufficient direction; and that the pith of all sciences, which maketh the artsman differ from the inexpert, is in the middle propositions, which in every particular knowledge are taken from tradition and experience." And therefore we see, that they which discourse of the inventions and originals of things, refer them rather to chance than to art, and rather to beasts, birds, fishes, serpents, than to men.

*Distamnum genetrix Cretaea carpit ab Ida,
Puberibus caulem foliis, et flore comantem
Purpureo: non illa feris incognita capris,
Gramina cum tergo volucres hæserè sagittæ.*

So that it was no marvel, the manner of antiquity being to consecrate inventors, that the Ægyptians had so few human idols in their temples, but almost all brute;

*Omnigenumque Deum monstra, et latrator Anubis,
Contra Neptunum, et Venerem, contraque Minervam, etc.*

And if you like better the tradition of the Grecians, and ascribe the first inventions to men, yet you will rather believe that Prometheus first struck the flints, and marvelled at the spark, than that when he first struck the flints he expected the spark; and therefore we see the West-Indian Prometheus had no intelligence with the European, because of the rareness with them of flint, that gave the first occasion: so as it should seem, that hitherto men are rather beholden to a wild goat for surgery, or to a nightingale for music, or to the ibis for some part of physic, or to the potlid that flew open for artillery, or generally to chance, or any thing else, than to logic, for the invention of arts and sciences. Neither is the form of invention which Virgil describeth much other.

*Ut varias usus meditando extunderet artes
Pauulatim.*

For if you observe the words well, it is no other method than that which brute beasts are capable of and do put in use: which is a perpetual intending or practising some one thing, urged and imposed by an absolute necessity of conservation of being; for so Cicero saith very truly, *Usus uni rei deditus, et naturam et artem sæpe vincit*. And therefore if it be said of men,

Labor omnia vincit

Improbis, et duris urgens in rebus egestas;

it is likewise said of beasts, *Quis psittaco docuit suum χυρπε*; Who taught the raven in a drought to throw pebbles into an hollow tree, where she espied water, that the water

water might rise so as she might come to it? Who taught the bee to fall through such a vast sea of air, and to find the way from a field in flower, a great way off, to her hive? Who taught the ant to bite every grain of corn that she burieth in her hill, lest it should take root and grow? Add then the word *extundere*, which importeth the extreme difficulty; and the word *proculatim*, which importeth the extreme slowness; and we are where we were, even amongst the Ægyptians gods; there being little left to the faculty of reason, and nothing to the duty of art, for matter of invention.

Secondly, the induction which the logicians speak of, and which seemeth familiar with Plato, whereby the principles of sciences may be pretended to be invented, and so the middle propositions by derivation from the principles; their form of induction, I say, is utterly vicious and incompetent; wherein their error is the fouler, because it is the duty of art to perfect and exalt nature; but they contrariwise have wronged, abused, and traduced nature. For he that shall attentively observe how the mind doth gather this excellent dew of knowledge, like unto that which the poet speaketh of, *Aërei mellis coelestia dona*, distilling and contriving it out of particulars natural and artificial, as the flowers of the field and garden, shall find, that the mind of herself by nature doth manage and act an induction much better than they describe it. For to conclude upon an enumeration of particulars without instance contradictory, is no conclusion, but a conjecture; for who can assure, in many subjects, upon those particulars which appear of a side, that there are not other on the contrary side which appear not. As if Samuel should have rested upon those sons of Jesse, which were brought before him, and failed of David which was in the field. And this form, to say truth, is so gross, as it had not been possible for wits so subtle, as have managed these things, to have offered it to the world, but that they hasted to their theories and dogmaticals, and were imperious and scornful toward particulars, which their manner was to use but as *lictiores* and *viatores*, for serjeants and whiffers, *ad summovendam turbam*, to make way and make room for their opinions, rather than in their true use and service: certainly it is a thing may touch a man with a religious wonder to see how the footsteps of seducement are the very same in divine and human truth; for as in divine truth man cannot endure to become as a child; so in human, they reputed the attending the inductions, whereof we speak, as if it were a second infancy or childhood.

Thirdly, allow some principles or axioms were rightly induced, yet nevertheless certain it is, that middle propositions cannot be deduced from them in subject of nature by syllogism, that is, by touch and reduction of them to principles in a middle term. It is true that in sciences popular, as moralities, laws, and the like; yea and divinity, because it pleaseth God to apply himself to the capacity of the simplest, that form may have use, and in natural philosophy likewise, by way of argument or satisfactory reason, *Quae assensum parit, operis effoeta est*; but the subtilty of nature and operations will not be inchained in those bonds: for arguments consist of propositions, and propositions of words, and words are but the current tokens or marks of popular notions of things; which notions, if they be grossly and variably collected out of particulars, it is not the laborious examination either of consequences of arguments, or of the truth of propositions, that can ever correct that error, being, as the physicians speak, in the first digestion; and therefore it was not without cause, that so many excellent philosophers became sceptics and academics, and denied any certainty of knowledge or comprehension, and held opinion, that the knowledge of

man extended only to appearances and probabilities. It is true, that in Socrates it was supposed to be but a form of irony, *Scientiam dissimulando simulavit* : for he used to disable his knowledge, to the end to enhance his knowledge, like the humour of Tiberius in his beginnings, that would reign, but would not acknowledge so much ; and in the later academy, which Cicero embraced, this opinion also of *acatalepsia*, I doubt, was not held sincerely : for that all those which excelled in *copia* of speech, seem to have chosen that sect as that which was fittest to give glory to their eloquence, and variable discourses ; being rather like progresses of pleasure, than journeys to an end. But assuredly many scattered in both academies did hold it in subtilty and integrity. But here was their chief error ; they charged the deceit upon the senses, which in my judgment, notwithstanding all their cavillations, are very sufficient to certify and report truth, though not always immediately, yet by comparison, by help of instrument, and by producing and urging such things as are too subtle for the sense, to some effect comprehensible by the sense ; and other like assistance. But they ought to have charged the deceit upon the weakness of the intellectual powers, and upon the manner of collecting, and concluding upon the reports of the senses. This I speak not to disable the mind of man, but to stir it up to seek help : for no man, be he never so cunning or practised, can make a straight line or perfect circle by steadiness of hand, which may be easily done by help of a ruler or compass.

Experientia
literata, et
interpretatio
naturae.

This part of invention, concerning the invention of sciences, I purpose, if God give me leave, hereafter to propound, having digested it into two parts ; whereof the one I term *experientia literata*, and the other, *interpretatio naturae* : the former being but a degree and rudiment of the latter. But I will not dwell too long, nor speak too much upon a promise.

The invention of speech or argument is not properly an invention ; for to invent, is to discover that we know not, and not to recover or resummon that which we already know ; and the use of this invention is no other, but out of the knowledge, whereof our mind is already possessed, to draw forth or call before us that which may be pertinent to the purpose which we take into our consideration. So as, to speak truly, it is no invention, but a remembrance or suggestion, with an application ; which is the cause why the schools do place it after judgment, as subsequent and not precedent. Nevertheless, because we do account it a chace, as well of deer in an inclosed park, as in a forest at large, and that it hath already obtained the name ; let it be called invention, so as it be perceived and discerned that the scope and end of this invention is readiness and present use of our knowledge, and not addition or amplification thereof.

To procure this ready use of knowledge there are two courses, preparation and suggestion. The former of these seemeth scarcely a part of knowledge, consisting rather of diligence than of any artificial erudition. And herein Aristotle wittily, but hurtfully, doth deride the sophists near his time, saying, “ They did as if one “ that professed the art of shoemaking should not teach how to make up a shoe, “ but only exhibit in a readiness a number of shoes of all fashions and sizes.” But yet a man might reply, that if a shoemaker should have no shoes in his shop but only work as he is bespoken, he should be weakly customed. But our Saviour, speaking of divine knowledge, saith, *that the kingdom of heaven is like a good householder, that bringeth forth new and old store* : and we see the ancient writers of rhetoric do give it in precept, that pleaders should have the places whereof they have most continual use,

use, ready handled in all the variety that may be; as that, to speak for the literal interpretation of the law against equity, and contrary; and to speak for presumptions and inferences against testimony, and contrary. And Cicero himself, being broken unto it by great experience, delivereth it plainly: that whatsoever a man shall have occasion to speak of, if he will take the pains, may have it in effect premeditated, and handled *in the best*: so that when he cometh to a particular, he shall have nothing to do but to add names, and times, and places, and such other circumstances of individuals. We see likewise the exact diligence of Demosthenes, who in regard of the great force that the entrance and access into causes hath to make a good impression, had ready framed a number of prefaces for orations and speeches. All which authorities and precedents may outweigh Aristotle's opinion, that would have us change a rich wardrobe for a pair of shears.

But the nature of the collection of this provision or preparatory store, though it be common both to logic and rhetoric, yet having made an entry of it here, where it came first to be spoken of, I think fit to refer over the farther handling of it to rhetoric.

The other part of invention, which I term suggestion, doth assign and direct us to certain marks or places, which may excite our mind to return and produce such knowledge, as it hath formerly collected, to the end we may make use thereof. Neither is this use, truly taken, only to furnish argument to dispute probably with others, but likewise to minister unto our judgment to conclude aright within ourselves. Neither may these places serve only to prompt our invention, but also to direct our inquiry. For a faculty of wise interrogating is half a knowledge. For as Plato saith, "Whosoever seeketh, knoweth that which he seeketh for in a general notion, else how shall he know it when he hath found it?" And therefore the larger your anticipation is, the more direct and compendious is your search. But the same places which will help us what to produce of that which we know already, will also help us, if a man of experience were before us, what questions to ask; or, if we have books and authors to instruct us, what points to search and revolve: so as I cannot report, that this part of invention, which is that which the schools call topics, is deficient.

Nevertheless topics are of two sorts, general and special. The general we have spoken to, but the particular hath been touched by some, but rejected generally as inartificial and variable. But leaving the humour which hath reigned too much in the schools, which is, to be vainly subtle in a few things, which are within their command, and to reject the rest, I do receive particular topics, that is, places or directions of invention and inquiry in every particular knowledge, as things of great use, being mixtures of logic with the matter of sciences: for in these it holdeth, *Actus inveniendi adolescit cum inventis*; for as in going of a way, we do not only gain that part of the way which is passed, but we gain the better sight of that part of the way which remaineth; so every degree of proceeding in a science giveth a light to that which followeth, which light if we strengthen, by drawing it forth into questions or places of inquiry, we do greatly advance our pursuit.

Now we pass unto the arts of judgment, which handle the natures of proofs and demonstrations, which as to induction hath a coincidence with invention: for in all inductions, whether in good or vicious form, the same action of the mind which inventeth, judgeth; all one as in the sense: but otherwise it is in proof by syllogism; for the proof being not immediate, but by mean, the invention of the mean is one thing,

thing, and the judgment of the consequence is another; the one exciting only, the other examining. Therefore, for the real and exact form of judgment, we refer ourselves to that which we have spoken of interpretation of nature.

For the other judgment by syllogism, as it is a thing most agreeable to the mind of man, so it hath been vehemently and excellently laboured; for the nature of man doth extremely covet to have somewhat in his understanding fixed and immoveable, and as a rest and support of the mind. And therefore as Aristotle endeavoureth to prove, that in all motion there is some point quiescent; and as he elegantly expoundeth the ancient fable of Atlas, that stood fixed, and bore up the heaven from falling, to be meant of the poles or axle-tree of heaven, whereupon the conversion is accomplished; so assuredly men have a desire to have an Atlas or axle-tree within, to keep them from fluctuation, which is like to a perpetual peril of falling; therefore men did hasten to set down some principles about which the variety of their disputations might turn.

So then this art of judgment is but the reduction of propositions to principles in a middle term. The principles to be agreed by all, and exempted from argument: the middle term to be elected at the liberty of every man's invention: the reduction to be of two kinds, direct and inverted; the one when the proposition is reduced to the principle, which they term a probation ostensive; the other when the contradictory of the proposition is reduced to the contradictory of the principle, which is, that which they call *per incommodum*, or pressing an absurdity; the number of middle terms to be as the proposition standeth degrees more or less removed from the principle.

But this art hath two several methods of doctrine, the one by way of direction, the other by way of caution; the former frameth and setteth down a true form of consequence, by the variations and defections from which errors and inconsequences may be exactly judged. Toward the composition and structure of which form it is incident to handle the parts thereof, which are propositions, and the parts of propositions, which are simple words; and this is that part of logic which is comprehended in the analytics.

The second method of doctrine was introduced for expedite use and assurance sake, discovering the more subtle forms of sophisms and illaqueations, with their redargutions, which is that which is termed elenches. For although in the more gross sorts of fallacies it happeneth, as Seneca maketh the comparison well, as in juggling feats, which though we know not how they are done, yet we know well it is not as it seemeth to be; yet the more subtle sort of them doth not only put a man besides his answer, but doth many times abuse his judgment.

This part concerning Elenches, is excellently handled by Aristotle in precept, but more excellently by Plato in example; not only in the persons of the sophists, but even in Socrates himself, who professing to affirm nothing, but to infirm that which was affirmed by another, hath exactly expressed all the forms of objection, fallacy, and redargution. And although we have said that the use of this doctrine is for redargution; yet it is manifest, the degenerate and corrupt use is for caption and contradiction, which passeth for a great faculty, and no doubt is of very great advantage, though the difference be good which was made between orators and sophisters, that the one is as the greyhound, which hath his advantage in the race, and the other as the hare, which hath her advantage in the turn, so as it is the advantage of the weaker creature.

But

But yet farther, this doctrine of Elenches hath a more ample latitude and extent, than is perceived; namely, unto divers parts of knowledge; whereof some are laboured and others omitted. For first, I conceive, though it may seem at first somewhat strange, that that part which is variably referred, sometimes to logic, sometimes to metaphysic, touching the common adjuncts of essences, is but an Elenche; for the great sophism of all sophisms being equivocation or ambiguity of words and phrase, especially of such words as are most general and intervene in every inquiry; it seemeth to me that the true and fruitful uses, leaving vain subtilties and speculations, of the inquiry of majority, minority, priority, posteriority, identity, diversity, possibility, act, totality, parts, existence, privation, and the like, are but wise cautions against ambiguities of speech. So again, the distribution of things into certain tribes, which we call categories or predicaments, are but cautions against the confusion of definitions and divisions.

Secondly, there is a seducement that worketh by the strength of the impression, and not by the subtilty of the illaqueation, not so much perplexing the reason, as overruling it by power of the imagination. But this part I think more proper to handle when I shall speak of rhetoric.

But lastly, there is yet a much more important and profound kind of fallacies in the mind of man, which I find not observed or inquired at all, and think good to place here, as that which of all others appertaineth most to rectify judgment: the force whereof is such, as it doth not dazzle or snare the understanding in some particulars, but doth more generally and inwardly infect and corrupt the state thereof. For the mind of man is far from the nature of a clear and equal glass, wherein the beams of things should reflect according to their true incidence; nay, it is rather like an enchanted glass, full of superstition and imposture, if it be not delivered and reduced. For this purpose, let us consider the false appearances that are imposed upon us by the general nature of the mind, beholding them in an example or two, as first in that instance which is the root of all superstition, namely, that to the nature of the mind of all men it is consonant for the affirmative or active to effect, more than the negative or privative. So that a few times hitting, or presence, countervails oft-times failing, or absence; as was well answered by Diagoras to him that shewed him, in Neptune's temple, the great number of pictures of such as had escaped shipwreck, and had paid their vows to Neptune, saying, "Advise now, you that think it folly to invoke Neptune in tempest. Yea, but, saith Diagoras, where are they painted that are drowned?" Let us behold it in another instance, namely, "That the spirit of man, being of an equal and uniform substance, doth usually suppose and feign in nature a greater equality and uniformity than is in truth." Hence it cometh, that the mathematicians cannot satisfy themselves, except they reduce the motions of the celestial bodies to perfect circles, rejecting spiral lines, and labouring to be discharged of eccentrics. Hence it cometh, that whereas there are many things in nature, as it were *monodica, sui juris*; yet the cogitations of man do feign unto them relatives, parallels, and conjugates, whereas no such thing is; as they have feigned an element of fire to keep square with earth, water, and air, and the like; nay, it is not credible, till it be opened, what a number of fictions and fancies, the similitude of human actions and arts, together with the making of man *communis mensura*, have brought into natural philosophy, not much better than the heresy of the Anthropomorphites, bred in the cells of gross and solitary monks, and the opinion of Epicurus, answerable to the same in heathenism, who supposed the

the gods to be of human shape. And therefore Velleius the Epicurean needed not to have asked, why God should have adorned the heavens with stars, as if he had been an Ædilis; one that should have set forth some magnificent shews or plays. For if that great work-master had been of an human disposition, he would have cast the stars into some pleasant and beautiful works and orders, like the frets in the roofs of houses; whereas one can scarce find a posture in square, or triangle, or straight line, amongst such an infinite number; so differing an harmony there is between the spirit of man, and the spirit of nature.

Let us consider, again, the false appearances imposed upon us by every man's own individual nature and custom, in that feigned supposition that Plato maketh of the cave; for certainly if a child were continued in a grot or cave under the earth until maturity of age, and came suddenly abroad, he would have strange and absurd imaginations. So in like manner, although our persons live in the view of heaven, yet our spirits are included in the caves of our own complexions and customs, which minister unto us infinite errors and vain opinions, if they be not recalled to examination. But hereof we have given many examples in one of the errors, or peccant humours, which we ran briefly over in our first book.

And lastly, let us consider the false appearances that are imposed upon us by words, which are framed and applied according to the conceit and capacities of the vulgar sort; and although we think we govern our words, and prescribe it well, *Loquendum ut vulgus, sentiendum ut sapientes*; yet certain it is, that words, as a Tartar's bow, do shoot back upon the understanding of the wisest, and mightily intangle and pervert the judgment; so as it is almost necessary in all controversies and disputations, to imitate the wisdom of the mathematicians; in setting down in the very beginning the definitions of our words and terms, that others may know how we accept and understand them, and whether they concur with us or no. For it cometh to pass, for want of this, that we are sure to end there where we ought to have begun, which is in questions and differences about words. To conclude therefore, it must be confessed that it is not possible to divorce ourselves from these fallacies and false appearances, because they are inseparable from our nature and condition of life; so yet nevertheless the caution of them, for all elenches, as was said, are but cautions, doth extremely import the true conduct of human judgment. The particular elenches or cautions against these three false appearances, I find altogether deficient.

Elenchi magni, five de idolis animi humani: natiui et adventitii.

De analogia demonstrationum.

There remaineth one part of judgment of great excellency, which to mine understanding is so slightly touched, as I may report that also deficient; which is, the application of the differing kinds of proofs to the differing kinds of subjects; for there being but four kinds of demonstrations, that is, by the immediate consent of the mind or sense, by induction, by syllogism, and by congruity; which is that which Aristotle calleth demonstration in orb, or circle, and not *à notioribus*; every of these hath certain subjects in the matter of sciences, in which respectively they have chiefest use; and certain others, from which respectively they ought to be excluded, and the rigour and curiosity in requiring the more severe proofs in some things, and chiefly the facility in contenting ourselves with the more remiss proofs in others, hath been amongst the greatest causes of detriment and hindrance to knowledge. The distributions and assignations of demonstrations, according to the analogy of sciences, I note as deficient.

The

The custody or retaining of knowledge is either in writing or memory; whereof writing hath two parts, the nature of the character, and the order of the entry: for the art of characters, or other visible notes of words or things, it hath nearest conjugation with grammar; and therefore I refer it to the due place: for the disposition and collocation of that knowledge which we preserve in writing, it consisteth in a good digest of common-places, wherein I am not ignorant of the prejudice imputed to the use of common-place books, as causing a retardation of reading, and some sloth or relaxation of memory. But because it is but a counterfeit thing in knowledges, to be forward and pregnant, except a man be deep and full, I hold the entry of common-places, to be a matter of great use and essence in studying, as that which assureth *copia* of invention, and contracteth judgment to strength. But this is true, that of the methods of common-places that I have seen, there is none of any sufficient worth, all of them carrying merely the face of a school, and not of a world, and referring to vulgar matters, and pedantical divisions, without all life, or respect to action.

For the other principal part of the custody of knowledge, which is memory, I find that faculty in my judgment weakly inquired of. An art there is extant of it; but it seemeth to me that there are better precepts than that art, and better practices of that art, than those received. It is certain the art, as it is, may be raised to points of ostentation prodigious: but in use, as it is now managed, it is barren, not burdensome, nor dangerous to natural memory, as is imagined, but barren; that is, not dexterous to be applied to the serious use of business and occasions. And therefore I make no more estimation of repeating a great number of names or words upon once hearing, or the pouring forth of a number of verses or rhimes *ex tempore*, or the making of a satirical simile of every thing, or the turning of every thing to a jest, or the falsifying or contradicting of every thing by cavil, or the like, whereof in the faculties of the mind there is great *copia*, and such as by device and practice may be exalted to an extreme degree of wonder, than I do of the tricks of tumblers, funambuloes, baladines; the one being the same in the mind, that the other is in the body; matters of strangeness without worthiness.

This art of memory is but built upon two intentions; the one prenotation, the other emblem. Prenotation dischargeth the indefinite seeking of that we would remember, and directeth us to seek in a narrow compass; that is, somewhat that hath congruity with our place of memory. Emblem reduceth conceits intellectual to images sensible, which strike the memory more; out of which axioms may be drawn much more practical than that in use: and besides which axioms, there are divers more touching help of memory, not inferior to them. But I did in the beginning distinguish, not to report those things deficient, which are but only ill managed.

There remaineth the fourth kind of rational knowledge, which is transitive, concerning the expressing or transferring our knowledge to others, which I will term by the general name of tradition or delivery. Tradition hath three parts: the first concerning the organ of tradition; the second concerning the method of tradition; and the third, concerning the illustration of tradition.

For the organ of tradition, it is either speech or writing: for Aristotle saith well, "Words are the images of cogitations, and letters are the images of words;" but yet it is not of necessity that cogitations be expressed by the medium of words. For whatsoever is capable of sufficient differences, and those perceptible by the sense, is

in nature competent to express cogitations. And therefore we see in the commerce of barbarous people, that understand not one another's language, and in the practice of divers that are dumb and deaf, that mens minds are expressed in gestures, though not exactly, yet to serve the turn. And we understand farther, that it is the use of China, and the kingdoms of the high Levant, to write in characters real, which express neither letters nor words in gross, but things or notions; insomuch as countries and provinces, which understand not one another's language, can nevertheless read one another's writings, because the characters are accepted more generally than the languages do extend; and therefore they have a vast multitude of characters, as many, I suppose, as radical words.

These notes of cogitations are of two sorts; the one when the note hath some similitude or congruity with the notion; the other *ad placitum*, having force only by contract or acceptation. Of the former sort are hieroglyphics and gestures. For as to hieroglyphics, things of ancient use, and embraced chiefly by the Ægyptians, one of the most ancient nations, they are but as continued impresses and emblems. And as for gestures, they are as transitory hieroglyphics, and are to hieroglyphics as words spoken are to words written, in that they abide not: but they have evermore, as well as the other, an affinity with the things signified; as Periander, being consulted with how to preserve a tyranny newly usurped, bid the messenger attend and report what he saw him do, and went into his garden and topped all the highest flowers; signifying, that it consisted in the cutting off and keeping low of the nobility and grandees. *Ad placitum* are the characters real before mentioned, and words: although some have been willing by curious inquiry, or rather by apt feigning, to have derived imposition of names from reason and intendment; a speculation elegant, and by reason it searcheth into antiquity, reverent; but sparingly mixed with truth, and of small fruit. This portion of knowledge, touching the notes of things, and cogitations in general, I find not inquired, but deficient. And although it may seem of no great use, considering that words and writings by letters do far excel all the other ways; yet because this part concerneth, as it were, the mint of knowledge, for words are the tokens current and accepted for conceits, as moneys are for values, and that it is fit men be not ignorant that moneys may be of another kind than gold and silver, I thought good to propound it to better inquiry.

De notis re-
rum.

Concerning speech and words, the consideration of them hath produced the science of Grammar; for man still striveth to reintegrate himself in those benedictions, from which by his fault he hath been deprived: and as he hath striven against the first general curse, by the invention of all other arts; so hath he sought to come forth of the second general curse, which was the confusion of tongues, by the art of grammar, whereof the use in a mother tongue is small; in a foreign tongue more; but most in such foreign tongues as have ceased to be vulgar tongues, and are turned only to learned tongues. The duty of it is of two natures; the one popular, which is for the speedy and perfect attaining languages, as well for intercourse of speech as for understanding of authors; the other philosophical, examining the power and nature of words, as they are the footsteps and prints of reason: which kind of analogy between words and reason is handled *sparsum*, brokenly, though not intirely; and therefore I cannot report it deficient, though I think it very worthy to be reduced into a science by itself.

Unto

Unto grammar also belongeth, as an appendix, the consideration of the accidents of words, which are measure, sound, and elevation or accent, and the sweetness and harshness of them : whence hath issued some curious observations in rhetoric, but chiefly poesy, as we consider it, in respect of the verse, and not of the argument ; wherein though men in learned tongues do tie themselves to the ancient measures, yet in modern languages it seemeth to me, as free to make new measures of verses as of dances ; for a dance is a measured pace, as a verse is a measured speech. In these things the sense is better judge than the art ;

Cœnæ fercula nostræ,

Mallet convivis, quam placuisse cocis.

And of the servile expressing antiquity in an unlike and an unfit subject, it is well said, *Quod tempore antiquum videtur, id incongruitate est maxime novum.*

For ciphers, they are commonly in letters or alphabets, but may be in words. The kinds of ciphers, besides the simple ciphers, with changes, and intermixtures of nulls and non-significants, are many, according to the nature or rule of the infolding : wheel-ciphers, key-ciphers, doubles, *etc.* But the virtues of them, whereby they are to be preferred, are three ; that they be not laborious to write and read ; that they be impossible to decipher ; and in some cases, that they be without suspicion. The highest degree whereof is to write *omnia per omnia* ; which is undoubtedly possible with a proportion quincuple at most, of the writing infolding, to the writing infolded, and no other restraint whatsoever. This art of ciphering hath for relative an art of deciphering, by supposition unprofitable, but as things are, of great use. For suppose that ciphers were well managed, there be multitudes of them which exclude the decipherer. But in regard of the rawness and unskilfulness of the hands through which they pass, the greatest matters are many times carried in the weakest ciphers.

In the enumeration of these private and retired arts, it may be thought I seek to make a great muster-roll of sciences, naming them for shew and ostentation, and to little other purpose. But let those which are skilful in them judge, whether I bring them in only for appearance, or whether in that which I speak of them, though in few words, there be not some seed of proficience. And this must be remembered, that as there be many of great account in their countries and provinces, which when they come up to the seat of the estate, are but of mean rank, and scarcely regarded ; so these arts being here placed with the principal and supreme sciences, seem petty things ; yet to such as have chosen them to spend their labours and studies in them, they seem great matters.

For the method of tradition, I see it hath moved a controversy in our time. But as in civil business, if there be a meeting, and men fall at words, there is commonly an end of the matter for that time, and no proceeding at all : so in learning, where there is much controversy, there is many times little inquiry. For this part of knowledge of method seemeth to me so weakly inquired, as I shall report it deficient.

Method hath been placed, and that not amiss, in logic, as a part of judgment ; for as the doctrine of syllogisms comprehendeth the rules of judgment upon that which is invented, so the doctrine of method containeth the rules of judgment upon that which is to be delivered ; for judgment precedeth delivery, as it followeth invention. Neither is the method or the nature of the tradition material only to the use of knowledge, but likewise to the progression of knowledge : for since the labour

and life of one man cannot attain to perfection of knowledge, the wisdom of the tradition is that which inspireth the felicity of continuance and proceeding. And therefore the most real diversity of method, is of method referred to use, and method referred to progression, whereof the one may be termed magisterial, and the other of probation.

The latter whereof seemeth to be *via deserta et interclusa*. For as knowledges are now delivered, there is a kind of contract of error, between the deliverer and the receiver; for he that delivereth knowledge, desireth to deliver it in such form as may be best believed, and not as may be best examined: and he that receiveth knowledge, desireth rather present satisfaction, than expectant inquiry; and so rather not to doubt, than not to err; glory making the author not to lay open his weakness, and sloth making the disciple not to know his strength.

But knowledge, that is delivered as a thread to be spun on, ought to be delivered and intimated, if it were possible, in the same method wherein it was invented, and so is it possible of knowledge induced. But in this same anticipated and prevented knowledge, no man knoweth how he came to the knowledge which he hath obtained. But yet nevertheless, *secundum majus et minus*, a man may revisit and descend unto the foundations of his knowledge and consent; and so transplant it into another, as it grew in his own mind. For it is in knowledges, as it is in plants, if you mean to use the plant, it is no matter for the roots; but if you mean to remove it to grow, then it is more assured to rest upon roots than slips: so the delivery of knowledges, as it is now used, is as of fair bodies of trees without the roots; good for the carpenter, but not for the planter. But if you will have sciences grow, it is less matter for the shaft or body of the tree, so you look well to the taking up of the roots: of which kind of delivery the method of the mathematics, in that subject, hath some shadow; but generally I see it neither put in use nor put in inquisition, and therefore note it for deficient.

De methodo
fincera, five ad
filios scientia-
rum.

Another diversity of method there is, which hath some affinity with the former, used in some cases by the discretion of the ancients, but disgraced since by the impostures of many vain persons, who have made it as a false light for their counterfeit merchandises; and that is, enigmatical and disclosed. The pretence whereof is to remove the vulgar capacities from being admitted to the secrets of knowledges, and to reserve them to selected auditors, or wits of such sharpness as can pierce the veil.

Another diversity of method, whereof the consequence is great, is the delivery of knowledge in aphorisms, or in methods; wherein we may observe, that it hath been too much taken into custom, out of a few axioms or observations upon any subject to make a solemn and formal art, filling it with some discourses, and illustrating it with examples, and digesting it into a sensible method; but the writing in aphorisms hath many excellent virtues, whereto the writing in method doth not approach.

For first it trieth the writer, whether he be superficial or solid: for aphorisms, except they should be ridiculous, cannot be made but of the pith and heart of sciences; for discourse of illustration is cut off, recitals of examples are cut off; discourse of connection and order is cut off; descriptions of practice are cut off; so there remaineth nothing to fill the aphorisms, but some good quantity of observation: and therefore no man can suffice, nor in reason will attempt to write aphorisms, but he that is sound and grounded. But in methods,

Tantum

*Tantum series juncturaque pollet,
Tantum de medicis sumptis accedit honoris;*

as a man shall make a great shew of an art, which if it were disjointed, would come to little. Secondly, methods are more fit to win consent or belief; but less fit to point to action; for they carry a kind of demonstration in orb or circle, one part illuminating another, and therefore satisfy. But particulars being dispersed, do best agree with dispersed directions. And lastly, aphorisms, representing a knowledge broken, do invite men to inquire farther; whereas methods carrying the shew of a total, do secure men as if they were at farthest.

Another diversity of method, which is likewise of great weight, is, the handling of knowledge by assertions, and their proofs; or by questions, and their determinations; the latter kind whereof, if it be immoderately followed, is as prejudicial to the proceeding of learning, as it is to the proceeding of an army to go about to besiege every little fort or hold. For if the field be kept, and the sum of the enterprise pursued, those smaller things will come in of themselves; indeed a man would not leave some important place with an enemy at his back. In like manner, the use of confutation in the delivery of sciences ought to be very sparing; and to serve to remove strong preoccupations and prejudgments, and not to minister and excite disputations and doubts.

Another diversity of method is according to the subject or matter which is handled; for there is a great difference in the delivery of the mathematics, which are the most abstracted of knowledges, and policy, which is the most immersed; and howsoever contention hath been moved, touching an uniformity of method in uniformity of matter: yet we see how that opinion, besides the weakness of it, hath been of ill desert towards learning, as that which taketh the way to reduce learning to certain empty and barren generalities; being but the very husks and shells of sciences, all the kernel being forced out and expelled with the torture and press of the method: And therefore as I did allow well of particular topics for invention, so do I allow likewise of particular methods of tradition.

Another diversity of judgment in the delivery and teaching of knowledge, is according unto the light and presuppositions of that which is delivered; for that knowledge which is new and foreign from opinions received, is to be delivered in another form than that that is agreeable and familiar; and therefore Aristotle, when he thinks to tax Democritus, doth in truth commend him, where he saith, "If we shall indeed dispute, and not follow after similitudes," *etc.* For those, whose conceits are seated in popular opinions, need only but to prove or dispute: but those whose conceits are beyond popular opinions, have a double labour; the one to make themselves conceived, and the other to prove and demonstrate: so that it is of necessity with them to have recourse to similitudes and translations to express themselves. And therefore in the infancy of learning, and in rude times, when those conceits which are now trivial were then new, the world was full of parables and similitudes; for else would men either have passed over without mark, or else rejected for paradoxes that which was offered, before they had understood or judged. So in divine learning, we see how frequent parables and tropes are: for it is a rule, "That whatsoever science is not consonant to presuppositions, must pray in aid of similitudes."

There be also other diversities of methods vulgar and received: as that of resolution or *analysis*, of constitution or *synthesis*, of concealment or cryptic, *etc.* which I do allow well of, though I have stood upon those which are least handled and observed.

De prudentia
traditionis.

ed. All which I have remembered to this purpose, because I would erect and constitute one general inquiry, which seems to me deficient touching the wisdom of tradition.

But unto this part of knowledge concerning method, doth farther belong, not only the architecture of the whole frame of a work, but also the several beams and columns thereof, not as to their stuff, but as to their quantity and figure: and therefore method considereth not only the disposition of the argument or subject, but likewise the propositions; not as to their truth or matter, but as to their limitation and manner. For herein Ramus merited better a great deal in reviving the good rules of propositions, *Καθόλου πρῶτον κατὰ παντός, etc.* than he did in introducing the canker of epitomes; and yet, as it is the condition of human things, that, according to the ancient fables, “The most precious things have the most pernicious keepers;” it was so, that the attempt of the one made him fall upon the other. For he had need be well conducted, that should design to make axioms convertible; if he make them not withal circular, and *non promovent*, or incurring into themselves: but yet the intention was excellent.

De productione
axiomatum.

The other considerations of method concerning propositions, are chiefly touching the utmost propositions, which limit the dimensions of sciences; for every knowledge may be fitly said, besides the profundity, which is the truth and substance of it that makes it solid, to have a longitude and a latitude, accounting the latitude towards other sciences, and the longitude towards action; that is, from the greatest generality, to the most particular precept: The one giveth rule how far one knowledge ought to intermeddle within the province of another, which is the rule they call *καθ'αυτὸ*: the other giveth rule, unto what degree of particularity a knowledge should descend: which latter I find passed over in silence, being in my judgment the more material; for certainly there must be somewhat left to practice; but how much is worthy the inquiry. We see remote and superficial generalities do but offer knowledge to scorn of practical men, and are no more aiding to practice, than an Ortelius's universal map is to direct the way between London and York. The better sort of rules have been not unfitly compared to glasses of steel unpolished; where you may see the images of things, but first they must be filed; so the rules will help, if they be laboured and polished by practice. But how crytalline they may be made at the first, and how far forth they may be polished beforehand, is the question; the inquiry whereof seemeth to me deficient.

There hath been also laboured, and put in practice, a method, which is not a lawful method, but a method of imposture, which is, to deliver knowledges in such manner as men may speedily come to make a shew of learning, who have it not; such was the travel of Raymundus Lullius in making that art, which bears his name, not unlike to some books of typocomy which have been made since, being nothing but a mass of words of all arts, to give men countenance, that those which use the terms might be thought to understand the art; which collections are much like a fripper's or broker's shop, that hath ends of every thing, but nothing of worth.

Now we descend to that part which concerneth the illustration of tradition, comprehended in that science which we call Rhetoric, or art of eloquence; a science excellent and excellently well laboured. For although in true value it is inferior to wisdom, as it is said by God to Moses, when he disabled himself for want of this faculty, *Aaron shall be thy speaker, and thou shalt be to him as God.* Yet with people

ple it is the more mighty : for so Solomon saith, *Sapientia domus apparatusus scientiarum, et datus eloquii majora reperiet* ; signifying, that profoundness of wisdom will help a man to a name or admiration, but that it is eloquence that prevailleth in an active life ; and as to the labouring of it, the emulation of Aristotle with the rhetoricians of his time, and the experience of Cicero, hath made them in their works of rhetorics exceed themselves. Again, the excellency of examples of eloquence in the orations of Demosthenes and Cicero, added to the perfection of the precepts of eloquence, hath doubled the progression in this art : and therefore the deficiencies which I shall note, will rather be in some collections, which may as hand-maids attend the art, than in the rules or use of the art itself.

Notwithstanding, to stir the earth a little about the roots of this science, as we have done of the rest ; the duty and office of rhetoric is to apply reason to imagination, for the better moving of the will : for we see reason is disturbed in the administration thereof by three means ; by illaqueation or sophism, which pertains to logic ; by imagination or impressiion, which pertains to rhetoric ; and by passion or affection, which pertains to morality. And as in negotiation with others, men are wrought by cunning, by importunity, and by vehemency ; so in this negotiation within ourselves, men are undetermined by inconsequencies, solicited and importuned by impressiions or observations, and transported by passions. Neither is the nature of man so unfortunately built, as that those powers and arts should have force to disturb reason, and not to establish and advance it ; for the end of logic is to teach a form of argument to secure reason, and not to intrap it. The end of morality, is to procure the affections to obey reason, and not to invade it. The end of rhetoric, is to fill the imagination to second reason, and not to oppress it ; for these abuses of arts come in but *ex obliquo* for caution.

And therefore it was great injustice in Plato, though springing out of a just hatred of the rhetoricians of his time, to esteem of rhetoric but as a voluptuary art, resembling it to cookery, that did mar wholesome meats, and help unwholesome by variety of sauces, to the pleasure of the taste. For we see that speech is much more conversant in adorning that which is good, than in colouring that which is evil ; for there is no man but speaketh more honestly than he can do or think ; and it was excellently noted by Thucydides in Cleon, that because he used to hold on the bad side in causes of estate, therefore he was ever inveighing against eloquence and good speech, knowing that no man can speak fair of courses fordid and base. And therefore as Plato said elegantly, “ That Virtue, if she could be seen, would move great love and affection :” so seeing that she cannot be shewed to the sense by corporal shape, the next degree is, to shew her to the imagination in lively representation : for to shew her to reason only in subtilty of argument, was a thing ever derided in Chrysippus, and many of the Stoics, who thought to thrust virtue upon men by sharp disputations and conclusions, which have no sympathy with the will of man.

Again, if the affections in themselves were pliant and obedient to reason, it were true, there should be no great use of persuasions and insinuations to the will, more than of naked proposition and proofs : but in regard of the continual mutinies and seditions of the affections,

Video meliora, proboque,

Detriora sequor ;

Reason would become captive and servile, if eloquence of persuasions did not prac-

tise and win the imagination from the affections part, and contract a confederacy between the reason and imagination against the affections; for the affections themselves carry ever an appetite to good, as reason doth. The difference is, that the affection beholdeth merely the present, reason beholdeth the future and sum of time. And therefore the present filling the imagination more, reason is commonly vanquished; but after that force of eloquence and persuasion hath made things future and remote appear as present, then upon revolt of the imagination reason prevaileth.

We conclude therefore, that rhetoric can be no more charged with the colouring of the worst part, than logic with sophistry, or morality with vice. For we know the doctrines of contraries are the same, though the use be opposite. It appeareth also, that logic differeth from rhetoric, not only as the fist from the palm, the one close, the other at large; but much more in this, that logic handleth reason exact, and in truth; and rhetoric handleth it as it is planted in popular opinions and manners. And therefore Aristotle doth wisely place rhetoric as between logic on the one side, and moral or civil knowledge on the other, as participating of both: for the proofs and demonstrations of logic are toward all men indifferent and the same: but the proofs and persuasions of rhetoric ought to differ according to the auditors:

Orpheus in sylvis, inter delphinas Arion.

Which application, in perfection of idea, ought to extend so far, that if a man should speak of the same thing to several persons, he should speak to them all respectively, and several ways: though this politic part of eloquence in private speech, it is easy for the greatest orators to want; whilst by the observing their well graced forms of speech, they lose the volubility of application: and therefore it shall not be amiss to recommend this to better inquiry, not being curious whether we place it here, or in that part which concerneth policy.

D. prudentia
sermonis pri-
vati.

Colores boni
et mali, sim-
plicis et com-
parati.

Now therefore will I descend to the deficiencies, which, as I said, are but attendances: and first, I do not find the wisdom and diligence of Aristotle well pursued, who began to make a collection of the popular signs and colours of good and evil, both simple and comparative, which are as the sophisms of rhetoric, as I touched before. For example;

SOPHISMA.

Quod laudatur, bonum: quod vituperatur, malum.

REDARGUTIO.

Laudat venales qui vult extrudere merces.

Malum est, malum est, inquit emptor; sed cum recesserit, tum gloriabitur.

The defects in the labour of Aristotle are three; one, that there be but a few of many; another, that their elenchus's are not annexed; and the third, that he conceived but a part of the use of them: for their use is not only in probation, but much more in impression. For many forms are equal in signification, which are differing in impression; as the difference is great in the piercing of that which is sharp, and that which is flat, though the strength of the percussion be the same: for there is no man but will be a little more raised by hearing it said; "Your enemies will be glad of this;"

Hoc Ithacus velit, et magno mercentur Atridae;
than by hearing it said only, "This is evil for you."

Secondly,

Secondly, I do resume also that which I mentioned before, touching provision or preparatory store, for the furniture of speech and readines of invention, which appeareth to be of two sorts; the one in resemblance to a shop of pieces unmade up, the other to a shop of things ready made up, both to be applied to that which is frequent and most in request: the former of these I will call *antitheta*, and the latter *formulae*.

Antitheta are theses argued *pro et contra*, wherein men may be more large and laborious; but, in such as are able to do it, to avoid prolixity of entry, I wish the seeds of the severall arguments to be cast up into some brief and acute sentences, not to be cited, but to be as scanes or bottoms of thread, to be unwinded at large when they come to be used; supplying authorities and examples by reference.

PRO VERBIS LEGIS.

Non est interpretatio, sed divinatio, quae recedit à litera.

Cum receditur à litera iudex transit in legislatorem.

PRO SENTENTIA LEGIS.

Ex civilibus verbis est eliciendus sensus, qui interpretatur singula.

Formulae are but decent and apt passages or conveyances of speech, which may serve indifferently for differing subjects; as of preface, conclusion, digression, transition, excusation, etc. For as in buildings there is great pleasure and use in the well-casting of the stair-cases, entries, doors, windows, and the like; so in speech, the conveyances and passages are of special ornament and effect.

A CONCLUSION IN A DELIBERATIVE.

So may we redeem the faults passed, and prevent the inconveniencies future.

There remain two *appendices* touching the tradition of knowledge, the one critical, the other pedantical; for all knowledge is either delivered by teachers, or attained by mens proper endeavours: and therefore as the principal part of tradition of knowledge concerneth chiefly writing of books, so the relative part thereof concerneth reading of books: whereunto appertain incidently these considerations. The first is concerning the true correction and edition of authors, wherein nevertheless rash diligence hath done great prejudice. For these critics have often presumed that that which they understood not, is false set down. As the priest, that where he found it written of St. Paul, *Demissus est per sportam*, mended his book, and made it *Demissus est per portam*, because *sporta* was an hard word, and out of his reading: and surely these errors, though they be not so palpable and ridiculous, are yet of the same kind. And therefore as it hath been wisely noted, the most corrected copies are commonly the least correct.

The second is concerning the exposition and explication of authors, which resteth in annotations and commentaries, wherein it is over usual to blanch the obscure places, and discourse upon the plain.

The third is concerning the times, which in many cases give great light to true interpretations.

The fourth is concerning some brief censure and judgment of the authors, that men thereby may make some election unto themselves what books to read.

And the fifth is concerning the syntax and disposition of studies, that men may know in what order or pursuit to read.

For pedantical knowledge, it containeth that difference of tradition which is proper for youth, whereunto appertain divers considerations of great fruit.

As first the timing and seasoning of knowledges ; as with what to initiate them, and from what for a time to refrain them.

Secondly, the consideration where to begin with the easiest, and so proceed to the more difficult, and in what courses to press the more difficult, and then to turn them to the more easy ; for it is one method to practise swimming with bladders, and another to practise dancing with heavy shoes.

A third is the application of learning according unto the propriety of the wits ; for there is no defect in the faculties intellectual but seemeth to have a proper cure contained in some studies : as for example, if a child be bird-witted, that is, hath not the faculty of attention, the mathematics giveth a remedy thereunto, for in them, if the wit be caught away but a moment, one is to begin anew : and as sciences have a propriety towards faculties for cure and help, so faculties or powers have a sympathy towards sciences for excellency or speedy profiting ; and therefore it is an inquiry of great wisdom what kinds of wits and natures are most proper for what sciences.

Fourthly, the ordering of exercises is matter of great consequence to hurt or help : for, as is well observed by Cicero, men in exercising their faculties, if they be not well advised, do exercise their faults, and get ill habits as well as good ; so there is a great judgment to be had in the continuance and intermission of exercises. It were too long to particularize a number of other considerations of this nature ; things but of mean appearance, but of singular efficacy : for as the wronging or cherishing of seeds or young plants, is that that is most important to their thriving ; and as it was noted, that the first six kings, being in truth as tutors of the state of Rome in the infancy thereof, was the principal cause of the immense greatness of that state which followed ; so the culture and manurance of minds in youth hath such a forcible, though unseen, operation, as hardly any length of time or contention of labour can countervail it afterwards. And it is not amiss to observe also, how small and mean faculties gotten by education, yet when they fall into great men or great matters, do work great and important effects ; whereof we see a notable example in Tacitus, of two stage-players, Percennius and Vibulenus, who by their faculty of playing put the Pannonian armies into an extreme tumult and combustion ; for there arising a mutiny amongst them, upon the death of Augustus Cæsar, Blæsus the lieutenant had committed some of the mutineers, which were suddenly rescued ; whereupon Vibulenus got to be heard speak, which he did in this manner : “ These poor innocent wretches appointed to cruel death, you have restored to behold the light : “ but who shall restore my brother to me, or life unto my brother, that was sent hither in message from the regions of Germany, to treat of the common cause ? “ And he hath murdered him this last night by some of his fencers and ruffians, that he hath about him for his executioners upon soldiers. Answer, Blæsius, what is done with his body ? The mortalest enemies do not deny burial ; when I have performed my last duties to the corps with kisses, with tears, command me to be slain besides him, so that these my fellows, for our good meaning, and our true hearts to the legions, may have leave to bury us.” With which speech he put the army into an infinite fury and uproar ; whereas truth was he had no brother, neither was there any such matter, but he played it merely as if he had been upon the stage.

But to return, we are now come to a period of rational knowledges, wherein if I have made the divisions other than those that are received, yet would I not be thought

to disallow all those divisions which I do not use; for there is a double necessity imposed upon me of altering the divisions. The one, because it differeth in end and purpose, to sort together those things which are next in nature, and those things which are next in use; for if a secretary of state should sort his papers, it is like in his study, or general cabinet, he would sort together things of a nature, as treaties, instructions, *etc.* but in his boxes, or particular cabinet, he would sort together those that he were like to use together, though of several natures; so in this general cabinet of knowledge it was necessary for me to follow the divisions of the nature of things; whereas if myself had been to handle any particular knowledge, I would have respected the divisions fittest for use. The other, because the bringing in of the deficiencies did by consequence alter the partitions of the rest; for let the knowledge extant, for demonstration sake, be fifteen, let the knowledge with the deficiencies be twenty, the parts of fifteen are not the parts of twenty, for the parts of fifteen are three and five, the parts of twenty are two, four, five and ten; so as these things are without contradiction, and could not otherwise be.

WE proceed now to that knowledge which considereth of the Appetite and Will of Man, whereof Solomon saith, *Ante omnia, fili, custodi cor tuum, nam inde procedunt actiones vitæ.* In the handling of this science, those which have written seem to me to have done as if a man that professed to teach to write, did only exhibit fair copies of alphabets, and letters joined, without giving any precepts or directions for the carriage of the hand and framing of the letters; so have they made good and fair exemplars and copies, carrying the draughts and portraitures of good, virtue, duty, felicity; propounding them well described as the true objects and scopes of man's will and desires; but how to attain these excellent marks, and how to frame and subdue the will of man to become true and conformable to these pursuits, they pass it over altogether, or slightly and unprofitably; for it is not the disputing that moral virtues are in the mind of man by habit and not by nature, or the distinguishing that generous spirits are won by doctrines and persuasions, and the vulgar sort by reward and punishment, and the like scattered glances and touches, that can excuse the absence of this part.

The reason of this omission I suppose to be that hidden rock whereupon both this and many other barks of knowledge have been cast away; which is, that men have despised to be conversant in ordinary and common matters, the judicious direction whereof nevertheless is the wisest doctrine, for life consisteth not in novelties nor subtilities, but contrariwise they have compounded sciences chiefly of a certain resplendent or lustrous mass of matter, chosen to give glory either to the subtilty of disputations, or to the eloquence of discourses. But Seneca giveth an excellent check to eloquence: *Nec est illis eloquentia, quibus non rerum cupiditatem facit, sed sui.* Doctrine should be such as should make men in love with the lesson, and not with the teacher, being directed to the auditor's benefit, and not to the author's commendation; and therefore those are of the right kind which may be concluded as Demosthenes concludes his counsel, *Quæ si feceritis, non oratorem duntaxat in præsentia laudabitis, sed vos metipsos etiam, non ita multo post statu rerum vestrarum meliore.* Neither needed men of so excellent parts to have despaired of a fortune, which the poet Virgil promised himself, and indeed obtained, who got as much glory of eloquence, wit, and learning in the expressing of the observations of husbandry, as of the heroical acts of Æneas:

*Nec sum animi dubius, verbis ea vincere magnum
Quam sit, et angusti hunc addere rebus honorem.*

Georg. iii. 289.

And surely if the purpose be in good earnest not to write at leisure that which men may read at leisure, but really to instruct and suborn action and active life, these georgics of the mind concerning the husbandry and tillage thereof, are no less worthy than the heroical descriptions of virtue, duty, and felicity. Wherefore the main and primitive division of moral knowledge seemeth to be into the Exemplar or Platform of Good, and the Regiment or Culture of the Mind; the one describing the nature of good, the other prescribing rules how to subdue, apply, and accommodate the will of man thereunto.

The doctrine touching the Platform or Nature of Good considereth it either simple or compared, either the kinds of good, or the degrees of good; in the latter whereof those infinite disputations which were touching the supreme degree thereof, which they term felicity, beatitude, or the highest good, the doctrines concerning which were as the heathen divinity, are by the christian faith discharged. And, as Aristotle saith, "That young men may be happy, but not otherwise but by hope;" so we must all acknowledge our minority, and embrace the felicity which is by hope of the future world.

Freed therefore, and delivered from this doctrine of the philosophers heaven, whereby they feigned an higher elevation of man's nature than was, for we see in what an height of stile Seneca writeth, *Vere magnum, habere fragilitatem hominis, securitatem Dei*, we may with more sobriety and truth receive the rest of their inquiries and labours; wherein for the nature of good, positive or simple, they have set it down excellently, in describing the forms of virtue and duty with their situations and postures, in distributing them into their kinds, parts, provinces, actions, and administrations, and the like: nay farther, they have commended them to man's nature and spirit, with great quickness of argument and beauty of persuasions; yea, and fortified and intrenched them, as much as discourse can do, against corrupt and popular opinions. Again, for the degrees and comparative nature of good, they have also excellently handled it in their triplicity of good, in the comparison between a contemplative and an active life, in the distinction between virtue with reluctance, and virtue secured, in their encounters between honesty and profit, in their balancing of virtue with virtue, and the like; so as this part deserveth to be reported for excellently laboured.

Notwithstanding, if before they had come to the popular and received notions of virtue and vice, pleasure and pain, and the rest, they had stayed a little longer upon the inquiry concerning the roots of good and evil, and the strings of those roots, they had given, in my opinion, a great light to that which followed; and specially if they had consulted with nature, they had made their doctrines less prolix and more profound: which being by them in part omitted and in part handled with much confusion, we will endeavour to resume and open in a more clear manner.

There is formed in every thing a double nature of good, the one as every thing is a total or substantive in itself, the other as it is a part or member of a greater body; whereof the latter is in degree the greater and the worthier, because it tendeth to the conservation of a more general form: therefore we see the iron in particular sympathy moveth to the loadstone, but yet if it exceed a certain quantity, it forsaketh the affection to the loadstone, and like a good patriot moveth to the earth, which is the region and country of massy bodies; so may we go forward and see that water
and

and massy bodies move to the center of the earth, but rather than to suffer a dissolution in the continuance of nature they will move upwards from the center of the earth, forsaking their duty to the earth in regard of their duty to the world. This double nature of good and the comparative thereof is much more engraven upon man, if he degenerate not, unto whom the conservation of duty to the public ought to be much more precious than the conservation of life and being; according to that memorable speech of Pompeius magnus, when being in commission of purveyance for a famine at Rome, and being dissuaded with great vehemency and instance by his friends about him, that he should not hazard himself to sea in an extremity of weather, he said only to them *Necessse est ut eam, non ut vivam*: but it may be truly affirmed that there was never any philosophy, religion, or other discipline, which did so plainly and highly exalt the good which is communicative, and depress the good which is private and particular, as the holy faith: well declaring, that it was the same God that gave the christian law to men, who gave those laws of nature to inanimate creatures that we spake of before; for we read that the elected saints of God have wished themselves anathematized and razed out of the book of life, in an extasy of charity, and infinite feeling of communion.

This being set down and strongly planted, doth judge and determine most of the controversies wherein moral philosophy is conversant. For first, it decideth the question touching the preferment of the contemplative or active life, and decideth it against Aristotle: for all the reasons which he bringeth for the contemplative, are private, and respecting the pleasure and dignity of a man's self, in which respects, no question, the contemplative life hath the preeminence: not much unlike to that comparison, which Pythagoras made for the gracing and magnifying of philosophy and contemplation; who being asked what he was, answered, "That if Hiero were ever at the Olympian games, he knew the manner, that some came to try their fortune for the prizes, and some came as merchants to utter their commodities, and some came to make good cheer and meet their friends, and some came to look on, and that he was one of them that came to look on." But men must know, that in this theatre of man's life, it is reserved only for God and angels to be lookers on: neither could the like question ever have been received in the church, notwithstanding their *Pretiosa in oculis Domini mors sanctorum ejus*; by which place they would exalt their civil death and regular professions, but upon this defence, that the monastical life is not simply contemplative, but performeth the duty either of incessant prayers and supplications, which hath been truly esteemed as an office in the church, or else of writing or taking instructions for writing concerning the law of God; as Moses did when he abode so long in the mount. And so we see Enoch the seventh from Adam, who was the first contemplative, and walked with God; yet did also endow the church with prophecy, which St. Jude citeth. But for contemplation which should be finished in itself, without casting beams upon society, assuredly divinity knoweth it not.

It decideth also the controversies between Zeno and Socrates, and their schools and successions on the one side, who placed felicity in virtue simply or attended; the actions and exercises whereof do chiefly embrace and concern society; and on the other side, the Cyreniacs and Epicureans, who placed it in pleasure, and made virtue, as it is used in some comedies of errors, wherein the mistress and the maid change habits, to be but as a servant, without which pleasure cannot be served and attended: and the reformed school of the Epicureans, which placed it in serenity of mind and freedom

dom from perturbation ; as if they would have deposed Jupiter again, and restored Saturn and the first age, when there was no summer nor winter, spring nor autumn, but all after one air and season ; and Herillus, who placed felicity in extinguishment of the disputes of the mind, making no fixed nature of good and evil, esteeming things according to the clearness of the desires, or the reluctance ; which opinion was revived in the heresy of the Anabaptists, measuring things according to the motions of the spirit, and the constancy or wavering of belief : all which are manifest to tend to private repose and contentment, and not to point of society.

It censurcth also the philosophy of Epictetus, which presupposeth that felicity must be placed in those things which are in our power, lest we be liable to fortune and disturbance ; as if it were not a thing much more happy to fail in good and virtuous ends for the public, than to obtain all that we can wish to ourselves in our proper fortune ; as Consalvo said to his soldiers, shewing them Naples, and protesting, “ He had rather die one foot forwards, than to have his life secured for long, by “ one foot of retreat.” Whereunto the wisdom of that heavenly leader hath signified, who hath affirmed, *that a good conscience is a continual feast* ; shewing plainly, that the conscience of good intentions, howsoever succeeding, is a more continual joy to nature, than all the provision which can be made for security and repose.

It censurcth likewise that abuse of philosophy, which grew general about the time of Epictetus, in converting it into an occupation or profession ; as if the purpose had been not to resist and extinguish perturbations, but to fly and avoid the causes of them, and to shape a particular kind and course of life to that end, introducing such an health of mind, as was that health of body, of which Aristotle speaketh of Herodicus, who did nothing all his life long but intend his health : whereas if men refer themselves to duties of society ; as that health of body is best, which is able to endure all alterations and extremities : so likewise that health of mind is most proper, which can go through the greatest temptations and perturbations. So as Diogenes’s opinion is to be accepted, who commended not them which abstained, but them which sustained, and could refrain their mind *in praecipitio*, and could give unto the mind, as is used in horsemanship, the shortest stop or turn.

Lastly, it censurcth the tenderness and want of application in some of the most ancient and reverend philosophers and philosophical men, that did retire too easily from civil business, for avoiding of indignities and perturbations ; whereas the resolution of men truly moral, ought to be such as the same Consalvo said the honour of a soldier should be, *è tela crassiore*, and not so fine, as that every thing should catch in it and endanger it.

To resume private or particular good, it falleth into the division of good active and passive : for this difference of good, not unlike to that which amongst the Romans was expressed in the familiar or household terms of *Promus* and *Condu*, is formed also in all things, and is best disclosed in the two several appetites in creatures ; the one to preserve or continue themselves, and the other to dilate or multiply themselves : whereof the latter seemeth to be the worthier ; for in nature the heavens, which are the more worthy, are the agent ; and the earth, which is the less worthy, is the patient : in the pleasures of living creatures, that of generation is greater than that of food : in divine doctrine, *Beatius est dare, quam accipere* : and in life there is no man’s spirit so soft, but esteemeth the effecting of somewhat that he hath fixed in his desire, more than sensuality. Which priority of the active good is
much

much upheld by the consideration of our estate to be mortal and exposed to fortune : for if we might have a perpetuity and certainty in our pleasures, the state of them would advance their price ; but when we see it is but *Magni aestimamus mori tardius*, and *Ne gloriaris de crastino, nescis partum diei*, it maketh us to desire to have somewhat secured and exempted from time, which are only our deeds and works ; as it is said, *Opera eorum sequuntur eos*. The preeminence likewise of this active good is upheld by the affection which is natural in man towards variety and proceeding, which in the pleasures of the sense, which is the principal part of passive good, can have no great latitude. *Cogita quamdiu eadem feceris ; cibus, somnus, ludus per hunc circulum curritur ; mori velle non tantum fortis, aut miser, aut prudens, sed etiam fastidiosus potest*. But in enterprises, pursuits, and purposes of life, there is much variety, whereof men are sensible with pleasure in their inceptions, progressions, recoils, re-integrations, approaches and attainings to their ends. So as it was well said, *Vita sine proposito languida et vaga est*. Neither hath this active good any identity with the good of society, though in some case it hath an incidence into it : for although it do many times bring forth acts of beneficence, yet it is with a respect private to a man's own power, glory, amplification, continuance ; as appeareth plainly, when it findeth a contrary subject. For that gigantic state of mind which possesseth the troublers of the world, such as was Lucius Sylla, and infinite other in smaller model, who would have all men happy or unhappy as they were their friends or enemies, and would give form to the world according to their own humours, which is the true theomachy, pretendeth and aspires to active good, though it recedeth farthest from good of society, which we have determined to be the greater.

To resume passive good, it receiveth a subdivision of conservative and perfective. For let us take a brief review of that which we have said ; we have spoken first of the good of society, the intention whereof embraceth the form of human nature, whereof we are members and portions, and not our own proper and individual form ; we have spoken of active good, and supposed it as a part of private and particular good. And rightly, for there is impressed upon all things a triple desire or appetite proceeding from love to themselves ; one of preserving and continuing their form ; another of advancing and perfecting their form ; and a third of multiplying and extending their form upon other things ; whereof the multiplying or signature of it upon other things, is that which we handled by the name of active good. So as there remaineth the conserving of it, and perfecting or raising of it ; which latter is the highest degree of passive good. For to preserve in state is the less, to preserve with advancement is the greater. So in man,

Igneus est ollis vigor, et coelestis origo.

His approach or assumption to divine or angelical nature is the perfection of his form ; the error or false imitation of which good, is that which is the tempest of human life, while man, upon the instinct of an advancement formal and essential, is carried to seek an advancement local. For as those which are sick, and find no remedy, do tumble up and down and change place, as if by a remove local they could obtain a remove internal : so is it with men in ambition, when failing of the means to exalt their nature, they are in a perpetual estuation to exalt their place. So then passive good is, as was said, either conservative or perfective.

To resume the good of conservation or comfort, which consisteth in the fruition of that which is agreeable to our natures ; it seemeth to be the most pure and natural of pleasures, but yet the softest and the lowest. And this also receiveth a difference,

which hath neither been well judged of, nor well inquired. For the good of fruition or contentment, is placed either in the sincereness of the fruition, or in the quickness and vigour of it: the one superinduced by equality, the other by vicissitude; the one having less mixture of evil, the other more impression of good. Whether of these is the greater good, is a question controverted; but whether man's nature may not be capable of both, is a question not inquired.

The former question being debated between Socrates and a sophist, Socrates placing felicity in an equal and constant peace of mind, and the sophist in much desiring and much enjoying, they fell from argument to ill words: the sophist saying that Socrates's felicity was the felicity of a block or stone; and Socrates saying that the sophist's felicity was the felicity of one that had the itch, who did nothing but itch and scratch. And both these opinions do not want their supports: for the opinion of Socrates is much upheld by the general consent even of the Epicures themselves, that virtue beareth a great part in felicity: and if so, certain it is, that virtue hath more use in clearing perturbations, than in compassing desires. The sophist's opinion is much favoured by the assertion we last spake of, that good of advancement is greater than good of simple preservation; because every obtaining a desire hath a shew of advancement, as motion though in a circle hath a shew of progression.

But the second question decided the true way maketh the former superfluous: for can it be doubted but that there are some who take more pleasure in enjoying pleasures, than some other, and yet nevertheless are less troubled with the loss or leaving of them: so as this same, *Non uti, ut non appetas; non appetere, ut non metuas; sunt animi pusilli et diffidentis*. And it seemeth to me that most of the doctrines of the philosophers are more fearful and cautionary than the nature of things requireth: so have they increased the fear of death in offering to cure it; for when they would have a man's whole life to be but a discipline or preparation to die, they must needs make men think that it is a terrible enemy against whom there is no end of preparing. Better saith the poet,

*Qui finem vitae extremum inter munera ponat
Naturae:*

So have they sought to make mens minds too uniform and harmonical, by not breaking them sufficiently to contrary motions: the reason whereof I suppose to be, because they themselves were men dedicated to a private, free, and unapplied course of life. For as we see, upon the lute or like instrument, a ground, though it be sweet and have shew of many changes, yet breaketh not the hand to such strange and hard stops and passages, as a set song or voluntary: much after the same manner was the diversity between a philosophical and a civil life. And therefore men are to imitate the wisdom of jewellers, who if there be a grain, or a cloud, or an ice which may be ground forth without taking too much of the stone, they help it; but if it should lessen and abate the stone too much, they will not meddle with it; so ought men so to procure serenity, as they destroy not magnanimity.

Having therefore deduced the good of man, which is private and particular, as far as seemeth fit, we will now return to that good of man which respecteth and beholdeth Society, which we may term duty; because the term of duty is more proper to a mind well framed and disposed towards others, as the term of virtue is applied to a mind well formed and composed in itself; though neither can a man understand virtue without some relation to society, nor duty without an inward disposition.

fit. This part may seem at first to pertain to science civil and politic, but not if it be well observed; for it concerneth the regimen and government of every man over himself, and not over others. And as in architecture the direction of the framing the posts, beams, and other parts of building, is not the same with the manner of joining them and erecting the building; and in mechanics, the direction how to frame an instrument or engine, is not the same with the manner of setting it on work and employing it; and yet nevertheless in expressing of the one you incidently express the aptness towards the other: so the doctrine of conjugation of men in society differeth from that of their conformity thereunto.

This part of duty is subdivided into two parts; the common duty of every man as a man or member of a state, the other the respective or special duty of every man in his profession, vocation, and place. The first of these is extant and well laboured, as hath been said. The second likewise I may report rather dispersed, than deficient; which manner of dispersed writing in this kind of argument I acknowledge to be best: for who can take upon him to write of the proper duty, virtue, challenge, and right of every several vocation, profession, and place? For although sometimes a looker on may see more than a gamester, and there be a proverb more arrogant than sound, "That the vale best discovereth the hill;" yet there is small doubt but that men can write best, and most really and materially in their own professions; and that the writing of speculative men of active matter, for the most part, doth seem to men of experience, as Phormio's argument of the wars seemed to Hannibal, to be but dreams and dotage. Only there is one vice which accompanieth them that write in their own professions, that they magnify them in excess; but generally it were to be wished, as that which would make learning indeed solid and fruitful, that active men would or could become writers.

In which I cannot but mention, *honoris causa*, your majesty's excellent book touching the duty of a king, a work richly compounded of divinity, morality, and policy, with great asperion of all other arts; and being in mine opinion one of the most found and healthful writings that I have read, not distempered in the heat of invention, nor in the coldness of negligence; not sick of business, as those are who lose themselves in their order, nor of convulsions, as those which cramp in matters impertinent; not favouring of perfumes and paintings, as those do who seek to please the reader more than nature beareth; and chiefly well disposed in the spirits thereof, being agreeable to truth and apt for action, and far removed from that natural infirmity whereunto I noted those that write in their own professions to be subject, which is, that they exalt it above measure: for your majesty hath truly described, not a king of Assyria, or Persia, in their external glory, but a Moses, or a David, pastors of their people. Neither can I ever lose out of my remembrance, what I heard your majesty in the same sacred spirit of government deliver in a great cause of judicature, which was, "That kings ruled by their laws as God did by the laws of nature, and ought as rarely to put in use their supreme prerogative, as God doth his power of working miracles." And yet notwithstanding, in your book of a free monarchy, you do well give men to understand, that you know the plenitude of the power and right of a king, as well as the circle of his office and duty. Thus have I presumed to alledge this excellent writing of your majesty, as a prime or eminent example of Tractates concerning special and respective duties, wherein I should have said as much if it had been written a thousand years since: neither am I moved with certain courtly decencies, which esteem it flattery to praise

in presence; no, it is flattery to praise in absence, that is, when either the virtue is absent, or the occasion is absent, and so the praise is not natural but forced, either in truth or in time. But let Cicero be read in his oration *pro Marcello*, which is nothing but an excellent table of Cæsar's virtue, and made to his face; besides the example of many other excellent persons wiser a great deal than such observers, and we will never doubt, upon a full occasion, to give just praises to present or absent.

But to return, there belongeth farther to the handling of this part, touching the duties of professions and vocations, a relative or opposite touching the frauds, cautions, impostures, and vices of every profession, which hath been likewise handled. But how? Rather in a satire and cynically, than seriously and wisely; for men have rather fought by wit to deride and traduce much of that which is good in professions, than with judgment to discover and sever that which is corrupt. For, as Solomon saith, he that cometh to seek after knowledge with a mind to scorn and censure, shall be sure to find matter for his humour, but no matter for his instruction: *Quærenti derisori scientiam, ipsa se abscondit: sed studiosa fit obviam.* But the managing of this argument with integrity and truth, which I note as deficient, seemeth to me to be one of the best fortifications for honesty and virtue that can be planted. For, as the fable goeth of the basilisk, that if he see you first, you die for it; but if you see him first, he dieth: so is it with deceits and evil arts, which, if they be first espied, lose their life; but if they prevent, they indanger. So that we are much beholden to Machiavel and others, that write what men do, and not what they ought to do: for it is not possible to join serpentine wisdom with the columbine innocency, except men know exactly all the conditions of the serpent; his baseness and going upon his belly, his volubility and lubricity, his envy and sting, and the rest; that is, all forms and natures of evil: for without this, virtue lieth open and unfenced. Nay, an honest man can do no good upon those that are wicked, to reclaim them, without the help of the knowledge of evil: for men of corrupted minds presuppose that honesty groweth out of simplicity of manners, and believing of preachers, schoolmasters and mens exterior language. So as, except you can make them perceive that you know the utmost reaches of their own corrupt opinions, they despise all morality; *Non recipit stultus verba prudentiæ, nisi ea dixeris, quæ versantur in corde ejus.*

Unto this part touching respective duty doth also appertain the duties between husband and wife, parent and child, master and servant: so likewise the laws of friendship and gratitude, the civil bond of companies, colleges and politic bodies, of neighbourhood, and all other proportionate duties; not as they are parts of government and society, but as to the framing of the mind of particular persons.

The knowledge concerning good respecting society doth handle it also not simply alone, but comparatively, whereunto belongeth the weighing of duties between person and person, case and case, particular and public: as we see in the proceeding of Lucius Brutus against his own sons, which was so much extolled; yet what was said?

Infelix, utcumque ferent ea fata minores.

So the case was doubtful, and had opinion on both sides. Again, we see when M. Brutus and Cassius invited to a supper certain whose opinions they meant to feel, whether they were fit to be made their associates, and cast forth the question touching the killing of a tyrant being an usurper, they were divided in opinion, some holding that servitude was the extreme of evils, and others that tyranny was better than

than a civil war ; and a number of the like cases there are of comparative duty : amongst which that of all others is the most frequent, where the question is of a great deal of good to ensue of a small injustice, which Jason of Thessalia determined against the truth : *Aliqua sunt injuste facienda, ut multa juste fieri possint.* But the reply is good, *Aliquom praesentis justitiae habes, sponsorem futurae non habes ;* men must pursue things which are just in present, and leave the future to the divine providence. Then we pass on from this general part touching the exemplar and de-

Now therefore that we have spoken of this fruit of life, it remaineth to speak of the husbandry that belongeth thereunto, without which part the former seemeth to be no better than a fair image, or *statua*, which is beautiful to contemplate, but is without life and motion : whereunto Aristotle himself subscribeth in these words, *Necesse est scire, et de virtute dicere, et quid sit, et ex quibus gignatur. Inutile enim fore scire, virtutem quidem necesse, acquirendae autem ejus modos et vias ignorare : non enim de virtute tantum, qua specie sit, quaerendum est, sed et quomodo sui copiam faciat ; utrumque enim volumus, et rem ipsam necesse et ejus compotes fieri : hoc autem ex voto non succedet, nisi sciamus et ex quibus et quomodo.* In such full words and with such iteration doth he inculcate this part : so saith Cicero in great commendation of Cato the second, that he had applied himself to philosophy, *non ita disputandi causa, sed ita vivendi.* And although the neglect of our times, wherein few men do hold any consultations touching the reformation of their life, as Seneca excellently saith, *De partibus vitae quique deliberat, de summa nemo,* may make this part seem superfluous ; yet I must conclude with that aphorism of Hippocrates, *Qui gravi morbo correpti dolores non sentiunt, iis mens aegrotat ;* they need medicine not only to assuage the disease, but to awake the sense. And if it be said, that the cure of mens minds belongeth to sacred divinity, it is most true : but yet moral philosophy may be preferred unto her as a wife servant and humble handmaid. For as the Psalm saith, that *the eyes of the handmaid look perpetually towards the mistress,* and yet no doubt many things are left to the discretion of the handmaid, to discern of the mistress's will ; so ought moral philosophy to give a constant attention to the doctrines of divinity, and yet so as it may yield of herself, within due limits, many sound and profitable directions.

De cultura animi.

This part therefore, because of the excellency thereof, I cannot but find exceeding strange that it is not reduced to written inquiry, the rather because it consisteth of much matter, wherein both speech and action is often conversant, and such wherein the common talk of men, which is rare, but yet cometh sometimes to pass, is wiser than their books. It is reasonable therefore that we propound it in the more particularity, both for the worthiness, and because we may acquit ourselves for reporting it deficient, which seemeth almost incredible, and is otherwise conceived and presupposed by those themselves that have written. We will therefore enumerate some heads or points thereof, that it may appear the better what it is, and whether it be extant.

First therefore, in this, as in all things which are practical, we ought to cast up our account, what is in our power, and what not ; for the one may be dealt with by way of alteration, but the other by way of application only. The husbandman cannot command, neither the nature of the earth, nor the seasons of the weather, no more can the physician the constitution of the patient, nor the variety of accidents. So in the culture and cure of the mind of man, two things are without our command ;

points of nature, and points of fortune : for to the basis of the one, and the conditions of the other, our work is limited and tied. In these things therefore, it is left unto us to proceed by application.

Vincenda est omnis fortuna ferendo :

and so likewise,

Vincenda est omnis natura ferendo.

But when that we speak of suffering, we do not speak of a dull and neglected suffering, but of a wise and industrious suffering, which draweth and contriveth use and advantage out of that which seemeth adverse and contrary, which is that properly which we call accommodating or applying. Now the wisdom of application resteth principally in the exact and distinct knowledge of the precedent state or disposition, unto which we do apply ; for we cannot fit a garment, except we first take measure of the body.

So then the first article of this knowledge is to set down sound and true distributions, and descriptions of the several characters and tempers of mens natures and dispositions, especially having regard to those differences which are most radical, in being the fountains and causes of the rest, or most frequent in concurrence or commixture ; wherein it is not the handling of a few of them in passage, the better to describe the mediocrities of virtues, that can satisfy this intention : for if it deserve to be considered, “ that there are minds which are proportioned to great matters, “ and others to small,” which Aristotle handleth, or ought to have handled by the name of magnanimity, doth it not deserve as well to be considered, “ that there are “ minds proportioned to intend many matters, and others to few ?” So that some can divide themselves, others can perchance do exactly well, but it must be but in few things at once ; and so there cometh to be a narrowness of mind, as well as a pusillanimity. And again, “ that some minds are proportioned to that which may “ be dispatched at once, or within a short return of time ; others to that which begins afar off, and is to be won with length of pursuit,”

Jam tum tenditque fovetque.

So that there may be fitly said to be a longanimity, which is commonly ascribed to God as a magnanimity. So farther deserved it to be considered by Aristotle, “ that there is a disposition in conversation, supposing it in things which do in no sort “ touch or concern a man’s self, to sooth and please ; and a disposition contrary to “ contradict and cross :” and deserveth it not much better to be considered, “ that “ there is a disposition, not in conversation or talk, but in matter of more serious nature, and supposing it still in things merely indifferent, to take pleasure in the “ good of another, and a disposition contrariwise, to take distaste at the good of “ another ?” which is that properly which we call good-nature or ill-nature, benignity or malignity. And therefore I cannot sufficiently marvel, that this part of knowledge, touching the several characters of natures and dispositions, should be omitted both in morality and policy, considering it is of so great ministry and suppeditation to them both. A man shall find in the traditions of astrology some pretty and apt divisions of mens natures, according to the predominances of the planets ; lovers of quiet, lovers of action, lovers of victory, lovers of honour, lovers of pleasure, lovers of arts, lovers of change, and so forth. A man shall find in the wisest sort of these relations, which the Italians make touching conclaves, the natures of the several cardinals, handsomely and lively painted forth ; a man shall meet with, in every day’s conference, the denominations of sensitive, dry, formal, real, humorous, certain,

certain, *uomo di prima impressione, uomo di ultima impressione*, and the like : and yet nevertheless this kind of observations wandereth in words, but is not fixed in inquiry. For the distinctions are found, many of them, but we conclude no precepts upon them : wherein our fault is the greater, because both history, poesy, and daily experience, are as goodly fields where these observations grow ; whereof we make a few poesies to hold in our hands, but no man bringeth them to the confectionary, that receipts might be made of them for the use of life.

Of much like kind are those impressions of nature, which are imposed upon the mind by the sex, by the age, by the region, by health and sickness, by beauty and deformity, and the like, which are inherent, and not external ; and again, those which are caused by external fortune : as sovereignty, nobility, obscure birth, riches, want, magistracy, privateness, prosperity, adversity, constant fortune, variable fortune, rising *per saltum, per gradus*, and the like. And therefore we see that Plautus maketh it a wonder to see an old man beneficent, *benignitas hujus ut adolescentuli est*. St. Paul concludeth, that severity of discipline was to be used to the Cretans, *Increpa eos dure*, upon the disposition of their country, *Cretenses semper mendaces, malae bestiae, ventres pigri*. Sallust noteth, that it is usual with kings to desire contradictories ; *Sed plerumque regiae voluntates, ut vehementes sunt, sic mobiles, saepeque ipsae sibi adversae*. Tacitus observeth, how rarely raising of the fortune mendeth the disposition, *Solus Vespasianus mutatus in melius*. Pindarus maketh an observation, that great and sudden fortune for the most part defeateth men, *Qui magnam felicitatem concoquere non possunt*. So the *Psalms* sheweth it is more easy to keep a measure in the enjoying of fortune, than in the increase of fortune : *Divitiae si affluent, nolite cor apponere*. These observations, and the like, I deny not but are touched a little by Aristotle, as in passage, in his Rhetorics, and are handled in some scattered discourses ; but they were never incorporated into moral philosophy, to which they do essentially appertain ; as the knowledge of the diversity of grounds and moulds doth to agriculture, and the knowledge of the diversity of complexions and constitutions doth to the physician ; except we mean to follow the indiscretion of empirics, which administer the same medicines to all patients.

Another article of this knowledge, is the inquiry touching the affections : for as in medicining of the body, it is in order first to know the divers complexions and constitutions ; secondly, the diseases ; and lastly, the cures : so in medicining of the mind, after knowledge of the divers characters of mens natures, it followeth, in order, to know the diseases and infirmities of the mind, which are no other than the perturbations and dittempers of the affections. For as the ancient politicians in popular states were wont to compare the people to the sea, and the orators to the winds, because as the sea would of itself be calm and quiet, if the winds did not move and trouble it ; so the people would be peaceable and tractable if the seditious orators did not set them in working and agitation : so it may be fitly said, that the mind in the nature thereof would be temperate and stayed, if the affections, as winds, did not put it into tumult and perturbation. And here again I find strange as before, that Aristotle should have written divers volumes of Ethics, and never handled the affections, which is the principal subject thereof ; and yet in his Rhetorics, where they are considered but collaterally, and in a second degree, as they may be moved by speech, he findeth place for them, and handleth them well for the quantity ; but where their true place is, he pretermitteth them. For it is not his disputations about pleasure and pain that can satisfy this inquiry, no more than he that should generally handle the nature of light, can be said to handle the
nature

nature of colours ; for pleasure and pain are to the particular affections, as light is to particular colours. Better travels, I suppose, had the Stoics taken in this argument, as far as I can gather by that which we have at second hand. But yet, it is like, it was after their manner, rather in subtilty of definitions, which, in a subject of this nature, are but curiosities, than in active and ample descriptions and observations. So likewise I find some particular writings of an elegant nature, touching some of the affections ; as of anger, of comfort upon adverse accidents, of tenderness of countenance, and other. But the poets and writers of histories are the best doctors of this knowledge, where we may find painted forth with great life, how affections are kindled and incited ; and how pacified and refrained ; and how again contained from act, and farther degree ; how they disclose themselves ; how they work ; how they vary ; how they gather and fortify ; how they are inwrapped one within another ; and how they do fight and encounter one with another ; and other the like particularities. Amongst the which, this last is of special use in moral and civil matters : how, I say, to set affection against affection, and to master one by another, even as we use to hunt beast with beast, and fly bird with bird, which otherwise perhaps we could not so easily recover : upon which foundation is erected that excellent use of *praemium* and *poena*, whereby civil states consist, employing the predominant affections of fear and hope, for the suppressing and bridling the rest. For as in the government of states, it is sometimes necessary to bridle one faction with another, so it is in the government within.

Now come we to those points which are within our own command, and have force and operation upon the mind, to affect the will and appetite, and to alter manners : wherein they ought to have handled custom, exercise, habit, education, example, imitation, emulation, company, friends, praise, reproof, exhortation, fame, laws, books, studies : these as they have determinate use in moralities, from these the mind suffereth, and of these are such receipts and regimens compounded and described, as may serve to recover or preserve the health and good estate of the mind, as far as pertaineth to human medicine ; of which number we will insist upon some one or two, as an example of the rest, because it were too long to prosecute all ; and therefore we do resume custom and habit to speak of.

The opinion of Aristotle seemeth to me a negligent opinion, that of those things which consist by nature, nothing can be changed by custom ; using for example, that if a stone be thrown ten thousand times up, it will not learn to ascend, and that by often seeing or hearing, we do not learn to hear or see the better. For though this principle be true in things wherein nature is peremptory, the reason whereof we cannot now stand to discuss, yet it is otherwise in things wherein nature admitteth a latitude. For he might see that a strait glove will come more easily on with use ; and that a wand will by use bend otherwise than it grew ; and that by use of the voice we speak louder and stronger ; and that by use of enduring heat or cold, we endure it the better, and the like : which latter sort have a nearer resemblance unto that subject of manners he handleth, than those instances which he alledgeth. But allowing his conclusion, that virtues and vices consist in habit, he ought so much the more to have taught the manner of superinducing that habit : for there be many precepts of the wise ordering the exercises of the mind, as there is of ordering the exercises of the body, whereof we will recite a few.

The first shall be, that we beware we take not at the first either too high a strain, or too weak : for if too high in a diffident nature you discourage ; in a confident nature

nature you breed an opinion of facility, and so a sloth; and in all natures you breed a farther expectation than can hold out, and so an insatisfaction in the end: if too weak of the other side, you may not look to perform and overcome any great talk.

Another precept is, to practise all things chiefly at two several times, the one when the mind is best disposed, the other when it is worst disposed; that by the one you may gain a great step, by the other you may work out the knots and stonds of the mind, and make the middle times the more easy and pleasant.

Another precept is that which Aristotle mentioneth by the way, which is, to bear ever towards the contrary extreme of that whereunto we are by nature inclined: like unto the rowing against the stream, or making a wand straight, by binding him contrary to his natural crookedness.

Another precept is, that the mind is brought to any thing better, and with more sweetness and happiness, if that whereunto you pretend be not first in the intention, but *tanquam aliud agendo*, because of the natural hatred of the mind against necessity and constraint. Many other axioms there are touching the managing of exercise and custom; which being so conducted, doth prove indeed another nature; but being governed by chance, doth commonly prove but an ape of nature, and bringeth forth that which is lame and counterfeit.

So if we should handle books and studies, and what influence and operation they have upon manners, are there not divers precepts of great caution and direction appertaining thereunto? Did not one of the fathers in great indignation call poetry *vinum daemonum*, because it increaseth temptations, perturbations, and vain opinions? Is not the opinion of Aristotle worthy to be regarded, wherein he saith, "That young men are no fit auditors of moral philosophy, because they are not settled from the boiling heat of their affections, nor tempered with time and experience?" And doth it not hereof come, that those excellent books and discourses of the ancient writers, whereby they have persuaded unto virtue most effectually, by representing her in state and majesty; and popular opinions against virtue in their parasites coats, fit to be scorned and derided, are of so little effect towards honesty of life, because they are not read, and revolved by men in their mature and settled years, but confined almost to boys and beginners? But is it not true also, that much less young men are fit auditors of matters of policy, till they have been thoroughly seasoned in religion and morality, lest their judgments be corrupted, and made apt to think that there are no true differences of things, but according to utility and fortune, as the verse describes it?

Prosperum et felix scelus virtus vocatur.

And again,

Ille crucem pretium sceleris tulit, hic diadema:

which the poets do speak satirically, and in indignation on virtue's behalf: but books of policy do speak it seriously and positively; for it so pleaseth Machiavel to say, "that if Cæsar had been overthrown, he would have been more odious than ever was Catiline:" as if there had been no difference, but in fortune, between a very fury of lust and blood, and the most excellent spirit, his ambition reserved, of the world? Again, is there not a caution likewise to be given of the doctrines of moralities themselves, some kinds of them, lest they make men too precise, arrogant, incompatible, as Cicero saith of Cato in *Marco Catone*: *Haec bona, quae videmus, divina et egregia, ipsius scitote esse propria: quae nonnunquam requirimus, ea sunt omnia,*

non à natura, sed à magistro? Many other axioms and advices there are touching those proprieties and effects, which studies do infuse and instil into manners. And so likewise is there touching the use of all those other points, of company, fame, laws, and the rest, which we recited in the beginning in the doctrine of morality.

But there is a kind of culture of the mind that seemeth yet more accurate and elaborate than the rest, and is built upon this ground: that the minds of all men are sometimes in a state more perfect, and at other times in a state more depraved. The purpose therefore of this practice is, to fix and cherish the good hours of the mind, and to obliterate and take forth the evil. The fixing of the good hath been practised by two means, vows or constant resolutions, and observances or exercises; which are not to be regarded so much in themselves, as because they keep the mind in continual obedience. The obliteration of the evil hath been practised by two means, some kind of redemption or expiation of that which is past, and an inception or account *de novo*, for the time to come: but this part seemeth sacred and religious, and justly; for all good moral philosophy, as was said, is but an handmaid to religion.

Wherefore we will conclude with that last point, which is of all other means the most compendious and summary; and, again, the most noble and effectual to the reducing of the mind unto virtue and good estate; which is, the electing, and propounding unto a man's self good and virtuous ends of his life, such as may be in a reasonable sort within his compass to attain. For if these two things be supposed, that a man set before him honest and good ends, and again that he be resolute; constant, and true unto them; it will follow, that he shall mould himself into all virtue at once. And this is indeed like the work of nature, whereas the other course is like the work of the hand: for as when a carver makes an image, he shapes only that part whereupon he worketh, as if he be upon the face, that part which shall be the body is but a rude stone still, till such time as he comes to it: but, contrariwise, when nature makes a flower or living creature, she formeth rudiments of all the parts at one time: so in obtaining virtue by habit, while a man practiseth temperance, he doth not profit much to fortitude, nor the like: but when he dedicateth and applieth himself to good ends, look, what virtue soever the pursuit and passage towards those ends doth commend unto him, he is invested of a precedent disposition to conform himself thereunto. Which state of mind Aristotle doth excellently express himself, that it ought not to be called virtuous but divine: his words are these; *Immanitati autem consentaneum est, opponere eam, quae supra humanitatem est, heroicam sive divinam virtutem.* And a little after, *Nam ut feræ neque vitæ non neque virtus est, sic neque Dei. Sed hic quidem status altius quiddam virtute est, ille aliud quiddam à vitio.* And therefore we may see what celsitude of honour Plinius Secundus attributeth to Trajan in his funeral oration; where he said, "that men " needed to make no other prayers to the gods, but that they would continue as " good lords to them as Trajan had been;" as if he had not been only an imitation of divine nature, but a pattern of it. But these be heathen and profane passages, having but a shadow of that divine state of mind, which religion and the holy faith doth conduct men unto, by imprinting upon their souls charity, which is excellently called *the bond of perfection*, because it comprehendeth and fasteneth all virtues together. And as it is elegantly said by Menander of vain love, which is but a false imitation of divine love, *Amor melior sibiista laevo ad humanam vitam,* that
love

love teacheth a man to carry himself better than the sophist or preceptor, which he calleth left-handed, because, with all his rules and precepts, he cannot form a man so dexterously, nor with that facility, to prize himself, and govern himself, as love can do. So certainly if a man's mind be truly inflamed with charity, it doth work him suddenly into greater perfection than all the doctrine of morality can do, which is but a sophist in comparison of the other. Nay farther, as Xenophon observed truly, that all other affections, though they raise the mind, yet they do it by distorting and uncomeliness of ecstasies or excesses; but only love doth exalt the mind, and nevertheless at the same instant doth settle and compose it: so in all other excellencies, though they advance nature, yet they are subject to excess. Only charity admitteth no excess; for so we see, by aspiring to be like God in power, the angels transgressed and fell; *Ascendam, et ero similis Altissimo*: by aspiring to be like God in knowledge, man transgressed and fell; *Eritis sicut Dii, scientes bonum et malum*: but by aspiring to a similitude of God in goodness, or love, neither man nor angel ever transgressed, or shall transgress. For unto that imitation we are called; *Diligite inimicos vestros, benefacite eis qui oderunt vos, et orate pro persequentibus et calumniantibus vos ut sitis filii Patris vestri, qui in coelis est, qui solem suum oriri facit super bonos et malos, et pluit super justos et injustos*. So in the first platform of the divine nature itself, the heathen religion speaketh thus, *Optimus Maximus*; and the sacred Scriptures thus, *Misericordia ejus super omnia opera ejus*.

Wherefore I do conclude this part of moral knowledge concerning the culture and regimen of the mind; wherein if any man, considering the parts thereof, which I have enumerated, do judge that my labour is but to collect into an art or science, that which hath been pretermitted by others, as matters of common sense and experience, he judgeth well: but as Philocrates sported with Demosthenes, "You may not marvel, Athenians, that Demosthenes and I do differ, for he drinketh water, and I drink wine." And like as we read of an ancient parable of the two gates of sleep,

*Sunt geminae somni portae, quarum altera fertur
Cornea, qua veris facilis datur exitus umbris:
Altera candenti perfecta nitens elephanto,
Sed falsa ad coelum mittunt insomnia manes.*

So if we put on sobriety and attention, we shall find it a sure maxim in knowledge, that the more pleasant liquor of wine is the more vaporous, and the braver gate of ivory sendeth forth the falser dreams.

But we have now concluded that general part of human philosophy, which contemplateth man segregate, and as he consisteth of body and spirit. Wherein we may farther note, that there seemeth to be a relation or conformity between the good of the mind and the good of the body. For as we divided the good of the body into health, beauty, strength, and pleasure; so the good of the mind, inquired in rational and moral knowledges, tendeth to this to make the mind sound and without perturbation; beautiful and graced with decency; and strong and agile for all duties of life. These three, as in the body, so in the mind, seldom meet, and commonly sever. For it is easy to observe, that many have strength of wit and courage, but have neither health from perturbations, nor any beauty or decency in their doings: some again have an elegance and fineness of carriage, which have neither soundness of honesty, nor substance of sufficiency: and some again have honest and reformed minds, that can neither become themselves, nor manage business. And

sometimes two of them meet, and rarely all three. As for pleasure, we have likewise determined, that the mind ought not to be reduced to stupidity, but to retain pleasure; confined rather in the subject of it, than in the strength and vigour of it.

CIVIL Knowledge is conversant about a subject which of all others is most immersed in matter, and hardiest reduced to axiom. Nevertheless, as Cato the censor said, "that the Romans were like sheep, for that a man might better drive a flock of them, than one of them; for in a flock, if you could get but some few to go right, the rest would follow:" so in that respect moral philosophy is more difficult than policy. Again, moral philosophy propoundeth to itself the framing of internal goodness; but civil knowledge requireth only an external goodness; for that as to society sufficeth. And therefore it cometh oft to pass that there be evil times in good governments: for so we find in the holy story, when the kings were good; yet it is added, *Sed adhuc populus non direxerat cor suum ad Dominum Deum patrum suorum*. Again, states, as great engines, move slowly, and are not so soon put out of frame: for as in Egypt the seven good years sustained the seven bad; so governments for a time well grounded, do bear out errors following. But the resolution of particular persons is more suddenly subverted. These respects do somewhat qualify the extreme difficulty of civil knowledge.

This knowledge hath three parts, according to the three summary actions of society, which are Conversation, Negotiation, and Government. For man seeketh in society comfort, use, and protection: and they be three wisdoms of divers natures, which do often sever; wisdom of behaviour, wisdom of business, and wisdom of state.

The wisdom of Conversation ought not to be over-much affected, but much less despised: for it hath not only an honour in itself, but an influence also into business and government. The poet saith, *Nec vultu destrue verba tuo*. A man may destroy the force of his words with his countenance: so may he of his deeds, saith Cicero, recommending to his brother affability and easy access, *Nil interest habere ostium apertum, vultum clausum*. "It is nothing won to admit men with an open door, and to receive them with a shut and reserved countenance." So, we see, Atticus, before the first interview between Cæsar and Cicero, the war depending, did seriously advise Cicero touching the composing and ordering of his countenance and gesture. And if the government of the countenance be of such effect, much more is that of the speech, and other carriage appertaining to conversation; the true model whereof seemeth to me well expressed by Livy, though not meant for this purpose; *Ne aut arrogans videar, aut obnoxius; quorum alterum est alienae libertatis oblitus, alterum suae*: "The sum of behaviour is to retain a man's own dignity, without intruding upon the liberty of others." On the other side, if behaviour and outward carriage be intended too much, first it may pass into affectation, and then *Quid deformius, quam scenam in vitam transferre*, to act a man's life? But although it proceed not to that extreme, yet it consumeth time, and employeth the mind too much. And therefore as we use to advise young students from company keeping, by saying, *Amici, fures temporis*; so certainly the intending of the discretion of behaviour is a great thief of meditation. Again, such as are accomplished in that form of urbanity, please themselves in it, and seldom aspire to higher virtue; whereas those that have defect in it, do seek comeliness by reputation: for where reputation

tation is, almost every thing becometh; but where that is not, it must be supplied by punctilios and compliments. Again, there is no greater impediment of action, than an over-curious observance of decency, and the guide of decency, which is time and season. For as Solomon saith, *Qui respicit ad ventos, non seminat; et qui respicit ad nubes, non metit*: a man must make his opportunity as oft as find it. To conclude; behaviour seemeth to me as a garment of the mind, and to have the conditions of a garment. For it ought to be made in fashion; it ought not to be too curious; it ought to be shaped so as to set forth any good making of the mind, and hide any deformity; and above all, it ought not to be too strait, or restrained for exercise or motion. But this part of civil knowledge hath been elegantly handled, and therefore I cannot report it for deficient.

The wisdom touching Negotiation or Business hath not been hitherto collected into writing, to the great derogation of learning, and the professors of learning. For from this root springeth chiefly that note or opinion, which by us is expressed in adage to this effect; that there is no great concurrence between learning and wisdom. For of the three wisdoms which we have set down to pertain to civil life, for wisdom of behaviour, it is by learned men for the most part despised, as an inferior to virtue, and an enemy to meditation; for wisdom of government, they acquit themselves well when they are called to it, but that happeneth to few: but for the wisdom of business, wherein man's life is most conversant, there be no books of it, except some few scattered advertisements, that have no proportion to the magnitude of this subject. For if books were written of this, as the other, I doubt not but learned men, with mean experience, would far excel men of long experience, without learning, and outshoot them in their own bow.

Neither needeth it at all to be doubted, that this knowledge should be so variable, as it falleth not under precept; for it is much less infinite than science of government, which, we see, is laboured, and in some part reduced. Of this wisdom, it seemeth, some of the ancient Romans, in the sadest and wisest times, were professors; for Cicero reporteth, that it was then in use for senators that had name and opinion for general wise men, as Coruncanius, Curius, Lælius, and many others, to walk at certain hours in the place, and to give audience to those that would use their advice; and that the particular citizens would resort unto them, and consult with them of the marriage of a daughter, or of the employing of a son, or of a purchase or bargain, or of an accusation, and every other occasion incident to man's life. So as there is a wisdom of counsel and advice even in private cases, arising out of an universal insight into the affairs of the world; which is used indeed upon particular cases propounded, but is gathered by general observation of cases of like nature. For so we see in the book which Q. Cicero writeth to his brother, *De petitione consulatus*, being the only book of business, that I know, written by the ancients, although it concerned a particular action then on foot, yet the substance thereof consisteth of many wise and politic axioms, which contain not a temporary, but a perpetual direction in the case of popular elections. But chiefly we may see in those aphorisms which have place amongst divine writings, composed by Solomon the king, of whom the scriptures testify, that his heart was as the sands of the sea, encompassing the world and all worldly matters: we see, I say, not a few profound and excellent cautions, precepts, positions, extending to much variety of occasions; whereupon we will stay awhile, offering to consideration some number of examples.

Sed et cunctis sermonibus, qui dicuntur, ne accommodes aurem tuam, ne forte audias servum tuum maledicentem tibi.

Here is recommended the provident stay of inquiry of that which we would be loth to find; as it was judged great wisdom in Pompeius Magnus that he burned Sertorius's papers unperused.

Vir sapiens, si cum stulto contenderit, sive irascatur, sive rideat, non inveniet requiem.

Here is described the great disadvantage which a wise man hath in undertaking a lighter person than himself, which is such an engagement, as whether a man turn the matter to jest, or turn it to heat, or howsoever he change copy, he can no ways quit himself well of it.

Qui delicate à pueritia nutrit servum suum, postea sentiet eum contumacem.

Here is signified, that if a man begin too high a pitch in his favours, it doth commonly end in unkindness and unthankfulness.

Vidisti virum velocem in opere suo, coram regibus stabit, nec erit inter ignobiles.

Here is observed, that of all virtues for rising to honour, quickness of dispatch is the best; for superiors many times love not to have those they employ, too deep or too sufficient, but ready and diligent.

Vidi cunctos viventes, qui ambulant sub sole, cum adolescente secundo, qui consurgit pro eo.

Here is expressed that which was noted by Sylla first, and after him by Tiberius; *Plures adorant solem orientem, quam occidentem vel meridianum.*

Si spiritus potestatem habentis ascenderit super te, locum tuum ne dimiseris, quia curatio faciet cessare peccata maxima.

Here caution is given, that upon displeasure, retiring is of all courses the unfittest; for a man leaveth things at worst, and depriveth himself of means to make them better.

Erat civitas parva, et pauci in ea viri; venit contra eam rex magnus, et vadavit eam, instruxitque munitiones per gyrum, et perfecta est obsidio; inventusque est in ea vir pauper et sapiens, et liberavit eam per sapientiam suam, et nullus deinceps recordatus est hominis illius pauperis.

Here the corruption of states is set forth, that esteem not virtue or merit longer than they have use of it.

Mollis responsio frangit iram.

Here is noted, that silence or rough answer exasperateth; but an answer present and temperate pacifieth.

Iter pigrorum, quasi sepes spinarum.

Here is lively represented how laborious sloth proveth in the end; for when things are deferred to the last instant, and nothing prepared beforehand, every step findeth a brier or an impediment, which catcheth or stopeth.

Melior est finis orationis, quam principium.

Here is taxed the vanity of formal speakers, that study more about prefaces and inducements, than upon the conclusions and issues of speech.

Qui cognoscit in judicio faciem, non bene facit; iste et pro buccella panis deseret veritatem.

Here is noted, that a judge were better be a briber, than a respecter of persons; for a corrupt judge offendeth not so lightly as a facile.

Vir pauper calumnians pauperes, similis est imbri vehementi, in quo paratur fames.

Here

Here is expressed the extremity of necessitous extortions, figured in the ancient fable of the full and the hungry horse-leech.

Fons turbatus pede, et vena corrupta, est justus cadens coram impio.

Here is noted that one judicial and exemplar iniquity in the face of the world, doth trouble the fountains of justice more than many particular injuries passed over by connivance.

Qui subtrahit aliquid à patre et à matre, et dicit hoc non esse peccatum, particeps est homicidii.

Here is noted, that whereas men in wronging their best friends, use to extenuate their fault, as if they might presume or be bold upon them, it doth contrariwise indeed aggravate their fault, and turneth it from injury to impiety.

Noli esse amicus homini iracundo, nec ambulato cum homine furioso.

Here caution is given, that in the election of our friends we do principally avoid those which are impatient, as those that will espouse us to many factions and quarrels.

Qui conturbat domum suam, possidebit ventum.

Here is noted that in domestical separations and breaches men do promise to themselves quieting of their mind and contentment, but still they are deceived of their expectation, and it turneth to wind.

Filius sapiens laetificat patrem: filius vero stultus moestitia est matri suae.

Here is distinguished, that fathers have most comfort of the good proof of their sons; but mothers have most discomfort of their ill proof, because women have little discerning of virtue, but of fortune.

Qui celat delictum, quaerit amicitiam; sed qui altero sermone repetit, separat foederatos.

Here caution is given, that reconciliation is better managed by an amnesty, and passing over that which is past, than by apologies and excusations.

In omni opere bono erit abundantia; ubi autem verba sunt plurima, ibi frequenter aegestas.

Here is noted, that words and discourse abound most where there is idleness and want.

Primus in sua causa justus; sed venit altera pars, et inquirat in eum.

Here is observed that in all causes the first tale possesseth much, in such sort, that the prejudice thereby wrought will be hardly removed, except some abuse or falsity in the information be detected.

Verba bilinguis quasi simplicia, et ipsa perveniunt ad interiora ventris.

Here is distinguished, that flattery and insinuation, which seemeth set and artificial, sinketh not far; but that entereth deep which hath shew of nature, liberty, and simplicity.

Qui erudit derisorem, ipse sibi injuriam facit; et qui arguit impium, sibi maculam generat.

Here caution is given how we tender reprehension to arrogant and scornful natures, whose manner is to esteem it for contumely, and accordingly to return it.

Da sapienti occasionem, et addetur ei sapientia.

Here is distinguished the wisdom brought into habit, and that which is but verbal, and swimming only in conceit; for the one upon the occasion presented is quickened and redoubled, the other is amazed and confused.

Quomodo

Quomodo in aquis resplendent cultus prospicientium, sic cordia hominum manifesta sunt prudentibus.

Here the mind of a wise man is compared to a glass, wherein the images of all diversity of natures and customs are represented, from which representation proceedeth that application,

Qui sapit, innumeris meritis aptus erit.

Thus have I staid somewhat longer upon these sentences politic of Solomon than is agreeable to the proportion of an example, led with a desire to give authority to this part of knowledge which I noted as deficient, by so excellent a precedent; and have also attended them with brief observations, such as to my understanding offer no violence to the sense, though I know they may be applied to a more divine use: but it is allowed even in divinity, that some interpretations, yea and some writings, have more of the eagle than others; but taking them as instructions for life, they might have received large discourse, if I would have broken them and illustrated them by deducements and examples.

Neither was this in use only with the Hebrews, but it is generally to be found in the wisdom of the more ancient times; that as men found out any observation that they thought was good for life, they would gather it and express it in parable, or aphorism, or fable. But for fables, they were vicegerents and supplies where examples failed: now that the times abound with history, the aim is better when the mark is alive. And therefore the form of writing, which of all others is the fittest for this variable argument of negotiation and occasions, is that which Machiavel chose wisely and aptly for government; namely, discourse upon histories or examples: for knowledge drawn freshly, and in our view, out of particulars, knoweth the way best to particulars again; and it hath much greater life for practice when the discourse attendeth upon the example, than when the example attendeth upon the discourse. For this is no point of order, as it seemeth at first, but of substance: for when the example is the ground, being set down in an history at large, it is set down with all circumstances, which may sometimes control the discourse thereupon made, and sometimes supply it as a very pattern for action; whereas the examples alledged for the discourse's sake, are cited succinctly, and without particularity, and carry a fervile aspect towards the discourse which they are brought in to make good.

But this difference is not amiss to be remembered, that as history of times is the best ground for discourse of government, such as Machiavel handleth, so history of lives is the most proper for discourse of business, because it is more conversant in private actions. Nay, there is a ground of discourse for this purpose fitter than them both, which is discourse upon letters; such as are wise and weighty, as many are of Cicero *ad Atticum*, and others. For letters have a great and more particular representation of business than either chronicles or lives. Thus have we spoken both of the matter and form of this part of civil knowledge touching negotiation, which we note to be deficient.

But yet there is another part of this part, which differeth as much from that whereof we have spoken, as *sapere* and *sibi sapere*; the one moving as it were to the circumference, the other to the center: for there is a wisdom of counsel, and again there is a wisdom of pressing a man's own fortune, and they do sometimes meet, and often sever: for many are wise in their own ways that are weak for government or counsel; like ants, which is a wise creature for itself, but very hurtful for the garden.

den. This wisdom the Romans did take much knowledge of: *Nam pot sapiens*, saith the comical poet, *tingit fortunam sibi*; and it grew to an adage, *Faber quisque fortunæ propriae*: and Livy attributeth it to Cato the first, *in hoc viro tanta vis animi et ingenii inerat, ut quocunque loco natus esset, sibi ipse fortunam facturus videretur*.

This conceit or position, if it be too much declared and professed, hath been thought a thing impolitic and unlucky, as was observed in Timotheus the Athenian; who having done many great services to the estate in his government, and giving an account thereof to the people, as the manner was, did conclude every particular with this clause, “and in this fortune had no part.” And it came to pass that he never prospered in any thing he took in hand afterwards; for this is too high and too arrogant, favouring of that which Ezekiel saith of Pharaoh, *Dicit, Plusius est meus, et ego feci memetipsum*: or of that which another prophet speaketh, that *men offer sacrifices to their nets and snares*; and that which the poet expresseth,

Dextra mihi Deus, et telum, quod missile libro.

Nunc adsint :

For these confidences were ever unhallowed, and unblest: and therefore those that were great politicians indeed ever ascribed their successes to their felicity, and not to their skill or virtue. For so Sylla surnamed himself *Felix* not *Magnus*: so Cæsar said to the master of the ship, *Cæsarem portas et fortunam ejus*.

But yet nevertheless these positions, *Faber quisque fortunæ suæ*; *Sapiens dominabitur astris*: *In via virtuti nulla est via*, and the like, being taken and used as spurs to industry, and not as stirrups to insolency, rather for resolution than for presumption or outward declaration, have been ever thought sound and good, and are, no question, imprinted in the greatest minds, who are so sensible of this opinion, as they can scarce contain it within: As we see in Augustus Cæsar, who was rather diverse from his uncle, than inferior in virtue, how when he died, he desired his friends about him to give him a *Plaudite*, as if he were conscious to himself that he had played his part well upon the stage. This part of knowledge we do report also as deficient; not but that it is practised too much, but it hath not been reduced to writing. And therefore lest it should seem to any that it is not comprehensible by axiom, it is requisite, as we did in the former, that we set down some heads or passages of it.

Wherein it may appear at the first a new and unwonted argument to teach men how to raise and make their fortune: a doctrine, wherein every man perchance will be ready to yield himself a disciple till he seeth difficulty; for fortune layeth as heavy impositions as virtue, and it is as hard and severe a thing to be a true politician, as to be truly moral. But the handling thereof concerneth learning greatly, both in honour and in substance: In honour, because pragmatistical men may not go away with an opinion that learning is like a lark, that can mount, and sing, and please herself, and nothing else; but may know that she holdeth as well of the hawk, that can soar aloft, and can also descend and strike upon the prey. In substance, because it is the perfect law of inquiry of truth, “that nothing be in the globe of matter, which should not be likewise in the globe of crystal, or form;” that is, that there be not any thing in being and action, which should not be drawn and collected into contemplation and doctrine. Neither doth learning admire or esteem of this architecture of fortune, otherwise than as of an inferior work: for no man’s fortune can be an end worthy of his being, and many times

times the worthiest men do abandon their fortune willingly for better respects; but nevertheless fortune, as an organ of virtue and merit, deserveth the consideration.

First, therefore, the precept which I conceive to be most summary towards the prevailing in fortune, is to obtain that window which Momus did require; who seeing in the frame of man's heart such angles and recesses, found fault there was not a window to look into them: that is, to procure good informations of particulars touching persons, their natures, their desires and ends, their customs and fashions, their helps and advantages, and whereby they chiefly stand; so again their weaknesses and disadvantages, and where they lie most open and obnoxious; their friends, factions, and dependencies; and again their opposites, enviers, competitors, their moods and times, *Sola viri molles aditus et tempora noras*; their principles, rules, and observations, and the like: and this not only of persons, but of actions, what are on foot from time to time, and how they are conducted, favoured, opposed, and how they import, and the like. For the knowledge of present actions is not only material in itself, but without it also the knowledge of persons is very erroneous; for men change with the actions, and whilst they are in pursuit they are one, and when they return to their nature they are another. These informations of particulars, touching persons and actions, are as the minor propositions in every active syllogism, for no excellency of observations, which are as the major propositions, can suffice to ground a conclusion, if there be error and mistaking in the minors.

That this knowledge is possible Solomon is our surety, who saith, *Consilium in corde viri tanquam aqua profunda, sed vir prudens exhauriet illud*: And although the knowledge itself falleth not under precept, because it is of individuals, yet the instructions for the obtaining of it may.

We will begin therefore with this precept, according to the ancient opinion, that the sinews of wisdom are slowness of belief and distrust: that more trust be given to countenances and deeds than to words; and in words, rather to sudden passages and surprised words than to set and purposed words. Neither let that be feared which is said, *fronti nulla fides*; which is meant of a general outward behaviour, and not of the private and subtle motions and labours of the countenance and gesture; which, as Q. Cicero elegantly saith, is *animi janua*, "the gate of the mind." None more close than Tiberius, and yet Tacitus saith of Gallus, *Etenim vultu offensionem conjeſtaverat*. So again, noting the differing character and manner of his commending Germanicus and Drusus in the senate; he saith, touching his fashion wherein he carried his speech of Germanicus, thus: *Magis in speciem adornatis verbis, quam ut penitus sentire videretur*; but of Drusus thus, *Paucioribus, sed intentior, et fida oratione*: and in another place, speaking of his character of speech when he did any thing that was gracious and popular, he saith, that in other things he was *velut eluciantium verborum*: but then again, *Solutius vero loquebatur quando subvenerit*. So that there is no such artificer of dissimulation, nor no such commanded countenance, *vultus jussus*, that can sever from a feigned tale some of these fashions, either a more slight and careless fashion, or more set and formal, or more tedious and wandring, or coming from a man more drily and hardly.

Neither are deeds such assured pledges, as that they may be trusted without a judicious consideration of their magnitude and nature: *Fraus sibi in parvis fidem praeſtruit, ut majore emolumento fallat*: and the Italian thinketh himself upon the point to be bought and sold, when he is better used than he was wont to be, without manifest cause. For small favours, they do but lull men asleep, both as to caution and as to industry,

industry, and are, as Demosthenes calleth them, *Alimenta foecrdiac*. So again we see how false the nature of some deeds are, in that particular which Mutianus practised upon Antonius Primus, upon that hollow and unfaithful reconciliation which was made between them : whereupon Mutianus advanced many of the friends of Antonius : *simul amicis ejus praefecturas et tribunatus largitur* : wherein, under pretence to strengthen him, he did desolate him, and won from him his dependences.

As for words, though they be like waters to physicians, full of flattery and uncertainty, yet they are not to be despised, specially with the advantage of passion and affection. For so we see Tiberius, upon a stinging and incensing speech of Agrippina, came a step forth of his dissimulation, when he said, " You are hurt, because you do not reign ;" of which Tacitus saith, *Audita haec raram occulti peſtoris vocem effluere, correptamque Graeco versu admonuit : ideo laedi, quia non regnaret*. And therefore the poet doth elegantly call passions, tortures, that urge men to confess their secrets :

Vino tortus et ira.

And experience sheweth, there are few men so true to themselves, and so settled, but that, sometimes upon heat, sometimes upon bravery, sometimes upon kindness, sometimes upon trouble of mind and weakness, they open themselves ; specially if they be put to it with a counter-dissimulation, according to the proverb of Spain, *Di mentira, y facaras verdad*, " Tell a lye, and find a truth."

As for the knowing of men, which is at second hand from reports : mens weakness and faults are best known from their enemies, their virtues and abilities from their friends, their customs and times from their servants, their conceits and opinions from their familiar friends, with whom they discourse most. General fame is light, and the opinions conceived by superiors or equals are deceitful ; for to such, men are more masked, *Verior fama è domesticis emanat*.

But the soundest disclosing and expounding of men is, by their natures and ends ; wherein the weakest sort of men are best interpreted by their natures, and the wisest by their ends. For it was both pleasantly and wisely said, though I think very untruly, by a nuncio of the pope, returning from a certain nation, where he served as lieger ; whose opinion being asked touching the appointment of one to go in his place, he wished that in any case they did not send one that was too wise ; because no very wise man would ever imagine, what they in that country were like to do : and certainly it is an error frequent for men to shoot over, and to suppose deeper ends, and more compass-reaches than are : the Italian proverb being elegant, and for the most part true,

Di danari, di senno, e di fede,

Ce' nè manco che non credi :

" There is commonly less money, less wisdom, and less good faith, than men do account upon."

But princes, upon a far other reason, are best interpreted by their natures, and private persons by their ends : for princes being at the top of human desires, they have for the most part no particular ends whereto they aspire, by distance from which a man might take measure and scale of the rest of their actions and desires ; which is one of the causes that maketh their hearts more inscrutable. Neither is it sufficient to inform ourselves in mens ends and natures of the variety of them only, but also of the predominancy, what humour reigneth most, and what end is principally sought. For so we see, when Tigellinus saw himself out-stripped by Petro-

nus Turpilianus in Nero's humours of pleasures; *metus ejus rimatur*, he wrought upon Nero's fears, whereby he broke the other's neck.

But to all this part of inquiry, the most compendious way resteth in three things: the first, to have general acquaintance and inwardness with those which have general acquaintance, and look most into the world; and especially according to the diversity of business, and the diversity of persons, to have privacy and conversation with some one friend at least, which is perfect and well intelligenced in every several kind. The second is, to keep a good mediocrity in liberty of speech and secrecy: in most things liberty, secrecy where it importeth; for liberty of speech inviteth and provoketh liberty to be used again, and so bringeth much to a man's knowledge; and secrecy, on the other side, induceth trust and inwardness. The last is the reducing of a man's self to this watchful and serene habit, as to make account and purpose, in every conference and action as well to observe as to act. For as Epictetus would have a philosopher in every particular action to say to himself, *Et hoc volo, et etiam institutum servare*: so a politic man in every thing should say to himself, *Et hoc volo, ac etiam aliquid addiscere*. I have stayed the longer upon this precept of obtaining good information; because it is a main part by itself, which answereth to all the rest. But above all things caution must be taken, that men have a good stay and hold of themselves, and that this much knowing do not draw on much meddling; for nothing is more unfortunate than light and rash intermeddling in many matters. So that this variety of knowledge tendeth in conclusion but only to this, to make a better and freer choice of those actions which may concern us, and to conduct them with the less error and the more dexterity.

The second precept concerning this knowledge, is for men to take good information touching their own persons, and well to understand themselves: knowing that, as St. James saith, though men look oft in a glass, yet they do suddenly forget themselves; wherein as the divine glass is the word of God, so the politic glass is the state of the world, or times wherein we live; in the which we are to behold ourselves.

For men ought to take an impartial view of their own abilities and virtues; and again of their wants and impediments; accounting these with the most; and those other with the least; and from this view and examination, to frame the considerations following.

First, to consider how the constitution of their nature sorteth with the general state of the times; which if they find agreeable and fit, then in all things to give themselves more scope and liberty; but if differing and dissonant, then in the whole course of their life to be more close, retired, and reserved: as we see in Tiberius, who was never seen at a play, and came not into the senate in twelve of his last years; whereas Augustus Cæsar lived ever in mens eyes, which Tacitus observeth: *Alia Tiberio merum via*.

Secondly, to consider how their nature sorteth with professions and courses of life, and accordingly to make election, if they be free; and, if engaged, to make the departure at the first opportunity, as we see was done by duke Valentine, that was designed by his father to a sacerdotal profession, but quitted it soon after in regard of his parts and inclination; being such nevertheless, as a man cannot tell well whether they were worse for a prince or for a priest.

Thirdly, to consider how they sort with those whom they are like to have competitors and concurrents, and to take that course wherein there is most solitude, and themselves

themselves like to be most eminent ; as Julius Cæsar did, who at first was an orator or pleader ; but when he saw the excellency of Cicero, Hortentius, Catulus, and others, for eloquence, and saw there was no man of reputation for the wars but Pompeius, upon whom the state was forced to rely ; he forsook his course begun toward a civil and popular greatness, and transferred his designs to a martial greatness.

Fourthly, in the choice of their friends and dependences, to proceed according to the composition of their own nature ; as we may see in Cæsar ; all whose friends and followers were men active and effectual, but not solemn, or of reputation.

Fifthly, to take special heed how they guide themselves by examples, in thinking they can do as they see others do ; whereas perhaps their natures and carriages are far differing. In which error it seemeth Pompey was, of whom Cicero saith, that he was wont often to say, *Sylla potuit, ego non potero* ? Wherein he was much abused, the natures and proceedings of himself and his example, being the unlikest in the world ; the one being fierce, violent, and pressing the fact ; the other solemn, and full of majesty and circumstance ; and therefore the less effectual.

But this precept touching the politic knowledge of ourselves, hath many other branches whereupon we cannot insist.

Next to the well understanding and discerning of a man's self, there followeth the well opening and revealing a man's self ; wherein we see nothing more usual than for the more able man to make the less shew. For there is a great advantage in the well setting forth of a man's virtues, fortunes, merits ; and again, in the artificial covering of a man's weaknesses, defects, disgraces, staying upon the one, sliding from the other ; cherishing the one by circumstances, gracing the other by exposition, and the like ; wherein we see what Tacitus saith of Mutianus, who was the greatest politician of his time, *Omnium, quae dixerat, feceratque, arte quadam ostentator* ; which requireth indeed some art, lest it turn tedious and arrogant ; but yet so, as ostentation, though it be to the first degree of vanity, seemeth to me rather a vice in manners than in policy : for as it is said, *Audacter calumniare, semper aliquid haeret* ; so except it be in a ridiculous degree of deformity, *Audacter te vendita, semper aliquid haeret*. For it will stick with the more ignorant and inferior sort of men, though men of wisdom and rank do smile at it, and despise it ; and yet the authority won with many, doth countervail the disdain of a few. But if it be carried with decency and government, as with a natural, pleasant, and ingenuous fashion, or at times when it is mixed with some peril and unsafety, as in military persons, or at times when others are most envied ; or with easy and careless passage to it and from it, without dwelling too long, or being too serious ; or with an equal freedom of taxing a man's self, as well as gracing himself ; or by occasion of repelling or putting down others injury or insolence ; it doth greatly add to reputation ; and surely not a few solid natures that want this ventosity, and cannot sail in the height of the winds, are not without some prejudice and disadvantage by their moderation.

But for these flourishes and enhancements of virtue, they are not perchance unnecessary, so it is at least necessary that virtue be not disvalued and imbas'd under the just price, which is done in three manners ; by offering and obtruding a man's self, wherein men think he is rewarded, when he is accepted : by doing too much, which will not give that which is well done leave to settle, and in the end induceth satiety : and by finding too soon the fruit of a man's virtue, in commendation, applause, honour, favour ; wherein if a man be pleased with a little, let him hear what

is truly said; *Cave ne infuetus rebus maioribus videaris, si haec te res parva, sicuti magna, delectet.*

But the covering of defects is of no less importance than the valuing of good parts: which may be done likewise in three manners, by caution, by colour, and by confidence. Caution is, when men do ingeniously and discreetly avoid to be put into those things for which they are not proper: whereas contrariwise, bold and unquiet spirits will thrust themselves into matters without difference, and so publish and proclaim all their wants: colour is, when men make a way for themselves, to have a construction made of their faults or wants, as proceeding from a better cause, or intended for some other purpose: for of the one it is well said,

Saepe latet vitium proximitate boni.

And therefore whatsoever want a man hath, he must see that he pretend the virtue that shadoweth it; as if he be dull, he must affect gravity; if a coward, mildness; and so the rest. For the second, a man must frame some probable cause why he should not do his best, and why he should dissemble his abilities; and for that purpose must use to dissemble those abilities which are notorious in him, to give colour that his true wants are but industries and dissimulations. For confidence, it is the last, but surest remedy; namely, to depress and seem to despise whatsoever a man cannot attain, observing the good principle of the merchants, who endeavour to raise the price of their own commodities, and to beat down the price of others. But there is a confidence that passeth this other, which is, to face out a man's own defects, in seeming to conceive that he is best in those things wherein he is failing; and, to help that again, to seem on the other side that he hath least opinion of himself in those things wherein he is best; like as we shall see it commonly in poets, that if they shew their verses, and you except to any, they will say "that that line cost them more labour than any of the rest;" and presently will seem to dislike and suspect rather some other line, which they know well enough to be the best in the number. But above all, in this righting and helping of a man's self in his own carriage, he must take heed he shew not himself dismantled, and exposed to scorn and injury, by too much sweetness, goodness, and facility of nature, but shew some sparkles of liberty, spirit, and edge: which kind of fortified carriage, with a ready rescuing of a man's self from scorns, is sometimes of necessity imposed upon men by somewhat in their person or fortune, but it ever succeedeth with good felicity.

Another precept of this knowledge is, by all possible endeavour to frame the mind to be pliant and obedient to occasion; for nothing hindereth mens fortunes so much as this: *Idem manebat, neque idem decebat.* Men are where they were, when occasions turn; and therefore to Cato, whom Livy maketh such an architect of fortune, he addeth, that he had *versatile ingenium.* And thereof it cometh, that these grave solemn wits, which must be like themselves, and cannot make departures, have more dignity than felicity. But in some it is nature to be somewhat viscous and inwrapped, and not easy to turn. In some it is a conceit, that is almost a nature, which is, that men can hardly make themselves believe that they ought to change their course, when they have found good by it in former experience; for Machiavel noteth wisely, how Fabius Maximus would have been temporizing still, according to his old bias, when the nature of the war was altered, and required hot pursuit. In some other it is want of point and penetration in their judgment, that they do

not

not discern when things have a period, but come in too late after the occasion; as Demosthenes compareth the people of Athens to country fellows, when they play in a fence school, that if they have a blow, then they remove the weapon to that ward, and not before. In some other it is a lothness to lose labours passed, and a conceit that they can bring about occasions to their ply; and yet in the end, when they see no other remedy, then they come to it with disadvantage; as Tarquinius, that gave for the third part of Sibyla's book the treble price, when he might at first have had all three for the simple. But from whatsoever root or cause this restiveness of mind proceedeth, it is a thing most prejudicial, and nothing is more politic than to make the wheels of our mind concentric and voluble with the wheels of fortune.

Another precept of this knowledge, which hath some affinity with that we last spoke of, but with difference, is that which is well expressed, *sc̄tis accede dei que*, that men do not only turn with the occasions, but also run with the occasions, and not strain their credit or strength to over-hard or extreme points; but choose in their actions that which is most passable: for this will preserve men from foil, not occupy them too much about one matter, win opinion of moderation, please the most, and make a shew of a perpetual felicity in all they undertake; which cannot but mightily increase reputation.

Another part of this knowledge seemeth to have some repugnancy with the former two, but not as I understand it, and it is that which Demosthenes uttereth in high terms: *Et quemadmodum receptum est, ut exercitum ducat imperator, sic et à senatibus viris res ipse ducendas; ut quæ ipsi videntur, ea gerantur, et non ipsi eventus tantum persequi cogantur.* For, if we observe, we shall find two differing kinds of sufficiency in managing of business: some can make use of occasions aptly and dexterously, but plot little: some can urge and pursue their own plots well, but cannot accommodate nor take in; either of which is very imperfect without the other.

Another part of this knowledge is the observing a good mediocrity in the declaring, or not declaring a man's self: for although depth of secrecy, and making way, *qualis est via navis in mari*, which the French calleth *sourdes menées*, when men set things in work without opening themselves at all, be sometimes both prosperous and admirable, yet many times *Dissimulatio errores parit, qui dissimulatorem ipsum illaqueant.* And therefore, we see, the greatest politicians have in a natural and free manner professed their desires, rather than been reserved and disguised in them: for so we see that Lucius Sylla made a kind of profession, "that he wished all men "happy or unhappy, as they stood his friends or enemies." So Cæsar, when he first went into Gaul, made no scruple to profess, "that he had rather be first in a village, "than second at Rome." So again, as soon as he had begun the war, we see what Cicero saith of him, *Alter*, meaning of Cæsar, *non recusat, sed quodammodo postulat, ut, ut est, sic appelletur tyrannus.* So we may see in a letter of Cicero to Atticus, that Augustus Cæsar, in his very entrance into affairs, when he was a darling of the senate, yet in his harangues to the people would swear: *Ita parentis honores consequi liceat*, which was no less than the tyranny, save that, to help it, he would stretch forth his hand towards a statue of Cæsar's, that was erected in the place: and men laughed, and wondered, and said, Is it possible, or did you ever hear the like? and yet thought he meant no hurt, he did it so handsomely and ingenuously. And all these were prosperous: whereas Pompey, who tended to the same end, but in a more dark and dissembling manner, as Tacitus saith of him, *Occulter, non nullo, vinculis Syllæ concurreth,*

concurrereth, *ore probo, animo inverecondo*, made it his design, by infinite secret engines to cast the state into an absolute anarchy and confusion, that the state might call itself into his arms for necessity and protection, and so the sovereign power be put upon him, and he never seen in it: and when he had brought it, as he thought, to that point when he was chosen consul alone, as never any was, yet he could make no great matter of it, because men understood him not; but was fain in the end to go the beaten track of getting arms into his hands, by colour of the doubt of Cæsar's designs: so tedious, casual, and unfortunate are these deep dissimulations; whereof, it seemeth, Tacitus made this judgment, that they were a cunning of an inferior form in regard of true policy, attributing the one to Augustus, the other to Tiberius, where, speaking of Livia, he saith, *Et cum artibus mariti, simulatione filii bene composita*; for surely the continual habit of dissimulation is but a weak and sluggish cunning, and not greatly politic.

Another precept of this architecture of fortune is, to accustom our minds to judge of the proportion or value of things, as they conduce and are material to our particular ends; and that to do substantially and not superficially. For we shall find the logical part, as I may term it, of some mens minds good, but the mathematical part erroneous; that is, they can well judge of consequences, but not of proportions and comparisons, preferring things of shew and sense before things of substance and effect. So some fall in love with access to princes, others with popular fame and applause, supposing they are things of great purchase; when, in many cases, they are but matters of envy, peril, and impediment.

So some measure things according to the labour and difficulty, or assiduity, which are spent about them; and think if they be ever moving, that they must needs advance and proceed: as Cæsar saith in a despising manner of Cato the second, when he describeth how laborious and indefatigable he was to no great purpose: *Haec omnia magno studio agebat*. So in most things men are ready to abuse themselves in thinking the greatest means to be best, when it should be the fittest.

As for the true marshalling of mens pursuits towards their fortune, as they are more or less material, I hold them to stand thus: first, the amendment of their own minds; for the remove of the impediments of the mind will sooner clear the passages of fortune, than the obtaining fortune will remove the impediments of the mind. In the second place I set down wealth and means, which, I know, most men would have placed first, because of the general use which it beareth towards all variety of occasions. But that opinion I may condemn with like reason as Machiavel doth that other, that moneys were the sinews of the wars, whereas, saith he, the true sinews of the wars are the sinews of mens arms, that is, a valiant, populous, and military nation; and he voucheth aptly the authority of Solon, who when Cræsus shewed him his treasury of gold, said to him, that if another came that had better iron, he would be master of his gold. In like manner it may be truly affirmed, that it is not moneys that are the sinews of fortune, but it is the sinews and steel of mens minds, wit, courage, audacity, resolution, temper, industry, and the like. In the third place I set down reputation, because of the peremptory tides and currents it hath, which if they be not taken in their due time, are seldom recovered, it being extreme hard to play an after-game of reputation. And lastly I place honour, which is more easily won by any of the other three, much more by all, than any of them can be purchased by honour. To conclude this precept, as there is order and priority in matter, so is there in time, the preposterous placing whereof is one of the commonest

commonest errors, while men fly to their ends when they should intend their beginnings ; and do not take things in order of time as they come on, but marshal them according to greatness, and not according to instance, not observing the good precept, *Quod nunc instat agamus.*

Another precept of this knowledge is, not to embrace any matters which do occupy too great a quantity of time, but to have that sounding in a man's ears, *Sed fugit interea, fugit irreparabile tempus* : and that is the cause why those which take their course of rising by professions of burden, as lawyers, orators, painful divines, and the like, are not commonly so politic for their own fortune, otherwise than in their ordinary way, because they want time to learn particulars, to wait occasions, and to devise plots.

Another precept of this knowledge is, to imitate nature, which doth nothing in vain ; which surely a man may do if he do well interlace his business, and bend not his mind too much upon that which he principally intendeth. For a man ought in every particular action so to carry the motions of his mind, and so to have one thing under another, as if he cannot have that he seeketh in the best degree, yet to have it in a second, or so in a third ; and if he can have no part of that which he purposed, yet to turn the use of it to somewhat else ; and if he cannot make any thing of it for the present, yet to make it as a seed of somewhat in time to come ; and if he can contrive no effect or substance from it, yet to win some good opinion by it, or the like. So that he should exact an account of himself of every action, to reap somewhat, and not to stand amazed and confused if he fail of that he chiefly meant : for nothing is more impolitic than to mind actions wholly one by one ; for he that doth so, loseth infinite occasions which intervene, and are many times more proper and propitious for somewhat that he shall need afterwards, than for that which he urgeth for the present ; and therefore men must be perfect in that rule, *Haec oportet facere, et illa non omittere.*

Another precept of this knowledge is, not to engage a man's self peremptorily in any thing, though it seem not liable to accident, but ever to have a window to fly out at, or a way to retire ; following the wisdom in the ancient fable of the two frogs, which consulted when their plash was dry whither they should go, and the one moved to go down into a pit, because it was not likely the water would dry there, but the other answered, " True, but if it do, how shall we get out again ?"

Another precept of this knowledge is, that ancient precept of Bias, construed not to any point of perfidiousness, but only to caution and moderation, *Et ama tanquam inimicus futurus, et odi tanquam amaturus* : for it utterly betrayeth all utility for men to embark themselves too far in unfortunate friendships, troublesome spleens, and childish and humorous envies or emulations.

But I continue this beyond the measure of an example, led, because I would not have such knowledges, which I note as deficient, to be thought things imaginative, or in the air ; or an observation or two much made of, but things of bulk and mass, whereof an end is hardlier made than a beginning. It must be likewise conceived that in those points which I mention and set down, they are far from complete tractates of them, but only as small pieces for patterns : and lastly, no man, I suppose, will think that I mean fortunes are not obtained without all this ado ; for I know they come tumbling into some mens laps, and a number obtain good fortunes by diligence in a plain way, little intermeddling, and keeping themselves from gross errors.

But

But as Cicero, when he setteth down an idea of a perfect orator, doth not mean that every pleader should be such; and so likewise, when a prince or a courtier hath been described by such as have handled those subjects, the mold hath used to be made according to the perfection of the art, and not according to common practice: so I understand it, that it ought to be done in the description of a politic man, I mean politic for his own fortune.

But it must be remembered all this while, that the precepts which we have set down, are of that kind which may be counted and called *bonae artes*. As for evil arts, if a man would set down for himself that principle of Machiavel; "that a man seek not to attain virtue itself, but the appearance only thereof; because the credit of virtue is a help, but the use of it is cumber:" or that other of his principles; "that he presuppose that men are not fitly to be wrought otherwise but by fear," and therefore that he seek to have every man obnoxious, low, and in strait," which the Italians call *seminar spine*, to sow thorns: or that other principle contained in the verse which Cicero citeth, *Cadant amici, dummodo inimici intercidant*, as the Triumvirs, which sold, every one to other, the lives of their friends, for the deaths of their enemies: or that other protestation of L. Catilina, to set on fire, and trouble states, to the end to fish in droumy waters, and to unwrap their fortunes, *Ego si quid in fortunis meis excitatum sit incendium, id non aqua, sed ruina restinguam*: or that other principle of Lyfander; "that children are to be deceived with comfits, and men with oaths:" and the like evil and corrupt positions, whereof, as in all things, there are more in number than of the good: certainly, with these dispensations from the laws of charity and integrity, the pressing of a man's fortune may be more hasty and compendious. But it is in life, as it is in ways, the shortest way is commonly the foulest, and surely the fairer way is not much about.

But men, if they be in their own power, and do bear and sustain themselves, and be not carried away with a whirlwind or tempest of ambition, ought, in the pursuit of their own fortune, to set before their eyes, not only that general map of the world, that *all things are vanity and vexation of spirit*, but many other more particular cards and directions: chiefly that, that being, without well-being, is a curse, and the greater being the greater curse; and that all virtue is most rewarded, and all wickedness most punished in itself: according as the poet saith excellently:

*Quae vobis quae digna viri, pro laudibus istis
Præmia posse rear solvi? pulcherrima primum
Dii moresque dabunt vestri.*

And so of the contrary. And, secondly, they ought to look up to the eternal providence and divine judgment, which often subverteth the wisdom of evil plots and imaginations, according to that Scripture, *He hath conceived mischief, and shall bring forth a vain thing*. And although men should refrain themselves from injury and evil arts, yet this incessant and sabbathless pursuit of a man's fortune leaveth not that tribute which we owe to God of our time, who, we see, demandeth a tenth of our substance, and a seventh, which is more strict, of our time: and it is to small purpose to have an erected face towards heaven, and a perpetual groveling spirit upon earth, eating dust, as doth the serpent, *Atque affigit humo divinæ particulam auræ*. And if any man flatter himself that he will employ his fortune well, though he should obtain it ill, as was said concerning Augustus Cæsar, and after of Septimius Severus, "that either they should never have been born, or else they should never have died," they did so much mischief in the pursuit and ascent of their greatness, and so much

good

good when they were established : yet these compensations and satisfactions are good to be used, but never good to be purposed. And, lastly, it is not amiss for men in their race towards their fortune, to cool themselves a little with that conceit which is elegantly expressed by the emperor Charles the fifth, in his instructions to the king his son, " that fortune hath somewhat of the nature of a woman, that if she be too much wooed, " she is the farther off." But this last is but a remedy for those whose tastes are corrupted; let men rather build upon that foundation which is as a corner-stone of divinity and philosophy, wherein they join close, namely, that same *Primum quærite*. For divinity saith, *Primum quærite regnum Dei, et ista omnia adjicientur vobis* : and philosophy saith, *Primum quærite bona animi, caetera aut aderunt, aut non oberunt*. And although the human foundation hath somewhat of the sands, as we see in M. Brutus, when he brake forth into that speech,

Te colui, virtus, ut rem : ast tu nomen inane es :

yet the divine foundation is upon the rock. But this may serve for a taste of that knowledge which I noted as deficient.

Concerning Government, it is a part of knowledge, secret and retired in both these respects, in which things are deemed secret; for some things are secret because they are hard to know, and some because they are not fit to utter; we see all governments are obscure and invisible.

Totamque infusa per artus,

Mens agitat molem, et magno se corpore miscet.

Such is the description of governments : we see the government of God over the world is hidden, inasmuch as it seemeth to participate of much irregularity and confusion : the government of the soul in moving the body is inward and profound, and the passages thereof hardly to be reduced to demonstration. Again, the wisdom of antiquity, the shadows whereof are in the poets, in the description of torments and pains, next unto the crime of rebellion, which was the giants offence, doth detest the crime of futility, as in Sisyphus and Tantalus. But this was meant of particulars; nevertheless even unto the general rules and discourses of policy and government there is due a reverent and reserved handling.

But, contrariwise, in the governors towards the governed, all things ought, as far as the frailty of man permitteth, to be manifest and revealed. For so it is expressed in the Scriptures touching the government of God, that this globe which seemeth to us a dark and shady body, is in the view of God as crystal, *Et in conspectu sedis tanquam mare vitreum simile crystallo*. So unto princes and states, specially towards wise senates and councils, the natures and dispositions of the people, their conditions and necessities, their factions and combinations, their animosities and discontents, ought to be, in regard of the variety of their intelligences, the wisdom of their observations, and the height of the station where they keep centinel, in great part clear and transparent. Wherefore, considering that I write to a king that is a master of this science, and is so well assisted, I think it decent to pass over this part in silence, as willing to obtain the certificate which one of the ancient philosophers aspired unto; who being silent when others contended to make demonstration of their abilities by speech, desired it might be certified for his part, " that there was " one that knew how to hold his peace."

Notwithstanding, for the more public part of government, which is laws, I think good to note only one deficiency : which is, that all those which have written of laws, have written either as philosophers, or as lawyers, and none as statesmen. As

for the philosophers, they make imaginary laws for imaginary commonwealths, and their discourses are as the stars, which give little light, because they are so high. For the lawyers, they write according to the states where they live, what is received law, and not what ought to be law; for the wisdom of a lawmaker is one, and of a lawyer is another. For there are in nature certain fountains of justice, whence all civil laws are derived but as streams: and like as waters do take tinctures and tastes from the soils through which they run, so do civil laws vary according to the regions and governments where they are planted, though they proceed from the same fountains. Again, the wisdom of a lawmaker consisteth not only in a platform of justice, but in the application thereof; taking into consideration, by what means laws may be made certain, and what are the causes and remedies of the doubtfulness and uncertainty of law; by what means laws may be made apt and easy to be executed, and what are the impediments and remedies in the execution of laws; what influence laws touching private right of *meum* and *tuum* have into the public state, and how they may be made apt and agreeable; how laws are to be penned and delivered, whether in texts or in acts, brief or large, with preambles, or without; how they are to be pruned and reformed from time to time, and what is the best means to keep them from being too vast in volumes, or too full of multiplicity and crossness; how they are to be expounded, when upon causes emergent, and judicially discussed; and when upon responses and conferences touching general points or questions; how they are to be pressed rigorously or tenderly; how they are to be mitigated by equity and good conscience, and whether discretion and strict law are to be mingled in the same courts, or kept apart in several courts; again, how the practice, profession, and erudition of law is to be censured and governed; and many other points touching the administration, and, as I may term it, animation of laws. Upon which I insist the less, because I purpose, if God give me leave, having begun a work of this nature, in aphorisms, to propound it hereafter, noting it in the mean time for deficient.

De prudentia
legislatoria,
sive de fontibus
juris.

And for your majesty's laws of England, I could say much of their dignity, and somewhat of their defect; but they cannot but excel the civil laws in fitness for the government; for the civil law was, *Non hoc quaesitum munus in usus*; it was not made for the countries which it governeth: hereof I cease to speak, because I will not intermingle matter of action with matter of general learning.

Thus have I concluded this portion of learning touching civil knowledge, and with civil knowledge have concluded human philosophy; and with human philosophy, philosophy in general; and being now at some pause, looking back into that I have passed through, this writing seemeth to me, *si nunquam fallit imago*, as far as a man can judge of his own work, not much better than that noise or sound which musicians make while they are in tuning their instruments, which is nothing pleasant to hear, but yet is a cause why the music is sweeter afterwards. So have I been content to tune the instruments of the muses, that they may play that have better hands. And surely, when I set before me the condition of these times, in which learning hath made her third visitation or circuit in all the qualities thereof; as the excellency and vivacity of the wits of this age; the noble helps and lights which we have by the travels of ancient writers; the art of printing, which communiceth books to men of all fortunes; the openness of the world by navigation, which hath disclosed multitudes of experiments, and a mass of natural history; the
leisure

leisure wherewith these times abound, not employing men so generally in civil business, as the states of Græcia did, in respect of their popularity, and the state of Rome in respect of the greatness of their monarchy; the present disposition of these times at this instant to peace; the consumption of all that ever can be said in controversies of religion, which have so much diverted men from other sciences; the perfection of your majesty's learning, which as a phoenix may call whole volleys of wits to follow you; and the inseparable propriety of time, which is ever more and more to disclose truth: I cannot but be raised to this persuasion, that this third period of time will far surpass that of the Græcian and Roman learning: only if men will know their own strength, and their own weakness both; and take one from the other, light of invention, and not fire of contradiction; and esteem of the inquisition of truth, as of an enterprize, and not as of a quality or ornament; and employ wit and magnificence to things of worth and excellency, and not to things vulgar, and of popular estimation. As for my labours, if any man shall please himself, or others, in the reprehension of them, they shall make that ancient and patient request, *Verbera, sed audi*. Let men reprehend them, so they observe and weigh them. For the appeal is lawful, though it may be it shall not be needful, from the first cogitations of men to their second, and from the nearer times to the times farther off. Now let us come to that learning, which both the former times were not so blessed as to know, sacred and inspired Divinity, the sabbath and port of all mens labours and peregrinations.

THE prerogative of God extendeth as well to the reason, as to the will of man; so that as we are to obey his law, though we find a reluctance in our will; so we are to believe his word, though we find a reluctance in our reason. For if we believe only that which is agreeable to our sense, we give consent to the matter, and not to the author, which is no more than we would do towards a suspected and discredited witness: but that faith which was *accounted to Abraham for righteousness*, was of such a point, as whereat Sarah laughed, who therein was an image of natural reason.

Howbeit, if we will truly consider it, more worthy it is to believe, than to know as we now know. For in knowledge man's mind suffereth from sense, but in belief it suffereth from spirit, such one as it holdeth for more authorized than itself; and so suffereth from the worthier agent. Otherwise it is of the state of man glorified, for then faith shall cease, and *we shall know as we are known*.

Wherefore we conclude, that sacred theology, which in our idiom we call divinity, is grounded only upon the word and oracle of God, and not upon the light of nature: for it is written, *Coeli enarrant gloriam Dei*: but it is not written, *Coeli enarrant voluntatem Dei*: but of that it is said, *Ad legem et testimonium, si non fecerint secundum verbum istud, etc.* This holdeth not only in those points of faith which concern the great mysteries of the Deity, of the creation, of the redemption, but likewise those which concern the law moral truly interpreted; *Love your enemies: do good to them that hate you: be like to your heavenly Father, that suffereth his rain to fall upon the just and unjust*. To this it ought to be applauded, *Nec vox hominem sonat*, it is a voice beyond the light of nature. So we see the heathen poets, when they fall upon a libertine passion, do still expostulate with laws and moralities, as if they were opposite and malignant to nature; *Et quod natura remittit, Invida jura negant*. So said Dendamis the Indian unto Alexander's messengers; "That he

" had heard somewhat of Pythagoras, and some other of the wise men of Græcia,

“and that he held them for excellent men: but that they had a fault, which was, that they had in too great reverence and veneration a thing they called law and manners.” So it must be confessed that a great part of the law moral is of that perfection, whereunto the light of nature cannot aspire: how then is it, that man is said to have, by the light and law of nature, some notions and conceits of virtue and vice, justice and wrong, good and evil? Thus, because the light of nature is used in two several senses; the one, that which springeth from reason, sense, induction, argument, according to the laws of heaven and earth; the other, that which is imprinted upon the spirit of man by an inward instinct, according to the law of conscience, which is a sparkle of the purity of his first estate: in which latter sense only he is participant of some light and discerning touching the perfection of the moral law: but how? Sufficient to check the vice, but not to inform the duty. So then the doctrine of religion, as well moral as mystical, is not to be attained, but by inspiration and revelation from God.

The use, notwithstanding, of reason in spiritual things, and the latitude thereof, is very great and general; for it is not for nothing that the apostle calleth religion our *reasonable service* of God, insomuch as the very ceremonies and figures of the old law were full of reason and signification, much more than the ceremonies of idolatry and magic, that are full of non-significants and sord characters. But most especially the christian faith, as in all things, so in this, deserveth to be highly magnified, holding and preserving the golden mediocrity in this point, between the law of the heathen, and the law of Mahomet, which have embraced the two extremes. For the religion of the heathen had no constant belief or confession, but left all to the liberty of argument; and the religion of Mahomet, on the other side, interdicteth argument altogether: the one having the very face of error, and the other of imposture; whereas the faith doth both admit and reject disputation with difference.

The use of human reason in religion is of two sorts: the former, in the conception and apprehension of the mysteries of God to us revealed; the other, in the inferring and deriving of doctrine and direction thereupon. The former extendeth to the mysteries themselves; but how? By way of illustration, and not by way of argument. The latter consisteth indeed of probation and argument. In the former, we see, God vouchsafeth to descend to our capacity, in the expressing of his mysteries in such sort as may be sensible unto us; and doth graft his revelations and holy doctrine upon the notions of our reason, and applieth his inspirations to open our understanding, as the form of the key to the ward of the lock. For the latter, there is allowed us an use of reason and argument, secondary and respective, although not original and absolute. For after the articles and principles of religion are placed and exempted from examination of reason, it is then permitted unto us to make derivations and inferences from, and according to the analogy of them, for our better direction. In nature this holdeth not, for both the principles are examinable by induction, though not by a medium or syllogism; and, besides, those principles or first positions have no discordance with that reason, which draweth down and deduceth the inferior positions. But yet it holdeth not in religion alone, but in many knowledges, both of greater and smaller nature, namely, wherein there are not only *posita* but *placita*; for in such there can be no use of absolute reason: we see it familiarly in games of wit, as ches, or the like; the draughts and first laws of the game are positive, but how? Merely *ad placitum*, and not examinable

able by reason: but then how to direct our play thereupon with best advantage to win the game, is artificial and rational. So in human laws, there be many grounds and maxims, which are *placita juris*, positive upon authority, and not upon reason, and therefore not to be disputed: but what is most just, not absolutely, but relatively and according to those maxims, that affordeth a long field of disputation. Such therefore is that secondary reason, which hath place in divinity, which is grounded upon the *placets* of God.

Here therefore I note this deficiency, that there hath not been, to my understanding, sufficiently inquired and handled the true limits and use of reason in spiritual things, as a kind of divine dialectic: which for that it is not done, it seemeth to me a thing usual, by pretext of true conceiving that which is revealed, to search and mine into that which is not revealed, and, by pretext of enucleating inferences and contradictories, to examine that which is positive: the one sort falling into the error of Nicodemus, demanding to have things made more sensible than it pleaseth God to reveal them, *Quomodo possit homo nasci cum sit senex?* the other sort into the error of the disciples, which were scandalized at a shew of contradiction, *Quid est hoc, quod dicit nobis? Modicum et non videbitis me, et iterum modicum, et videbitis me, etc.*

De usu legitimo rationis humane in divinis.

Upon this I have insisted the more, in regard of the great and blessed use thereof; for this point, well laboured and defined of, would, in my judgment, be an opiate to stay and bridle not only the vanity of curious speculations, wherewith the schools labour, but the fury of controversies, wherewith the church laboureth. For it cannot but open mens eyes, to see that many controversies do merely pertain to that which is either not revealed, or positive, and that many others do grow upon weak and obscure inferences or derivations; which latter sort, if men would revive the blessed stile of that great doctor of the Gentiles, would be carried thus; *Ego, non Dominus*; and again, *Secundum consilium meum*; in opinions and counsels, and not in positions and oppositions. But men are now over-ready to usurp the stile, *Non ego, sed Dominus*; and not so only, but to bind it with the thunder and denunciation of curses and anathemas, to the terror of those which have not sufficiently learned out of Solomon, that *the causeless curse shall not come*.

Divinity hath two principal parts; the matter informed or revealed, and the nature of the information or revelation: and with the latter we will begin, because it hath most coherence with that which we have now last handled. The nature of the information consisteth of three branches; the limits of the information, the sufficiency of the information, and the acquiring or obtaining the information. Unto the limits of the information, belong these considerations; how far forth particular persons continue to be inspired; how far forth the church is inspired; and how far forth reason may be used: the last point whereof I have noted as deficient. Unto the sufficiency of the information belong two considerations; what points of religion are fundamental, and what perfective, being matter of farther building and perfection upon one and the same foundation; and again, how the gradations of light, according to the dispensation of times, are material to the sufficiency of belief.

Here again I may rather give it in advice, than note it as deficient, that the points fundamental, and the points of farther perfection only ought to be with piety and wisdom distinguished; a subject tending to much like end, as that I noted before; for as that other were likely to abate the number of controversies, so this is like to

De gradibus utriusque in claritate Dei.

abate

abate the heat of many of them. We see Moses when he saw the Israelite and the Egyptian fight, he did not say, *Why strive you?* but drew his sword and slew the Egyptian: but when he saw the two Israelites fight, he said, *You are brethren, why strive you?* If the point of doctrine be an Egyptian, it must be slain by *the sword of the Spirit*, and not reconciled: but if it be an Israelite, though in the wrong, then, *Why strive you?* We see of the fundamental points, our Saviour penneth the league thus; *He that is not with us, is against us*; but of points not fundamental, thus; *He that is not against us, is with us*. So we see the coat of our Saviour was intire without seam, and so is the doctrine of the Scriptures in itself; but the garment of the church was of divers colours, and yet not divided: we see the chaff may and ought to be severed from the corn in the ear, but the tares may not be pulled up from the corn in the field. So as it is a thing of great use well to define, what, and of what latitude those points are, which do make men merely aliens and disincorporate from the church of God.

For the obtaining of the information, it resteth upon the true and found interpretation of the Scriptures, which are the fountains of the water of life. The interpretations of the Scriptures are of two sorts: methodical, and solute or at large. For this divine water, which excelleth so much that of Jacob's well, is drawn forth much in the same kind, as natural water useth to be out of wells and fountains; either it is first forced up into a cistern, and from thence fetched and derived for use; or else it is drawn and received in buckets and vessels immediately where it springeth. The former sort whereof, though it seem to be the more ready, yet, in my judgment, is more subject to corrupt. This is that method which hath exhibited unto us the scholastical divinity, whereby divinity hath been reduced into an art, as into a cistern, and the streams of doctrine or positions fetched and derived from thence.

In this men have sought three things, a summary brevity, a compacted strength, and a complete perfection; whereof the two first they fail to find, and the last they ought not to seek. For as to brevity, we see, in all summary methods, while men purpose to abridge, they give cause to dilate. For the sum, or abridgment, by contraction becometh obscure; the obscurity requireth exposition, and the exposition is deduced into large commentaries, or into common places and titles, which grow to be more vast than the original writings, whence the sum was at first extracted. So, we see, the volumes of the schoolmen are greater much than the first writings of the fathers, whence the master of the Sentences made his sum or collection. So, in like manner, the volumes of the modern doctors of the civil law exceed those of the ancient juriconsults, of which Trebonian compiled the digest. So as this course of sums and commentaries is that which doth infallibly make the body of sciences more immense in quantity, and more base in substance.

And for strength, it is true, that knowledges reduced into exact methods have a shew of strength, in that each part seemeth to support and sustain the other; but this is more satisfactory than substantial: like unto buildings which stand by architecture and compaction, which are more subject to ruin, than those that are built more strong in their several parts, though less compacted. But it is plain, that the more you recede from your grounds, the weaker do you conclude: and as in nature, the more you remove yourself from particulars, the greater peril of error you do incur; so much more in divinity, the more you recede from the Scriptures, by inferences and consequences, the more weak and dilute are your positions.

And

And as for perfection, or completeness in divinity, it is not to be sought; which makes this course of artificial divinity the more suspect. For he that will reduce a knowledge into an art, will make it round and uniform: but, in divinity, many things must be left abrupt and concluded with this: *O altitudo sapientiae et scientiae Dei! quam incomprehensibilia sunt judicia ejus, et non investigabiles viae ejus?* So again the apostle saith, *Ex parte scimus*; and to have the form of a total, where there is but matter for a part, cannot be without supplies by supposition and presumption. And therefore I conclude, that the true use of these fums and methods hath place in institutions or introductions preparatory unto knowledge; but in them, or by deducement from them, to handle the main body and substance of a knowledge, is in all sciences prejudicial, and in divinity dangerous.

As to the interpretation of the Scriptures solute and at large, there have been divers kinds introduced and devised; some of them rather curious and unsafe, than sober and warranted. Notwithstanding, thus much must be confessed, that the Scriptures being given by inspiration, and not by human reason, do differ from all other books in the author; which by consequence doth draw on some difference to be used by the expositor. For the inditer of them did know four things which no man attains to know; which are, the mysteries of the kingdom of glory, the perfection of the laws of nature, the secrets of the heart of man, and the future succession of all ages. For as to the first, it is said, *He that presseth into the light, shall be oppressed of the glory.* And again, *No man shall see my face and live.* To the second, *When he prepared the heavens I was present, when by law and compass he inclosed the deep.* To the third, *Neither was it needful that any should bear witness to him of man, for he knew well what was in man.* And to the last, *From the beginning are known to the Lord all his works.*

From the former of these two have been drawn certain senses and expositions of Scriptures, which had need be contained within the bounds of sobriety; the one anagogical, and the other philosophical. But as to the former, man is not to prevent his time; *Videmus nunc per speculum in aenigmate, tunc autem facie ad faciem*; wherein, nevertheless, there seemeth to be a liberty granted, as far forth as the polishing of this glass, or some moderate explication of this ænigma. But to press too far into it, cannot but cause a dissolution and overthrow of the spirit of man: for in the body there are three degrees of that we receive into it, aliment, medicine, and poison; whereof aliment is that which the nature of man can perfectly alter and overcome; medicine is that which is partly converted by nature, and partly converteth nature; and poison is that which worketh wholly upon nature, without that, that nature can in any part work upon it: so in the mind, whatsoever knowledge reason cannot at all work upon and convert, is a mere intoxication, and indangereth a dissolution of the mind and understanding.

But for the latter, it hath been extremely set on foot of late time by the school of Paracelsus, and some others, that have pretended to find the truth of all natural philosophy in the Scriptures; scandalizing and traducing all other philosophy as heathenish and profane. But there is no such enmity between God's word and his works: neither do they give honour to the Scriptures, as they suppose, but much embase them. For to seek heaven and earth in the word of God, whereof it is said, *heaven and earth shall pass, but my word shall not pass*, is to seek temporary things amongst eternal: and as to seek divinity in philosophy, is to seek the living amongst the dead; so to seek philosophy in divinity, is to seek the dead amongst the living;

neither

neither are the pots or lavers, whose place was in the outward part of the temple, to be sought in the holiest place of all, where the ark of the testimony was seated. And again, the scope or purpose of the Spirit of God is not to express matters of nature in the Scriptures, otherwise than in passage, and for application to man's capacity, and to matters moral or divine. And it is a true rule, *Auctoris aliud agentis parva auctoritas* : for it were a strange conclusion, if a man should use a similitude for ornament or illustration sake, borrowed from nature or history according to vulgar conceit, as of a basilisk, an unicorn, a centaur, a Briareus, an Hydra, or the like, that therefore he must needs be thought to affirm the matter thereof positively to be true. To conclude therefore, these two interpretations, the one by reduction or ænigmatical, the other philosophical or physical, which have been received and pursued in imitation of the rabbins and cabalists, are to be confined with a *noli altum sapere, sed time.*

But the two latter points, known to God, and unknown to man, touching the secrets of the heart, and the successions of time, do make a just and found difference between the manner of the exposition of the Scriptures, and all other books. For it is an excellent observation which hath been made upon the answers of our Saviour Christ to many of the questions which were propounded to him, how that they are impertinent to the state of the question demanded; the reason whereof is, because not being like man, which knows man's thoughts by his words, but knowing man's thoughts immediately, he never answered their words, but their thoughts : much in the like manner it is with the Scriptures, which being written to the thoughts of men, and to the succession of all ages, with a foresight of all heresies, contradictions, differing estates of the church, yea and particularly of the elect, are not to be interpreted only according to the latitude of the proper sense of the place, and respectively towards that present occasion, whereupon the words were uttered, or in precise congruity or contexture with the words before or after, or in contemplation of the principal scope of the place; but have in themselves, not only totally or collectively, but distributively in clauses and words, infinite springs and streams of doctrine to water the church in every part : and therefore as the literal sense is, as it were, the main stream or river, so the moral sense chiefly, and sometimes the allegorical or typical, are they whereof the church hath most use : not that I wish men to be bold in allegories, or indulgent or light in allusions; but that I do much condemn that interpretation of the Scripture, which is only after the manner as men use to interpret a profane book.

In this part, touching the exposition of the Scriptures, I can report no deficiency; but by way of remembrance this I will add, in perusing books of divinity, I find many books of controversies, and many of common places, and treatises, a mass of positive divinity as it is made an art; a number of sermons and lectures, and many prolix commentaries upon the Scriptures, with harmonies and concordances : but that form of writing in divinity, which in my judgment is of all others most rich and precious, is positive divinity collected upon particular texts of Scriptures in brief observations, not dilated into common places; not chafing after controversies, not reduced into method of art; a thing abounding in sermons, which will vanish, but defective in books which will remain, and a thing wherein this age excelleth. For I am persuaded, and I may speak it with an *Abfit invidia verbo*, and no ways in derogation of antiquity, but as in a good emulation between the vine and the olive, that if the choice and best of those observations upon texts of Scriptures,

tures, which have been made dispersedly in sermons within this your majesty's island of Britain, by the space of these forty years and more, leaving out the largeness of exhortations and applications thereupon, had been set down in a continuance, it had been the best work in divinity, which had been written since the apostles times.

The matter informed by divinity is of two kinds; matter of belief, and truth of opinion; and matter of service and adoration; which is also judged and directed by the former; the one being as the internal soul of religion, and the other as the external body thereof. And therefore the heathen religion was not only a worship of idols, but the whole religion was an idol in itself, for it had no soul; that is, no certainty of belief or confession; as a man may well think, considering the chief doctors of their church were the poets: and the reason was, because the heathen gods were no jealous gods, but were glad to be admitted into part, as they had reason. Neither did they respect the pureness of heart, so they might have external honour and rites.

But out of these two do result and issue four main branches of divinity; faith, manners, liturgy, and government. Faith containeth the doctrine of the nature of God, of the attributes of God, and of the works of God. The nature of God consisteth of three persons in unity of Godhead. The attributes of God are either common to the Deity, or respective to the persons. The works of God summary are two, that of the creation, and that of the redemption; and both these works, as in total they appertain to the unity of the Godhead, so in their parts they refer to the three persons: that of the creation, in the mass of the matter, to the Father; in the disposition of the form, to the Son; and in the continuance and conservation of the being, to the Holy Spirit; so that of the redemption, in the election and counsel, to the Father; in the whole act and consummation to the Son; and in the application, to the Holy Spirit: for by the Holy Ghost was Christ conceived in flesh, and by the Holy Ghost are the elect regenerated in spirit. This work likewise we consider either effectually, in the elect; or privately, in the reprobate; or according to appearance, in the visible church.

For manners, the doctrine thereof is contained in the law, which discloseth sin. The law itself is divided, according to the edition thereof, into the law of nature, the law moral, and the law positive; and, according to the stile, into negative and affirmative, prohibitions and commandments. Sin, in the matter and subject thereof, is divided according to the commandments; in the form thereof, it referreth to the three persons in Deity. Sins of infirmity against the Father, whose more special attribute is power; sins of ignorance against the Son, whose attribute is wisdom; and sins of malice against the Holy Ghost, whose attribute is grace or love. In the motions of it, it either moveth to the right hand or to the left, either to blind devotion, or to profane and libertine transgression; either in imposing restraint where God granteth liberty, or in taking liberty where God imposeth restraint. In the degrees and progress of it, it divideth itself into thought, word, or act. And in this part I commend much the deducing of the law of God to cases of conscience, for that I take indeed to be a breaking, and not exhibiting whole of the bread of life. But that which quickneth both these doctrines of faith and manners, is the elevation and consent of the heart; whereunto appertain books of exhortation, holy meditation, christian resolution, and the like.

For the liturgy or service, it consisteth of the reciprocal acts between God and man; which, on the part of God, are the preaching of the word, and the sacraments,

which are seals to the covenant, or as the visible word ; and on the part of man, invocation of the name of God ; and, under the law, sacrifices ; which were as visible prayers or confessions ; but now the adoration being *in spiritu et veritate*, there remaineth only *vituli labiorum*, although the use of holy vows of thankfulness and retribution may be accounted also as sealed petitions.

And for the government of the church, it consisteth of the patrimony of the church, the franchises of the church, and the offices and jurisdictions of the church, and the laws of the church directing the whole ; all which have two considerations, the one in themselves, the other how they stand compatible and agreeable to the civil estate.

This matter of divinity is handled either in form of instruction of truth, or in form of confutation of falshood. The declinations from religion, besides the primitive, which is atheism, and the branches thereof, are three ; heresies, idolatry, and witchcraft : heresies, when we serve the true God with a false worship ; idolatry, when we worship false gods, supposing them to be true ; and witchcraft, when we adore false gods, knowing them to be wicked and false. For so your majesty doth excellently well observe, that witchcraft is the height of idolatry. And yet we see though these be true degrees, Samuel teacheth us that they are all of a nature, when there is once a receding from the word of God ; for so he saith, *Quasi peccatum ariolandi est repugnare, et quasi scelus idolatriæ nolle acquiescere*.

These things I have passed over so briefly, because I can report no deficiency concerning them : for I can find no space or ground that lieth vacant and unfown in the matter of divinity ; so diligent have men been, either in sowing of good seed, or in sowing of tares.

Thus have I made as it were a small globe of the intellectual world, as truly and faithfully as I could discover, with a note and description of those parts which seem to me not constantly occupate, or not well converted by the labour of man. In which, if I have in any point receded from that which is commonly received, it hath been with a purpose of proceeding *in melius*, and not *in aliud* : a mind of amendment and proficience, and not of change and difference. For I could not be true and constant to the argument I handle, if I were not willing to go beyond others, but yet not more willing than to have others go beyond me again ; which may the better appear by this, that I have propounded my opinions naked and unarmed, not seeking to preoccupate the liberty of mens judgments by confutations. For in any thing which is well set down, I am in good hope, that if the first reading move an objection, the second reading will make an answer. And in those things wherein I have erred, I am sure, I have not prejudiced the right by litigious arguments, which certainly have this contrary effect and operation, that they add authority to error, and destroy the authority of that which is well invented. For question is an honour and preferment to falshood, as on the other side it is a repulse to truth. But the errors I claim and challenge to myself as my own. The good, if any be, is due *tanquam adeps sacrificii*, to be incensed to the honour first of the Divine Majesty, and next of your majesty, to whom on earth I am most bounden.

MAGNALIA NATURAE,

PRAECIPUE QUOAD USUS HUMANOS.

THE prolongation of life : the restitution of youth in some degree : the retardation of age : the curing of diseases counted incurable : the mitigation of pain : more easy and less loathsome purgings : the increasing of strength and activity : the increasing of ability to suffer torture or pain : the altering of complexions, and fatness and leanness : the altering of statures : the altering of features : the increasing and exalting of the intellectual parts : versions of bodies into other bodies : making of new species : transplanting of one species into another ; instruments of destruction, as of war and poison : exhilaration of the spirits, and putting them in good disposition : force of the imagination, either upon another body, or upon the body itself : acceleration of time in maturations : acceleration of time in clarifications : acceleration of putrefaction : acceleration of decoction : acceleration of germination : making rich composts for the earth : impressions of the air, and raising of tempests : great alteration ; as in induration, emolition, *etc.* turning crude and watry substances into oily and unctuous substances : drawing of new foods out of substances not now in use : making new threads for apparel ; and new stuffs, such as paper, glass, *etc.* natural divinations : deceptions of the senses : greater pleasures of the senses : artificial minerals and cements.

SYLVA SYLVARUM:

OR, A

N A T U R A L

H I S T O R Y.

I N

T E N C E N T U R I E S.

T O T H E
R E A D E R.

Having had the honour to be continually with my lord, in compiling of this work, and to be employed therein, I have thought it not amiss, with his lordship's good leave and liking, for the better satisfaction of those that shall read it, to make known somewhat of his lordship's intentions touching the ordering, and publishing of the same. I have heard his lordship often say, that, if he should have served the glory of his own name, he had been better not to have published this Natural History: for it may seem an indigested heap of particulars, and cannot have that lustre, which books cast into methods have; but that he resolved to prefer the good of men, and that which might best secure it, before any thing that might have relation to himself. And he knew well, that there was no other way open to unloose mens minds, being bound, and, as it were, maleficate, by the charms of deceiving notions and theories, and thereby made impotent for generation of works, but only no where to depart from the sense, and clear experience, but to keep close to it, especially in the beginning: besides, this Natural History was a debt of his, being designed and set down for a third part of the Instauration. I have also heard his lordship discourse that men, no doubt, will think many of the experiments, contained in this collection, to be vulgar and trivial, mean and sordid, curious and fruitless: and therefore, he wisheth that they would have perpetually before their eyes what is now in doing, and the difference between this Natural History and others. For those Natural Histories which are extant, being gathered for delight and use, are full of pleasant descriptions and pictures, and affect and seek after admiration, rarities, and secrets. But, contrariwise, the scope, which his lordship intendeth, is to write such a Natural History, as may be fundamental to the erecting and building of a true philosophy, for the illumination of the understanding, the extracting of axioms, and the producing of many noble works and effects. For he hopeth by this means to acquit himself of that for which he taketh himself in a sort bound, and that is, the advancement of all learning and sciences. For, having in this present work collected the materials for the building, and in his *Novum Organum*, of which his lordship is yet to publish a second part, set down the instruments and directions for the work; men shall now be wanting to themselves, if they raise not knowledge to that perfection whereof the nature of mortal men is capable. And in this behalf, I have heard his lordship speak complainingly, that his lordship, who thinketh he deserveth to be an architect in this building, should be forced to be a workman, and a labourer, and to dig the clay, and burn the brick; and, more than that, according to the hard condition of the Israelites at the latter end, to gather the straw and stubble over all the fields, to burn the bricks withal. For he knoweth, that except he do it, nothing will be done: men are so set to despise the means of their own good. And as for the baseness of many of the experiments;

T O T H E R E A D E R .

ments; as long as they be God's works, they are honourable enough. And for the vulgarness of them, true axioms must be drawn from plain experience, and not from doubtful; and his lordship's course is to make wonders plain, and not plain things wonders; and that experience likewise must be broken and grinded, and not whole, or as it groweth. And for use; his lordship hath often in his mouth the two kinds of experiments; *experimenta fructifera*, and *experimenta lucifera*: experiments of use, and experiments of light: and he reporteth himself, whether he were not a strange man, that should think that light hath no use because it hath no matter. Further, his lordship thought good also to add unto many of the experiments themselves some gloss of the causes; that in the succeeding work of interpreting nature, and framing axioms, all things may be in more readyness. And for the causes herein by him assigned; his lordship persuadeth himself, they are far more certain than those that are rendred by others; not for any excellency of his own wit, as his lordship is wont to say, but in respect of his continual conversation with nature and experience. He did consider likewise, that by this addition of causes, mens minds, which make so much haste to find out the causes of things, would not think themselves utterly lost in a vast wood of experience, but stay upon these causes, such as they are, a little, till true axioms may be more fully discovered. I have heard his lordship say also, that one great reason, why he would not put these particulars into any exact method, though he that looketh attentively into them shall find that they have a secret order, was, because he conceived that other men would now think that they could do the like; and so go on with a further collection: which, if the method had been exact, many would have despaired to attain by imitation. As for his lordship's love of order, I can refer any man to his lordship's latin book, *De Augmentis Scientiarum*; which, if my judgment be any thing, is written in the exactest order that I know any writing to be. I will conclude with an usual speech of his lordship's: That this work of his *Natural History* is the *World as God made it*, and not as men have made it; for that it hath nothing of imagination.

W. R A W L E Y .

This epistle is the same, that should have been prefixed to this book, if his lordship had lived.

N A T U R A L

NATURAL HISTORY.

CENTURY I.

Experiments in concert, touching the straining and passing of bodies one through another; which they call Percolation.

DIG a pit upon the sea-shore, somewhat above the high-water mark, and sink it as deep as the low-water mark; and as the tide cometh in, it will fill with water, fresh and potable. This is commonly practised upon the coast of Barbary, where other fresh water is wanting. And Cæsar knew this well when he was besieged in Alexandria: for by digging of pits in the sea-shore, he did frustrate the laborious works of the enemies, which had turned the sea-water upon the wells of Alexandria; and so saved his army being then in desperation. But Cæsar mistook the cause, for he thought that all sea-sands had natural springs of fresh water: but it is plain, that it is the sea-water; because the pit filleth according to the measure of the tide: and the sea-water passing or straining through the sands, leaveth the saltness.

2. I REMEMBER to have read, that trial hath been made of salt-water passed through earth, through ten vessels, one within another; and yet it hath not lost its saltness, as to become potable: but the same man saith, that, by the relation of another, salt-water drained through twenty vessels hath become fresh. This experiment seemeth to cross that other of pits made by the sea-side; and yet but in part, if it be true that twenty repetitions do the effect. But it is worth the note, how poor the imitations of nature are in common course of experiments, except they be led by great judgment, and some good light of axioms. For first, there is no small difference between a passage of water through twenty small vessels, and through such a distance, as between the low-water and high-water mark. Secondly, there is a great difference between earth and sand; for all earth hath in it a kind of nitrous salt, from which sand is more free; and besides, earth doth not strain the water so finely, as sand doth. But there is a third point, that I suspect as much or more than the other two; and that is, that in the experiment of transmission of the sea-water into the pits, the water riseth; but in the experiment of transmission of the water through the vessels, it falleth. Now certain it is, that the saltier part of water, once salted throughout, goeth to the bottom. And therefore no marvel, if the draining of water by descent doth not make it fresh: besides, I do somewhat doubt, that the very dashing of the water, that cometh from the sea, is more proper to strike off the salt part, than where the water slideth of its own motion.

3. It seemeth percolation, or transmission, which is commonly called straining, is a good kind of separation, not only of thick from thin, and gross from fine, but of more subtle natures; and varieth according to the body through which the transmission is made: as if through a woollen bag, the liquor leaveth the fatness; if through sand, the saltness, etc. They speak of sieving wine from water, passing it through ivy wood, or through other the like porous body; but *non constat*.

4. THE gum of trees, which we see to be commonly shining and clear, is but a fine passage or straining of the juice of the tree through the wood and bark. And in like manner, Cornish diamonds, and rock rubies, which are yet more resplendent than gums, are the fine exudations of stone.

5. ARISTOTLE giveth the cause, vainly, why the feathers of birds are of more lively colours, than the hairs of beasts; for no beast hath any fine azure, or carnation, or green hair. He saith, it is because birds are more in the beams of the sun than beasts; but that is manifestly untrue; for cattle are more in the sun than birds, that live commonly in the woods, or in some covert. The true cause is, that the excrementitious moisture of living creatures, which maketh as well the feathers in birds, as the hair in beasts, passeth in birds through a finer and more delicate strainer than it doth in beasts: for feathers pass through quills; and hair through skin.

6. THE clarifying of liquors by adhesion, is an inward percolation; and is effected, when some cleaving body is mixed and agitated with the liquors; whereby the grosser part of the liquor sticks to that cleaving body; and so the finer parts are freed from the grosser. So the apothecaries clarify their syrups by whites of eggs, beaten with the juices which they would clarify; which whites of eggs gather all the dregs and grosser parts of the juice to them; and after the syrup being set on the fire, the whites of eggs themselves harden, and are taken forth. So hippocras is clarified by mixing with milk, and stirring it about, and then passing it through a woollen bag, which they call Hippocrates's Sleeve, and the cleaving nature of the milk draweth the powder of the spices, and grosser parts of the liquor to it; and in the passage they stick upon the woollen bag.

7. THE clarifying of water is an experiment tending to health; besides the pleasure of the eye, when water is crystalline. It is effected by casting in and placing pebbles at the head of a current, that the water may strain through them.

8. It may be, percolation doth not only cause clearness and splendor, but sweetness of favour; for that also followeth as well as clearness, when the finer parts are severed from the grosser. So it is found, that the sweats of men, that have much heat, and exercise much, and have clean bodies, and fine skins, do smell sweet; as was said of Alexander; and we see that commonly gums have sweet odours.

Experiments in consort, touching Motion of bodies upon their pressure.

9. TAKE a glass, and put water into it, and wet your finger, and draw it round about the lip of the glass, pressing it somewhat hard; and after you have drawn it some few times about, it will make the water frisk and sprinkle up in a fine dew. This instance doth excellently demonstrate the force of compression in a solid body: for whensoever a solid body, as wood, stone, metal, *etc.* is pressed, there is an inward tumult in the parts thereof, seeking to deliver themselves from the compression: and this is the cause of all violent motion. Wherein it is strange in the highest degree, that this motion hath never been observed, nor inquired; it being of all motions the most common, and the chief root of all mechanical operations. This motion worketh in round at first, by way of proof and search which way to deliver itself; and then worketh in progress, where it findeth the deliverance easiest. In liquors this motion is visible; for all liquors stricken make round circles, and withal dash; but in solids, which break not, it is so subtle, as it is invisible; but nevertheless bewrayeth itself by many effects; as in this instance whereof we speak. For the

the pressure of the finger, furthered by the wetting, because it flicketh so much the better unto the lip of the glass, after some continuance, putteth all the small parts of the glass into work; that they strike the water sharply; from which percussion that sprinkling cometh.

10. IF you strike or pierce a solid body that is brittle, as glass, or sugar, it breaketh not only where the immediate force is; but breaketh all about into shivers and fitters; the motion, upon the pressure, searching all ways, and breaking where it findeth the body weakest.

11. THE powder in shot, being dilated into such a flame as endureth not compression, moveth likewise in round, the flame being in the nature of a liquid body, sometimes recoiling, sometimes breaking the piece, but generally discharging the bullet, because there it findeth easiest deliverance.

12. THIS motion upon pressure, and the reciprocal thereof, which is motion upon tension, we use to call by one common name, motion of liberty; which is, when any body, being forced to a preternatural extent or dimension, delivereth and restoreth itself to the natural: as when a blown bladder, pressed, riseth again; or when leather or cloth tentured, spring back. These two motions, of which there be infinite instances, we shall handle in due place.

13. THIS motion upon pressure is excellently also demonstrated in sounds; as when one chimeth upon a bell, it soundeth; but as soon as he layeth his hand upon it, the sound ceaseth: and so the sound of a virginal string, as soon as the quill of the jack falleth from it, stoppeth. For these sounds are produced by the subtil percussion of the minute parts of the bell, or string, upon the air; all one, as the water is caused to leap by the subtil percussion of the minute parts of the glass, upon the water, whereof we spake a little before in the ninth experiment. For you must not take it to be the local shaking of the bell, or string, that doth it: as we shall fully declare, when we come hereafter to handle sounds.

Experiments in consort, touching separations of bodies by weight.

14. TAKE a glass with a belly and a long neck; fill the belly, in part, with water: take also another glass, whereinto put claret wine and water mingled; reverse the first glass, with the belly upwards, stopping the neck with your finger; then dip the mouth of it within the second glass, and remove your finger: continue it in that posture for a time; and it will unminge the wine from the water: the wine ascending and settling in the top of the upper glass; and the water descending and settling in the bottom of the lower glass. The passage is apparent to the eye; for you shall see the wine, as it were, in a small vein, rising through the water. For hand-someness sake, because the working requireth some small time, it were good you hang the upper glass upon a nail. But as soon as there is gathered so much pure and unmixed water in the bottom of the lower glass, as that the mouth of the upper glass dippeth into it, the motion ceaseth.

15. LET the upper glass be wine, and the lower water; there followeth no motion at all. Let the upper glass be water pure, the lower water coloured, or contrariwise, there followeth no motion at all. But it hath been tried, that though the mixture of wine and water, in the lower glass, be three parts water and but one wine, yet it doth not dead the motion. This separation of water and wine appeareth to be made by weight; for it must be of bodies of unequal weight, or else it worketh not; and the heavier body must ever be in the upper glass. But then note withal,

that the water being made penfile, and there being a great weight of water in the belly of the glaſs, ſupported by a ſmall pillar of water in the neck of the glaſs, it is that which ſetteth the motion on work : for water and wine in one glaſs, with long ſtanding, will hardly ſever.

16. THIS experiment would be extended from mixtures of ſeveral liquors, to ſimple bodies which conſiſt of ſeveral ſimilar parts : try it therefore with brine or ſalt-water, and freſh-water : placing the ſalt-water, which is the heavier, in the upper glaſs ; and ſee whether the freſh will come above. Try it alſo with water thick ſugared, and pure water ; and ſee whether the water, which cometh above, will loſe its ſweetneſs : for which purpoſe it were good there were a little cock made in the belly of the upper glaſs.

Experiments in conſort, touching judicious and accurate infuſions, both in liquors and air.

17. IN bodies containing fine ſpirits, which do eaſily diſſipate, when you make infuſions, the rule is ; a ſhort ſtay of the body in the liquor, receiveth the ſpirit ; and a longer ſtay, confoundeth it ; becauſe it draweth forth the earthy part withal, which embafeth the finer. And therefore it is an error in phyſicians, to reſt ſimply upon the length of ſtay for increaſing the virtue. But if you will have the infuſion ſtrong, in thoſe kinds of bodies which have fine ſpirits, your way is not to give longer time, but to repeat the infuſion of the body oftner. Take violets, and infuſe a good pugil of them in a quart of vinegar ; let them ſtay three quarters of an hour, and take them forth, and reſreſh the infuſion with like quantity of new violets, ſeven times ; and it will make a vinegar ſo freſh of the flower, as if, a twelvemonth after, it be brought you in a ſaucer, you ſhall ſmell it before it come at you. Note, that it ſmelleth more perfectly of the flower a good while after, than at firſt.

18. THIS rule, which we have given, is of ſingular uſe for the preparations of medicines, and other infuſions. As for example : the leaf of burrage hath an excellent ſpirit to repreſs the fuliginous vapour of duſky melancholy, and ſo to cure madneſs : but nevertheleſs if the leaf be infuſed long it yieldeth forth but a raw ſubſtance, of no virtue : therefore I ſuppoſe, that if in the muſt of wine, or wort of beer, while it worketh, before it be tunned, the burrage ſtay a ſmall time, and be often changed with freſh ; it will make a ſovereign drink for melancholy paſſions. And the like I conceive of orange flowers.

19. RHUBARB hath manifeſtly in it parts of contrary operations : parts that purge ; and parts that bind the body : and the firſt lie looſer, and the latter lie deeper : ſo that if you infuſe rhubarb for an hour, and cruſh it well, it will purge better, and bind the body leſs after the purging, than if it had ſtood twenty four hours ; this is tried : but I conceive likewise, that by repeating the infuſion of rhubarb, ſeveral times, as was ſaid of violets, letting each ſtay in but a ſmall time ; you may make it as ſtrong a purging medicine as ſcammony. And it is not a ſmall thing won in phyſic, if you can make rhubarb, and other medicines that are benediſt, as ſtrong purgers as thoſe that are not, without ſome malignity.

20. PURGING medicines, for the moſt part, have their purgative virtue in a fine ſpirit ; as appeareth by that they endure not boiling without much loſs of virtue. And therefore it is of good uſe in phyſic, if you can retain the purging virtue, and take away the unpleaſant taſte of the purger ; which it is like you may do, by this courſe

course of infusing oft, with little stay. For it is probable, that the horrible and odious taste is in the grosser part.

21. **GENERALLY**, the working by infusions is gross and blind, except you first try the issuing of the several parts of the body, which of them issue more speedily, and which more slowly; and so by apportioning the time, can take and leave that quality which you desire. This to know there are two ways; the one to try what long stay, and what short stay worketh, as hath been said; the other to try in order the succeeding infusions of one and the same body, successively, in several liquors. As for example; take orange pills, or rosemary, or cinnamon, or what you will; and let them infuse half an hour in water: then take them out, and infuse them again in other water; and so the third time: and then taste and consider the first water, the second, and the third: and you will find them differing, not only in strength and weakness, but otherwise in taste or odour; for it may be the first water will have more of the scent, as more fragrant; and the second more of the taste, as more bitter or biting, *etc.*

22. **INFUSIONS** in air, for so we may well call odours, have the same diversities with infusions in water; in that the several odours, which are in one flower, or other body, issue at several times; some earlier, some later: so we find that violets, woodbines, strawberries, yield a pleasing scent, that cometh forth first; but soon after an ill scent quite differing from the former. Which is caused, not so much by mellowing, as by the late issuing of the grosser spirit.

23. As we may desire to extract the finest spirits in some cases; so we may desire also to discharge them, as hurtful, in some other. So wine burnt, by reason of the evaporating of the finer spirit, inflameth less, and is best in agues: opium loseth some of his poisonous quality, if it be vapoured out, mingled with spirit of wine, or the like: fena loseth somewhat of its windiness by decocting; and, generally, subtiler or windy spirits are taken off by incension or evaporation. And even in infusions in things that are of too high a spirit, you were better pour off the first infusion, after a small time, and use the latter.

Experiment solitary touching the appetite of continuation in liquids.

24. **BUBBLES** are in the form of an hemisphere; air within and a little skin of water without: and it seemeth somewhat strange, that the air should rise so swiftly, while it is in the water; and when it cometh to the top, should be stayed by so weak a cover as that of the bubble is. But as for the swift ascent of the air, while it is under the water, that is a motion of percussing from the water; which itself descending driveth up the air; and no motion of levity in the air. And this Democritus called *motus plagae*. In this common experiment, the cause of the inclosure of the bubble is, for that the appetite to resist separation, or discontinuance, which in solid bodies is strong, is also in liquors, though fainter and weaker; as we see in this of the bubble: we see it also in little glasses of spittle that children make of rushes; and in castles of bubbles, which they make by blowing into water, having obtained a little degree of tenacity by mixture of soap: we see it also in the stillicides of water, which if there be water enough to follow, will draw themselves into a small thread, because they will not discontinue; but if there be no remedy, then they cast themselves into round drops; which is the figure that saveth the body most from discontinuance: the same reason is of the roundness of the bubble, as well for the skin

of water, as for the air within : for the air likewise avoideth discontinuance ; and therefore casteth itself into a round figure. And for the stop and arrest of the air a little while, it sheweth that the air of itself hath little or no appetite of ascending.

Experiment solitary touching the making of artificial springs.

25. THE rejection, which I continually use, of experiments, though it appeareth not, is infinite ; but yet if an experiment be probable in the work, and of great use, I receive it, but deliver it as doubtful. It was reported by a sober man, that an artificial spring may be made thus : Find out a hanging ground, where there is a good quick fall of rain-water. Lay a half-trough of stone, of a good length, three or four foot deep within the same ground ; with one end upon the high ground, the other upon the low. Cover the trough with brakes a good thickness, and cast sand upon the top of the brakes : you shall see, saith he, that after some showers are past, the lower end of the trough will run like a spring of water : which is no marvel, if it hold while the rain-water lasteth ; but he said it would continue long time after the rain is past : as if the water did multiply itself upon the air, by the help of the coldness and condensation of the earth, and the consort of the first water.

Experiment solitary touching the venomous quality of man's flesh.

26. THE French, who put off the name of the French disease unto the name of the disease of Naples, do report, that at the siege of Naples, there were certain wicked merchants that barrell'd up man's flesh, of some that had been lately slain in Barbary, and sold it for tunney ; and that upon that foul and high nourishment, was the original of that disease. Which may well be, for that it is certain, that the canibals in the West-Indies eat man's flesh ; and the West-Indies were full of the pox when they were first discovered : and at this day the mortalest poisons, practis'd by the West-Indians, have some mixture of the blood, or fat, or flesh of man : and divers witches and forcereffes, as well amongst the heathen, as amongst the christians, have fed upon man's flesh, to aid, as it seemeth, their imagination, with high and foul vapours.

Experiment solitary touching the version and transmutation of air into water.

27. IT seemeth that there be these ways, in likelihood, of version of vapours or air, into water and moisture. The first is cold ; which doth manifestly condense ; as we see in the contracting of the air in the weather-glass ; whereby it is a degree nearer to water. We see it also in the generation of springs, which the ancients thought, very probably, to be made by the version of air into water, holpen by the rest, which the air hath in those parts ; whereby it cannot dissipate. And by the coldness of rocks ; for there springs are chiefly generated. We see it also in the effects of the cold of the middle region, as they call it, of the air ; which produceth dews and rains. And the experiment of turning water into ice, by snow, nitre, and salt, whereof we shall speak hereafter, would be transferred to the turning of air into water. The second way is by compression ; as in stillatories, where the vapour is turned back upon itself, by the encounter of the sides of the stillatory ; and in the dew upon the covers of boiling pots ; and in the dew towards rain, upon marble and waincot. But this is like to do no great effect ; except it be upon vapours, and gross air, that are already very near in degree to water. The third is that, which may be searched into, but doth not yet appear ; which is, by mingling of moist vapours

pours with air ; and trying if they will not bring a return of more water, than the water was at first : for if so, that increase is a version of the air : therefore put water into the bottom of a stillatory, with the neb stopped ; weigh the water first ; hang in the middle of the stillatory a large sponge ; and see what quantity of water you can crush out of it ; and what it is more or less, compared with the water spent ; for you must understand, that if any version can be wrought, it will be easiest done in small pores : and that is the reason why we prescribe a sponge. The fourth way is probable also, though not appearing ; which is, by receiving the air into the small pores of bodies : for, as hath been said, every thing in small quantity is more easy for version ; and tangible bodies have no pleasure in the consort of air, but endeavour to subact it into a more dense body : but in intire bodies it is checked ; because if the air should condense, there is nothing to succeed : therefore it must be in loose bodies, as sand, and powder ; which, we see, if they lie close, of themselves gather moisture.

Experiment solitary touching helps towards the beauty and good features of persons.

28. It is reported by some of the ancients ; that whelps, or other creatures, if they be put young into such a cage or box, as they cannot rise to their stature, but may increase in breadth or length, will grow accordingly as they can get room : which if it be true and feasible, and that the young creature so pressed and straitened, doth not thereupon die ; it is a means to produce dwarf creatures, and in a very strange figure. This is certain, and noted long since ; that the pressure or forming of the parts of creatures, when they are very young, doth alter the shape not a little ; as the stroking of the heads of infants, between the hands, was noted of old, to make *Macrocephali* ; which shape of the head, at that time, was esteemed. And the raising gently of the bridge of the nose, doth prevent the deformity of a saddle nose. Which observation well weighed, may teach a means to make the persons of men and women, in many kinds, more comely and better featured than otherwise they would be ; by the forming and shaping of them in their infancy : as by stroking up the calves of the legs, to keep them from falling down too low ; and by stroking up the forehead, to keep them from being low-foreheaded. And it is a common practice to swathe infants, that they may grow more straight and better shaped : and we see young women, by wearing strait bodice, keep themselves from being gross and corpulent.

Experiment solitary touching the condensing of air in such sort as it may put on weight, and yield nourishment.

29. ONIONS, as they hang, will many of them shoot forth ; and so will penny-royal ; and so will an herb called orpin ; with which they use in the country to trim their houses, binding it to a lath or stick, and setting it against a wall. We see it likewise, more especially, in the greater semper-vive, which will put out branches, two or three years : but it is true, that commonly they wrap the root in a cloth besmeared with oil, and renew it once in half a year. The like is reported by some of the ancients, of the stalks of lilies. The cause is ; for that these plants have a strong, dense, and succulent moisture, which is not apt to exhale ; and so is able, from the old store, without drawing help from the earth, to suffice the sprouting of the plant : and this sprouting is chiefly in the late spring, or early summer ; which

are the times of putting forth. We see also, that stumps of trees, lying out of the ground, will put forth sprouts for a time. But it is a noble trial, and of very great consequence, to try whether these things in the sprouting, do increase weight; which must be tried, by weighing them before they be hanged up; and afterwards again, when they are sprouted. For if they increase not in weight, then it is no more but this; that what they send forth in the sprout, they lose in some other part: but if they gather weight, then it is *magnale naturae*; for it sheweth that air may be made so to be condensed, as to be converted into a dense body; whereas the race and period of all things, here above the earth, is to extenuate and turn things to be more pneumatical and rare; and not to be retrograde, from pneumatical to that which is dense. It sheweth also, that air can nourish; which is another great matter of consequence. Note, that to try this, the experiment of the *semper-vive*, must be made without oiling the cloth; for else, it may be, the plant receiveth nourishment from the oil.

Experiment solitary touching the commixture of flame and air, and the great force thereof.

30. FLAME and air do not mingle, except it be in an instant; or in the vital spirits of vegetables and living creatures. In gun-powder, the force of it hath been ascribed to rarefaction of the earthy substance into flame; and thus far it is true: and then, forsooth, it is become another element; the form whereof occupieth more place; and so, of necessity, followeth a dilatation: and therefore, lest two bodies should be in one place, there must needs also follow an expulsion of the pellet; or blowing up of the mine. But these are crude and ignorant speculations. For flame, if there were nothing else, except it were in very great quantity, will be suffocate with any hard body, such as a pellet is; or the barrel of a gun; so as the flame would not expel the hard body; but the hard body would kill the flame, and not suffer it to kindle or spread. But the cause of this so potent a motion, is the nitre, which we call otherwise salt-petre, which having in it a notable crude and windy spirit, first by the heat of the fire suddenly dilateth itself; and we know that simple air, being preternaturally attenuated by heat, will make itself room, and break and blow up that which resisteth it; and secondly, when the nitre hath dilated itself, it bloweth abroad the flame, as an inward bellows. And therefore we see that brimstone, pitch, camphire, wild-fire, and divers other inflammable matters, though they burn cruelly, and are hard to quench, yet they make no such fiery wind as gun-powder doth: and on the other side, we see that quick-silver, which is a most crude and watry body, heated and pent in, hath the like force with gun-powder. As for living creatures, it is certain, their vital spirits are a substance compounded of an airy and flamy matter; and though air and flame being free, will not well mingle; yet bound in by a body that hath some fixing, they will. For that you may best see in those two bodies, which are their aliments, water and oil; for they likewise will not well mingle of themselves; but in the bodies of plants, and living creatures, they will. It is no marvel therefore, that a small quantity of spirits, in the cells of the brain and canals of the sinews, are able to move the whole body, which is of so great mass, both with so great force, as in wrestling, leaping; and with so great swiftness, as in playing division upon the lute. Such is the force of these two natures, air and flame, when they incorporate.

Experiment

Experiment solitary touching the secret nature of flame.

31. TAKE a small wax candle, and put it in a socket of brass or iron; then set it upright in a porringer full of spirit of wine heated: then set both the candle and spirit of wine on fire, and you shall see the flame of the candle open itself, and become four or five times bigger than otherwise it would have been; and appear in figure globular, and not in pyramis. You shall see also, that the inward flame of the candle keepeth colour, and doth not wax any whit blue towards the colour of the outward flame of the spirit of wine. This is a noble instance; wherein two things are most remarkable: the one, that one flame within another quencheth not; but is a fixed body, and continueth as air or water do. And therefore flame would still ascend upwards in one greatness, if it were not quenched on the sides: and the greater the flame is at the bottom, the higher is the rise. The other, that flame doth not mingle with flame, as air doth with air, or water with water, but only remaineth contiguous; as it cometh to pass betwixt consisting bodies. It appeareth also, that the form of a pyramis in flame, which we usually see, is merely by accident, and that the air about, by quenching the sides of the flame, crusheth it, and extenuateth it into that form; for of itself it would be round; and therefore smoke is in the figure of a pyramis reversed; for the air quencheth the flame, and receiveth the smoke. Note also, that the flame of the candle, within the flame of the spirit of wine, is troubled; and doth not only open and move upwards, but moveth waving to and fro; as if flame of its own nature, if it were not quenched, would roll and turn, as well as move upwards. By all which it should seem, that the celestial bodies most of them, are true fires or flames, as the Stoics held; more fine, perhaps, and rarified than our flame is. For they are all globular and determinate; they have rotation; and they have the colour and splendor of flame: so that flame above is durable, and consistent, and in its natural place; but with us it is a stranger, and momentary, and impure; like Vulcan that halted with his fall.

Experiment solitary touching the different force of flame in the midst and in the sides.

32. TAKE an arrow, and hold it in flame for the space of ten pulses, and when it cometh forth, you shall find those parts of the arrow which were on the outsides of the flame more burned, blacked, and turned almost into a coal, whereas that in the midst of the flame will be as if the fire had scarce touched it. This is an instance of great consequence for the discovery of the nature of flame; and sheweth manifestly, that flame burneth more violently towards the sides than in the midst: and, which is more, that heat or fire is not violent or furious, but where it is checked and pent up. And therefore the Peripatetics, howsoever their opinion of an element of fire above the air is justly exploded, in that point they acquit themselves well: for being opposed, that if there were a sphere of fire, that encompassed the earth so near hand, it were impossible but all things should be burnt up; they answer, that the pure elemental fire, in its own place, and not irritated, is but of a moderate heat.

Experiment solitary touching the decrease of the natural motion of gravity, in great distance from the earth; or within some depth of the earth.

33. IT is affirmed constantly by many, as an usual experiment; that a lump of ore, in the bottom of a mine, will be tumbled and stirred by two mens strength; VOL. I. U which

which if you bring it to the top of the earth, will ask six mens strength at the least to stir it. It is a noble instance, and is fit to be tried to the full; for it is very probable, that the motion of gravity worketh weakly, both far from the earth, and also within the earth: the former, because the appetite of union of dense bodies with the earth, in respect of the distance, is more dull; the latter because the body hath in part attained its nature when it is some depth in the earth. For as for the moving to a point or place, which was the opinion of the ancients, it is a mere vanity.

Experiment solitary touching the contraction of bodies in bulk, by the mixture of the more liquid body with the more solid.

34. It is strange how the ancients took up experiments upon credit, and yet did build great matters upon them. The observation of some of the best of them, delivered confidently, is, that a vessel filled with ashes will receive the like quantity of water, that it would have done if it had been empty. But this is utterly untrue, for the water will not go in by a fifth part. And I suppose, that that fifth part is the difference of the lying close, or open, of the ashes; as we see that ashes alone, if they be hard pressed, will lie in less room: and so the ashes with air between, lie looser; and with water, closer. For I have not yet found certainly, that the water itself, by mixture of ashes or dust, will shrink or draw into less room.

Experiment solitary touching the making vines more fruitful.

35. It is reported of credit, that if you lay good store of kernels of grapes about the root of a vine, it will make the vine come earlier and prosper better. It may be tried with other kernels, laid about the root of a plant of the same kind; as figs, kernels of apples, etc. The cause may be, for that the kernels draw out of the earth juice fit to nourish the tree, as those that would be trees of themselves, though there were no root; but the root being of greater strength, robbeth and devoureth the nourishment, when they have drawn it: as great fishes devour little.

Experiments in consort touching purging medicines.

36. THE operation of purging medicines, and the causes thereof, have been thought to be a great secret, and so according to the slothful manner of men, it is referred to a hidden propriety, a specific virtue, and a fourth quality, and the like shifts of ignorance. The causes of purging are divers: all plain and perspicuous; and thoroughly maintained by experience. The first is, that whatsoever cannot be overcome and digested by the stomach, is by the stomach either put up by vomit, or put down to the guts; and by that motion of expulsion in the stomach and guts, other parts of the body, as the orifices of the veins, and the like, are moved to expel by consent. For nothing is more frequent than motion of consent in the body of man. This surcharge of the stomach is caused either by the quality of the medicine, or by the quantity. The qualities are three: extreme bitter, as in aloes, coloquintida, etc. loathsome and of horrible taste, as in agaric, black hellebore, etc. and of secret malignity, and disagreement towards man's body, many times not appearing much in the taste, as in scammony, mechoachan, antimony, etc. And note well, that if there be any medicine that purgeth, and hath neither of the first two manifest qualities, it is to be held suspected as a kind of poison; for that it worketh either by corrosion, or by a secret malignity, and
enmity

enmity to nature: and therefore such medicines are warily to be prepared and used. The quantity of that which is taken doth also cause purging; as we see in a great quantity of new milk from the cow; yea and a great quantity of meat; for surfeits many times turn to purges, both upwards and downwards. Therefore we see generally, that the working of purging medicines cometh two or three hours after the medicines taken; for that the stomach first maketh a proof, whether it can concoct them. And the like happeneth after surfeits, or milk in too great quantity.

37. A SECOND cause is mordication of the orifices of the parts; especially of the mesentery veins; as it is seen, that salt, or any such thing that is sharp and biting, put into the fundament, doth provoke the part to expel; and mustard provoketh sneezing: and any sharp thing to the eyes provoketh tears. And therefore we see that almost all purgers have a kind of twitching and vellication, besides the griping which cometh of wind. And if this mordication be in an over-high degree, it is little better than the corrosion of poison; as it cometh to pass sometimes in antimony, especially if it be given to bodies not replete with humours; for where humours abound, the humours save the parts.

38. THE third cause is attraction: for I do not deny, but that purging medicines have in them a direct force of attraction; as drawing plaisters have in surgery: and we see sage or betony bruised, sneezing powder, and other powders or liquors, which the physicians call *errhines*, put into the nose, draw phlegm and water from the head; and so it is in apophlegmatisms and gargarisms, that draw the rheum down by the palate. And by this virtue, no doubt, some purgers draw more one humour, and some another, according to the opinion received: as rhubarb draweth choler; senna melancholy; agaric phlegm, *etc.* but yet, more or less, they draw promiscuously. And note also, that besides sympathy between the purger and the humour, there is also another cause, why some medicines draw some humour more than another. And it is, for that some medicines work quicker than others: they that draw quick, draw only the lighter and more fluid humours; and they that draw slow, work upon the more tough and viscous humours. And therefore men must beware how they take rhubarb, and the like, alone familiarly; for it taketh only the lightest part of the humour away, and leaveth the mass of humours more obstinate. And the like may be said of wormwood, which is so much magnified.

39. THE fourth cause is flatuosity; for wind stirred moveth to expel: and we find that in effect all purgers have in them a raw spirit or wind; which is the principal cause of tortion in the stomach and belly. And therefore purgers lose, most of them, the virtue, by decoction upon the fire; and for that cause are given chiefly in infusion, juice, or powder.

40. THE fifth cause is compression or crushing: as when water is crushed out of a sponge: so we see that taking cold moveth looseness by contraction of the skin and outward parts; and so doth cold likewise cause rheums and defluxions from the head; and some astringent plaisters crush out purulent matter. This kind of operation is not found in many medicines; myrobalanes have it; and it may be the barks of peaches; for this virtue requireth an astringency; but such an astringency as is not grateful to the body; for a pleasing astringency doth rather bind in the humours than expel them: and therefore, such astringency is found in things of an harsh taste.

41. THE sixth cause is lubrefaction and relaxation. As we see in medicines emollient; such as are milk, honey, mallows, lettuce, mercurial, pellitory of the wall, and others. There is also a secret virtue of relaxation in cold: for the heat of the body bindeth the parts and humours together, which cold relaxeth: as it is seen in urine, blood, pottage, or the like; which, if they be cold, break and dissolve. And by this kind of relaxation, fear looseth the belly; because the heat retiring inwards towards the heart, the guts and other parts are relaxed; in the same manner as fear also causeth trembling in the sinews. And of this kind of purgers are some medicines made of mercury.

42. THE seventh cause is absterfion: which is plainly a scouring off, or incision of the more viscous humours, and making the humours more fluid; and cutting between them and the part; as is found in nitrous water, which scoureth linen cloth speedily from the foulness. But this incision must be by a sharpness, without astringency: which we find in salt, wormwood, oxymel, and the like.

43. THERE be medicines that move stools, and not urine; some other, urine, and not stools. Those that purge by stool, are such as enter not at all, or little into the mesentery veins; but either at the first are not digestible by the stomach, and therefore move immediately downwards to the guts; or else are afterwards rejected by the mesentery veins; and so turn likewise downwards to the guts; and of these two kinds are most purgers. But those that move urine, are such as are well digested of the stomach, and well received also of the mesentery veins; so they come as far as the liver, which sendeth urine to the bladder, as the whey of blood: and those medicines being opening and piercing, do fortify the operation of the liver, in sending down the whey part of the blood to the reins. For medicines urinate do not work by rejection and indigestion, as solutive do.

44. THERE be divers medicines, which in greater quantity move stool, and in smaller urine: and so contrariwise, some that in greater quantity move urine, and in smaller stools. Of the former sort is rhubarb, and some others. The cause is, for that rhubarb is a medicine which the stomach in a small quantity doth digest and overcome, being not flatuous nor loathsome, and so sendeth it to the mesentery veins; and so being opening, it helpeth down urine: but in a greater quantity, the stomach cannot overcome it, and so it goeth to the guts. Pepper by some of the ancients is noted to be of the second sort; which being in small quantity, moveth wind in the stomach and guts, and so expelleth by stool; but being in greater quantity, dissipateth the wind; and itself getteth to the mesentery veins, and so to the liver and reins; where, by heating and opening, it sendeth down urine more plentifully.

Experiments in consort touching meats and drinks that are most nourishing.

45. WE have spoken of evacuating of the body; we will now speak something of the filling of it by restoratives in consumptions and emaciating diseases. In vegetables, there is one part that is more nourishing than another; as grains and roots nourish more than the leaves; insomuch as the order of the Foliatanes was put down by the pope, as finding leaves unable to nourish man's body. Whether there be that difference in the flesh of living creatures, is not well inquired: as whether livers and other entrails, be not more nourishing than the outward flesh. We find that amongst the Romans, a goose's liver was a great delicacy; insomuch as they had

had artificial means to make it fair and great; but whether it were more nourishing appeareth not. It is certain, that marrow is more nourishing than fat. And I conceive that some decoction of bones and sinews, stamped and well strained, would be a very nourishing broth: we find also that Scotch skinck, which is a pottage of strong nourishment, is made with the knees and sinews of beef, but long boiled: jelly also, which they use for a restorative, is chiefly made of knuckles of veal. The pulp that is within the crawfish or crab, which they spice and butter, is more nourishing than the flesh of the crab or crawfish. The yolks of eggs are clearly more nourishing than the whites. So that it should seem, that the parts of living creatures that lie more inwards, nourish more than the outward flesh; except it be the brain: which the spirits prey too much upon, to leave it any great virtue of nourishment. It seemeth for the nourishing of aged men, or men in consumptions, some such thing should be devised, as should be half chylus, before it be put into the stomach.

46. TAKE two large capons; parboil them upon a soft fire, by the space of an hour or more, till in effect all the blood be gone. Add in the decoction the peel of a sweet lemon, or a good part of the peel of a citron, and a little mace. Cut off the shanks, and throw them away. Then with a good strong chopping-knife mince the two capons, bones and all, as small as ordinary minced meat; put them into a large neat boulder; then take a kilderkin, sweet and well seasoned, of four gallons of beer, of 8 s. strength, new as it cometh from the tunning; make in the kilderkin a great bung-hole of purpose: then thrust into it the boulder, in which the capons are, drawn out in length; let it steep in it three days and three nights, the bung-hole open, to work; then close the bung-hole, and so let it continue a day and a half; then draw it into bottles, and you may drink it well after three days bottling; and it will last six weeks, approved. It drinketh fresh, flowereth and mantleth exceedingly; it drinketh not newish at all; it is an excellent drink for a consumption, to be drunk either alone, or carded with some other beer. It quencheth thirst, and hath no whit of windiness. Note, that it is not possible, that meat and bread, either in broths or taken with drink, as is used, should get forth into the veins and outward parts, so finely and easily, as when it is thus incorporate, and made almost a chylus aforehand.

47. TRIAL would be made of the like brew with potato roots, or burr roots, or the pith of artichokes, which are nourishing meats: it may be tried also with other flesh; as pheasant, partridge, young pork, pig, venison, especially of young deer, *etc.*

48. A MORTRESS made with the brawn of capons, stamped and strained, and mingled, after it is made, with like quantity, at the least, of almond butter, is an excellent meat to nourish those that are weak; better than blackmanger, or jelly: and so is the cullice of cocks, boiled thick with the like mixture of almond butter: for the mortress or cullice, of itself, is more savoury and strong, and not so fit for nourishing of weak bodies; but the almonds, that are not of so high a taste as flesh, do excellently qualify it.

49. INDIAN maiz hath, of certain, an excellent spirit of nourishment; but it must be thoroughly boiled, and made into a maiz-cream like a barley-cream. I judge the same of rice, made into a cream; for rice is in Turkey, and other countries of the east, most fed upon; but it must be thoroughly boiled in respect of the hardness of it, and also because otherwise it bindeth the body too much.

50. PISTACHDES,

50. PISTACHOES, so they be good, and not musty, joined with almonds in almond milk; or made into a milk of themselves, like unto almond milk, but more green, are an excellent nourisher: but you shall do well, to add a little ginger, scraped, because they are not without some subtle windiness.

51. MILK warm from the cow, is found to be a great nourisher, and a good remedy in consumptions: but then you must put into it, when you milk the cow, two little bags; the one of powder of mint, the other of powder of red roses; for they keep the milk somewhat from turning or curdling in the stomach; and put in sugar also, for the same cause, and partly for the taste's sake; but you must drink a good draught, that it may stay less time in the stomach, lest it curdle: and let the cup into which you milk the cow, be set in a greater cup of hot water, that you may take it warm. And cow milk thus prepared, I judge to be better for a consumption, than ass milk, which, it is true, turneth not so easily, but it is a little harsh; marry it is more proper for sharpness of urine, and exulceration of the bladder, and all manner of lenifying. Woman's milk likewise is prescribed, when all fail; but I commend it not, as being a little too near the juice of man's body, to be a good nourisher; except it be in infants, to whom it is natural.

52. OIL of sweet almonds, newly drawn, with sugar, and a little spice, spread upon bread toasted, is an excellent nourisher: but then to keep the oil from frying in the stomach, you must drink a good draught of mild beer after it; and to keep it from relaxing the stomach too much, you must put in a little powder of cinnamon.

53. THE yolks of eggs are of themselves so well prepared by nature for nourishment, as, so they be poached, or rare boiled, they need no other preparation or mixture; yet they may be taken also raw, when they are new laid, with Malmsey, or sweet wine; you shall do well to put in some few slices of eryngium roots, and a little ambergrice; for by this means, besides the immediate faculty of nourishment, such drink will strengthen the back, so that it will not draw down the urine too fast; for too much urine doth always hinder nourishment.

54. MINCING of meat, as in pies, and buttered minced meat, saveth the grinding of the teeth; and therefore, no doubt, it is more nourishing, especially in age, or to them that have weak teeth; but the butter is not so proper for weak bodies; and therefore it were good to moisten it with a little claret wine, peel of lemon or orange, cut small, sugar, and a very little cinnamon or nutmeg. As for chuets, which are likewise minced meat, instead of butter and fat, it were good to moisten them, partly with cream, or almond, or pistacho milk; or barley, or maiz cream; adding a little coriander seed and caraway seed, and a very little saffron. The more full handling of alimentation we reserve to the due place.

WE have hitherto handled the particulars which yield best, and easiest, and plentifullest nourishment; and now we will speak of the best means of conveying and converting the nourishment.

55. THE first means is to procure that the nourishment may not be robbed and drawn away; wherein that which we have already said is very material; to provide; that the reins draw not too strongly an over great part of the blood into urine. To this add that precept of Aristotle, that wine be forborn in all consumptions; for that the spirits of the wine do prey upon the roscid juice of the body, and inter-common with the spirits of the body, and so deceive and rob them of their nourishment. And therefore if the consumption, growing from the weakness of the stomach, do
force

force you to use wine, let it always be burnt, that the quicker spirits may evaporate ; or, at the least, quenched with two little wedges of gold, six or seven times repeated. Add also this provision, that there be not too much expence of the nourishment, by exhaling and sweating : and therefore if the patient be apt to sweat, it must be gently restrained. But chiefly Hippocrates's rule is to be followed, who adviseth quite contrary to that which is in use : namely, that the linen or garment next the flesh, be in winter, dry and oft changed ; and in summer seldom changed, and smeared over with oil ; for certain it is, that any substance that is fat, doth a little fill the pores of the body, and stay sweat in some degree : but the more cleanly way is, to have the linen smeared lightly over with oil of sweet almonds ; and not to forbear shifting as oft as is fit.

56. THE second means is, to send forth the nourishment into the parts more strongly ; for which the working must be by strengthening of the stomach ; and in this, because the stomach is chiefly comforted by wine and hot things, which otherwise hurt ; it is good to resort to outward applications to the stomach : Wherein it hath been tried, that the quilts of roses, spices, mastic, wormwood, mint, *etc.* are nothing so helpful, as to take a cake of new bread, and to bedew it with a little sack, or Alicant ; and to dry it ; and after it be dried a little before the fire, to put it within a clean napkin, and to lay it to the stomach ; for it is certain, that all flour hath a potent virtue of astringion ; in so much as it hardeneth a piece of flesh, or a flower, that is laid in it : and therefore a bag quilted with bran is likewise very good ; but it drieth somewhat too much, and therefore it must not lie long.

57. THE third means, which may be a branch of the former, is to send forth the nourishment the better by sleep. For we see, that bears, and other creatures that sleep in the winter, wax exceeding fat : and certain it is, as it is commonly believed, that sleep doth nourish much ; both for that the spirits do less spend the nourishment in sleep, than when living creatures are awake : and because, that which is to the present purpose, it helpeth to thrust out the nourishment into the parts. Therefore in aged men, and weak bodies, and such as abound not with choler, a short sleep after dinner doth help to nourish ; for in such bodies there is no fear of an over-hasty digestion, which is the inconvenience of postmeridian sleeps. Sleep also in the morning, after the taking of somewhat of easy digestion, as milk from the cow, nourishing broth, or the like, doth further nourishment : but this should be done sitting upright, that the milk or broth may pass the more speedily to the bottom of the stomach.

58. THE fourth means is, to provide that the parts themselves may draw to them the nourishment strongly. There is an excellent observation of Aristotle ; that a great reason, why plants, some of them, are of greater age than living creatures, is, for that they yearly put forth new leaves and boughs : whereas living creatures put forth, after their period of growth, nothing that is young, but hair and nails, which are excrements, and no parts. And it is most certain, that whatsoever is young, doth draw nourishment better than that which is old ; and then, that which is the mystery of that observation, young boughs, and leaves, calling the sap up to them, the same nourisheth the body in the passage. And this we see notably proved also, in that the oft cutting, or polling of hedges, trees, and herbs, doth conduce much to their lasting. Transfer therefore this observation to the helping of nourishment in living creatures : the noblest and principal use whereof is, for the prolongation of life ; restoration of some degree of youth ;
and

and inteneration of the parts: for certain it is, that there are in living creatures parts that nourish and repair easily, and parts that nourish and repair hardly: and you must refresh and renew those that are easy to nourish, that the other may be refreshed, and, as it were, drink in nourishment in the passage. Now we see that draught oxen, put into good pasture, recover the flesh of young beef; and men after long emaciating diets wax plump and fat, and almost new: so that you may surely conclude, that the frequent and wise use of those emaciating diets, and of purgings, and perhaps of some kind of bleeding, is a principal means of prolongation of life, and restoring some degree of youth: for as we have often said, death cometh upon living creatures like the torment of Mezentius:

Mortua quin etiam jungebat corpora vivis,

Compensans manibusque manus, atque cribus ora. Æn. viii. 485.

For the parts in man's body easily reparable, as spirits, blood, and flesh, die in the embracement of the parts hardly reparable, as bones, nerves, and membranes; and likewise some entrails, which they reckon amongst the spermatical parts, are hard to repair: though that division of spermatical and menstrual parts be but a conceit. And this same observation also may be drawn to the present purpose of nourishing emaciated bodies: and therefore gentle frication draweth forth the nourishment, by making the parts a little hungry, and heating them; whereby they call forth nourishment the better. This frication I wish to be done in the morning. It is also best done by the hand, or a piece of scarlet wool, wet a little with oil of almonds, mingled with a small quantity of bay-salt, or saffron; we see that the very currying of horses doth make them fat, and in good liking.

59. THE fifth means is, to further the very act of assimilation of nourishment; which is done by some outward emollients, that make the parts more apt to assimilate. For which I have compounded an ointment of excellent odour, which I call Roman ointment; *vide* the receipt. The use of it would be between sleeps; for in the latter sleep the parts assimilate chiefly.

Experiment solitary touching Filum medicinale.

60. THERE be many medicines, which by themselves would do no cure, but perhaps hurt; but being applied in a certain order, one after another, do great cures. I have tried, myself, a remedy for the gout, which hath seldom failed, but driven it away in twenty four hours space: it is first to apply a poultis, of which *vide* the receipt, and then a bath or fomentation, of which *vide* the receipt; and then a plaister, *vide* the receipt. The poultis relaxeth the pores, and maketh the humour apt to exhale. The fomentation calleth forth the humour by vapours; but yet in regard of the way made by the poultis, draweth gently; and therefore draweth the humour out, and doth not draw more to it; for it is a gentle fomentation, and hath withal a mixture, though very little, of some stupefactive. The plaister is a moderate astringent plaister, which repelleth new humours from falling. The poultis alone would make the part more soft and weak, and apter to take the defluxion and impression of the humour. The fomentation alone, if it were too weak, without way made by the poultis, would draw forth little; if too strong, it would draw to the part, as well as draw from it. The plaister alone would pen the humour already contained in the part, and so exasperate it, as well as forbid new humour. Therefore they must be all taken in order, as is said. The poultis is to be laid to for two or three hours: the fomentation for a quarter of an hour, or somewhat better, being used hot, and
seven

seven or eight times repeated : the plaister to continue on still, till the part be well confirmed.

Experiment solitary touching cure by custom.

61. THERE is a secret way of cure, unpractised, by aſuetude of that which in itſelf hurteth. Poiſons have been made, by ſome, familiar, as hath been ſaid. Ordinary keepers of the ſick of the plague are ſeldom infected. Enduring of tortures, by cuſtom, hath been made more eaſy : the brooking of enormous quantity of meats, and ſo of wine or ſtrong drink, hath been, by cuſtom, made to be without ſurfeit or drunkenneſs. And generally diſeaſes that are chronical, as coughs, pthiſics, ſome kinds of palsies, lunacies, *etc.* are moſt dangerous at the firſt : therefore a wiſe phyſician will conſider whether a diſeaſe be incurable ; or whether the juſt cure of it be not full of peril ; and if he find it to be ſuch, let him reſort to palliation ; and alleviate the ſymptom, without buſying himſelf too much with the perfect cure : and many times, if the patient be indeed patient, that courſe will exceed all expectation. Likewiſe the patient himſelf may ſtrive, by little and little, to overcome the ſymptom in the exacerbation, and ſo by time, turn ſuffering into nature.

Experiment solitary touching cure by exceſs.

62. DIVERS diſeaſes, eſpecially chronical, ſuch as quartan agues, are ſometimes cured by ſurfeit and exceſſes : as exceſs of meat, exceſs of drink, extraordinary faſting, extraordinary ſtirring or laſſitude, and the like. The cauſe is, for that diſeaſes of continuance get an adventitious ſtrength from cuſtom, beſides their material cauſe from the humours : ſo that the breaking of the cuſtom doth leave them only to their firſt cauſe, which if it be any thing weak will fall off. Beſides, ſuch exceſſes do excite and ſpur nature, which thereupon riſes more forcibly againſt the diſeaſe.

Experiment solitary touching cure by motion of conſent.

63. THERE is in the body of man a great conſent in the motion of the ſeveral parts. We ſee, it is childrens ſport, to prove whether they can rub upon their breaſt with one hand, and pat upon their forehead with another ; and ſtraightways they ſhall ſometimes rub with both hands, or pat with both hands. We ſee, that when the ſpirits that come to the noſtrils expel a bad ſcent, the ſtomach is ready to expel by vomit. We find that in conſumptions of the lungs, when nature cannot expel by cough, men fall into fluxes of the belly, and then they die. So in peſtilent diſeaſes, if they cannot be expelled by ſweat, they fall likewiſe into looſeneſs ; and that is commonly mortal. Therefore phyſicians ſhould ingeniouſly contrive, how by emotions that are in their power, they may excite inward motions that are not in their power, by conſent : as by the ſtENCH of feathers, or the like, they cure the riſing of the mother.

Experiment solitary touching cure of diſeaſes which are contrary to prediſpoſition.

64. HIPPOCRATES' aphoriſm, in *morbis minus*, is a good profound aphoriſm. It importeth, that diſeaſes, contrary to the complexion, age, ſex, ſeaſon of the year, diet, *etc.* are more dangerous than thoſe that are concurrent. A man would think it ſhould be otherwiſe ; for that, when the accident of ſickneſs, and the natural

disposition, do second the one the other, the disease should be more forcible: and so, no doubt, it is, if you suppose like quantity of matter. But that which maketh good the aphorism is, because such diseases do shew a greater collection of matter, by that they are able to overcome those natural inclinations to the contrary. And therefore in diseases of that kind, let the physician apply himself more to purgation than to alteration; because the offence is in the quantity; and the qualities are rectified of themselves.

Experiment solitary touching preparations before purging, and settling of the body afterwards.

65. PHYSICIANS do wisely prescribe, that there be preparatives used before just purgations; for certain it is, that purgers do many times great hurt, if the body be not accommodated, both before and after the purging. The hurt that they do, for want of preparation before purging, is by the sticking of the humours, and their not coming fair away; which causeth in the body great perturbations and ill accidents during the purging; and also the diminishing and dulling of the working of the medicine itself, that it purgeth not sufficiently: therefore the work of preparation is double; to make the humours fluid and mature, and to make the passages more open: for both those help to make the humours pass readily. And for the former of these, syrups are most profitable; and for the latter, apozemes, or preparing broths; clysters also help, lest the medicine stop in the guts, and work gripingly. But it is true, that bodies abounding with humours, and fat bodies, and open weather, are preparatives in themselves; because they make the humours more fluid. But let a physician beware, how he purge after hard frosty weather, and in a lean body, without preparation. For the hurt that they may do after purging, it is caused by the lodging of some humours in ill places: for it is certain, that there be humours, which somewhere placed in the body, are quiet, and do little hurt; in other places, especially passages, do much mischief. Therefore it is good, after purging, to use apozemes and broths, not so much opening as those used before purging; but abstersive and mundifying clysters also are good to conclude with, to draw away the reliques of the humours, that may have descended to the lower region of the body.

Experiments solitary touching stanching of blood.

66. BLOOD is stanch'd divers ways. First, by astringents, and repercussive medicines. Secondly, by drawing of the spirits and blood inwards; which is done by cold; as iron or a stone laid to the neck doth stanch the bleeding at the nose; also it hath been tried, that the testicles being put into sharp vinegar, hath made a sudden recess of the spirits, and stanch'd blood. Thirdly, by the recess of the blood by sympathy. So it hath been tried, that the part that bleedeth, being thrust into the body of a capon or sheep, new ript and bleeding, hath stanch'd blood; the blood, as it seemeth, sucking and drawing up, by similitude of substance, the blood it meeteth with, and so itself going back. Fourthly, by custom and time; so the Prince of Orange, in his first hurt by the Spanish boy, could find no means to stanch the blood, either by medicine or ligament; but was fain to have the orifice of the wound stopped by mens thumbs, succeeding one another, for the space at the least of two days; and at the last the blood by custom only retired. There is a fifth way also in use, to let blood in an adverse part, for a revulsion.

Experiment

Experiment solitary touching change of aliments and medicines.

67. IT helpeth, both in medicine and aliment, to change and not to continue the same medicine and aliment still. The cause is, for that nature, by continual use of any thing, groweth to a satiety and dulness, either of appetite or working. And we see that assuetude of things hurtful doth make them lose their force to hurt; as poison, which with use some have brought themselves to brook. And therefore it is no marvel, though things helpful by custom lose their force to help: I count intermission almost the same thing with change; for that that hath been intermitted, is after a sort new.

Experiment solitary touching diets.

68. IT is found by experience, that in diets of guaiacum, farza, and the like, especially if they be strict, the patient is more troubled in the beginning than after continuance; which hath made some of the more delicate sort of patients give them over in the midst; supposing that if those diets trouble them so much at first, they shall not be able to endure them to the end. But the cause is, for that all those diets do dry up humours, rheums, and the like; and they cannot dry up until they have first attenuated; and while the humour is attenuated, it is more fluid than it was before, and troubleth the body a great deal more, until it be dried up and consumed. And therefore patients must expect a due time, and not keek at them at the first.

Experiments in consort, touching the production of cold.

THE producing of cold is a thing very worthy the inquisition; both for use and disclosure of causes. For heat and cold are nature's two hands, whereby she chiefly worketh; and heat we have in readines, in respect of the fire; but for cold we must stay till it cometh, or seek it in deep caves, or high mountains: and when all is done, we cannot obtain it in any great degree: for furnaces of fire are far hotter than a summer's sun; but vaults or hills are not much colder than a winter's frost.

69. THE first means of producing cold, is that which nature presenteth us withal; namely, the expiring of cold out of the inward parts of the earth in winter, when the sun hath no power to overcome it; the earth being, as hath been noted by some, *primum frigidum*. This hath been asserted, as well by ancient as by modern philosophers: it was the tenet of Parmenides. It was the opinion of the author of the discourse in Plutarch, for I take it that book was not Plutarch's own, *De primo frigido*. It was the opinion of Telesius, who hath renewed the philosophy of Parmenides, and is the best of the novelists.

70. THE second cause of cold is the contact of cold bodies; for cold is active and transitive into bodies adjacent, as well as heat: which is seen in those things that are touched with snow or cold water. And therefore, whosoever will be an inquirer into nature, let him resort to a conservatory of snow and ice; such as they use for delicacy to cool wine in summer: which is a poor and contemptible use, in respect of other uses, that may be made of such conservatories.

71. THE third cause is the primary nature of all tangible bodies: for it is well to be noted, that all things whatsoever, tangible, are of themselves cold; except they have an accessory heat by fire, life, or motion: for even the spirit of wine, or chemical oils, which are so hot in operation, are to the first touch cold; and air itself compressed, and condensed a little by blowing, is cold.

72. THE fourth cause is the density of the body; for all dense bodies are colder than most other bodies; as metals, stone, glass; and they are longer in heating than softer bodies. And it is certain, that earth, dense, tangible, hold all of the nature of cold. The cause is, for that all matters tangible being cold, it must needs follow, that where the matter is most congregate, the cold is the greater.

73. THE fifth cause of cold, or rather of increase and vehemency of cold, is a quick spirit inclosed in a cold body: as will appear to any that shall attentively consider of nature in many instances. We see nitre, which hath a quick spirit, is cold; more cold to the tongue than a stone; so water is colder than oil, because it hath a quicker spirit; for all oil, though it hath the tangible parts better digested than water, yet hath it a duller spirit: so snow is colder than water, because it hath more spirit within it: so we see that salt put to ice, as in the producing of the artificial ice, increaseth the activity of cold: so some *insecta* which have spirit of life, as snakes and silk-worms, are to the touch cold: so quicksilver is the coldest of metals, because it is fullest of spirit.

74. THE sixth cause of cold is the chasing and driving away of spirits, such as have some degree of heat: for the banishing of the heat must needs leave any body cold. This we see in the operation of opium and stupefactive upon the spirits of living creatures: and it were not amiss to try opium, by laying it upon the top of a weather-glass, to see whether it will contract the air: but I doubt it will not succeed; for besides that the virtue of opium will hardly penetrate through such a body as glass, I conceive that opium, and the like, make the spirits fly rather by malignity, than by cold.

75. SEVENTHLY, the same effect must follow upon the exhaling or drawing out of the warm spirits, that doth upon the flight of the spirits. There is an opinion, that the moon is magnetical of heat, as the sun is of cold and moisture: it were not amiss therefore to try it, with warm waters; the one exposed to the beams of the moon, the other with some screen betwixt the beams of the moon and the water, as we use to the sun for shade; and to see whether the former will cool sooner. And it were also good to inquire, what other means there may be to draw forth the exile heat which is in the air; for that may be a secret of great power to produce cold weather.

Experiments in consort, touching the version and transmutation of air into water.

WE have formerly set down the means of turning air into water, in the experiment 27. But because it is *magnale naturae*, and tendeth to the subduing of a very great effect, and is also of manifold use, we will add some instances in consort that give light thereunto.

76. IT is reported by some of the ancients, that sailors have used, every night, to hang fleeces of wool on the sides of their ships, the wool towards the water; and that they have crushed fresh water out of them, in the morning, for their use. And thus much we have tried, that a quantity of wool tied loose together, being let down into a deep well, and hanging in the middle, some three fathom from the water, for a night, in the winter time; increased in weight, as I now remember, to a fifth part.

77. IT is reported by one of the ancients, that in Lydia, near Pergamus, there were certain workmen in time of wars fled into caves; and the mouth of the caves being stopped by the enemies, they were famished. But long time after the dead bones

bones were found ; and some vessels which they had carried with them ; and the vessels full of water ; and that water thicker, and more towards ice, than common water : which is a notable instance of condensation and induration by burial under earth, in caves, for long time ; and of version also as it should seem of air into water ; if any of those vessels were empty. Try therefore a small bladder hung in snow, and the like in nitre, and the like in quicksilver : and if you find the bladders fallen or shrunk, you may be sure the air is condensed by the cold of those bodies, as it would be in a cave under earth.

78. It is reported of very good credit, that in the East Indies, if you set a tub of water open in a room where cloves are kept, it will be drawn dry in twenty four hours ; though it stand at some distance from the cloves. In the country, they use many times, in deceit, when their wool is new shorn, to set some pails of water by in the same room, to increase the weight of the wool. But it may be, that the heat of the wool, remaining from the body of the sheep, or the heat gathered by the lying close of the wool, helpeth to draw the watry vapour ; but that is nothing to the version.

79. It is reported also credibly, that wool new shorn, being laid casually upon a vessel of verjuice, after some time, had drunk up a great part of the verjuice, though the vessel were whole without any flaw, and had not the bung-hole open. In this instance, there is, upon the by, to be noted, the percolation or siving of the verjuice through the wood ; for verjuice of itself would never have passed through the wood : so as, it seemeth, it must be first in a kind of vapour, before it pass.

80. It is especially to be noted, that the cause that doth facilitate the version of air into water, when the air is not in gross, but subtilly mingled with tangible bodies, is, as hath been partly touched before, for that tangible bodies have an antipathy with air ; and if they find any liquid body that is more dense near them, they will draw it : and after they have drawn it, they will condense it more, and in effect incorporate it ; for we see that a sponge, or wool, or sugar, or a woollen cloth, being put but in part in water or wine, will draw the liquor higher, and beyond the place where the water or wine cometh. We see also, that wood, lute strings, and the like, do swell in moist seasons : as appeareth by the breaking of the strings, the hard turning of the pegs, and the hard drawing forth of boxes, and opening of waincot doors ; which is a kind of infusion : and is much like to an infusion in water, which will make wood to swell : as we see in the filling of the chops of bowls, by laying them in water. But for that part of these experiments which concerneth attraction, we will reserve it to the proper title of attraction.

81. THERE is also a version of air into water seen in the sweating of marbles and other stones ; and of waincot before and in moist weather. This must be, either by some moisture the body yieldeth ; or else by the moist air thickened against the hard body. But it is plain, that it is the latter ; for that we see wood painted with oil colour, will sooner gather drops in a moist night, than wood alone ; which is caused by the smoothness and closeness ; which letteth in no part of the vapour, and so turneth it back, and thickneth it into dew. We see also, that breathing upon a glass, or smooth body, giveth a dew ; and in frosty mornings, such as we call rime frosts, you shall find drops of dew upon the inside of glais windows ; and the frost itself upon the ground is but a version or condensation of the moist vapours of the night, into a watry substance : dews likewise, and rain, are but the returns of moist vapours condensed ; the dew, by the cold only of the sun's departure, which is the gentler

gentler cold ; rains, by the cold of that which they call the middle region of the air ; which is the more violent cold.

82. It is very probable, as hath been touched, that that which will turn water into ice, will likewise turn air some degree nearer unto water. Therefore try the experiment of the artificial turning water into ice, whereof we shall speak in another place, with air in place of water, and the ice about it. And although it be a greater alteration to turn air into water, than water into ice ; yet there is this hope, that by continuing the air longer time, the effect will follow : for that artificial conversion of water into ice, is the work of a few hours ; and this of air may be tried by a month's space, or the like.

Experiments in consort touching induration of bodies.

INDURATION, or lapidification of substances more soft, is likewise another degree of condensation ; and is a great alteration in nature. The effecting and accelerating thereof is very worthy to be inquired. It is effected by three means. The first is by cold ; whose property is to condense and constipate, as hath been said. The second is by heat ; which is not proper but by consequence ; for the heat doth attenuate ; and by attenuation doth send forth the spirit and moister part of a body ; and upon that, the more gross of the tangible parts do contract and ferre themselves together ; both to avoid *vacuum*, as they call it, and also to munite themselves against the force of the fire, which they have suffered. And the third is by assimilation ; when a hard body assimilateth a soft, being contiguous to it.

The examples of induration, taking them promiscuously, are many : as the generation of stones within the earth, which at the first are but rude earth or clay ; and so of minerals, which come, no doubt, at first of juices concrete, which afterwards indurate : and so of porcellane, which is an artificial cement, buried in the earth a long time ; and so the making of brick and tile : also the making of glass of a certain sand and brake-roots, and some other matters ; also the exudations of rock-diamonds and crystal, which harden with time : also the induration of bead-amber, which at first is a soft substance ; as appeareth by the flies and spiders which are found in it ; and many more : but we will speak of them distinctly.

83. FOR indurations by cold, there be few trials of it ; for we have no strong or intense cold here on the surface of the earth, so near the beams of the sun, and the heavens. The likeliest trial is by snow and ice ; for as snow and ice, especially being holpen and their cold activated by nitre or salt, will turn water into ice, and that in a few hours ; so it may be, it will turn wood or stiff clay into stone, in longer time. Put therefore into a conserving pit of snow and ice, adding some quantity of salt and nitre, a piece of wood, or a piece of tough clay, and let it lie a month or more.

84. ANOTHER trial is by metalline waters, which have virtual cold in them. Put therefore wood or clay into smiths water, or other metalline water, and try whether it will not harden in some reasonable time. But I understand it of metalline waters that come by washing or quenching ; and not of strong waters that come by dissolution ; for they are too corrosive to consolidate.

85. It is already found that there are some natural spring waters, that will inlaidate wood ; so as you shall see one piece of wood, whereof the part above the water shall continue wood ; and the part under the water shall be turned into a kind of gravelly stone. It is likely those waters are of some metalline mixture ; but there
would

would be more particular inquiry made of them. It is certain, that an egg was found, having lain many years in the bottom of a mote, where the earth had somewhat overgrown it; and this egg was come to the hardness of a stone, and had the colours of the white and yolk perfect, and the shell shining in small grains like sugar or alabaster.

86. ANOTHER experience there is of induration by cold, which is already found; which is, that metals themselves are hardened by often heating and quenching in cold water: for cold ever worketh most potently upon heat precedent.

87. FOR induration by heat, it must be considered, that heat, by the exhaling of the moister parts, doth either harden the body, as in bricks, tiles, *etc.* or if the heat be more fierce, maketh the grosser part itself run and melt; as in the making of ordinary glass; and in the vitrification of earth, as we see in the inner parts of furnaces, and in the vitrification of brick, and of metals. And in the former of these, which is the hardening by baking without melting, the heat hath these degrees; first, it indurates, and then maketh fragile; and lastly it doth incinerate and calcinate.

88. BUT if you desire to make an induration with toughness, and less fragility, a middle way should be taken; which is that which Aristotle hath well noted; but should be thoroughly verified. It is to decoct bodies in water for two or three days; but they must be such bodies into which the water will not enter; as stone and metal: for if they be bodies into which the water will enter, then long seething will rather soften than indurate them; as hath been tried in eggs, *etc.* therefore softer bodies must be put into bottles, and the bottles hung into water seething, with the mouths open above the water, that no water may get in; for by this means the virtual heat of the water will enter; and such a heat, as will not make the body adust or fragile; but the substance of the water will be shut out. This experiment we made; and it sorted thus. It was tried with a piece of free-stone, and with pewter, put into the water at large. The free-stone we found received in some water; for it was softer and easier to scrape than a piece of the same stone kept dry. But the pewter into which no water could enter, became more white and liker to silver, and less flexible by much. There were also put into an earthen bottle, placed as before, a good pellet of clay, a piece of cheese, a piece of chalk, and a piece of free-stone. The clay came forth almost of the hardness of stone; the cheese likewise very hard, and not well to be cut; the chalk and free-stone much harder than they were. The colour of the clay inclined not a whit to the colour of brick, but rather to white, as in ordinary drying by the sun. Note, that all the former trials were made by a boiling upon a good hot fire, renewing the water as it consumed, with other hot water; but the boiling was but for twelve hours only; and it is like that the experiment would have been more effectual, if the boiling had been for two or three days, as we prescribed before.

89. As touching assimilation, for there is a degree of assimilation even in inanimate bodies, we see examples of it in some stones in clay-grounds, lying near to the top of the earth, where pebble is; in which you may manifestly see divers pebbles gathered together, and a crust of cement or stone between them, as hard as the pebbles themselves: and it were good to make a trial of purpose, by taking clay, and putting in it divers pebble stones, thick set, to see whether in continuance of time, it will not be harder than other clay of the same lump, in which no pebbles are set. We see also in ruins of old walls, especially towards the bottom, the mortar will become as
hard

hard as the brick : we see also, that the wood on the sides of vessels of wine, gathereth a crust of tartar, harder than the wood itself ; and scales likewise grow to the teeth, harder than the teeth themselves.

90. MOST of all, induration by assimilation appeareth in the bodies of trees and living creatures : for no nourishment that the tree receiveth, or that the living creature receiveth, is so hard as wood, bone, or horn, *etc.* but is indurated after by assimilation.

Experiment solitary touching the version of water into air.

91. THE eye of the understanding is like the eye of the sense : for as you may see great objects through small crannies or levels ; so you may see great axioms of nature through small and contemptible instances. The speedy depredation of air upon watry moisture, and version of the same into air, appeareth in nothing more visible, than in the sudden discharge or vanishing of a little cloud of breath or vapour from glass, or the blade of a sword, or any such polished body, such as doth not at all detain or imbibe the moisture ; for the mistiness scattereth and breaketh up suddenly. But the like cloud, if it were oily or fatty, will not discharge ; not because it sticketh faster ; but because air preyeth upon water ; and flame and fire upon oil ; and therefore to take out a spot of grease, they use a coal upon brown paper ; because fire worketh upon grease or oil, as air doth upon water. And we see paper oiled, or wood oiled, or the like, last long moist ; but wet with water, dry or putrify sooner. The cause is, for that air meddeth little with the moisture of oil.

Experiment solitary touching the force of union.

92. THERE is an admirable demonstration in the same trifling instance of the little cloud upon glass, or gems, or blades of swords, of the force of union, even in the least quantities and weakest bodies, how much it conduceth to preservation of the present form, and the resisting of a new. For mark well the discharge of that cloud ; and you shall see it ever break up, first in the skirts and last in the midst. We see likewise, that much water draweth forth the juice of the body infused ; but little water is imbibed by the body : and this is a principal cause, why in operation upon bodies for their version or alteration, the trial in great quantities doth not answer the trial in small ; and so deceiveth many ; for that, I say, the greater body resisteth more any alteration of form, and requireth far greater strength in the active body that should subdue it.

Experiment solitary touching the producing of feathers and hairs of divers colours.

93. WE have spoken before, in the fifth instance, of the cause of orient colours in birds ; which is by the fineness of the strainer ; we will now endeavour to reduce the same axiom to a work. For this writing of our *Sylva Sylvarum* is, to speak properly not natural history, but a high kind of natural magic. For it is not a description only of nature but a breaking of nature into great and strange works. Try therefore the anointing over of pigeons, or other birds, when they are but in their down ; or of whelps, cutting their hair as short as may be ; or of some other beast ; with some ointment that is not hurtful to the flesh, and that will harden and stick very close ; and see whether it will not alter the colours of the feathers or hair. It is received, that the pulling off the first feathers of birds clean, will make the new
come

come forth white : and it is certain that white is a penurious colour, and where moisture is scant. So blue violets, and other flowers, if they be starved, turn pale and white ; birds and horses, by age or scars, turn white : and the hoar hairs of men come by the same reason. And therefore in birds, it is very likely, that the feathers that come first will be many times of divers colours, according to the nature of the bird, for that the skin is more porous ; but when the skin is more shut and close, the feathers will come white. This is a good experiment, not only for the producing of birds and beasts of strange colours ; but also for the disclosure of the nature of colours themselves ; which of them require a finer porosity, and which a grosser.

Experiment solitary touching the nourishment of living creatures before they be brought forth.

94. It is a work of providence, that hath been truly observed by some, that the yolk of the egg conduceth little to the generation of the bird, but only to the nourishment of the same : for if a chicken be opened, when it is new hatched, you shall find much of the yolk remaining. And it is needful, that birds that are shaped without the female's womb have in the egg, as well matter of nourishment, as matter of generation for the body. For after the egg is laid, and severed from the body of the hen, it hath no more nourishment from the hen, but only a quickning heat when she sitteth. But beasts and men need not the matter of nourishment within themselves, because they are shaped within the womb of the female, and are nourished continually from her body.

Experiments in consort touching sympathy and antipathy for medicinal use.

95. It is an inveterate and received opinion, that cantharides applied to any part of the body, touch the bladder and exulcerate it, if they stay on long. It is likewise received, that a kind of stone, which they bring out of the West-Indies, hath a peculiar force to move gravel, and to dissolve the stone ; insomuch, as laid but to the wrist, it hath so forcibly sent down gravel, as men have been glad to remove it, it was so violent.

96. It is received, and confirmed by daily experience, that the soles of the feet have great affinity with the head and the mouth of the stomach : as we see, going wet-shod, to those that use it not, affecteth both : applications of hot powders to the feet attenuate first, and after dry the rheum : and therefore a physician that would be mystical, prescribeth for the cure of the rheum, that a man should walk continually upon a camomile-alley ; meaning, that he should put camomile within his socks. Likewise pigeons bleeding, applied to the soles of the feet, ease the head : and saporiferous medicines applied unto them, provoke sleep.

97. It seemeth, that as the feet have a sympathy with the head, so the wrists and hands have a sympathy with the heart ; we see the affections and passions of the heart and spirits are notably disclosed by the pulse : and it is often tried, that juices of stock-gilly-flowers, rose-campian, garlick, and other things, applied to the wrists, and renewed, have cured long agues. And I conceive, that washing with certain liquors the palms of the hands doth much good : and they do well in heats of agues, to hold in the hands eggs of alabaster and balls of crystal.

Of these things we shall speak more, when we handle the title of sympathy and antipathy in the proper place.

Experiment solitary touching the secret processes of nature.

98. THE knowledge of man hitherto hath been determined by the view or sight; so that whatsoever is invisible, either in respect of the fineness of the body itself, or the smallness of the parts, or of the subtilty of the motion, is little inquired. And yet these be the things that govern nature principally; and without which you cannot make any true analysis and indication of the proceedings of nature. The spirits or pneumatics, that are in all tangible bodies, are scarce known. Sometimes they take them for *vacuum*; whereas they are the most active of bodies. Sometimes they take them for air; from which they differ exceedingly, as much as wine from water; and as wood from earth. Sometimes they will have them to be natural heat, or a portion of the element of fire; whereas some of them are crude and cold. And sometimes they will have them to be the virtues and qualities of the tangible parts which they see; whereas they are things by themselves. And then, when they come to plants and living creatures, they call them souls. And such superficial speculations they have; like prospectives, that shew things inward, when they are but paintings. Neither is this a question of words, but infinitely material in nature. For spirits are nothing else but a natural body, rarified to a proportion, and included in the tangible parts of bodies, as in an integument. And they be no less differing one from the other, than the dense or tangible parts; and they are in all tangible bodies whatsoever more or less; and they are never almost at rest: and from them, and their motions, principally proceed arefaction, colliquation, concoction, maturation, putrefaction, vivification, and most of the effects of nature: for, as we have figured them in our *Sapientia veterum*, in the fable of Proserpina, you shall in the infernal regiment hear little doings of Pluto, but most of Proserpina: for tangible parts in bodies are stupid things; and the spirits do in effect all. As for the differences of tangible parts in bodies, the industry of the chemists hath given some light, in discerning by their separations the oily, crude, pure, impure, fine, gross parts of bodies, and the like. And the physicians are content to acknowledge, that herbs and drugs have divers parts; as that opium hath a stupefactive part and a heating part; the one moving sleep, the other a sweat following; and that rhubarb hath purging parts and astringent parts, *etc.* But this whole inquisition is weakly and negligently handled. And for the more subtle differences of the minute parts, and the posture of them in the body, which also hath great effects, they are not at all touched: as for the motions of the minute parts of bodies, which do so great effects, they have not been observed at all; because they are invisible, and occur not to the eye; but yet they are to be deprehended by experience: as Democritus said well, when they charged him to hold, that the world was made of such little motes, as were seen in the sun; *Atomus*, saith he, *necessitate rationis et experientiae esse convincitur; atomum enim nemo unquam vidit.* And therefore the tumult in the parts of solid bodies, when they are compressed, which is the cause of all flight of bodies through the air, and of other mechanical motions, as hath been partly touched before, and shall be thoroughly handled in due place, is not seen at all. But nevertheless, if you know it not, or inquire it not attentively and diligently, you shall never be able to discern, and much less to produce a number of mechanical motions. Again, as to the motions corporal, within the inclosures of bodies, whereby the effects, which were mentioned before, pass between the spirit and the tangible parts, which are arefaction, colliquation, concoction,

coction, maturation, *etc.* they are not at all handled. But they are put off by the names of virtues, and natures, and actions, and passions, and such other logical words.

Experiment solitary touching the power of heat.

99. It is certain, that of all powers in nature heat is the chief; both in the frame of nature, and in the works of art. Certain it is likewise, that the effects of heat are most advanced, when it worketh upon a body without loss or dilipation of the matter; for that ever betrayeth the account. And therefore it is true, that the power of heat is best perceived in distillations which are performed in close vessels and receptacles. But yet there is a higher degree; for howsoever distillations do keep the body in cells and cloisters, without going abroad, yet they give space unto bodies to turn into vapour; to return into liquor; and to separate one part from another. So as nature doth expatiate, although it hath not full liberty: whereby the true and ultime operations of heat are not attained. But if bodies may be altered by heat, and yet no such reciprocation of rarefaction, and of condensation, and of separation, admitted; then it is like that this Proteus of matter, being held by the sleeves, will turn and change into many metamorphoses. Take therefore a square vessel of iron, in form of a cube, and let it have good thick and strong sides. Put into it a cube of wood, that may fill it as close as may be; and let it have a cover of iron, as strong at least as the sides; and let it be well luted, after the manner of the chemists. Then place the vessel within burning coals, kept quick kindled for some few hours space. Then take the vessel from the fire, and take off the cover, and see what is become of the wood. I conceive, that since all inflammation and evaporation are utterly prohibited, and the body still turned upon itself, that one of these two effects will follow: either that the body of the wood will be turned into a kind of *amalgama*, as the chemists call it, or that the finer part will be turned into air, and the grosser stick as it were baked, and incrustate upon the sides of the vessel, being become of a denser matter than the wood itself crude. And for another trial, take also water, and put it in the like vessel, stopped as before; but use a gentler heat, and remove the vessel sometimes from the fire; and again, after some small time, when it is cold, renew the heating of it; and repeat this alteration some few times: and if you can once bring to pass, that the water, which is one of the simplest of bodies, be changed in colour, odour, or taste, after the manner of compound bodies, you may be sure that there is a great work wrought in nature, and a notable entrance made into strange changes of bodies and productions; and also a way made to do that by fire, in small time, which the sun and age do in long time. But of the admirable effects of this distillation in close, for so we will call it, which is like the wombs and matrices of living creatures, where nothing expireth nor separateth, we will speak fully, in the due place; not that we aim at the making of Paracelsus' pygmies, or any such prodigious follies; but that we know the effects of heat will be such, as will scarce fall under the conceit of man, if the force of it be altogether kept in.

Experiment solitary touching the impossibility of annihilation.

100. THERE is nothing more certain in nature than that it is impossible for any body to be utterly annihilated; but that, as it was the work of the omnipotency
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of God to make somewhat of nothing, so it requireth the like omnipotency to turn somewhat into nothing. And therefore it is well said by an obscure writer of the sect of the chemists; that there is no such way to effect the strange transmutations of bodies, as to endeavour and urge by all means the reducing of them to nothing. And herein is contained also a great secret of preservation of bodies from change; for if you can prohibit, that they neither turn into air because no air cometh to them; nor go into the bodies adjacent, because they are utterly heterogeneal; nor make a round and circulation within themselves; they will never change, though they be in their nature never so perishable or mutable. We see how flies, and spiders, and the like, get a sepulchre in amber, more durable than the monument and embalming of the body of any king. And I conceive the like will be of bodies put into quicksilver. But then they must be but thin, as a leaf, or a piece of paper or parchment; for if they have a greater crassitude, they will alter in their own body, though they spend not. But of this we shall speak more when we handle the title of conservation of bodies.



N A T U R A L H I S T O R Y.

C E N T U R Y I I.

Experiments in consort touching music.

MUSIC, in the practice, hath been well pursued, and in good variety; but in the theory, and especially in the yielding of the causes of the practice, very weakly; being reduced into certain mystical subtilties of no use and not much truth. We shall therefore, after our manner, join the contemplative and active part together.

101. ALL sounds are either musical sounds, which we call tones; whereunto there may be an harmony; which sounds are ever equal; as singing, the sounds of stringed and wind instruments, the ringing of bells, *etc.* or immusical sounds, which are ever unequal; such as are the voice in speaking, all whisperings, all voices of beasts and birds, except they be singing birds, all percussions of stones, wood, parchment, skins, as in drums, and infinite others.

102. THE sounds that produce tones, are ever from such bodies as are in their parts and pores equal; as well as the sounds themselves are equal; and such are the percussions of metal, as in bells; of glass, as in the flapping of a drinking glass; of air, as in mens voices whilst they sing, in pipes, whistles, organs, stringed instruments, *etc.* and of water, as in the nightingale pipes of regals, or organs, and other hydraulics; which the ancients had, and Nero did so much esteem, but are now lost. And if any man think, that the string of the bow and the string of the viol are neither of them equal bodies; and yet produce tones, he is in an error. For the sound is not created between the bow or *plectrum* and the string; but between the string and the air; no more than it is between the finger or quill, and the string in other instruments. So there are, in effect, but three percussions that create tones; percussions of metals, comprehending glass and the like, percussions of air, and percussions of water.

103. THE diapason or eight in music is the sweetest concord, in so much as it is in effect an unison; as we see in lutes that are stringed in the base strings with two strings, one an eight above another; which make but as one sound. And every eighth note in ascent, as from eight to fifteen, from fifteen to twenty two, and so *in infinitum*, are but scales of diapason. The cause is dark, and hath not been rendered by any; and therefore would be better contemplated. It seemeth that air, which is the subject of sounds, in sounds that are not tones, which are all unequal, as hath been said, admitteth much variety; as we see in the voices of living creatures; and likewise in the voices of several men, for we are capable to discern several men by their voices, and in the conjugation of letters, whence articulate sounds proceed; which of all others are most various. But in the sounds which we call tones, that are ever equal, the air is not able to cast itself into any such variety; but is forced to

recur

recur into one and the same posture or figure, only differing in greatness and smallness. So we see figures may be made of lines, crooked and straight, in infinite variety, where there is inequality; but circles, or squares, or triangles equilateral, which are all figures of equal lines, can differ but in greater or lesser.

104. IT is to be noted, the rather lest any man should think, that there is any thing in this number of eight, to create the diapason, that this computation of eight is a thing rather received, than any true computation. For a true computation ought ever to be by distribution into equal portions. Now there be intervenient in the rise of eight, in tones, two beemolls, or half notes: so as if you divide the tones equally, the eight is but seven whole and equal notes; and if you subdivide that into half-notes, as it is in the stops of a lute, it maketh the number of thirteen.

105. YET this is true; that in the ordinary rises and falls of the voice of man, not measuring the tone by whole notes, and half-notes, which is the equal measure, there fall out to be two beemolls, as hath been said, between the unison and the diapason: and this varying is natural. For if a man would endeavour to raise or fall his voice, still by half-notes, like the stops of a lute; or by whole notes alone without halves, as far as an eight; he will not be able to frame his voice unto it. Which sheweth, that after every three whole notes, nature requireth, for all harmonical use, one half-note to be interposed.

106. IT is to be considered, that whatsoever virtue is in numbers, for conducing to concert of notes, is rather to be ascribed to the ante-number, than to the entire number; as namely, that the sound returneth after six or after twelve; so that the seventh or the thirteenth is not the matter, but the sixth or the twelfth; and the seventh and the thirteenth are but the limits and boundaries of the return.

107. THE concords in music which are perfect or semiperfect, between the unison and the diapason, are the fifth, which is the most perfect; the third next; and the sixth, which is more harsh: and, as the ancients esteemed, and so do myself and some other yet, the fourth which they call diatessaron. As for the tenth, twelfth, thirteenth, and so *in infinitum*; they be but recurrences of the former, *viz.* of the third, the fifth, and the sixth; being an eight respectively from them.

108. FOR discords, the second and the seventh are of all others the most odious, in harmony, to the sense; whereof the one is next above the unison, the other next under the diapason: which may shew, that harmony requireth a competent distance of notes.

109. IN harmony, if there be not a discord to the base, it doth not disturb the harmony, though there be a discord to the higher parts; so the discord be not of the two that are odious; and therefore the ordinary concert of four parts consisteth of an eight, a fifth, and a third to the base; but that fifth is a fourth to the treble, and the third is a sixth. And the cause is, for that the base striking more air, doth overcome and drown the treble, unless the discord be very odious; and so hideth a small imperfection. For we see, that in one of the lower strings of a lute, there soundeth not the sound of the treble, nor any mixt sound, but only the sound of the base.

110. WE have no music of quarter-notes; and it may be they are not capable of harmony; for we see the half-notes themselves do but interpose sometimes. Nevertheless we have some slides or relishes of the voice or strings, as it were continued without notes, from one tone to another, rising or falling, which are delightful.

111. THE

111. THE causes of that which is pleasing or ingrate to the hearing, may receive light by that which is pleasing or ingrate to the sight. There be two things pleasing to the sight, leaving pictures and shapes aside, which are but secondary objects; and please or displease but in memory; these two are colours and order. The pleasing of colour symbolizeth with the pleasing of any single tone to the ear; but the pleasing of order doth symbolize with harmony. And therefore we see in garden-knots, and the frets of houses, and all equal and well answering figures, as globes, pyramids, cones, cylinders, *etc.* how they please: whereas unequal figures are but deformities. And both these pleasures, that of the eye, and that of the ear, are but the effects of equality, good proportion, or correspondence: so that, out of question, equality and correspondence, are the causes of harmony. But to find the proportion of that correspondence, is more abstruse; whereof notwithstanding we shall speak somewhat, when we handle tones in the general enquiry of sounds.

112. TONES are not so apt altogether to procure sleep, as some other sounds; as the wind, the purling of water, humming of bees, a sweet voice of one that readeth, *etc.* The cause whereof is, for that tones, because they are equal and slide not, do more strike and erect the sense than the other. And overmuch attention hindereth sleep.

113. THERE be in music certain figures or tropes, almost agreeing with the figures of rhetoric, and with the affections of the mind, and other senses. First, the division and quavering, which please so much in music, have an agreement with the glittering of light; as the moon-beams playing upon a wave. Again, the falling from a discord to a concord, which maketh great sweetness in music, hath an agreement with the affections, which are reintegrated to the better, after some dislikes: it agreeth also with the taste, which is soon glutted with that which is sweet alone. The sliding from the close or cadence, hath an agreement with the figure in rhetoric, which they call *praeter expectatum*; for there is a pleasure even in being deceived. The reports, and fuges, have an agreement with the figures in rhetoric, of repetition and traduction. The triplas, and changing of times, have an agreement with the changes of motions; as when galliard time, and measure time, are in the medley of one dance.

114. IT hath been anciently held and observed, that the sense of hearing, and the kinds of music, have most operation upon manners; as, to encourage men, and make them warlike; to make them soft and effeminate; to make them grave; to make them light; to make them gentle and inclined to pity, *etc.* The cause is, for that the sense of hearing striketh the spirits more immediately, than the other senses; and more incorporeally than the smelling; for the sight, taste, and feeling, have their organs not of so present and immediate access to the spirits, as the hearing hath. And as for the smelling, which indeed worketh also immediately upon the spirits, and is forcible while the object remaineth, it is with a communication of the breath or vapour of the object odorate; but harmony entring easily, and mingling not at all, and coming with a manifest motion, doth by custom of often affecting the spirits, and putting them into one kind of posture, alter not a little the nature of the spirits, even when the object is removed. And therefore we see, that tunes and airs, even in their own nature, have in themselves some affinity with the affections; as there be merry tunes, doleful tunes, solemn tunes; tunes inclining mens minds to pity; warlike tunes, *etc.* So as it is no marvel if they alter the spirits, considering that tunes have a predisposition to the motion of the spirits in themselves. But yet it hath been

noted, that though this variety of tunes doth dispose the spirits to variety of passions, conform unto them, yet generally music feedeth that disposition of the spirits which it findeth. We see also, that several airs and tunes do please several nations and persons, according to the sympathy they have with their spirits.

Experiments in consort touching sounds; and first touching the nullity and entity of sounds.

PERSPECTIVE hath been with some diligence enquired; and so hath the nature of sounds, in some sort, as far as concerneth music: but the nature of sounds in general hath been superficially observed. It is one of the subtlest pieces of nature. And besides, I practise, as I do advise; which is, after long inquiry of things immersed in matter, to interpose some subject which is immateriate, or less materiate; such as this of sounds; to the end, that the intellect may be rectified, and become not partial.

115. IT is first to be considered, what great motions there are in nature, which pass without sound or noise. The heavens turn about in a most rapid motion, without noise to us perceived; though in some dreams they have been said to make an excellent music. So the motions of the comets, and fiery meteors, as *stella cadens, etc.* yield no noise. And if it be thought, that it is the greatness of distance from us, whereby the sound cannot be heard; we see that lightnings and coruscations, which are near at hand, yield no sound neither: and yet in all these, there is a percussio and division of the air. The winds in the upper region, which move the clouds above, which we call the rack, and are not perceived below, pass without noise. The lower winds in a plain, except they be strong, make no noise; but amongst trees, the noise of such winds will be perceived. And the winds, generally, when they make a noise, do ever make it unequally, rising and falling, and sometimes, when they are vehement, trembling at the height of their blast. Rain or hail falling, though vehemently, yieldeth no noise in passing through the air, till it fall upon the ground, water, houses, or the like. Water in a river, though a swift stream, is not heard in the channel, but runneth in silence, if it be of any depth; but the very stream upon shallows, of gravel, or pebble, will be heard. And waters, when they beat upon the shore, or are straitned, as in the falls of bridges, or are dashed against themselves, by winds, give a roaring noise. Any piece of timber, or hard body, being thrust forwards by another body contiguous, without knocking, giveth no noise. And so bodies in weighing one upon another, though the upper body press the lower body down, make no noise. So the motion in the minute parts of any solid body, which is the principal cause of violent motion, though unobserved, passeth without sound; for that sound that is heard sometimes, is produced only by the breaking of the air; and not by the impulsion of the parts. So it is manifest, that where the anterior body giveth way, as fast as the posterior cometh on, it maketh no noise, be the motion never so great or swift.

116. AIR open, and at large, maketh no noise, except it be sharply percussed; as in the sound of a string, where air is percussed by a hard and stiff body, and with a sharp loose: for if the string be not strained, it maketh no noise. But where the air is pent and straitned, there breath or other blowing, which carry but a gentle percussio, suffice to create sound; as in pipes and wind-instruments. But then you must note, that in recorders, which go with a gentle breath, the concave of the pipe, were it not for the fipple that straitneth the air, much more than the simple concave, would

would yield no sound. For as for other wind-instruments, they require a forcible breath; as trumpets, cornets, hunters-horns, *etc.* which appeareth by the blown cheeks of him that windeth them. Organs also are blown with a strong wind by the bellows. And note again, that some kind of wind-instruments are blown at a small hole in the side, which straitneth the breath at the first entrance; the rather, in respect of their traverse and stop above the hole, which performeth the fipples part; as it is seen in flutes and fifes, which will not give sound by a blast at the end, as recorders, *etc.* do. Likewise in all whistling, you contract the mouth; and to make it more sharp, men sometimes use their finger. But in open air, if you throw a stone or a dart, they give no sound: no more do bullets, except they happen to be a little hollowed in the casting; which hollowness penneth the air: nor yet arrows, except they be ruffled in their feathers, which likewise penneth the air. As for small whistles or shepherds oaten pipes, they give a sound because of their extreme slenderness, whereby the air is more pent, than in a wider pipe. Again, the voices of men and living creatures pass through the throat, which penneth the breath. As for the Jewsharp, it is a sharp percussion; and, besides, hath the advantage of penning the air in the mouth.

117. SOLID bodies, if they be very softly percussed, give no sound; as when a man treadeth very softly upon boards. So chests or doors in fair weather, when they open easily, give no sound. And cart-wheels squeak not when they are liquored.

118. THE flame of tapers or candles, though it be a swift motion and breaketh the air, yet passeth without sound. Air in ovens, though, no doubt, it doth, as it were, boil and dilate itself, and is repercussed; yet it is without noise.

119. FLAME percussed by air, giveth a noise; as in blowing of the fire by bellows; greater than if the bellows should blow upon the air itself. And so likewise flame percussing the air strongly, as when flame suddenly taketh and openeth, giveth a noise; so great flames, while the one impelleth the other, give a bellowing sound.

120. THERE is a conceit runneth abroad, that there should be a white powder, which will discharge a piece without noise; which is a dangerous experiment if it should be true: for it may cause secret murders. But it seemeth to me impossible; for, if the air pent be driven forth and strike the air open, it will certainly make a noise. As for the white powder, if any such thing be, that may extinguish or deaden the noise, it is like to be a mixture of petre and sulphur, without coal. For petre alone will not take fire. And if any man think, that the sound may be extinguished or deadened by discharging the pent air, before it cometh to the mouth of the piece and to the open air, that is not probable; for it will make more divided sounds: as if you should make a cross-barrel hollow through the barrel of a piece, it may be it would give several sounds, both at the nose and at the sides. But I conceive, that if it were possible to bring to pass, that there should be no air pent at the mouth of the piece, the bullet might fly with small or no noise. For first it is certain, there is no noise in the percussion of the flame upon the bullet. Next the bullet, in piercing through the air, maketh no noise; as hath been said. And then, if there be no pent air that striketh upon open air, there is no cause of noise; and yet the flying of the bullet will not be stayed. For that motion, as hath been oft said, is in the parts of the bullet, and not in the air. So as trial must be made by taking some small concave of metal, no more than you mean to fill with powder, and laying the bullet in the mouth of it, half out into the open air.

121. I HEARD it affirmed by a man that was a great dealer in secrets, but he was but vain, that there was a conspiracy, which himself hindered, to have killed queen Mary, sister to queen Elizabeth, by a burning-glass, when she walked in Saint James's park, from the leads of the house. But thus much, no doubt, is true; that if burning-glasses could be brought to a great strength, as they talk generally of burning-glasses that are able to burn a navy, the percussion of the air alone, by such a burning-glass, would make no noise; no more than is found in coruscations and lightnings without thunders.

122. I SUPPOSE, that impression of the air with sounds asketh a time to be conveyed to the sense, as well as the impressing of species visible; or else they will not be heard. And therefore, as the bullet moveth so swift that it is invisible; so the same swiftness of motion maketh it inaudible: for we see, that the apprehension of the eye is quicker than that of the ear.

123. ALL eruptions of air, though small and slight, give an entity of sound, which we call crackling, puffing, spitting, *etc.* as in bay-salt, and bay-leaves, cast into the fire; so in chestnuts, when they leap forth of the ashes; so in green wood laid upon the fire, especially roots; so in candles, that spit flame if they be wet; so in rasping, sneezing, *etc.* so in a rose leaf gathered together into the fashion of a purse, and broken upon the forehead, or back of the hand, as children use.

Experiments in concert touching production, conservation, and dilation of sounds; and the office of the air therein.

124. THE cause given of sound, that it should be an elision of the air, whereby, if they mean any thing, they mean a cutting or dividing, or else an attenuating of the air, is but a term of ignorance; and the notion is but a catch of the wit upon a few instances; as the manner is in the philosophy received. And it is common with men, that if they have gotten a pretty expression, by a word of art, that expression goeth current; though it be empty of matter. This conceit of elision appeareth most manifestly to be false, in that the sound of a bell, string, or the like, continueth melting some time after the percussion; but ceaseth straightways, if the bell, or string, be touched and stayed: whereas, if it were the elision of the air that made the sound, it could not be that the touch of the bell or string should extinguish so suddenly that motion caused by the elision of the air. This appeareth yet more manifestly by chiming with a hammer upon the outside of a bell; for the sound will be according to the inward concave of the bell; whereas the elision or attenuation of the air cannot be but only between the hammer and the outside of the bell. So again, if it were an elision, a broad hammer, and a bodkin, struck upon metal, would give a diverse tone, as well as a diverse loudness: but they do not so; for though the sound of the one be louder, and of the other softer, yet the tone is the same. Besides, in echoes, whereof some are as loud as the original voice, there is no new elision, but a repercussion only. But that which convinceth it most of all is, that sounds are generated where there is no air at all. But these and the like conceits, when men have cleared their understanding by the light of experience, will scatter and break up like a mist.

125. IT is certain, that sound is not produced at the first, but with some local motion of the air, or flame, or some other medium; nor yet without some resistance, either in the air or the body percussed. For if there be a mere yielding or cession, it produceth no sound; as hath been said. And therein sounds differ from light and colours,

colours, which pass through the air, or other bodies, without any local motion of the air; either at the first, or after. But you must attentively distinguish between the local motion of the air, which is but *vehiculum causae*, a carrier of the sounds, and the sounds themselves, conveyed in the air. For as to the former, we see manifestly, that no sound is produced, no not by air itself against other air, as in organs, *etc.* but with a perceptible blast of the air; and with some resistance of the air struck. For even all speech, which is one of the gentlest motions of air, is with expulsion of a little breath. And all pipes have a blast, as well as a sound. We see also manifestly, that sounds are carried with wind: and therefore sounds will be heard further with the wind, than against the wind; and likewise do rise and fall with the intension or remission of the wind. But for the impression of the sound, it is quite another thing, and is utterly without any local motion of the air, perceptible; and in that resembleth the species visible: for after a man hath lured, or a bell is rung, we cannot discern any perceptible motion at all in the air as the sound goeth along; but only at the first. Neither doth the wind, as far as it carrieth a voice, with the motion thereof, confound any of the delicate and articulate figurations of the air, in variety of words. And if a man speak a good loudness against the flame of a candle, it will not make it tremble much; though most when those letters are pronounced which contract the mouth; as *F, S, V*, and some others. But gentle breathing, or blowing without speaking, will move the candle far more. And it is the more probable, that sound is without any local motion of the air, because as it differeth from the sight, in that it needeth a local motion of the air at first; so it paralleleth in so many other things with the sight, and radiation of things visible; which, without all question, induce no local motion in the air, as hath been said.

126. NEVERTHELESS it is true, that upon the noise of thunder, and great ordnance, glass windows will shake; and fishes are thought to be frightened with the motion caused by noise upon the water. But these effects are from the local motion of the air, which is a concomitant of the sound, as hath been said, and not from the sound.

127. IT hath been anciently reported, and is still received, that extreme applauses and shouting of people assembled in great multitudes, have so rarified and broken the air, that birds flying over have fallen down, the air being not able to support them. And it is believed by some, that great ringing of bells in populous cities hath chased away thunder; and also dissipated pestilent air: all which may be also from the concussion of the air, and not from the sound.

128. A VERY great sound, near hand, hath stricken many deaf; and at the instant they have found, as it were, the breaking of a skin or parchment in their ear: and myself standing near one that lured loud and shrill, had suddenly an offence, as if somewhat had broken or been dislocated in my ear; and immediately after a loud ringing, not an ordinary ringing or hissing, but far louder and differing, so as I reared some deafness. But after some half quarter of an hour it vanished. This effect may be truly referred unto the sound: for, as is commonly received, an over-potent object doth destroy the sense; and spiritual species, both visible and audible, will work upon the sensories, though they move not any other body.

129. IN dilation of sounds, the inclosure of them preserveth them, and causeth them to be heard further. And we find in rolls of parchment or trunks, the mouth being laid to the one end of the roll of parchment or trunk, and the ear to the other, the sound is heard much farther than in the open air. The cause is, for that the

found spendeth, and is dissipated in the open air; but in such concaves it is conserved and contracted. So also in a piece of ordnance, if you speak in the touch-hole, and another lay his ear to the mouth of the piece, the sound passeth and is far better heard than in the open air.

130. It is further to be considered, how it proveth and worketh when the sound is not inclosed all the length of his way, but passeth partly through open air; as where you speak some distance from a trunk; or where the ear is some distance from the trunk at the other end; or where both mouth and ear are distant from the trunk. And it is tried, that in a long trunk of some eight or ten foot, the sound is holpen, though both the mouth and the ear be a handful or more from the ends of the trunk; and somewhat more holpen, when the ear of the hearer is near, than when the mouth of the speaker. And it is certain, that the voice is better heard in a chamber from abroad, than abroad from within the chamber.

131. As the inclosure that is round about and intire, preserveth the sound; so doth a semi-concave, though in a less degree. And therefore, if you divide a trunk, or a cane into two, and one speak at the one end, and you lay your ear at the other, it will carry the voice further, than in the air at large. Nay further, if it be not a full semi-concave, but if you do the like upon the mast of a ship, or a long pole, or a piece of ordnance, though one speak upon the surface of the ordnance, and not at any of the bores, the voice will be heard farther than in the air at large.

132. It would be tried, how, and with what proportion of disadvantage the voice will be carried in an horn, which is a line arched; or in a trumpet, which is a line retorted; or in some pipe that were sinuous.

133. It is certain, howsoever it cross the received opinion, that sounds may be created without air, though air be the most favourable deferent of sounds. Take a vessel of water, and knap a pair of tongs some depth within the water, and you shall hear the sound of the tongs well, and not much diminished; and yet there is no air at all present.

134. TAKE one vessel of silver and another of wood, and fill each of them full of water, and then knap the tongs together, as before, about an handful from the bottom, and you shall find the sound much more resounding from the vessel of silver, than from that of wood: and yet if there be no water in the vessel, so that you knap the tongs in the air, you shall find no difference between the silver and the wooden vessel. Whereby, beside the main point of creating sound without air, you may collect two things: the one, that the sound communicateth with the bottom of the vessel; the other, that such a communication passeth far better through water than air.

135. STRIKE any hard bodies together, in the midst of a flame; and you shall hear the sound with little difference from the sound in the air.

136. THE pneumatical part which is in all tangible bodies, and hath some affinity with the air, performeth, in some degree, the part of the air; as when you knock upon an empty barrel, the sound is in part created by the air on the outside; and in part by the air in the inside: for the sound will be greater or lesser, as the barrel is more empty or more full; but yet the sound participateth also with the spirit in the wood through which it passeth, from the outside to the inside: and so it cometh to pass in the chiming of bells on the outside; where also the sound passeth to the inside: and a number of other like instances, whereof we shall speak more when we handle the communication of sounds.

137. It were extreme grossness to think, as we have partly touched before, that the

the sound in strings is made or produced between the hand and the string, or the quill and the string, or the bow and the string, for those are but *vehicula motus*, passages to the creation of the sound, the sound being produced between the string and the air; and that not by any impulsion of the air from the first motion of the string; but by the return or result of the string, which was strained by the touch, to his former place: which motion of result is quick and sharp; whereas the first motion is soft and dull. So the bow tortureth the string continually, and thereby holdeth it in a continual trepidation.

Experiments in consort touching the magnitude and exility and damps of sounds.

138. TAKE a trunk, and let one whistle at the one end, and hold your ear at the other, and you shall find the sound strike so sharp as you can scarce endure it. The cause is, for that sound diffuseth itself in round, and so spendeth itself; but if the sound, which would scatter in open air, be made to go all into a canal, it must needs give greater force to the sound. And so you may note, that inclosures do not only preserve sound, but also increase and sharpen it.

139. A HUNTER'S horn being greater at one end than at the other, doth increase the sound more than if the horn were all of an equal bore. The cause is, for that the air and sound being first contracted at the lesser end, and afterwards having more room to spread at the greater end, do dilate themselves; and in coming out strike more air; whereby the sound is the greater and baser. And even hunters horns, which are sometimes made straight, and not oblique, are ever greater at the lower end. It would be tried also in pipes, being made far larger at the lower end; or being made with a belly towards the lower end, and then issuing into a straight concave again.

140. THERE is in Saint James's fields a conduit of brick, unto which joineth a low vault; and at the end of that a round house of stone: and in the brick conduit there is a window; and in the round house a slit or rift of some little breadth: if you cry out in the rift, it will make a fearful roaring at the window. The cause is the same with the former; for that all concaves, that proceed from more narrow to more broad, do amplify the sound at the coming out.

141. HAWKS bells, that have holes in the sides, give a greater ring, than if the pellet did strike upon brass in the open air. The cause is the same with the first instance of the trunk; namely, for that the sound inclosed with the sides of the bell cometh forth at the holes unspent and more strong.

142. IN drums, the closeness round about, that preserveth the sound from dispersing, maketh the noise come forth at the drum-hole far more loud and strong than if you should strike upon the like skin extended in the open air. The cause is the same with the two precedent.

143. SOUNDS are better heard, and farther off, in an evening or in the night, than at the noon or in the day. The cause is, for that in the day, when the air is more thin, no doubt, the sound pierceth better; but when the air is more thick, as in the night, the sound spendeth and spreadeth abroad less: and so it is a degree of inclosure. As for the night, it is true also that the general silence helpeth.

144. THERE be two kinds of reflexions of sounds; the one at distance, which is the echo; wherein the original is heard distinctly, and the reflexion also distinctly; of which we shall speak hereafter: the other in concurrence; when the sound reflecting, the reflexion being near at hand, returneth immediately upon the original, and

so

so iterateth it not, but amplifieth it. Therefore we see, that music upon the water soundeth more; and so likewise music is better in chambers wainscotted than hanged.

145. THE strings of a lute, or viol, or virginals, do give a far greater sound, by reason of the knot, and board, and concave underneath, than if there were nothing but only the flat of a board, without that hollow and knot, to let in the upper air into the lower. The cause is the communication of the upper air with the lower, and penning of both from expence or dispersing.

146. AN Irish harp hath open air on both sides of the strings: and it hath the concave or belly not along the strings, but at the end of the strings. It maketh a more resounding sound than a bandora, orpharion, or cittern, which have likewise wire-strings. I judge the cause to be, for that open air on both sides helpeth, so that there be a concave; which is therefore best placed at the end.

147. IN a virginal, when the lid is down, it maketh a more exile sound than when the lid is open. The cause is, for that all shutting in of air, where there is no competent vent, dampeth the sound: which maintaineth likewise the former instance; for the belly of the lute or viol doth pen the air somewhat.

148. THERE is a church at Gloucester, and, as I have heard, the like is in some other places, where if you speak against a wall softly, another shall hear your voice better a good way off, than near at hand. Inquire more particularly of the frame of that place. I suppose there is some vault, or hollow, or isle, behind the wall, and some passage to it towards the farther end of that wall against which you speak; so as the voice of him that speaketh slideth along the wall, and then entreth at some passage, and communicateth with the air of the hollow; for it is preserved somewhat by the plain wall; but that is too weak to give a sound audible, till it hath communicated with the back air.

149. STRIKE upon a bow-string, and lay the horn of the bow near your ear, and it will increase the sound, and make a degree of a tone. The cause is, for that the sensory, by reason of the close holding, is percussed before the air disperseth. The like is, if you hold the horn betwixt your teeth: but that is a plain dilation of the sound from the teeth to the instrument of hearing; for there is a great intercourse between those two parts; as appeareth by this, that a harsh grating tune setteth the teeth on edge. The like falleth out, if the horn of the bow be put upon the temples; but that is but the slide of the sound from thence to the ear.

150. IF you take a rod of iron or brass, and hold the one end to your ear, and strike upon the other, it maketh a far greater sound than the like stroke upon the rod, made not so contiguous to the ear. By which, and by some other instances that have been partly touched, it should appear, that sounds do not only slide upon the surface of a smooth body, but do also communicate with the spirits, that are in the pores of the body.

151. I REMEMBER in Trinity College in Cambridge, there was an upper chamber, which being thought weak in the roof of it, was supported by a pillar of iron of the bigness of one's arm in the midst of the chamber; which if you had struck, it would make a little flat noise in the room where it was struck, but it would make a great bomb in the chamber beneath.

152. THE sound which is made by buckets in a well, when they touch upon the water, or when they strike upon the side of the well, or when two buckets dash the one against the other, these sounds are deeper and fuller than if the like percussion were

were made in the open air. The cause is the penning and inclosure of the air in the concave of the well.

153. BARRELS placed in a room under the floor of a chamber, make all noises in the same chamber more full and resounding.

So that there be five ways, in general, of majoration of sounds: inclosure simple; inclosure with dilatation; communication; reflexion concurrent; and approach to the sensory.

154. FOR exility of the voice or other sounds; it is certain that the voice doth pass through solid and hard bodies if they be not too thick: and through water, which is likewise a very close body, and such an one as letteth not in a r. But then the voice, or other sound, is reduced by such passage to a great weakness or exility. If therefore you stop the holes of a hawk's bell, it will make no ring, but a flat noise or rattle. And so doth the *adittes* or eagle-stone, which hath a little stone within it.

155. AND as for water, it is a certain trial: let a man go into a bath, and take a pail, and turn the bottom upward, and carry the mouth of it even down to the level of the water, and so press it down under the water some handful and an half, still keeping it even, that it may not tilt on either side, and so the air get out: then let him that is in the bath dive with his head so far under water, as he may put his head into the pail, and there will come as much air bubbling forth, as will make room for his head. Then let him speak, and any that shall stand without shall hear his voice plainly; but yet made extreme sharp and exile, like the voice of puppets: but yet the articulate sounds of the words will not be confounded. Note, that it may be much more handsomely done, if the pail be put over the man's head above water, and then he cower down, and the pail be pressed down with him. Note, that a man must kneel or sit, that he may be lower than the water. A man would think that the Sicilian poet had knowledge of this experiment; for he saith, that Hercules's page, Hylas, went with a water-pot to fill it at a pleasant fountain that was near the shore, and that the nymphs of the fountain fell in love with the boy, and pulled him under water, keeping him alive; and that Hercules missing his page, called him by his name aloud, that all the shore rang of it; and that Hylas from within the water answered his master, but, that which is to the present purpose, with so small and exile a voice, as Hercules thought he had been three miles off, when the fountain, indeed, was fast by.

156. IN lutes and instruments of strings, if you stop a string high, whereby it hath less scope to tremble, the sound is more treble, but yet more dead.

157. TAKE two faucers, and strike the edge of the one against the bottom of the other, within a pail of water; and you shall find, that as you put the faucers lower and lower, the sound groweth more flat; even while part of the faucer is above the water; but that flatness of sound is joined with a harshness of sound; which no doubt is caused by the inequality of the sound which cometh from the part of the faucer under the water and from the part above. But when the faucer is wholly under the water the sound becometh more clear, but far more low, and as if the sound came from afar off.

158. A SOFT body dampeth the sound much more than a hard; as if a bell hath cloth or silk wrapped about it, it deadneth the sound more than if it were wood. And therefore in clericals the keys are lined; and in colleges they use to line the tabernacles.

159. TRIAL was made in a recorder after these several manners. The bottom of it was set against the palm of the hand; stopped with wax round about; set against a damask cushion; thrust into sand; into ashes; into water, half an inch under the water; close to the bottom of a silver basin; and still the tone remained: but the bottom of it was set against a woollen carpet; a lining of plush; a lock of wool, though loosely put in; against snow; and the sound of it was quite deadned, and but breath.

160. IRON hot produceth not so full a sound as when it is cold; for while it is hot, it appeareth to be more soft and less resounding. So likewise warm water, when it falleth, maketh not so full a sound as cold: and I conceive it is softer, and nearer the nature of oil; for it is more slippery, as may be perceived in that it scowreth better.

161. LET there be a recorder made with two fipples, at each end one; the trunk of it of the length of two recorders, and the holes answerable towards each end; and let two play the same lesson upon it at an unison; and let it be noted whether the sound be confounded, or amplified, or dulled. So likewise let a cross be made of two trunks hollow throughout; and let two speak, or sing, the one long-ways, the other traverse: and let two hear at the opposite ends; and note whether the sound be confounded, amplified, or dulled. Which two instances will also give light to the mixture of sounds, whereof we shall speak hereafter.

162. A BELLOWS blown in at the hole of a drum, and the drum then stricken, maketh the sound a little flatter, but no other apparent alteration. The cause is manifest; partly for that it hindereth the issue of the sound; and partly for that it maketh the air, being blown together, less moveable.

Experiments in consort touching the loudness or softness of sounds, and their carriage at longer or shorter distance.

163. THE loudness and softness of sounds is a thing distinct from the magnitude and exility of sounds; for a base string, though softly stricken, giveth the greater sound; but a treble string, if hard stricken, will be heard much farther off. And the cause is, for that the base string striketh more air, and the treble less air, but with a sharper percussion.

164. IT is therefore the strength of the percussion, that is a principal cause of the loudness or softness of sounds; as in knocking harder or softer; winding of a horn stronger or weaker; ringing of a hand-bell harder or softer, *etc.* And the strength of this percussion consisteth as much or more in the hardness of the body percussed, as in the force of the body percussing: for if you strike against a cloth, it will give a less sound; if against wood, a greater; if against metal, yet a greater; and in metals, if you strike against gold, which is the more pliant, it giveth the flatter sound; if against silver or brass, the more ringing sound. As for air, where it is strongly pent, it matcheth a hard body. And therefore we see in discharging of a piece, what a great noise it maketh. We see also, that the charge with bullet, or with paper wet and hard stopped, or with powder alone rammed in hard, maketh no great difference in the loudness of the report.

165. THE sharpness or quickness of the percussion, is a great cause of the loudness, as well as the strength; as in a whip or wand, if you strike the air with it; the sharper and quicker you strike it, the louder sound it giveth. And in playing upon the lute or virginals, the quick stroke or touch is a great life to the sound. The cause
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is, for that the quick striking cutteth the air speedily; whereas the soft striking doth rather beat than cut.

Experiments in consort touching the communication of sounds.

THE communication of sounds, as in bellies of lutes, empty vessels, *etc.* hath been touched *obiter* in the majoration of sounds; but it is fit also to make a title of it apart.

166. THE experiment for greatest demonstration of communication of sounds, is the chiming of bells; where if you strike with a hammer upon the upper part, and then upon the midst, and then upon the lower, you shall find the sound to be more treble and more base, according to the concave on the inside, though the percussion be only on the outside.

167. WHEN the sound is created between the blast of the mouth and the air of the pipe, it hath nevertheless some communication with the matter of the sides of the pipe, and the spirits in them contained; for in a pipe, or trumpet, of wood, and brass, the sound will be diverse; so if the pipe be covered with cloth or silk, it will give a diverse sound from what it would do of itself; so if the pipe be a little wet on the inside, it will make a differing sound from the same pipe dry.

168. THAT sound made within water doth communicate better with a hard body through water, than made in air it doth with air, *vide experimentum* 134.

Experiments in consort touching equality and inequality of sounds.

WE have spoken before, in the inquisition touching music, of musical sounds, whereunto there may be a concord or discord in two parts; which sounds we call tones: and likewise of immusical sounds; and have given the cause, that the tone proceedeth of equality, and the other of inequality. And we have also expressed there, what are the equal bodies that give tones, and what are the unequal that give none. But now we shall speak of such inequality of sounds, as proceedeth not from the nature of the bodies themselves, but is accidental; either from the roughness or obliquity of the passage, or from the doubling of the percipient, or from the trepidation of the motion.

169. A BELL, if it have a rift in it, whereby the sound hath not a clear passage, giveth a hoarse and jarring sound; so the voice of man, when by cold taken the weasand groweth rugged, and, as we call it, furred, becometh hoarse. And in these two instances the sounds are ingrate, because they are merely unequal: but if they be unequal in equality, then the sound is grateful, but purling.

170. ALL instruments that have either returns, as trumpets; or flexions, as cornets; or are drawn up, and put from, as sackbuts; have a purling sound: but the recorder, or flute, that has none of these inequalities, gives a clear sound. Nevertheless, the recorder itself, or pipe, moistened a little in the inside, soundeth more solemnly, and with a little purling or hissing. Again, a wreathed string, such as are in the base strings of bandoras, giveth also a purling sound.

171. BUT a lute-string, if it be merely unequal in its parts, giveth a harsh and untuneable sound; which strings we call false, being bigger in one place than in another; and therefore wire strings are never false. We see also, that when we try a false lute-string, we use to extend it hard between the fingers, and to fillip it; and if it giveth a double species, it is true; but if it giveth a treble, or more, it is false.

172. WATERS, in the noise they make as they run, represent to the ear a trembling noise; and in regals, where they have a pipe they call the nightingale-pipe, which containeth water, the sound hath a continual trembling: and children have also little things they call cocks, which have water in them; and when they blow or whistle in them, they yield a trembling noise; which trembling of water hath an affinity with the letter *L*. All which inequalities of trepidation are rather pleasant than otherwise.

173. ALL base notes, or very treble notes, give an asper sound; for that the base striketh more air, than it can well strike equally: and the treble cutteth the air so sharp, as it returneth too swift to make the sound equal: and therefore a mean or tenor is the sweetest part.

174. WE know nothing that can at pleasure make a musical or immusical sound by voluntary motion, but the voice of man and birds. The cause is, no doubt, in the weasand or wind-pipe, which we call *aspera arteria*, which being well extended, gathereth equality; as a bladder that is wrinkled, if it be extended, becometh smooth. The extension is always more in tones than in speech: therefore the inward voice or whisper can never give a tone. And in singing, there is, manifestly, a greater working and labour of the throat, than in speaking; as appeareth in the thrusting out or drawing in of the chin, when we sing.

175. THE humming of bees is an unequal buzzing, and is conceived by some of the ancients not to come forth at their mouth, but to be an inward sound; but, it may be, it is neither; but from the motion of their wings; for it is not heard but when they stir.

176. ALL metals quenched in water give a sibilation or hissing sound, which hath an affinity with the letter *Z*, notwithstanding the sound be created between the water or vapour, and the air. Seething also, if there be but small store of water in a vessel, giveth a hissing sound; but boiling in a full vessel giveth a bubbling sound, drawing somewhat near to the cocks used by children.

177. TRIAL should be made, whether the inequality or interchange of the medium will not produce an inequality of sound; as if three bells were made one within another, and air betwixt each; and then the outermost bell were chimed with a hammer, how the sound would differ from a simple bell. So likewise take a plate of brass, and a plank of wood, and join them close together, and knock upon one of them, and see if they do not give an unequal sound. So make two or three partitions of wood in a hoghead, with holes or knots in them; and mark the difference of their sound from the sound of an hoghead without such partitions.

Experiments in concert touching the more treble, and the more base tones, or musical sounds.

178. IT is evident, that the percussion of the greater quantity of air causeth the baser sound; and the less quantity the more treble sound. The percussion of the greater quantity of air is produced by the greatness of the body percussing; by the latitude of the concave by which the sound passeth; and by the longitude of the same concave. Therefore we see that a base string is greater than a treble; a base pipe hath a greater bore than a treble; and in pipes, and the like, the lower the note-holes be, and the further off from the mouth of the pipe, the more base sound they yield; and the nearer the mouth, the more treble. Nay more, if you strike an entire body, as
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an andiron of brass, at the top, it maketh a more treble sound; and at the bottom a baser.

179. IT is also evident, that the sharper or quicker percussion of air causeth the more treble sound; and the slower or heavier, the more base sound. So we see in strings; the more they are wound up and strained, and thereby give a more quick start-back, the more treble is the sound; and the slacker they are, or less wound up, the baser is the sound. And therefore a bigger string more strained, and a lesser string less strained, may fall into the same tone.

180. CHILDREN, women, eunuchs, have more small and shrill voices than men. The reason is, not for that men have greater heat, which may make the voice stronger, for the strength of a voice or sound doth make a difference in the loudness or softness, but not in the tone, but from the dilatation of the organ; which, it is true, is likewise caused by heat. But the cause of changing the voice at the years of puberty, is more obscure. It seemeth to be, for that when much of the moisture of the body, which did before irrigate the parts, is drawn down to the spermatical vessels, it leaveth the body more hot than it was; whence cometh the dilatation of the pipes: for we see plainly all effects of heat do then come on; as pilosity, more roughness of the skin, hardness of the flesh, *etc.*

181. THE industry of the musician hath produced two other means of straining or intension of strings, besides their winding up. The one is the stopping of the string with the finger; as in the necks of lutes, viols, *etc.* The other is the shortness of the string, as in harps, virginals, *etc.* Both these have one and the same reason; for they cause the string to give a quicker start.

182. IN the straining of a string, the further it is strained, the less superstraining goeth to a note; for it requireth good winding of a string before it will make any note at all: and in the stops of lutes, *etc.* the higher they go, the less distance is between the frets.

183. IF you fill a drinking-glass with water, especially one sharp below, and wide above, and fill up upon the brim or outside; and after empty part of the water, and so more and more, and still try the tone by filliping; you shall find the tone fall and be more base, as the glass is more empty.

Experiments in consort touching the proportion of treble and base tones.

THE just and measured proportion of the air percussed, towards the baseness or trebleness of tones, is one of the greatest secrets in the contemplation of sounds. For it discovereth the true coincidence of tones into diapasons; which is the return of the same sound. And so of the concords and discords between the unison and diapason, which we have touched before in the experiments of music; but think fit to relume it here as a principal part of our inquiry touching the nature of sounds. It may be found out in the proportion of the winding of strings; in the proportion of the distance of frets; and in the proportion of the concave of pipes, *etc.* but most commodiously in the last of these.

184. TRY therefore the winding of a string once about, as soon as it is brought to that extension as will give a tone; and then of twice about, and thrice about, *etc.* and mark the scale or difference of the rise of the tone: whereby you shall discover, in one, two effects; both the proportion of the sound towards the dimension of the winding; and the proportion likewise of the sound towards the string, as it is more

or less strained. But note that to measure this, the way will be, to take the length in a right line of the string, upon any winding about of the peg.

185. As for the stops, you are to take the number of frets; and principally the length of the line, from the first stop of the string, unto such a stop as shall produce a diapason to the former stop upon the same string.

186. BUT it will best, as it is said, appear in the bores of wind-instruments: and therefore cause some half dozen pipes to be made, in length and all things else alike, with a single, double, and so on to a sextuple bore; and so mark what fall of tone every one giveth. But still in these three last instances, you must diligently observe, what length of string, or distance of stop, or concave of air, maketh what rise of sound. As in the last of these, which, as we said, is that which giveth the aptest demonstration, you must set down what increase of concave goeth to the making of a note higher; and what of two notes; and what of three notes; and so up to the diapason: for then the great secret of numbers and proportions will appear. It is not unlike that those that make recorders, *etc.* know this already: for that they make them in sets: and likewise bell-founders, in fitting the tune of their bells. So that inquiry may save trial. Surely it hath been observed by one of the ancients, that an empty barrel knocked upon with the finger, giveth a diapason to the sound of the like barrel full; but how that should be I do not well understand; for that the knocking of a barrel full or empty, doth scarce give any tone.

187. THERE is required some sensible difference in the proportion of creating a note, towards the sound itself, which is the passive: and that it be not too near, but at a distance. For in a recorder, the three uppermost holes yield one tone; which is a note lower than the tone of the first three. And the like, no doubt, is required in the winding or stopping of strings.

Experiments in consort touching exterior and interior sounds.

THERE is another difference of sounds, which we will call exterior and interior. It is not soft nor loud: nor it is not base nor treble: nor it is not musical nor immusical: though it be true, that there can be no tone in an interior sound; but on the other side, in an exterior sound there may be both musical and immusical. We shall therefore enumerate them, rather than precisely distinguish them; though, to make some adumbration of that we mean, the interior is rather an impulsion or concussion of the air, than an elision or section of the same: so as the percussion of the one towards the other differeth as a blow differeth from a cut.

188. IN speech of man, the whispering, which they call *susurrus* in latin, whether it be louder or softer, is an interior sound; but the speaking out is an exterior sound; and therefore you can never make a tone, nor sing in whispering; but in speech you may: so breathing, or blowing by the mouth, bellows, or wind, though loud, is an interior sound; but the blowing through a pipe or concave, though soft, is an exterior. So likewise the greatest winds, if they have no coarctation, or blow not hollow, give an interior sound; the whistling or hollow wind yieldeth a singing, or exterior sound; the former being pent by some other body; the latter being pent in by its own density: and therefore we see, that when the wind bloweth hollow, it is a sign of rain. The flame, as it moveth within itself or is blown by a bellows, giveth a murmur or interior sound.

189. THERE is no hard body, but struck against another hard body, will yield an exterior sound greater or lesser: inasmuch as if the percussion be over-soft, it may

may induce a nullity of sound; but never an interior sound; as when one treadeth so softly that he is not heard.

190. WHERE the air is the percipient, pent or not pent, against a hard body, it never giveth an exterior sound; as if you blow strongly with a bellows against a wall.

191. SOUNDS, both exterior and interior, may be made as well by suction as by emission of the breath: as in whistling or breathing.

Experiments in consort touching articulation of sounds.

192. IT is evident, and it is one of the strangest secrets in sounds, that the whole sound is not in the whole air only; but the whole sound is also in every small part of the air. So that all the curious diversity of articulate sounds, of the voice of man or birds, will enter at a small cranny inconfused.

193. THE unequal agitation of the winds and the like, though they be material to the carriage of the sounds farther or less way; yet they do not confound the articulation of them at all, within that distance that they can be heard; though it may be, they make them to be heard less way than in a still; as hath been partly touched.

194. OVER-GREAT distance confoundeth the articulation of sounds; as we see, that you may hear the sound of a preacher's voice, or the like, when you cannot distinguish what he saith. And one articulate sound will confound another, as when many speak at once.

195. IN the experiment of speaking under water, when the voice is reduced to such an extreme exility, yet the articulate sounds, which are the words, are not confounded, as hath been said.

196. I CONCEIVE, that an extreme small or an extreme great sound cannot be articulate; but that the articulation requireth a mediocrity of sound: for that the extreme small sound confoundeth the articulation by contracting; and the great sound by dispersing: and although, as was formerly said, a sound articulate, already created, will be contracted into a small cranny; yet the first articulation requireth more dimension.

197. IT hath been observed, that in a room, or in a chapel, vaulted below and vaulted likewise in the roof, a preacher cannot be heard so well, as in the like places not so vaulted. The cause is, for that the subsequent words come on before the precedent words vanish: and therefore the articulate sounds are more confused, though the gross of the sound be greater.

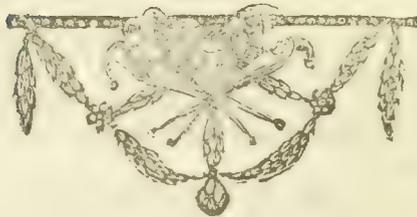
188. THE motions of the tongue, lips, throat, palate, *etc.* which go to the making of the several alphabetical letters, are worthy inquiry, and pertinent to the present inquisition of sounds: but because they are subtle, and long to describe, we will refer them over, and place them amongst the experiments of speech. The Hebrews have been diligent in it, and have assigned which letters are labial, which dental, which guttural, *etc.* As for the Latins and Grecians, they have distinguished between semi-vowels and mutes; and in mutes, between *mutae tenues, mediae,* and *aspiratae*; not amiss, but yet not diligently enough. For the special strokes and motions that create those sounds, they have little inquired: as, that the letters *B, P, F, M,* are not expressed, but with the contracting or shutting of the mouth; that the letters *N* and *B,* cannot be pronounced but that the letter *N* will turn into *M.* As *hecatonba* will be *hecatomba.* That *M* and *T* cannot be pronounced together, but *P* will come between; as *emptus* is pronounced *emptus*; and a number of the like.

So

So that if you inquire to the full, you will find, that to the making of the whole alphabet there will be fewer simple motions required than there are letters.

199. THE lungs are the most spongy part of the body; and therefore ablest to contract and dilate itself; and where it contracteth itself, it expelleth the air; which through the artery, throat, and mouth, maketh the voice: but yet articulation is not made but with the help of the tongue, palate, and the rest of those they call instruments of voice.

200. THERE is found a similitude between the sound that is made by inanimate bodies or by animate bodies, that have no voice articulate, and divers letters of articulate voices: and commonly men have given such names to those sounds, as do allude unto the articulate letters. As trembling of water hath resemblance with the letter *L*; quenching of hot metals with the letter *Z*; snarling of dogs with the letter *R*; the noise of screech-owls with the letter *Sb*; voice of cats with the diphthong *Eu*; voice of cuckows with the diphthong *Ou*; sounds of strings with the letter *Ng*: so that if a man, for curiosity or strangeness sake, would make a puppet or other dead body to pronounce a word, let him consider, on the one part, the motion of the instruments of voice; and on the other part, the like sounds made in inanimate bodies; and what conformity there is that causeth the similitude of sounds; and by that he may minister light to that effect.



NATURAL HISTORY.

CENTURY III.

Experiments in concert touching the motions of sounds, in what lines they are circular, oblique, straight, upwards, downwards, forwards, backwards.

201. **A**LL sounds whatsoever move round; that is to say, on all sides; upwards, downwards, forwards, and backwards. This appeareth in all instances.

202. SOUNDS do not require to be conveyed to the sense in a right line, as visibles do, but may be arched; though it be true, they move strongest in a right line; which nevertheless is not caused by the rightness of the line, but by the shortness of the distance; *linea recta brevissima*. And therefore we see if a wall be between, and you speak on the one side, you hear it on the other; which is not because the sound passeth through the wall, but archeth over the wall.

203. IF the sound be stopped and repercussed, it cometh about on the other side in an oblique line. So, if in a coach one side of the boot be down, and the other up, and a beggar beg on the close side; you will think that he were on the open side. So likewise, if a bell or clock be, for example, on the north side of a chamber, and the window of that chamber be upon the south; he that is in the chamber will think the sound came from the south.

204. SOUNDS, though they spread round, so that there is an orb or spherical area of the sound, yet they move strongest and go farthest in the fore-lines, from the first local impulsion of the air. And therefore in preaching, you shall hear the preacher's voice better before the pulpit, than behind it, or on the sides, though it stand open. So a harquebus, or ordnance, will be farther heard forwards from the mouth of the piece, than backwards or on the sides.

205. IT may be doubted, that sounds do move better downwards than upwards. Pulpits are placed high above the people. And when the ancient generals spake to their armies, they had ever a mount of turf cast up, whereupon they stood; but this may be imputed to the stops and obstacles which the voice meeteth with, when one speaketh upon the level. But there seemeth to be more in it; for it may be that spiritual species, both of things visible and sounds, do move better downwards than upwards. It is a strange thing, that to men standing below on the ground, those that be on the top of Paul's seem much less than they are, and cannot be known; but to men above, those below seem nothing so much lessened, and may be known: yet it is true, that all things, to them above seem also somewhat contracted, and better collected into figure: as knots in gardens shew best from an upper window or terras.

206. BUT to make an exact trial of it, let a man stand in a chamber not much above the ground, and speak out at the window, through a trunk, to one standing on the ground, as softly as he can, the other laying his ear close to the trunk: then

via versa, let the other speak below, keeping the same proportion of softness; and let him in the chamber lay his ear to the trunk: and this may be the aptest means to make a judgment, whether sounds descend or ascend better.

Experiments in consort touching the lasting and perishing of sounds; and touching the time they require to their generation or dilation.

207. AFTER that sound is created, which is in a moment, we find it continueth some small time, melting by little and little. In this there is a wonderful error amongst men, who take this to be a continuance of the first sound; whereas, in truth, it is a renovation, and not a continuance: for the body percussed hath, by reason of the percussio, a trepidation wrought in the minute parts, and so reneweth the percussio of the air. This appeareth manifestly, because that the melting sound of a bell, or of a string stricken, which is thought to be a continuance, ceaseth as soon as the bell or string is touched. As in a virginal, as soon as ever the jack falleth, and toucheth the string, the sound ceaseth; and in a bell, after you have chimed upon it, if you touch the bell the sound ceaseth. And in this you must distinguish that there are two trepidations: the one manifest and local; as of the bell when it is penfile: the other secret, of the minute parts; such as is described in the ninth instance. But it is true, that the local helpeth the secret greatly. We see likewise that in pipes, and other wind-instruments, the sound lasteth no longer than the breath bloweth. It is true, that in organs there is a confused murmur for a while after you have played; but that is but while the bellows are in falling.

208. IT is certain, that in the noise of great ordnance, where many are shot off together, the sound will be carried, at the least, twenty miles upon the land, and much farther upon the water. But then it will come to the ear, not in the instant of the shooting off, but it will come an hour or more later. This must needs be a continuance of the first sound; for there is no trepidation which should renew it. And the touching of the ordnance would not extinguish the sound the sooner: so that in great sounds the continuance is more than momentary.

209. To try exactly the time wherein sound is dilated, let a man stand in a steeple, and have with him a taper; and let some vail be put before the taper; and let another man stand in the field a mile off. Then let him in the steeple strike the bell; and in the same instant withdraw the vail; and so let him in the field tell by his pulse what distance of time there is between the light seen, and the sound heard: for it is certain that the dilation of light is in an instant. This may be tried in far greater distances, allowing greater lights and sounds.

210. IT is generally known and observed that light, and the object of sight, move swifter than sound; for we see the flash of a piece is seen sooner than the noise is heard. And in hewing wood, if one be some distance off, he shall see the arm lifted up for a second stroke, before he hears the noise of the first. And the greater the distance, the greater is the prevention: as we see in thunder which is far off, where the lightning precedeth the crack a good space.

211. COLOURS, when they represent themselves to the eye, fade not, nor melt not by degrees, but appear still in the same strength; but sounds melt and vanish by little and little. The cause is, for that colours participate nothing with the motion of the air, but sounds do. And it is a plain argument, that sound participateth of some local motion of the air, as a cause *sine qua non*, in that it perisheth suddenly;

denly; for in every suction or impulsion of the air, the air doth suddenly restore and reunite itself; which the water also doth, but nothing so swiftly.

Experiments in concert touching the passage and interception of sounds.

IN the trials of the passage, or not passage of sounds, you must take heed you mistake not the passing by the sides of a body, for the passing through a body; and therefore you must make the intercepting body very close; for sound will pass through a small chink.

212. WHERE sound passeth through a hard or close body, as through water; through a wall; through metal, as in hawks bells stopped, *etc.* the hard or close body must be but thin and small; for else it deadneth and extinguisheth the sound utterly. And therefore in the experiment of speaking in air under water, the voice must not be very deep within the water: for then the sound pierceth not. So if you speak on the farther side of a close wall, if the wall be very thick you shall not be heard: and if there were an hog'shead empty, whereof the sides were some two foot thick, and the bunghole stopped; I conceive the resounding sound, by the communication of the outward air with the air within, would be little or none: but only you shall hear the noise of the outward knock, as if the vessel were full.

213. IT is certain, that in the passage of sounds through hard bodies the spirit or pneumatical part of the hard body itself doth co-operate; but much better when the sides of that hard body are struck, than when the percussion is only within, without touch of the sides. Take therefore a hawk's bell, the holes stopped up, and hang it by a thread within a bottle glass, and stop the mouth of the glass very close with wax; and then shake the glass, and see whether the bell give any sound at all, or how weak: but note, that you must instead of the thread take a wire; or else let the glass have a great belly; lest when you shake the bell, it dash upon the sides of the glass.

214. IT is plain, that a very long and downright arch for the sound to pass, will extinguish the sound quite; so that that sound, which would be heard over a wall, will not be heard over a church; nor that sound, which will be heard if you stand some distance from the wall, will be heard if you stand close under the wall.

215. SOFT and foraminous bodies, in the first creation of the sound, will deaden it; for the striking against cloth or furr will make little sound; as hath been said: but in the passage of the sound, they will admit it better than harder bodies; as we see, that curtains and hangings will not stay the sound much; but glass-windows, if they be very close, will check a sound more than the like thickness of cloth. We see also in the rumbling of the belly, how easily the sound passeth through the guts and skin.

216. IT is worthy the inquiry, whether great sounds, as of ordnance or bells, become not more weak and exile when they pass through small crannies. For the subtilties of articulate sounds, it may be, may pass through small crannies not confused; but the magnitude of the sound, perhaps, not so well.

Experiments in concert touching the medium of sounds.

217. THE medium of sounds is air; soft and porous bodies; also water. And hard bodies refuse not altogether to be mediums of sounds. But all of them are dull and unapt deferents, except the air.

218. IN air, the thinner or drier air carrieth not the sound so well as the more dense; as appeareth in night sounds and evening sounds, and sounds in moist weather and southern winds. The reason is already mentioned in the title of majoration of sounds; being for that thin air is better pierced; but thick air preserveth the sound better from waste: let further trial be made by hollowing in mists and gentle showers; for, it may be, that will somewhat deaden the sound.

219. How far forth flame may be a medium of sounds, especially of such sounds as are created by air, and not betwixt hard bodies, let it be tried in speaking where a bonfire is between; but then you must allow for some disturbance the noise that the flame itself maketh.

220. WHETHER any other liquors, being made mediums, cause a diversity of sound from water, it may be tried: as by the knapping of the tongs; or striking of the bottom of a vessel, filled either with milk, or with oil; which though they be more light, yet are they more unequal bodies than air.

Of the natures of the mediums we have now spoken; as for the disposition of the said mediums, it doth consist in the penning, or not penning of the air; of which we have spoken before in the title of dilation of sounds: it consisteth also in the figure of the concave through which it passeth; of which we will speak next.

Experiments in concert, what the figures of the pipes, or concaves, or the bodies deferent, conduce to the sounds.

How the figures of pipes, or concaves, through which sounds pass, or of other bodies deferent, conduce to the variety and alteration of the sounds; either in respect of the greater quantity, or less quantity of air, which the concaves receive; or in respect of the carrying of sounds longer and shorter way; or in respect of many other circumstances; they have been touched, as falling into other titles. But those figures which we now are to speak of, we intend to be, as they concern the lines through which the sound passeth; as straight, crooked, angular, circular, *etc.*

221. THE figure of a bell partaketh of the pyramis, but yet coming off and dilating more suddenly. The figure of a hunter's horn and cornet, is oblique; yet they have likewise straight horns; which if they be of the same bore with the oblique, differ little in sound, save that the straight require somewhat a stronger blast. The figures of recorders, and flutes, and pipes, are straight; but the recorder hath a less bore and a greater, above and below. The trumpet hath the figure of the letter S: which maketh that purling sound, *etc.* Generally the straight line hath the cleanest and roundest sound, and the crooked, the more hoarse and jarring.

222. OF a sinuous pipe that may have some four flexions, trial should be made. Likewise of a pipe made like a cross, open in the midst. And so likewise of an angular pipe: and see what will be the effects of these several sounds. And so again of a circular pipe; as if you take a pipe perfectly round, and make a hole whereinto you shall blow, and another hole not far from that; but with a traverse or stop between them; so that your breath may go the round of the circle, and come forth at the second hole. You may try likewise percussions of solid bodies of several figures; as globes, flats, cubes, crosses, triangles, *etc.* and their combinations, as flat against flat, and convex against convex, and convex against flat, *etc.* and mark well the diversities of the sounds. Try also the difference in sound of several crassitudes of hard bodies percussed; and take knowledge of the diversities of the sounds. I myself have tried, that a bell of gold yieldeth an excellent sound, not inferior to that of silver or
bra's,

brafs, but rather better: yet we fee that a piece of money of gold foundeth far more flat than a piece of money of filver.

223. THE harp hath the concave not along the strings, but acrofs the strings; and no instrument hath the found fo melting and prolonged, as the Irish harp. So as I fuppofe, that if a virginal were made with a double concave, the one all the length as the virginal hath; the other at the end of the strings, as the harp hath; it muft needs make the found perfecter, and not fo shallow and jarring. You may try it without any found-board along, but only harp wife, at one end of the strings; or laftly, with a double concave, at each end of the strings one.

Experiments in concert touching the mixture of founds.

224. THERE is an apparent diversity between the fpecies vifible and audible in this, that the vifible doth not mingle in the medium, but the audible doth. For if we look abroad, we fee heaven, a number of ftars, trees, hills, men, beafts, at once. And the fpecies of the one doth not confound the other. But if fo many founds came from feveral parts, one of them would utterly confound the other. So we fee, that voices or concerts of mufic do make an harmony by mixture, which colours do not. It is true neverthelefs, that a great light drowneth a fmaller that it cannot be feen; as the fun that of a glow-worm; as well as a great found drowneth a leffer. And I fuppofe likewise, that if there were two lanthorns of glafs, the one a crimfon, and the other an azure, and a candle within either of them, thofe coloured lights would mingle, and caft upon a white paper a purple colour. And even in colours, they yield a faint and weak mixture: for white walls make rooms more lightfome than black, *etc.* but the caufe of the confufion in founds, and the inconfufion in fpecies vifible, is, for that the fight worketh in right lines, and maketh feveral cones; and fo there can be no coincidence in the eye or vifual point: but founds, that move in oblique and arcuate lines, muft needs encounter and difturb the one the other.

225. The sweeteft and beft harmony is, when every part or instrument is not heard by itfelf, but a conflation of them all; which requireth to ftand fome diftance off, even as it is in the mixture of perfumes; or the taking of the fmells of feveral flowers in the air.

226. THE difpofition of the air in other qualities, except it be joined with found, hath no great operation upon founds: for whether the air be lightfome or dark, hot or cold, quiet or ftirring, except it be with noife, sweet-smelling, or flinking, or the like; it importeth not much: fome petty alteration or difference it may make.

227. BUT founds do difturb and alter the one the other: fometimes the one drowneth the other, and making it not heard; fometimes the one jarring and difcording with the other, and making a confufion; fometimes the one mingling and compounding with the other, and making an harmony.

228. Two voices of like loudnefs will not be heard twice as far as one of them alone; and two candles of like light, will not make things feen twice as far off as one. The caufe is profound; but it feemeth that the impreffions from the objects of the fenfes do mingle refpectively, every one with his kind; but not in proportion, as is before demonftrated: and the reafon may be, becaufe the firft impreffion, which is from privative to active, as from filence to noife, or from darknefs to light, is a greater degree, than from lefs noife to more noife, or from lefs light to more light. And the reafon of that again may be, for that the air, after it hath received a charge, doth not

receive a furcharge, or greater charge, with like appetite as it doth the first charge. As for the increase of virtue, generally, what proportion it beareth to the increase of the matter, it is a large field, and to be handled by itself.

Experiments in consort touching melioration of sounds.

229. ALL reflexions concurrent to make sounds greater ; but if the body that createth either the original sound, or the reflexion, be clean and smooth, it maketh them sweeter. Trial may be made of a lute or viol, with the belly of polished brass instead of wood. We see that even in the open air, the wire-string is sweeter than the string of guts. And we see that for reflexion water excelleth ; as in music near the water, or in echos.

230. It hath been tried, that a pipe a little moisten'd on the inside, but yet so as there be no drops left, maketh a more solemn sound, than if the pipe were dry : but yet with a sweet degree of sibilation or purling ; as we touched it before in the title of equality. The cause is, for that all things porous being superficially wet, and, as it were, between dry and wet, become a little more even and smooth ; but the purling, which must needs proceed of inequality, I take to be bred between the smoothness of the inward surface of the pipe, which is wet, and the rest of the wood of the pipe unto which the wet cometh not, but it remaineth dry.

231. IN frosty weather music within doors soundeth better. Which may be by reason not of the disposition of the air, but of the wood or string of the instrument, which is made more crisp, and so more porous and hollow : and we see that old lutes sound better than new for the same reason. And so do lute-strings that have been kept long.

232. SOUND is likewise meliorated by the mingling of open air with pent air ; therefore trial may be made of a lute or viol with a double belly ; making another belly with a knot over the strings ; yet so, as there be room enough for the strings, and room enough to play below that belly. Trial may be made also of an Irish harp, with a concave on both sides ; whereas it useth to have it but on one side. The doubt may be, lest it should make too much resounding ; whereby one note would overtake another.

233. IF you sing in the hole of a drum, it maketh the singing more sweet. And so I conceive it would, if it were a song in parts sung into several drums ; and for handsomeness and strangeness sake, it would not be amiss to have a curtain between the place where the drums are and the hearers.

234. WHEN a sound is created in a wind-instrument between the breath and the air, yet if the sound be communicated with a more equal body of the pipe, it meliorateth the sound. For, no doubt, there would be a differing sound in a trumpet or pipe of wood ; and again in a trumpet or pipe of brass. It were good to try recorders and hunters horns of brass, what the sound would be.

235. SOUNDS are meliorated by the intension of the sense, where the common sense is collected most to the particular sense of hearing, and the sight suspended : and therefore sounds are sweeter, as well as greater, in the night than in the day ; and I suppose they are sweeter to blind men than to others : and it is manifest that between sleeping and waking, when all the senses are bound and suspended, music is far sweeter than when one is fully waking.

Experiments

Experiments in concert touching the imitation of sounds.

236. It is a thing strange in nature when it is attentively considered, how children, and some birds, learn to imitate speech. They take no mark at all of the motion of the mouth of him that speaketh, for birds are as well taught in the dark as by light. The sounds of speech are very curious and exquisite: so one would think it were a lesson hard to learn. It is true that it is done with time, and by little and little, and with many essays and profers: but all this dischargeth not the wonder. It would make a man think, though this which we shall say may seem exceeding strange, that there is some transmission of spirits; and that the spirits of the teacher put in motion, should work with the spirits of the learner a pre-disposition to offer to imitate; and so to perfect the imitation by degrees. But touching operations by transmissions of spirits, which is one of the highest secrets in nature, we shall speak in due place; chiefly when we come to inquire of imagination. But as for imitation, it is certain that there is in men and other creatures a pre-disposition to imitate. We see how ready apes and monkeys are to imitate all motions of man; and in the catching of dottrels, we see how the foolish bird playeth the ape in gestures: and no man, in effect, doth accompany with others, but he learneth, ere he is aware, some gesture, or voice or fashion of the other.

237. In imitation of sounds, that man should be the teacher is no part of the matter; for birds will learn one of another; and there is no reward by feeding, or the like, given them for the imitation; and besides, you shall have parrots that will not only imitate voices, but laughing, knocking, squeaking of a door upon the hinges, or of a cart-wheel; and, in effect, any other noise they hear.

238. No beast can imitate the speech of man but birds only; for the ape itself, that is so ready to imitate otherwise, attaineth not any degree of imitation of speech.

It is true, that I have known a dog, that if one howled in his ear, he would fall a howling a great while. What should be the aptness of birds in comparison of beasts, to imitate the speech of man, may be further inquired. We see that beasts have those parts which they count the instruments of speech, as lips, teeth, *etc.* liker unto man than birds. As for the neck, by which the throat passeth, we see many beasts have it for the length as much as birds. What better gorge or artery birds have, may be farther inquired. The birds that are known to be speakers, are parrots, pies, jays, daws, and ravens. Of which parrots have an adunque bill, but the rest not.

239. BUT I conceive, that the aptness of birds is not so much in the conformity of the organs of speech, as in their attention. For speech must come by hearing and learning; and birds give more heed, and mark sounds more than beasts; because naturally they are more delighted with them, and practise them more, as appeareth in their singing. We see also that those that teach birds to sing, do keep them waking to increase their attention. We see also, that cock birds amongst singing birds are ever the better singers; which may be because they are more lively and listen more.

240. LABOUR and intention to imitate voices, doth conduce much to imitation: and therefore we see that there be certain *pantomimi*, that will represent the voices of players of interludes so to the life, as if you see them not you would think they were those players themselves; and so the voices of other men that they hear.

241. THERE have been some that could counterfeit the distance of voices, which is a secondary object of hearing, in such sort, as when they stand fast by you, you
would

would think the speech came from afar off, in a fearful manner. How this is done may be further inquired. But I see no great use of it but for imposture, in counterfeiting ghosts or spirits.

Experiments in consort touching the reflexion of sounds.

THERE be three kinds of reflexions of sounds; a reflexion concurrent, a reflexion iterant, which we call echo; and a super-reflexion, or an echo of an echo; whereof the first hath been handled in the title of magnitude of sounds: the latter two we will now speak of.

242. THE reflexion of species visible by mirrors you may command; because passing in right lines they may be guided to any point: but the reflexion of sounds is hard to master; because the sound filling great spaces in arched lines, cannot be so guided: and therefore we see there hath not been practised any means to make artificial echos. And no echo already known returneth in a very narrow room.

243. THE natural echos are made upon walls, woods, rocks, hills, and banks; as for waters, being near, they make a concurrent echo; but being farther off, as upon a large river, they make an iterant echo: for there is no difference between the concurrent echo and the iterant, but the quickness or slowness of the return. But there is no doubt but water doth help the dilation of echo; as well as it helpeth the dilation of original sounds.

244. IT is certain, as hath been formerly touched, that if you speak through a trunk stopped at the farther end, you shall find a blast return upon your mouth, but no sound at all. The cause is, for that the closeness which preserveth the original, is not able to preserve the reflected sound: besides that echos are seldom created but by loud sounds. And therefore there is less hope of artificial echos in air pent in a narrow concave. Nevertheless it hath been tried, that one leaning over a well of twenty five fathom deep, and speaking, though but softly, yet not so soft as a whisper, the water returned a good audible echo. It should be tried, whether speaking in caves, where there is no issue save where you speak, will not yield echos as wells do.

245. THE echo cometh as the original sound doth, in a round orb of air: it were good to try the creating of the echo where the body repercussing maketh an angle: as against the return of a wall, *etc.* Also we see that in mirrors there is the like angle of incidence, from the object to the glass, and from the glass to the eye. And if you strike a ball side-long, not full upon the surface, the rebound will be as much the contrary way: whether there be any such resilience in echos, that is, whether a man shall hear better if he stand aside the body repercussing, than if he stand where he speaketh, or any where in a right line between, may be tried. Trial likewise should be made, by standing nearer the place of repercussing than he that speaketh; and again by standing farther off than he that speaketh; and so knowledge would be taken, whether echos, as well as original sounds, be not strongest near hand.

246. THERE be many places where you shall hear a number of echos one after another: and it is when there is variety of hills or woods, some nearer, some farther off: so that the return from the farther, being last created, will be likewise last heard.

247. As the voice goeth round, as well towards the back, as towards the front of him that speaketh; so likewise doth the echo: for you have many back echos to the place where you stand.

248. To make an echo that will report three, or four, or five words distinctly, it is requisite that the body repercussing be a good distance off: for if it be near, and yet not so near as to make a concurrent echo, it choppeth with you upon the sudden. It is requisite likewise that the air be not much pent: for air at a great distance pent, worketh the same effect with air at large in a small distance. And therefore in the trial of speaking in the well, though the well was deep, the voice came back suddenly, and would bear the report but of two words.

249. FOR echos upon echos, there is a rare instance thereof in a place which I will now exactly describe. It is some three or four miles from Paris, near a town called Pont-Charenton; and some bird-bolt shot or more from the river of Sein. The room is a chapel or small church. The walls all standing, both at the sides and at the ends. Two rows of pillars, after the manner of isles of churches, also standing; the roof all open, not so much as any embowment near any of the walls left. There was against every pillar a stack of billets above a man's height; which the watermen that bring wood down the Sein in stacks, and not in boats, laid there, as it seemeth for their ease. Speaking at the one end, I did hear it return the voice thirteen several times; and I have heard of others, that it would return sixteen times: for I was there about three of the clock in the afternoon: and it is best, as all other echos are, in the evening. It is manifest that it is not echos from several places, but a tossing of the voice, as a ball, to and fro; like to reflexions in looking-glasses, where if you place one glass before; and another behind, you shall see the glass behind with the image, within the glass before; and again, the glass before in that; and divers such super-reflexions, till the *species speciei* at last die. For it is every return weaker and more shady. In like manner the voice in that chapel createth *speciem speciei*, and maketh succeeding super-reflexions; for it melteth by degrees, and every reflexion is weaker than the former: so that if you speak three words, it will, perhaps, some three times report you the whole three words; and then the two latter words for some times; and then the last word alone for some times; still fading and growing weaker. And whereas in echos of one return, it is much to hear four or five words; in this echo of so many returns upon the matter, you hear above twenty words for three.

250. THE like echo upon echo, but only with two reports, hath been observed to be, if you stand between a house and a hill, and lure towards the hill. For the house will give a back echo; one taking it from the other, and the latter the weaker.

251. THERE are certain letters that an echo will hardly express; as S for one, especially being principal in a word. I remember well, that when I went to the echo at Pont-Charenton, there was an old Parisian, that took it to be the work of spirits, and of good spirits. For, said he, call *Satan*, and the echo will not deliver back the devil's name; but will say *va t'en*; which is as much in French as *apage*, or void. And thereby I did hap to find, that an echo would not return S, being but a hissing and an interior sound.

252. ECHOS are some more sudden, and chop again as soon as the voice is delivered; as hath been partly said: others are more deliberate, that is, give more space between the voice and the echo; which is caused by the local nearness or distance: some will report a longer train of words, and some a shorter: some more loud, full as loud as the original, and sometimes more loud, and some weaker and fainter.

253. WHERE echos come from several parts at the same distance, they must needs make, as it were, a choir of echos, and so make the report greater, and even a con-

tinued

tinued echo ; which you shall find in some hills that stand encompassed theatre-like.

254. IT doth not yet appear that there is refraction in sounds, as well as in species visible. For I do not think, that if a sound should pass through divers mediums, as air, cloth, wood, it would deliver the sound in a different place from that unto which it is deferred ; which is the proper effect of refraction. But majoration, which is also the work of refraction, appeareth plainly in sounds, as hath been handled at full, but it is not by diversity of mediums.

Experiments in consort touching the consent and dissent between visibles and audibles.

WE have *obiter*, for demonstration's sake, used in divers instances the examples of the light and things visible, to illustrate the nature of sounds : but we think good now to prosecute that comparison more fully.

Consent of visibles and audibles.

255. BOTH of them spread themselves in round, and fill a whole floor or orb unto certain limits : and are carried a great way : and do languish and lessen by degrees, according to the distance of the objects from the sensories.

256. BOTH of them have the whole species in every small portion of the air or medium, so as the species do pass through small crannies without confusion : as we see ordinarily in levels, as to the eye ; and in crannies or chinks, as to the sound.

257. BOTH of them are of a sudden and easy generation and dilation ; and likewise perish swiftly and suddenly ; as if you remove the light, or touch the bodies that give the sound.

258. BOTH of them do receive and carry exquisite and accurate differences ; as of colours, figures, motions, distances, in visibles ; and of articulate voices, tones, songs and quaverings, in audibles.

259. BOTH of them, in their virtue and working, do not appear to emit any corporal substance into their mediums, or the orb of their virtue ; neither again to raise or stir any evident local motion in their mediums as they pass ; but only to carry certain spiritual species ; the perfect knowledge of the cause whereof, being hitherto scarcely attained, we shall search and handle in due place.

260. BOTH of them seem not to generate or produce any other effect in nature, but such as appertaineth to their proper objects and senses, and are otherwise barren.

261. BUT both of them in their own proper action do work three manifest effects. The first, in that the stronger species drowneth the lesser ; as the light of the sun, the light of a glow-worm ; the report of an ordnance, the voice : The second, in that an object of surcharge or excess destroyeth the sense ; as the light of the sun the eye ; a violent sound near the ear the hearing : The third, in that both of them will be reverberate ; as in mirrors and in echos.

262. NEITHER of them doth destroy or hinder the species of the other, although they encounter in the same medium ; as light or colour hinder not sound, nor *à coura*.

263. BOTH of them affect the sense in living creatures, and yield objects of pleasure and dislike : yet nevertheless the objects of them do also, if it be well observed, affect and work upon dead things ; namely such as have some conformity with the organs of

of the two senses : as visibles work upon a looking-glass, which is like the pupil of the eye ; and audibles upon the places of echo, which resemble in some sort the cavern and structure of the ear.

264. BOTH of them do diversly work, as they have their medium diversly disposed. So a trembling medium, as smoke, maketh the object seem to tremble ; and a rising and falling medium, as winds, maketh the sounds to rise or fall.

265. To both, the medium, which is the most propitious and conducible, is air ; for glass or water, *etc.* are not comparable.

266. IN both of them, where the object is fine and accurate, it conduceth much to have the sense intente and erect ; infomuch as you contract your eye when you would see sharply ; and erect your ear when you would hear attentively ; which in beasts that have ears moveable is most manifest.

267. THE beams of light, when they are multiplied and conglomerate, generate heat ; which is a different action from the action of sight : and the multiplication and conglomeration of sounds doth generate an extreme rarefaction of the air ; which is an action materiate, differing from the action of sound ; if it be true, which is anciently reported, that birds with great shouts have fallen down.

Differents of visibles and audibles.

268. THE species of visibles seem to be emissions of beams from the object seen, almost like odours, save that they are more incorporeal : but the species of audibles seem to participate more with local motion, like percussions, or impressions made upon the air. So that whereas all bodies do seem to work in two manners, either by the communication of their natures, or by the impressions and signatures of their motions ; the diffusion of species visible seemeth to participate more of the former operation, and the species audible of the latter.

269. THE species of audibles seem to be carried more manifestly through the air than the species of visibles : for I conceive that a contrary strong wind will not much hinder the sight of visibles, as it will do the hearing of sounds.

270. THERE is one difference above all others between visibles and audibles, that is the most remarkable, as that whereupon many smaller differences do depend : namely, that visibles, except lights, are carried in right lines, and audibles in arcuate lines. Hence it cometh to pass, that visibles do not intermingle and confound one another, as hath been said before ; but sounds do. Hence it cometh, that the solidity of bodies doth not much hinder the sight, so that the bodies be clear, and the pores in a right line, as in glass, crystal, diamonds, water, *etc.* but a thin scarf or handkerchief, though they be bodies nothing so solid, hinder the sight : whereas, contrariwise, these porous bodies do not much hinder the hearing, but solid bodies do almost stop it, or at the least attenuate it. Hence also it cometh, that to the reflexion of visibles small glasses suffice ; but to the reverberation of audibles are required greater spaces, as hath likewise been said before.

271. VISIBLES are seen farther off than sounds are heard ; allowing nevertheless the rate of their bigness ; for otherwise a great sound will be heard farther off than a small body seen.

272. VISIBLES require, generally, some distance between the object and the eye, to be better seen ; whereas in audibles, the nearer the approach of the sound is to the sense, the better. But in this there may be a double error. The one because to seeing there is required light ; and any thing that toucheth the pupil of the eye all over

excludeth the light. For I have heard of a person very credible, who himself was cured of a cataract in one of his eyes, that while the silver needle did work upon the sight of his eye, to remove the film of the cataract, he never saw any thing more clear or perfect than that white needle: which, no doubt, was, because the needle was lesser than the pupil of the eye, and so took not the light from it. The other error may be, for that the object of sight doth strike upon the pupil of the eye directly without any interception; whereas the cave of the ear doth hold off the sound a little from the organ: and so nevertheless there is some distance required in both.

273. VISIBLES are swiffter carried to the sense than audibles; as appeareth in thunder and lightning, flame and report of a piece, motion of the air in hewing of wood. All which have been set down heretofore, but are proper for this title.

274. I conceive also, that the species of audibles do hang longer in the air than those of visibles: for although even those of visibles do hang some time, as we see in rings turned, that shew like spheres; in lute-strings filipped; a fire-brand carried along, which leaveth a train of light behind it; and in the twilight; and the like: yet I conceive that sounds stay longer, because they are carried up and down with the wind; and because of the distance of the time in ordnance discharged, and heard twenty miles off.

275. IN visibles there are not found objects so odious and ingrate to the sense as in audibles. For foul sights do rather displease, in that they excite the memory of foul things, than in the immediate objects. And therefore in pictures, those foul sights do not much offend; but in audibles, the grating of a saw, when it is sharpened, doth offend so much, as it setteth the teeth on edge. And any of the harsh discords in music the ear doth straightways refuse.

276. IN visibles, after great light, if you come suddenly into the dark, or contrariwise, out of the dark into a glaring light, the eye is dazzled for a time, and the sight confused; but whether any such effect be after great sounds, or after a deep silence, may be better inquired. It is an old tradition, that those that dwell near the cataracts of Nilus, are struck deaf: but we find no such effect in cannoniers, nor millers, nor those that dwell upon bridges.

277. IT seemeth that the impression of colour is so weak, as it worketh not but by a cone of direct beams, or right lines, whereof the basis is in the object, and the vertical point in the eye; so as there is a coradiation and conjunction of beams; and those beams so sent forth, yet are not of any force to beget the like borrowed or second beams, except it be by reflexion, whereof we speak not. For the beams pass and give little tincture to that air which is adjacent; which if they did, we should see colours out of a right line. But as this is in colours, so otherwise it is in the body of light. For when there is a skreen between the candle and the eye, yet the light passeth to the paper whereon one writeth; so that the light is seen where the body of the flame is not seen, and where any colour, if it were placed where the body of the flame is, would not be seen. I judge that sound is of this latter nature; for when two are placed on both sides of a wall, and the voice is heard, I judge it is not only the original sound which passeth in an arched line; but the sound which passeth above the wall in a right line, begetteth the like motion round about it as the first did, though more weak.

Experiments in consort touching the sympathy or antipathy of sounds one with another.

278. ALL concords and discords of music are, no doubt, sympathies and antipathies of sounds. And so, likewise, in that music which we call broken music, or consort music,

music, some consorts of instruments are sweeter than others, a thing not sufficiently yet observed: as the Irish harp and base viol agree well: the recorder and stringed music agree well: organs and the voice agree well, *etc.* But the virginals and the lute; or the Welsh harp and Irish harp; or the voice and pipes alone, agree not so well; but for the melioration of music, there is yet much left, in this point of exquisite consorts, to try and inquire.

279. THERE is a common observation, that if a lute or viol be laid upon the back, with a small straw upon one of the strings; and another lute or viol be laid by it; and in the other lute or viol the unison to that string be struck, it will make the string move; which will appear both to the eye, and by the straw's falling off. The like will be, if the diapason or eighth to that string be struck, either in the same lute or viol, or in others lying by; but in none of these there is any report of sound that can be discerned, but only motion.

280. IT was devised, that a viol should have a lay of wire-strings below, as close to the belly as a lute; and then the strings of guts mounted upon a bridge as in ordinary viols; to the end that by this means the upper strings struck, should make the lower resound by sympathy, and so make the music the better; which if it be to purpose, then sympathy worketh as well by report of sound as by motion. But this device I conceive to be of no use, because the upper strings, which are stopped in great variety, cannot maintain a diapason or unison with the lower, which are never stopped. But if it should be of use at all, it must be in instruments which have no stops; as virginals and harps; wherein trial may be made of two rows of strings, distant the one from the other.

281. THE experiment of sympathy may be transferred, perhaps, from instruments of strings to other instruments of sound. As to try, if there were in one steeple two bells of unison, whether the striking of the one would move the other, more than if it were another accord: and so in pipes, if they be of equal bore and sound, whether a little straw or feather would move in the one pipe, when the other is blown at an unison.

282. IT seemeth, both in ear and eye, the instrument of sense hath a sympathy or similitude with that which giveth the reflection, as hath been touched before: for as the sight of the eye is like a crystal, or glass, or water; so is the ear a sinuous cave, with a hard bone to stop and reverberate the sound: which is like to the places that report echos.

Experiments in consort touching the limbering or helping of the hearing.

283. WHEN a man yawneth, he cannot hear so well. The cause is, for that the membrane of the ear is extended; and so rather casteth off the sound than draweth it to.

284. WE hear better when we hold our breath than contrary; insomuch as in all listening to attain a sound afar off, men hold their breath. The cause is, for that in all expiration the motion is outwards; and therefore rather driveth away the voice than draweth it: and besides we see, that in all labour to do things with any strength, we hold the breath; and listening after any sound that is heard with difficulty, is a kind of labour.

285. LET it be tried, for the help of the hearing, and I conceive it likely to succeed, to make an instrument like a tunnel; the narrow part whereof may be of the bigness of the hole of the ear; and the broader end much larger, like a bell at the

skirts; and the length half a foot or more. And let the narrow end of it be set close to the ear: and mark whether any sound, abroad in the open air, will not be heard distinctly from farther distance, than without that instrument; being, as it were, an ear-spectacle. And I have heard there is in Spain an instrument in use to be set to the ear, that helpeth somewhat those that are thick of hearing.

286. If the mouth be shut close, nevertheless there is yielded by the roof of the mouth a murmur; such as is used by dumb men. But if the nostrils be likewise stopped, no such murmur can be made: except it be in the bottom of the palate towards the throat. Whereby it appeareth manifestly, that a sound in the mouth, except such as aforesaid, if the mouth be stopped, passeth from the palate through the nostrils.

Experiments in consort touching the spiritual and five nature of sounds.

287. THE repercussion of sounds, which we call echo, is a great argument of the spiritual essence of sounds. For if it were corporeal, the repercussion should be created in the same manner, and by like instruments, with the original sound: but we see what a number of exquisite instruments must concur in speaking of words, whereof there is no such matter in the returning of them, but only a plain stop and repercussion.

288. THE exquisite differences of articulate sounds, carried along in the air, shew that they cannot be signatures or impressions in the air, as hath been well refuted by the ancients. For it is true, that seals make excellent impressions; and so it may be thought of sounds in their first generation: but then the dilation and continuance of them without any new sealing, shew apparently they cannot be impressions.

289. ALL sounds are suddenly made, and do suddenly perish: but neither that, nor the exquisite differences of them, is matter of so great admiration: for the quaverings and warblings in lutes and pipes are as swift; and the tongue, which is no very fine instrument, doth in speech make no fewer motions than there be letters in all the words which are uttered. But that sounds should not only be so speedily generated, but carried so far every way in such a momentary time, deserveth more admiration. As for example; if a man stand in the middle of a field and speak aloud, he shall be heard a furlong in a round; and that shall be in articulate sounds; and those shall be entire in every little portion of the air; and this shall be done in the space of less than a minute.

290. THE sudden generation and perishing of sounds, must be one of these two ways. Either that the air suffereth some force by sound, and then restoreth itself, as water doth; which being divided, maketh many circles, till it restore itself to the natural consistence: or otherwise, that the air doth willingly imbibe the sound as grateful, but cannot maintain it; for that the air hath, as it should seem, a secret and hidden appetite of receiving the sound at the first; but then other gross and more materiate qualities of the air straightways suffocate it; like unto flame, which is generated with alacrity, but straight quenched by the enmity of the air or other ambient bodies.

There be these differences, in general, by which sounds are divided: 1. Musical, immusical. 2. Treble, base. 3. Flat, sharp. 4. Soft, loud. 5. Exterior, interior. 6. Clean, harsh or purling. 7. Articulate, inarticulate.

We have laboured, as may appear, in this inquisition of sounds diligently; both because sound is one of the most hidden portions of nature, as we said in the beginning,

ning, and because it is a virtue which may be called incorporeal and immateriate; whereof there be in nature but few. Besides, we were willing, now in these our first centuries, to make a pattern or precedent of an exact inquisition; and we shall do the like hereafter in some other subjects which require it. For we desire that men should learn and perceive, how severe a thing the true inquisition of nature is; and should accustom themselves by the light of particulars to enlarge their minds to the amplitude of the world, and not reduce the world to the narrowness of their minds.

Experiment solitary touching the orient colours in dissolution of metals.

291. METALS give orient and fine colours in dissolutions; as gold giveth an excellent yellow; quicksilver an excellent green; tin giveth an excellent azure: likewise in their putrefactions or rusts; as vermilion, verdegrease, bise, cirrus, *etc.* and likewise in their vitrifications. The cause is, for that by their strength of body they are able to endure the fire or strong waters, and to be put into an equal posture; and again to retain part of their principal spirit; which two things, equal posture and quick spirits, are required chiefly to make colours lightsome.

Experiment solitary touching prolongation of life.

292. IT conduceth unto long life, and to the more placid motion of the spirits, which thereby do less prey and consume the juice of the body, either that mens actions be free and voluntary, that nothing be done *invita Minerva*, but *secundum genium*; or on the other side, that the actions of men be full of regulation and commands within themselves: for then the victory and performing of the command giveth a good disposition to the spirits; especially if there be a proceeding from degree to degree; for then the sense of the victory is the greater. An example of the former of these is in a country life; and of the latter in monks and philosophers, and such as do continually enjoy themselves.

Experiment solitary touching appetite of union in bodies.

293. IT is certain that in all bodies there is an appetite of union and evitation-of-
solution of continuity: and of this appetite there be many degrees; but the most remarkable and fit to be distinguished are three. The first in liquors; the second in hard bodies; and the third in bodies cleaving or tenacious. In liquors this appetite is weak: we see in liquors, the threading of them in stillicides, as hath been said; the falling of them in round drops, which is the form of union; and the staying of them for a little time in bubbles and froth. In the second degree or kind, this appetite is strong; as in iron, in stone, in wood, *etc.* In the third, this appetite is in a medium between the other two: for such bodies do partly follow the touch of another body, and partly stick and continue to themselves; and therefore they rope, and draw themselves in threads; as we see in pitch, glue, birdlime, *etc.* But note, that all solid bodies are cleaving more or less: and that they love better the touch of somewhat that is tangible, than of air. For water in small quantity cleaveth to any thing that is solid; and so would metal too, if the weight drew it not off. And therefore gold foliate, or any metal foliate, cleaveth: but those bodies which are noted to be clammy and cleaving, are such as have a more indifferent appetite at once to follow another body, and to hold to themselves. And therefore they are commonly bodies ill mixed; and which take more pleasure in a foreign body, than in preserving their own consilience; and which have little predominance in drought or moisture.

Experiment

Experiment solitary touching the like operations of heat and time.

294. TIME and heat are fellows in many effects. Heat drieth bodies that do easily expire; as parchment, leaves, roots, clay, *etc.* And so doth time or age arefy; as in the same bodies, *etc.* Heat dissolveth and melteth bodies that keep in their spirits; as in divers liquefactions: and so doth time in some bodies of a softer consistence, as is manifest in honey, which by age waxeth more liquid; and the like in sugar; and so in old oil, which is ever more clear and more hot in medicinale use. Heat causeth the spirits to search some issue out of the body; as in the volatility of metals; and so doth time; as in the rust of metals. But generally heat doth that in a small time, which age doth in long.

Experiment solitary touching the differing operations of fire and time.

295. SOME things which pass the fire are softest at first, and by time grow hard, as the crumb of bread. Some are harder when they come from the fire, and afterwards give again, and grow soft, as the crust of bread, bisket, sweet-meats, salt, *etc.* The cause is, for that in those things which wax hard with time, the work of the fire is a kind of melting; and in those that wax soft with time, contrariwise, the work of the fire is a kind of baking; and whatsoever the fire baketh, time doth in some degree dissolve.

Experiment solitary touching motions by imitation.

296. MOTIONS pass from one man to another, not so much by exciting imagination, as by imitation; especially if there be an aptness or inclination before. Therefore gaping, or yawning, and stretching do pass from man to man; for that that causeth gaping and stretching is, when the spirits are a little heavy by any vapour, or the like. For then they strive, as it were, to wring out and expel that which loadeth them. So men drowsy, and desirous to sleep, or before the fit of an ague, do use to yawn and stretch; and do likewise yield a voice or sound, which is an interjection of expulsion: so that if another be apt and prepared to do the like, he followeth by the sight of another. So the laughing of another maketh to laugh.

Experiment solitary touching infectious diseases.

297. THERE be some known diseases that are infectious; and others that are not. Those that are infectious are, first, such as are chiefly in the spirits, and not so much in the humours; and therefore pass easily from body to body: such are pestilences, lipitudes, and such like. Secondly, such as taint the breath, which we see passeth manifestly from man to man; and not invisibly, as the affects of the spirits do: such are consumptions of the lungs, *etc.* Thirdly, such as come forth to the skin, and therefore taint the air or the body adjacent; especially if they consist in an unctuous substance not apt to dissipate; such are scabs and leprosy. Fourthly, such as are merely in the humours, and not in the spirits, breath, or exhalations: and therefore they never infect but by touch only; and such a touch also as cometh within the *epidermis*; as the venom of the French-pox, and the biting of a mad dog.

Experiment solitary touching the incorporation of powders and liquors.

298. MOST powders grow more close and coherent by mixture of water, than by mixture of oil, though oil be the thicker body; as meal, *etc.* The reason is the congruity of bodies; which if it be more, maketh a perfecter imbibition and incorporation;
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tion ; which in most powders is more between them and water, than between them and oil : but painters colours ground, and ashes, do better incorporate with oil.

Experiment solitary touching exercise of the body.

299. MUCH motion and exercise is good for some bodies ; and sitting and less motion for others. If the body be hot and void of superfluous moitures, too much motion hurteth : and it is an error in physicians, to call too much upon exercise. Likewise men ought to beware, that they use not exercise and a spare diet both : but if much exercise, then a plentiful diet ; and if sparing diet, then little exercise. The benefits that come of exercise are, first, that it sendeth nourishment into the parts more forcibly. Secondly, that it helpeth to excern by sweat, and so maketh the parts assimilate the more perfectly. Thirdly, that it maketh the substance of the body more solid and compact ; and so less apt to be contumed and depredated by the spirits. The evils that come of exercise are, first, that it maketh the spirits more hot and predatory. Secondly, that it doth absorb likewise, and attenuate too much the moisture of the body. Thirdly, that it maketh too great concussion, especially if it be violent, of the inward parts, which delight more in rest. But generally exercise, if it be much, is no friend to prolongation of life ; which is one cause why women live longer than men, because they stir less.

Experiment solitary touching meats that induce satiety.

300. SOME food we may use long, and much, without glutting ; as bread, flesh that is not fat or rank, *etc.* Some other, though pleasant, glutteth sooner ; as sweet meats, fat meats, *etc.* The cause is, for that appetite consisteth in the emptiness of the mouth of the stomach ; or possessing it with somewhat that is astringent ; and therefore cold and dry. But things that are sweet and fat are more filling ; and do swing and hang more about the mouth of the stomach ; and go not down so speedily : and again turn sooner to chol'er, which is hot and ever abateth the appetite. We see also, that another cause of satiety is an over-custom ; and of appetite is novelty ; and therefore meats, if the same be continually taken, induce loathing. To give the reason of the distaste of satiety, and of the pleasure of novelty ; and to distinguish not only in meats and drinks, but also in motions, loves, company, delights, studies, what they be that custom maketh more grateful, and what more tedious, were a large field. But for meats, the cause is attraction, which is quicker, and more excited towards that which is new, than towards that whereof there remaineth a relish by former use. And, generally, it is a rule, that whatsoever is somewhat ingrate at first, is made grateful by custom ; but whatsoever is too pleasing at first, groweth quickly to satiate.

NATURAL HISTORY.

CENTURY IV.

Experiments in consort touching the clarification of liquors, and the accelerating thereof.

ACCCELERATION of time, in works of nature, may well be esteemed *inter magnalia naturae*. And even in divine miracles, accelerating of the time is next to the creating of the matter. We will now therefore proceed to the inquiry of it: and for acceleration of germination, we will refer it over unto the place where we shall handle the subject of plants generally; and will now begin with other accelerations.

301. LIQUORS are, many of them, at the first thick and troubled; as muste, wort, juices of fruits, or herbs expressed, *etc.* and by time they settle and clarify. But to make them clear before the time, is a great work; for it is a spur to nature, and putteth her out of her pace: and, besides, it is of good use for making drinks and sauces potable and serviceable speedily. But to know the means of accelerating clarification, we must first know the causes of clarification. The first cause is, by the separation of the grosser parts of the liquor from the finer. The second, by the equal distribution of the spirits of the liquor with the tangible parts: for that ever representeth bodies clear and untroubled. The third, by the refining the spirit itself, which thereby giveth to the liquor more splendor and more lustre.

302. FIRST, for separation, it is wrought by weight, as in the ordinary residence or settlement of liquors; by heat, by motion, by precipitation, or sublimation, that is, a calling of the several parts either up or down, which is a kind of attraction; by adhesion, as when a body more viscous is mingled and agitated with the liquor, which viscous body, afterwards severed, draweth with it the grosser parts of the liquor; and lastly, by percolation or passage.

303. SECONDLY, for the even distribution of the spirits, it is wrought by gentle heat; and by agitation or motion, for of time we speak not, because it is that we would anticipate and represent; and it is wrought also by mixture of some other body, which hath a virtue to open the liquor, and to make the spirits the better pass through.

304. THIRDLY, for the refining of the spirit, it is wrought likewise by heat; by motion; and by mixture of some body which hath virtue to attenuate. So therefore, having shewn the causes, for the accelerating of clarification in general, and the inducing of it, take these instances and trials.

305. IT is in common practice to draw wine or beer from the lees, which we call racking, whereby it will clarify much the sooner: for the lees, though they keep the drink in heart, and make it lasting; yet withal they cast up some spissitude: and this instance is to be referred to separation.

306. ON the other side it were good to try, what the adding to the liquor more lees than his own will work ; for though the lees do make the liquor turbid, yet they refine the spirits. Take therefore a vessel of new beer, and take another vessel of new beer, and rack the one vessel from the lees, and pour the lees of the racked vessel into the unracked vessel, and see the effect : this instance is referred to the refining of the spirits.

307. TAKE new beer, and put in some quantity of stale beer into it, and see whether it will not accelerate the clarification, by opening the body of the beer, and cutting the grosser parts, whereby they may fall down into lees. And this instance again is referred to separation.

308. THE longer malt or herbs, or the like, are infused in liquor, the more thick and troubled the liquor is ; but the longer they be decocted in the liquor, the clearer it is. The reason is plain, because in infusion, the longer it is, the greater is the part of the gross body that goeth into the liquor : but in decoction, though more goeth forth, yet it either purgeth at the top, or settleth at the bottom. And therefore the most exact way to clarify is, first, to infuse, and then to take off the liquor and decoct it ; as they do in beer, which hath malt first infused in the liquor, and is afterwards boiled with the hop. This also is referred to separation.

309. TAKE hot embers, and put them about a bottle filled with new beer, almost to the very neck ; let the bottle be well stopped, lest it fly out : and continue it, renewing the embers every day, by the space of ten days ; and then compare it with another bottle of the same beer set by. Take also lime both quenched and unquenched, and set the bottles in them *ut supra*. This instance is referred both to the even distribution, and also to the refining of the spirits by heat.

310. TAKE bottles and swing them, or carry them in a wheel-barrow upon rough ground, twice in a day : but then you may not fill the bottles full, but leave some air ; for if the liquor come close to the stopple, it cannot play nor flower : and when you have shaken them well either way, pour the drink into another bottle stopped close after the usual manner ; for if it stay with much air in it, the drink will pall ; neither will it settle so perfectly in all the parts. Let it stand some twenty four hours : then take it, and put it again into a bottle with air, *ut supra* : and thence into a bottle stopped, *ut supra* : and so repeat the same operation for seven days. Note, that in the emptying of one bottle into another, you must do it swiftly lest the drink pall. It were good also to try it in a bottle with a little air below the neck, without emptying. This instance is referred to the even distribution and refining of the spirits by motion.

311. As for percolation inward and outward, which belongeth to separation, trial would be made of clarifying by adhesion, with milk put into new beer, and stirred with it : for it may be that the grosser part of the beer will cleave to the milk : the doubt is, whether the milk will sever well again ; which is soon tried. And it is usual in clarifying hippocras to put in milk ; which after severeth and carrieth with it the grosser parts of the hippocras, as hath been said elsewhere. Also for the better clarification by percolation, when they tun new beer, they use to let it pass through a strainer ; and it is like the finer the strainer is, the clearer it will be.

Experiments in consort touching maturation, and the accelerating thereof. And first touching the maturation and quickning of drinks. And next, touching the maturation of fruits.

THE accelerating of maturation we will now inquire of. And of maturation itself. It is of three natures. The maturation of fruits : the maturation of drinks : and the maturation of impostumes and ulcers. This last we refer to another place, where we shall handle experiments medicinal. There be also other maturations, as of metals, *etc.* whereof we will speak as occasion serveth. But we will begin with that of drinks, because it hath such affinity with the clarification of liquors.

312. FOR the maturation of drinks, it is wrought by the congregation of the spirits together, whereby they digest more perfectly the grosser parts : and it is effected partly by the same means that clarification is, whereof we spake before, but then note, that an extreme clarification doth spread the spirits so smooth, as they become dull, and the drink dead, which ought to have a little flowering. And therefore all your clear amber drink is flat.

313. WE see the degrees of maturation of drinks ; in muste, in wine, as it is drunk, and in vinegar. Whereof muste hath not the spirits well congregated ; wine hath them well united, so as they make the parts somewhat more oily ; vinegar hath them congregated, but more jejune, and in smaller quantity, the greatest and finest spirit and part being exhaled : for we see vinegar is made by setting the vessel of wine against the hot sun ; and therefore vinegar will not burn ; for that much of the finer parts is exhaled.

314. THE refreshing and quickning of drink palled or dead, is by enforcing the motion of the spirit : so we see that open weather relaxeth the spirit, and maketh it more lively in motion. We see also bottling of beer or ale, while it is new and full of spirit, so that it spirteth when the stopple is taken forth, maketh the drink more quick and windy. A pan of coals in the cellar doth likewise good, and maketh the drink work again. New drink put to drink that is dead provoketh it to work again : nay, which is more, as some affirm, a brewing of new beer set by old beer, maketh it work again. It were good also to enforce the spirits by some mixtures, that may excite and quicken them ; as by putting into the bottles, nitre, chalk, lime, *etc.* We see cream is matured, and made to rise more speedily by putting in cold water ; which, as it seemeth, getteth down the whey.

315. IT is tried, that the burying of bottles of drink well stopped, either in dry earth a good depth ; or in the bottom of a well within water ; and best of all, the hanging of them in a deep well somewhat above the water for some fortnights space, is an excellent means of making drink fresh and quick : for the cold doth not cause any exhaling of the spirits at all, as heat doth, though it rarifieth the rest that remain : but cold maketh the spirits vigorous, and irritateth them, whereby they incorporate the parts of the liquor perfectly.

316. AS for the maturation of fruits ; it is wrought by the calling forth of the spirits of the body outward, and so spreading them more smoothly : and likewise by digesting in some degree the grosser parts : and this is effected by heat, motion, attraction ; and by a rudiment of putrefaction : for the inception of putrefaction hath in it a maturation.

317. THERE were taken apples, and laid in straw ; in hay ; in flour ; in chalk ; in lime ; covered over with onions ; covered over with crabs ; closed up in wax ;
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shut in a box, *etc.* There was also an apple hanged up in smoke; of all which the experiment sorteth in this manner.

318. AFTER a month's space, the apple inclosed in wax was as green and fresh as at the first putting in, and the kernels continued white. The cause is, for that all exclusion of open air, which is ever predatory, maintaineth the body in its first freshness and moisture: but the inconvenience is, that it tasteth a little of the wax; which, I suppose, in a pomgranate, or some such thick-coated fruit, it would not do.

319. THE apple hanged in the smoke, turned like an old mellow apple wrinkled, dry, soft, sweet, yellow within. The cause is, for that such a degree of heat, which doth neither melt nor scorch, for we see that in a great heat, a rost apple softneth and melteth; and pigs feet, made of quarters of wardens, scorch and have a skin of cole, doth mellow, and not adure: the smoke also maketh the apple, as it were, sprinkled with foot, which helpeth to mature. We see that in drying of pears and prunes in the oven, and removing of them often as they begin to sweat, there is a like operation; but that is with a far more intense degree of heat.

320. The apples covered in the lime and ashes were well matured; as appeared both in their yellowness and sweetness. The cause is, for that that degree of heat which is in lime and ashes, being a smothering heat, is of all the rest most proper, for it doth neither liquefy nor arefy; and that is true maturation. Note, that the taste of those apples was good; and therefore it is the experiment fitted for use.

321. THE apples covered with crabs and onions were likewise well matured. The cause is, not any heat; but for that the crabs and the onions draw forth the spirits of the apple, and spread them equally throughout the body; which taketh away hardness. So we see one apple ripeneth against another. And therefore in making of cyder they turn the apples first upon a heap. So one cluster of grapes that toucheth another whilst it groweth, ripeneth faster; *botrus contra botrum citius maturescit.*

322. THE apples in the hay and straw ripened apparently, though not so much as the other; but the apple in the straw more. The cause is, for that the hay and straw have a very low degree of heat, but yet close and smothering, and which drieth not.

323. The apple in the close box was ripened also: the cause is, for that all air kept close hath a degree of warmth: as we see in wool, furr, plush, *etc.* Note, that all these were compared with another apple of the same kind, that lay of itself: and in comparison of that were more sweet and more yellow, and so appeared to be more ripe.

324. TAKE an apple, or pear, or other like fruit, and roll it upon a table hard: we see in common experience, that the rolling doth soften and sweeten the fruit presently; which is nothing but the smooth distribution of the spirits into the parts: for the unequal distribution of the spirits maketh the harshness: but this hard rolling is between concoction, and a simple maturation; therefore, if you should roll them but gently, perhaps twice a-day; and continue it some seven days, it is like they would mature more finely, and like unto the natural maturation.

325. TAKE an apple, and cut out a piece of the top, and cover it, to see whether that solution of continuity will not hasten a maturation: we see that where a wasp, or a fly, or a worm hath bitten, in a grape, or any fruit, it will sweeten hastily.

326. TAKE an apple, *etc.* and prick it with a pin full of holes, not deep, and smear it a little with sack or cinnamon water, or spirit of wine, every day for ten days, to see if the virtual heat of the wine or strong waters will not mature it.

In these trials also, as was used in the first, set another of the same fruits by to compare them; and try them by their yellowness and by their sweetness.

Experiment solitary touching the making of gold.

THE world hath been much abused by the opinion of making of gold: the work itself I judge to be possible; but the means, hitherto propounded, to effect it, are, in the practice, full of error and imposture; and in the theory, full of unsound imaginations. For to say, that nature hath an intention to make all metals gold; and that, if she were delivered from impediments, she would perform her own work; and that if the crudities, impurities, and leprositities of metals were cured, they would become gold; and that a little quantity of the medicine, in the work of projection, will turn a sea of the baser metal into gold by multiplying: all these are but dreams; and so are many other grounds of alchemy. And to help the matter, the alchemists call in likewise many vanities out of astrology, natural magic, superstitious interpretations of Scriptures, auricular traditions, feigned testimonies of ancient authors, and the like. It is true, on the other side, they have brought to light not a few profitable experiments, and thereby made the world some amends. But we, when we shall come to handle the version and transmutation of bodies, and the experiments concerning metals and minerals, will lay open the true ways and passages of nature, which may lead to this great effect. And we commend the wit of the Chineses, who despair of making of gold, but are mad upon the making of silver: for certain it is, that it is more difficult to make gold, which is the most ponderous and materiate amongst metals, of other metals less ponderous and less materiate; than, *via versa*, to make silver of lead or quicksilver; both which are more ponderous than silver; so that they need rather a farther degree of fixation, than any condensation. In the mean time, by occasion of handling the axioms touching maturation, we will direct a trial touching the maturing of metals, and thereby turning some of them into gold: for we conceive indeed, that a perfect good concoction, or digestion, or maturation of some metals, will produce gold. And here we call to mind, that we knew a Dutchman, that had wrought himself into the belief of a great person, by undertaking that he could make gold: whose discourse was, that gold might be made; but that the alchemists over-fired the work: for, he said, the making of gold did require a very temperate heat, as being in nature a subterrany work, where little heat cometh; but yet more to the making of gold than of any other metal; and therefore that he would do it with a great lamp, that should carry a temperate and equal heat: and that it was the work of many months. The device of the lamp was folly; but the over-firing now used, and the equal heat to be required, and the making it a work of some good time, are no ill discourses.

WE resort therefore to our axioms of maturation, in effect touched before. The first is, that there be used a temperate heat; for they are ever temperate heats that digest and mature: wherein we mean temperate according to the nature of the subject; for that may be temperate to fruits and liquors, which will not work at all upon metals. The second is, that the spirits of the metal be quickened, and the tangible parts opened: for without these two operations, the spirit of the metal wrought upon

upon will not be able to digest the parts. The third is that the spirits do spread themselves even, and move not subsultorily ; for that will make the parts close and pliant. And this requireth a heat that doth not rise and fall, but continue as equal as may be. The fourth is, that no part of the spirit be emitted, but detained : for if there be emission of spirit the body of the metal will be hard and churlish. And this will be performed, partly by the temper of the fire ; and partly by the closeness of the vessel. The fifth is, that there be choice made of the likeliest and best prepared metal for the version : for that will facilitate the work. The sixth is, that you give time enough for the work : not to prolong hopes, as the alchemists do, but indeed to give nature a convenient space to work in. These principles are most certain and true ; we will now derive a direction of trial out of them, which may, perhaps, by farther meditation be improved.

327. LET there be a small furnace made of a temperate heat ; let the heat be such as may keep the metal perpetually molten, and no more ; for that above all importeth to the work. For the material, take silver, which is the metal that in nature symbolizeth most with gold ; put in also with the silver, a tenth part of quicksilver, and a twelfth part of nitre, by weight ; both these to quicken and open the body of the metal : and so let the work be continued by the space of six months at the least. I wish also, that there be at sometimes an injection of some oiled substance ; such as they use in the recovering of gold which by vexing with separations hath been made churlish : and this is to lay the parts more close and smooth, which is the main work. For gold, as we see, is the closest and therefore the heaviest of metals ; and is likewise the most flexible and tensible. Note, that to think to make gold of quicksilver, because it is the heaviest, is a thing not to be hoped ; for quicksilver will not indure the manage of the fire. Next to silver, I think copper were fittest to be the material.

Experiment solitary touching the nature of gold.

328. GOLD hath these natures ; greatness of weight ; closeness of parts ; fixation ; pliantness, or softness ; immunity from rust ; colour or tincture of yellow. Therefore the sure way, though most about, to make gold, is to know the causes of the several natures before rehearsed, and the axioms concerning the same. For if a man can make a metal that hath all these properties, let men dispute whether it be gold or no ?

Experiments in consort touching the inducing and accelerating of putrefaction.

THE inducing and accelerating of putrefaction, is a subject of a very universal inquiry : for corruption is a reciprocal to generation : and they two are as nature's two terms or boundaries ; and the guides to life and death. Putrefaction is the work of the spirits of bodies, which ever are unquiet to get forth and congregate with the air, and to enjoy the sun-beams. The getting forth, or spreading of the spirits, which is a degree of getting forth, hath five differing operations. If the spirits be detained within the body, and move more violently, there followeth colligation, as in metals, *etc.* If more mildly, there followeth digestion, or maturation ; as in drinks and fruits. If the spirits be not merely detained, but protrude a little, and that motion be confused and inordinate, there followeth putrefaction ; which ever dissolveth the consistence of the body into much inequality ; as in flesh, rotten fruits, shining wood, *etc.* and also in the rust of metals. But if that motion be in a certain order, there followeth vivification and figuration ; as both in living creatures bred of putrefaction, and in living
creatures

creatures perfect. But if the spirits issue out of the body, there followeth desiccation, induration, consumption, *etc.* as in brick, evaporation of bodies liquid, *etc.*

329. THE means to induce and accelerate putrefaction, are, first, by adding some crude or watry moisture; as in wetting of any flesh, fruit, wood, with water, *etc.* for contrariwise unctuous and oily substances preserve.

330. THE second is by invitation or excitation; as when a rotten apple lieth close to another apple that is found: or when dung, which is a substance already putrified, is added to other bodies. And this is also notably seen in church-yards where they bury much, where the earth will consume the corps in far shorter time than other earth will.

331. THE third is by closeness and stopping, which detaineth the spirits in prison more than they would; and thereby irritateth them to seek issue; as in corn and cloths which wax musty; and therefore open air, which they call *aër persflabilis*, doth preserve: and this doth appear more evidently in agues, which come, most of them, of obstructions and penning the humours which thereupon putrify.

332. THE fourth is by solution of continuity; as we see an apple will rot sooner if it be cut or pierced; and so will wood, *etc.* And so the flesh of creatures alive, where they have received any wound.

333. THE fifth is either by the exhaling or by the driving back of the principal spirits which preserve the consistence of the body; so that when their government is dissolved, every part returneth to his nature or homogeny. And this appeareth in urine and blood when they cool, and thereby break: it appeareth also in the gangrene, or mortification of flesh, either by opiates or by intense colds. I conceive also the same effect is in pestilences; for that the malignity of the infecting vapour danceth the principal spirits, and maketh them fly and leave their regiment; and then the humours, flesh, and secondary spirits, do dissolve and break, as in an anarchy.

334. THE sixth is when a foreign spirit, stronger and more eager than the spirit of the body, entrencheth the body; as in the stinging of serpents. And this is the cause, generally, that upon all poisons followeth swelling: and we see swelling followeth also when the spirits of the body itself congregate too much, as upon blows and bruises; or when they are pent in too much, as in swelling upon cold. And we see also, that the spirits coming of putrefaction of humours in agues, *etc.* which may be counted as foreign spirits, though they be bred within the body, do extinguish and suffocate the natural spirits and heat.

335. THE seventh is by such a weak degree of heat, as setteth the spirits in a little motion, but is not able either to digest the parts, or to issue the spirits; as is seen in flesh kept in a room, that is not cool: whereas in a cool and wet larder it will keep longer. And we see that vivification, whereof putrefaction is the bastard brother, is effected by such soft heats; as the hatching of eggs, the heat of the womb, *etc.*

336. THE eighth is by the releasing of the spirits, which before were close kept by the solidness of their coverture, and thereby their appetite of issuing checked; as in the artificial rusts induced by strong waters in iron, lead, *etc.* and therefore wetting hasteneth rust or putrefaction of any thing, because it softeneth the crust for the spirits to come forth.

337. THE ninth is by the interchange of heat and cold, or wet and dry; as we see in the mouldering of earth in frosts and sun; and in the more hasty rotting of wood, that is sometimes wet, sometimes dry.

338. THE

338. THE tenth is by time, and the work and procedure of the spirits themselves, which cannot keep their station; especially if they be left to themselves, and there be not agitation or local motion. As we see in corn not stirred; and mens bodies not exercised.

339. ALL moulds are inceptions of putrefaction; as the moulds of pies and flesh; the moulds of oranges and lemons, which moulds afterwards turn into worms, or more odious putrefactions: and therefore, commonly, prove to be of ill odour. And if the body be liquid, and not apt to putrify totally, it will cast up a mother in the top, as the mothers of distilled waters.

340. Moss is a kind of mould of the earth and trees. But it may be better sorted as a rudiment of germination; to which we refer it.

Experiments in consort, touching prohibiting and preventing putrefaction.

It is an inquiry of excellent use, to inquire of the means of preventing or staying putrefaction; for therein consisteth the means of conservation of bodies: for bodies have two kinds of dissolutions; the one by consumption and desiccation; the other by putrefaction. But as for the putrefactions of the bodies of men and living creatures, as in agues, worms, consumptions of the lungs, impostumes, and ulcers both inwards and outwards, they are a great part of phytic and surgery; and therefore we will reserve the inquiry of them to the proper place, where we shall handle medicinal experiments of all sorts. Of the rest we will now enter into an inquiry: wherein much light may be taken from that which hath been said of the means to induce or accelerate putrefactions: for the removing that which caused putrefaction, doth prevent and avoid putrefaction.

341. THE first means of prohibiting or checking putrefaction, is cold: for so we see that meat and drink will last longer unputrified, or unfouled, in winter than in summer: and we see that flowers and fruits, put in conservatories of snow, keep fresh. And this worketh by the detention of the spirits, and constipation of the tangible parts.

342. THE second is astringency: for astringency prohibiteth dissolution: as we see generally in medicines, whereof such as are astringents do inhibit putrefaction: and by the same reason of astringency, some small quantity of oil of vitriol will keep fresh water long from putrifying. And this astringency is in a substance that hath a virtual cold; and it worketh partly by the same means that cold doth.

343. THE third is the excluding of the air; and again, the exposing to the air: for these contraries, as it cometh often to pass, work the same effect, according to the nature of the subject matter. So we see, that beer or wine, in bottles close stopped, last long; that the garners under ground keep corn longer than those above ground; and that fruit closed in wax keepeth fresh; and likewise bodies put in honey and flour keep more fresh: and liquors, drinks, and juices, with a little oil cast on the top, keep fresh. Contrariwise, we see that cloth and apparel not aired, do breed moths and mould; and the diversity is, that in bodies that need detention of spirits, the exclusion of the air doth good; as in drinks and corn: but in bodies that need emission of spirits to discharge some of the superfluous moisture, it doth hurt, for they require airing.

344. THE fourth is motion and stirring; for putrefaction asketh rest: for the stable motion which putrefaction requireth, is disturbed by any agitation; and all local motion keepeth bodies integral, and their parts together; as we see that turning

ing over of corn in a garner, or letting it run like an hour-glass, from an upper room into a lower, doth keep it sweet; and running waters putrify not: and in mens bodies, exercise hindereth putrefaction; and contrariwise, rest and want of motion, or stoppings, whereby the run of humours, or the motion of perspiration is stayed, further putrefaction; as we partly touched a little before.

345. THE fifth is, the breathing forth of the adventitious moisture in bodies; for as wetting doth hasten putrefaction: so convenient drying, whereby the more radical moisture is only kept in, putteth back putrefaction: so we see that herbs and flowers, if they be dried in the shade, or dried in the hot sun for a small time keep best. For the emission of the loose and adventitious moisture doth betray the radical moisture; and carrieth it out for company.

346. THE sixth is the strengthening of the spirits of bodies; for as a great heat keepeth bodies from putrefaction, but a tepid heat inclineth them to putrefaction; so a strong spirit likewise preserveth, and a weak or faint spirit disposeth to corruption. So we find that salt water corrupteth not so soon as fresh: and salting of oysters, and powdering of meat, keepeth them from putrefaction. It would be tried also, whether chalk put into water, or drink, doth not preserve it from putrifying or speedy souring. So we see that strong beer will last longer than small; that all things that are hot and aromatical, do help to preserve liquors, or powders, *etc.* which they do as well by strengthening the spirits, as by soaking out the loose moisture.

347. THE seventh is separation of the cruder parts, and thereby making the body more equal; for all imperfect mixture is apt to putrify; and watry substances are more apt to putrify than oily. So we see distilled waters will last longer than raw waters; and things that have passed the fire do last longer than those that have not passed the fire; as dried pears, *etc.*

348. THE eighth is the drawing forth continually of that part where the putrefaction beginneth: which is, commonly, the loose and watry moisture; not only for the reason before given, that it provoketh the radical moisture to come forth with it; but because being detained in the body, the putrefaction taking hold of it, infecteth the rest: as we see in the embalming dead bodies: and the same reason is of preserving herbs, or fruits, or flowers, in bran or meal.

349. THE ninth is the commixture of any thing that is more oily or sweet: for such bodies are least apt to putrify, the air working little upon them; and they not putrifying, preserve the rest. And therefore we see syrups and ointments will last longer than juices.

350. THE tenth is the commixture of somewhat that is dry; for putrefaction beginneth first from the spirits; and then from the moisture: and that that is dry is unapt to putrify: and therefore smoke preserveth flesh; as we see in bacon and neats tongues, and Martlemas beef, *etc.*

351. The opinion of some of the ancients, that blown airs do preserve bodies longer than other airs, seemeth to me probable; for that the blown airs, being overcharged and compressed, will hardly receive the exhaling of any thing, but rather repulse it. It was tried in a blown bladder, whereinto flesh was put, and likewise a flower, and it sorted not: for dry bladders will not blow; and new bladders rather further putrefaction: the way were therefore to blow strongly with a pair of bellows into a hogshhead, putting into the hogshhead, before, that which you would have preserved; and in the instant that you withdraw the bellows, stop the hole close.

Experiment

Experiment solitary touching wood shining in the dark.

352. THE experiment of wood that shineth in the dark, we have diligently driven and pursued: the rather, for that of all things that give light here below, it is the most durable, and hath least apparent motion. Fire and flame are in continual expence; sugar shineth only while it is in scraping; and salt-water while it is in dashing; glow-worms have their shining while they live, or a little after; only scales or fishes putrified seem to be of the same nature with shining wood: and it is true, that all putrefaction hath with it an inward motion, as well as fire or light. The trial sorteth thus: 1. The shining is in some pieces more bright, in some more dim; but the most bright of all doth not attain to the light of a glow-worm. 2. The woods that have been tried to shine, are chiefly fallow and willow; also the ash and hazle; it may be it holdeth in others. 3. Both roots and bodies do shine, but the roots better. 4. The colour of the shining part, by day-light, is in some pieces white, in some pieces inclining to red; which in the country they call the white and red garnet. 5. The part that shineth is, for the most part, somewhat soft, and moist to feel to; but some was found to be firm and hard, so as it might be figured into a cross, or into beads, *etc.* But you must not look to have an image, or the like, in any thing that is lightsome, for even a face in iron red-hot will not be seen, the light confounding the small differences of lightsome and darksome, which shew the figure. 6. There was the shining part pared off, till you came to that that did not shine; but within two days the part contiguous began also to shine, being laid abroad in the dew; so as it seemeth the putrefaction spreadeth. 7. There was other dead wood of like kind that was laid abroad, which shined not at the first; but after a night's lying abroad began to shine. 8. There was other wood that did first shine; and being laid dry in the house, within five or six days lost the shining; and laid abroad again, recovered the shining. 9. Shining woods being laid in a dry room, within a seven-night lost their shining; but being laid in a cellar, or dark room, kept the shining. 10. The boring of holes in that kind of wood, and then laying it abroad, seemeth to conduce to make it shine: the cause is, for that all solution of continuity doth help on putrefaction, as was touched before. 11. No wood hath been yet tried to shine, that was cut down alive, but such as was rotted both in stock and root while it grew. 12. Part of the wood that shined was steeped in oil, and retained the shining a fortnight. 13. The like succeeded in some steeped in water, and much better. 14. How long the shining will continue, if the wood be laid abroad every night, and taken in and sprinkled with water in the day, is not yet tried. 15. Trial was made of laying it abroad in frosty weather, which hurt it not. 16. There was a great piece of a root which did shine, and the shining part was cut off till no more shined; yet after two nights, though it were kept in a dry room, it got a shining.

Experiment solitary touching the acceleration of birth.

353. THE bringing forth of living creatures may be accelerated in two respects: the one, if the embryo ripeneth and perfecteth sooner: the other, if there be some cause from the mother's body, of expulsion or putting it down: whereof the former is good, and argueth strength; the latter is ill, and cometh by accident or disease. And therefore the ancient observation is true, that the child born in the seventh month doth commonly well; but born in the eighth month, doth for the most part die. But the cause assigned is fabulous; which is, that in the eighth month

be the return of the reign of the planet Saturn, which, as they say, is a planet malign; whereas in the seventh is the reign of the moon, which is a planet propitious. But the true cause is, for that where there is so great a prevention of the ordinary time, it is the lustiness of the child; but when it is less, it is some indispotion of the mother.

Experiment solitary touching the acceleration of growth and stature.

354. To accelerate growth or stature, it must proceed either from the plenty of the nourishment; or from the nature of the nourishment; or from the quickening and exciting of the natural heat. For the first, excess of nourishment is hurtful; for it maketh the child corpulent; and growing in breadth rather than in height. And you may take an experiment from plants, which if they spread much are seldom tall. As for the nature of the nourishment; first, it may not be too dry, and therefore children in dairy countries do wax more tall, than where they feed more upon bread and flesh. There is also a received tale; that boiling of dairy roots in milk, which it is certain are great driers, will make dogs little. But so much is true, that an over-dry nourishment in childhood putteth back stature. Secondly, the nourishment must be of an opening nature; for that attenuateth the juice, and furthereth the motion of the spirits upwards. Neither is it without cause, that Xenophon, in the nurture of the Persian children, doth so much commend their feeding upon cardamon; which, he saith, made them grow better, and be of a more active habit. Cardamon is in latin *nasturtium*; and with us water-creffes; which, it is certain, is an herb, that whilst it is young, is friendly to life. As for the quickening of natural heat, it must be done chiefly with exercise; and therefore no doubt much going to school, where they sit so much, hindreth the growth of children; whereas country-people that go not to school, are commonly of better stature. And again men must beware how they give children any thing that is cold in operation; for even long sucking doth hinder both wit and stature. This hath been tried, that a whelp that hath been fed with nitre in milk, hath become very little, but extreme lively: for the spirit of nitre is cold. And though it be an excellent medicine in strength of years for prolongation of life; yet it is in children and young creatures an enemy to growth: and all for the same reason; for heat is requisite to growth; but after a man is come to his middle age, heat consumeth the spirits; which the coldness of the spirit of nitre doth help to condense and correct.

Experiments in consort touching sulphur and mercury, two of Paracelsus's principles.

THERE be two great families of things; you may term them by several names; sulphureous and mercurial, which are the chemists words, for as for their *sal*, which is their third principle, it is a compound of the other two; inflammable and not inflammable; mature and crude; oily and watry. For we see that in subterrancies there are, as the fathers of their tribes, brimstone and mercury; in vegetables and living creatures there is water and oil: in the inferior order of pneumatics there is air and flame; and in the superior there is the body of the star and the pure sky. And these pairs, though they be unlike in the primitive differences of matter, yet they seem to have many consents: for mercury and sulphur are principal materials of metals; water and oil are principal materials of vegetables and animals; and seem to differ but in maturation or concoction: flame, in vulgar opinion, is but air incensed; and they both have quickness of motion, and facility of cession, much alike;

alike : and the interstellar sky, though the opinion be vain that the star is the denser part of his orb, hath notwithstanding so much affinity with the star, that there is a rotation of that, as well as of the star. Therefore it is one of the greatest *magnalia naturae*, to turn water or watry juice into oil or oily juice : greater in nature, than to turn silver or quicksilver into gold.

355. THE instances we have wherein crude and watry substance turneth into fat and oily, are of four kinds. First in the mixture of earth and water ; which mingled by the help of the sun gather a nitrous fatness, more than either of them have severally ; as we see in that they put forth plants, which need both juices

356. THE second is in the assimilation of nourishment, made in the bodies of plants and living creatures ; whereof plants turn the juice of mere water and earth into a great deal of oily matter : living creatures, though much of their fat and flesh are out of oily aliments, as meat and bread, yet they assimilate also in a measure their drink of water, *etc.* But these two ways of version of water into oil, namely, by mixture and by assimilation, are by many passages and percolations, and by long continuance of soft heats, and by circuits of time.

357. THE third is in the inception of putrefaction ; as in water corrupted ; and the mothers of waters distilled ; both which have a kind of fatness or oil.

358. THE fourth is in the dulceration of some metals ; as *saccharum Saturni*, *etc.*

359. THE intention of version of water into a more oily substance is by digestion ; for oil is almost nothing else but water digested ; and this digestion is principally by heat ; which heat must be either outward or inward : again, it may be by provocation or excitation ; which is caused by the mingling of bodies already oily or digested ; for they will somewhat communicate their nature with the rest. Digestion also is strongly effected by direct assimilation of bodies crude into bodies digested ; as in plants and living creatures, whose nourishment is far more crude than their bodies : but this digestion is by a great compass, as hath been said. As for the more full handling of these two principles, whereof this is but a taste, the inquiry of which is one of the profoundest inquiries of nature, we leave it to the title of version of bodies ; and likewise to the title of the first congregations of matter ; which, like a general assembly of estates, doth give law to all bodies.

Experiment solitary touching chameleons.

360. A chameleon is a creature about the bigness of an ordinary lizard : his head unproportionably big : his eyes great : he moveth his head without the writhing of his neck, which is inflexible, as a hog doth : his back crooked ; his skin spotted with little tumours, less eminent nearer the belly ; his tail slender and long : on each foot he hath five fingers ; three on the outside, and two on the inside ; his tongue of a marvellous length in respect of his body, and hollow at the end ; which he will lanch out to prey upon flies. Of colour green, and of a dusky yellow, brighter and whiter towards the belly ; yet spotted with blue, white and red. If he be laid upon green, the green predominateth ; if upon yellow, the yellow ; not so if he be laid upon blue, or red, or white ; only the green spots receive a more orient lustre ; laid upon black, he looketh all black, though not without a mixture of green. He feedeth not only upon air, though that be his principal sustenance, for sometimes he taketh flies, as was said ; yet some that have kept chameleons a whole year together, could never perceive that ever they fed upon any thing else but air ; and might ob-

serve their bellies to swell after they had exhausted the air, and closed their jaws; which they open commonly against the rays of the sun. They have a foolish tradition in magic, that if a chameleon be burnt upon the top of an house, it will raise a tempest; supposing, according to their vain dreams of sympathies, because he nourisheth with air, his body should have great virtue to make impression upon the air.

Experiment solitary touching subterraneous fires.

361. It is reported by one of the ancients, that in part of Media there are eruptions of flames out of plains; and that those flames are clear, and cast not forth such smoke, and ashes, and pumice, as mountain flames do. The reason, no doubt, is because the flame is not pent as it is in mountains and earthquakes which cast flame. There be also some blind fires under stone, which flame not out, but oil being poured upon them they flame out. The cause whereof is, for that it seemeth the fire is so choked, as not able to remove the stone, it is heat rather than flame; which nevertheless is sufficient to inflame the oil.

Experiment solitary touching nitre.

362. It is reported, that in some lakes the water is so nitrous, as, if foul clothes be put into it, it scoureth them of itself: and if they stay any whit long, they moulder away. And the scouring virtue of nitre is the more to be noted, because it is a body cold; and we see warm water scoureth better than cold. But the cause is, for that it hath a subtle spirit, which severeth and divideth any thing that is foul and viscous, and sticketh upon a body.

Experiment solitary touching congealing of air.

363. TAKE a bladder, the greatest you can get; fill it full of wind, and tie it about the neck with a silk thread waxed; and upon that put likewise wax very close; so that when the neck of the bladder drieth, no air may possibly get in or out. Then bury it three or four foot under the earth in a vault, or in a conservatory of snow, the snow being made hollow about the bladder; and after a fortnight's distance, see whether the bladder be shrunk; for if it be, then it is plain that the coldness of the earth or snow hath condensed the air, and brought it a degree nearer to water: which is an experiment of great consequence.

Experiment solitary touching congealing of water into crystal.

364. It is a report of some good credit, that in deep caves there are penile crystals, and degrees of crystal that drop from above; and in some other, though more rarely, that rise from below: Which though it be chiefly the work of cold, yet it may be that water that passeth through the earth, gathereth a nature more clammy, and fitter to congeal and become solid than water of itself. Therefore trial should be made, to lay a heap of earth, in great frosts, upon a hollow vessel, putting a canvas between, that it falleth not in: and pour water upon it, in such quantity as will be sure to soak through; and see whether it will not make an harder ice in the bottom of the vessel, and less apt to dissolve than ordinarily. I suppose also, that if you make the earth narrower at the bottom than at the top, in fashion of a sugar-loaf reversed, it will help the experiment. For it will make the ice, where it issueth, less in bulk; and evermore smallness of quantity is a help to version.

Experiment

Experiment solitary touching preserving of rose-leaves both in colour and smell.

365. TAKE damask roses, and pull them; then dry them upon the top of an house, upon a lead or terras, in the hot sun, in a clear day, between the hours only of twelve and two, or thereabouts. Then put them into a sweet dry earthen bottle or glafs, with a narrow mouth, stuffing them close together, but without bruising: stop the bottle or glafs close, and these roses will retain not only their smell perfect, but their colour fresh for a year at least. Note, that nothing doth so much destroy any plant, or other body, either by putrefaction or arefaction, as the adventitious moisture which hangeth loose in the body, if it be not drawn out. For it betrayeth and tolleth forth the innate and radical moisture along with it when itself goeth forth. And therefore in living creatures, moderate sweat doth preserve the juice of the body. Note, that these roses, when you take them from the drying, have little or no smell; so that the smell is a second smell, that issueth out of the flower afterwards.

Experiments in consort touching the continuance of flame.

366. THE continuance of flame, according to the diversity of the body inflamed, and other circumstances, is worthy the inquiry; chiefly, for that though flame be almost of a momentary lasting, yet it receiveth the more, and the less: we will first therefore speak at large of bodies inflamed wholly and immediately, without any wick to help the inflammation. A spoonful of spirit of wine, a little heated, was taken, and it burnt as long as came to a hundred and sixteen pulses. The same quantity of spirit of wine, mixed with the sixth part of a spoonful of nitre, burnt but to the space of ninety four pulses. Mixed with the like quantity of bay-salt, eighty three pulses. Mixed with the like quantity of gunpowder, which dissolved into a black water, one hundred and ten pulses. A cube or pellet of yellow wax was taken, as much as half the spirit of wine, and set in the midst, and it burnt only the space of eighty seven pulses. Mixed with the sixth part of a spoonful of milk, it burnt to the space of one hundred pulses; and the milk was curdled. Mixed with the sixth part of a spoonful of water, it burnt to the space of eighty six pulses; with an equal quantity of water, only to the space of four pulses. A small pebble was laid in the midst, and the spirit of wine burnt to the space of ninety four pulses. A piece of wood of the bigness of an arrow, and about a finger's length, was set up in the midst, and the spirit of wine burnt to the space of ninety four pulses. So that the spirit of wine simple endured the longest; and the spirit of wine with the bay-salt, and the equal quantity of water, were the shortest.

367. CONSIDER well, whether the more speedy going forth of the flame be caused by the greater vigour of the flame in burning; or by the resistance of the body mixed, and the aversion thereof to take flame: which will appear by the quantity of the spirit of wine that remaineth after the going out of the flame. And it seemeth clearly to be the latter; for that the mixture of things least apt to burn, is the speediest in going out. And note, by the way, that spirit of wine burned, till it go out of itself, will burn no more; and tasteth nothing so hot in the mouth as it did; no, nor yet four, as if it were a degree towards vinegar, which burnt wine doth; but flat and dead.

368. NOTE, that in the experiment of wax aforesaid, the wax dissolved in the burning, and yet did not incorporate itself with the spirit of wine, to produce one flame; but wheresoever the wax floated, the flame forsook it, till at last it spread all over, and put the flame quite out.

369. THE

369. THE experiments of the mixtures of the spirit of wine inflamed, are things of discovery, and not of use: but now we will speak of the continuance of flames, such as are used for candles, lamps, or tapers; consisting of inflammable matters, and of a wick that provoketh inflammation. And this importeth not only discovery, but also use and profit; for it is a great saving in all such lights, if they can be made as fair and bright as others, and yet last longer. Wax pure made into a candle, and wax mixed severally into candle-stuff, with the particulars that follow; *viz.* water, *aqua vitae*, milk, bay-salt, oil, butter, nitre, brimstone, saw-dust, every of these bearing a sixth part to the wax; and every of these candles mixed, being of the same weight and wick with the wax pure, proved thus in the burning and lasting. The swiftest in consuming was that with saw-dust; which first burned fair till some part of the candle was consumed, and the dust gathered about the snuff; but then it made the snuff big and long, and to burn duskiely, and the candle wasted in half the time of the wax pure. The next in swiftness were the oil and butter, which consumed by a fifth part swifter than the pure wax. Then followed in swiftness the clear wax itself. Then the bay-salt, which lasted about an eighth part longer than the clear wax. Then followed the *aqua vitae*, which lasted about a fifth part longer than the clear wax. Then followed the milk and water, with little difference from the *aqua vitae*, but the water slowest. And in these four last, the wick would spit forth little sparks. For the nitre, it would not hold lighted above some twelve pulses: but all the while it would spit out portions of flame, which afterwards would go out into a vapour. For the brimstone, it would hold lighted much about the same time with the nitre; but then after a little while it would harden and cake about the snuff; so that the mixture of bay-salt with wax will win an eighth part of the time of lasting, and the water a fifth.

370. AFTER the several materials were tried, trial was likewise made of several wicks; as of ordinary cotton, sewing thread, rush, silk, straw, and wood. The silk, straw, and wood, would flame a little, till they came to the wax, and then go out: of the other three, the thread consumed faster than the cotton, by a sixth part of time: the cotton next: then the rush consumed slower than the cotton, by at least a third part of time. For the bigness of the flame, the cotton and thread cast a flame much alike; and the rush much less and dimmer. *Query*, whether the wood and wicks both, as in torches, consume faster than the wicks simple?

371. WE have spoken of the several materials, and the several wicks: but to the lasting of the flame it importeth also, not only what the material is, but in the same material whether it be hard, soft, old, new, *etc.* Good housewives, to make their candles burn the longer, use to lay them, one by one, in bran or flour, which make them harder, and so they consume the slower: insomuch as by this means they will outlast other candles of the same stuff almost half in half. For bran and flour have a virtue to harden; so that both age, and lying in the bran, doth help to the lasting. And we see that wax candles last longer than tallow candles, because wax is more firm and hard.

372. THE lasting of flame also dependeth upon the easy drawing of the nourishment; as we see in the Court of England, there is a service which they call All-night; which is as it were a great cake of wax, with the wick in the midst; whereby it cometh to pass, that the wick fetcheth the nourishment farther off. We see also that lamps last longer, because the vessel is far broader than the breadth of a taper or candle.

373. TAKE a turreted lamp of tin, made in the form of a square; the height of the turret being thrice as much as the length of the lower part whereupon the lamp standeth: make only one hole in it, at the end of the return farthest from the turret. Reverse it, and fill it full of oil by that hole; and then set it upright again; and put a wick in at the hole, and lighten it: you shall find that it will burn slow, and a long time: which is caused, as was said last before, for that the flame fetcheth the nourishment afar off. You shall find also, that as the oil wasteth and descendeth, so the top of the turret by little and little filleth with air; which is caused by the rarefaction of the oil by the heat. It were worthy the observation, to make a hole in the top of the turret, and to try when the oil is almost consumed, whether the air made of the oil, if you put to it a flame of a candle, in the letting of it forth, will inflame. It were good also to have the lamp made, not of tin, but of glass, that you may see how the vapour or air gathereth by degrees in the top.

374. A FOURTH point that importeth the lasting of the flame, is the closeness of the air wherein the flame burneth. We see, that if wind bloweth upon a candle, it wasteth apace. We see also, it lasteth longer in a lanthorn than at large. And there are traditions of lamps and candles, that have burnt a very long time in caves and tombs.

375. A FIFTH point that importeth the lasting of the flame, is the nature of the air where the flame burneth; whether it be hot or cold, moist or dry. The air, if it be very cold, irritateth the flame, and maketh it burn more fiercely, as fire scorseth in frosty weather, and so furthereth the consumption. The air once heated, I conceive, maketh the flame burn more mildly, and so helpeth the continuance. The air, if it be dry, is indifferent: the air, if it be moist, doth in a degree quench the flame, as we see lights will go out in the damp or mines, and howsoever maketh it burn more dully, and so helpeth the continuance.

Experiments in consort touching burials or infusions of divers bodies in earth.

376. BURIALS in earth serve for preservation; and for condensation; and for induration of bodies. And if you intend condensation or induration, you may bury the bodies so as earth may touch them: as if you will make artificial porcellane, *etc.* And the like you may do for conservation, if the bodies be hard and solid; as clay, wood, *etc.* But if you intend preservation of bodies more soft and tender, then you must do one of these two: either you must put them in cases, whereby they may not touch the earth; or else you must vault the earth, whereby it may hang over them, and not touch them: for if the earth touch them, it will do more hurt by the moisture, causing them to putrify, than good by the virtual cold, to conserve them; except the earth be very dry and sandy.

377. AN orange, lemon, and apple, wrapt in a linen cloth, being buried for a fortnight's space four feet deep within the earth, though it were in a moist place and a rainy time, yet came forth no ways mouldy or rotten, but were become a little harder than they were; otherwise fresh in their colour; but their juice somewhat flatted. But with the burial of a fortnight more they became putrified.

378. A BOTTLE of beer, buried in like manner as before, became more lively, better tasted, and clearer than it was. And a bottle of wine in like manner. A bottle of vinegar so buried came forth more lively and more odorous, smelling almost

most like a violet. And after the whole month's burial, all the three came forth as fresh and lively, if not better, than before.

379. It were a profitable experiment, to preserve oranges, lemons, and pomegranates, till summer; for then their price will be mightily increased. This may be done, if you put them in a pot or vessel well covered, that the moisture of the earth come not at them; or else by putting them in a conservatory of snow. And generally, whosoever will make experiments of cold, let him be provided of three things; a conservatory of snow; a good large vault, twenty feet at least under the ground; and a deep well.

380. THERE hath been a tradition, that pearl, and coral, and turquois-stone, that have lost their colours, may be recovered by burying in the earth: which is a thing of great profit, if it would fort: but upon trial of six weeks burial, there followed no effect. It were good to try it in a deep well, or in a conservatory of snow; where the cold may be more constringent; and so make the body more united, and thereby more resplendent.

Experiment solitary touching the affects in mens bodies from several winds.

381. MENS bodies are heavier, and less disposed to motion, when southern winds blow, than when northern. The cause is, for that when the southern winds blow, the humours do, in some degree, melt and wax fluid, and so flow into the parts; as it is seen in wood and other bodies, which, when the southern winds blow, do swell. Besides, the motion and activity of the body consisteth chiefly in the sinews, which, when the southern wind bloweth, are more relax.

Experiment solitary touching winter and summer sicknesses.

382. IT is commonly seen, that more are sick in the summer, and more die in the winter; except it be in pestilent diseases, which commonly reign in summer or autumn. The reason is, because diseases are bred, indeed, chiefly by heat; but then they are cured most by sweat and purge; which in the summer cometh on or is provoked more easily. As for pestilent diseases, the reason why most die of them in summer is, because they are bred most in the summer; for otherwise those that are touched are in most danger in the winter.

Experiment solitary touching pestilential seasons.

383. THE general opinion is, that years hot and moist are most pestilent; upon the superficial ground, that heat and moisture cause putrefaction. In England it is not found true; for many times there have been great plagues in dry years. Whereof the cause may be, for that drought in the bodies of islanders habituated to moist airs, doth exasperate the humours, and maketh them more apt to putrify or inflame: besides, it tainteth the waters, commonly, and maketh them less wholesome. And again in Barbary, the plagues break up in the summer months, when the weather is hot and dry.

Experiment solitary touching an error received about epidemical diseases.

384. MANY diseases, both epidemical and others, break forth at particular times. And the cause is falsely imputed to the constitution of the air at that time when they break forth or reign; whereas it proceedeth, indeed, from a precedent sequence and series of the seasons of the year: and therefore Hippocrates in his prognostics doth make
make

make good observations of the diseases that ensue upon the nature of the precedent four seasons of the year.

Experiment solitary touching the alteration or preservation of liquors in wells or deep vaults.

385. TRIAL hath been made with earthen bottles well stopp'd, hanged in a well of twenty fathom deep at the least; and some of the bottles have been let down into the water, some others have hanged above, within about a fathom of the water; and the liquors so tried have been beer, not new, but ready for drinking, and wine, and milk. The proof hath been, that both the beer and the wine, as well within water as above, have not been palled or deadned at all; but as good, or somewhat better, than bottles of the same drinks and staleness kept in a cellar. But those which did hang above water were apparently the best; and that beer did flower a little; whereas that under water did not, though it were fresh. The milk soured and began to putrify. Nevertheless it is true, that there is a village near Blois, where in deep caves they do thicken milk, in such sort that it becometh very pleasant: which was some cause of this trial of hanging milk in the well: but our proof was naught; neither do I know whether that milk in those caves be first boiled. It were good therefore to try it with milk sodden, and with cream; for that milk of itself is such a compound body, of cream, curds and whey, as it is easily turned and dissolved. It were good also to try the beer when it is in wort, that it may be seen whether the hanging in the well will accelerate the ripening and clarifying of it.

Experiment solitary touching stuttering.

386. DIVERS we see do stutter. The cause may be, in most, the refrigeration of the tongue; whereby it is less apt to move. And therefore we see that naturals do generally stutter: and we see that in those that stutter, if they drink wine moderately, they stutter less, because it heateth: and so we see, that they that stutter, do stutter more in the first offer to speak, than in continuance; because the tongue is by motion somewhat heated. In some also, it may be, though rarely, the dryness of the tongue; which likewise maketh it less apt to move as well as cold: for it is an affect that cometh to some wise and great men; as it did unto Moses, who was *linguae praepeditae*; and many stutterers, we find, are very choleric men; choler inducing a dryness in the tongue.

Experiments in consort touching smells.

387. SMELLS and other odours are sweeter in the air at some distance, than near the nose; as hath been partly touched heretofore. The cause is double: first, the finer mixture or incorporation of the smell: for we see that in sounds likewise, they are sweetest when we cannot hear every part by itself. The other reason is, for that all sweet smells have joined with them some earthy or crude odours; and at some distance the sweet, which is the more spiritual, is perceived, and the earthy reacheth not so far.

388. SWEET smells are most forcible in dry substances when they are broken; and so likewise in oranges or lemons, the nipping of their rind giveth out their smell more; and generally when bodies are moved or stirred, though not broken, they smell more; as a sweet-bag waved. The cause is double: the one, for that there is a greater emission of the spirit when way is made; and this holdeth in the break-

ing, nipping, or crushing; it holdeth also, in some degree, in the moving: but in this last there is a concurrence of the second cause; which is the impulsion of the air, that bringeth the scent faster upon us.

389. THE daintiest smells of flowers are out of those plants whose leaves smell not; as violets, roses, wall-flowers, gilly-flowers, pinks, woodbines, vine-flowers, apple-blooms, limetree-blooms, bean-blooms, *etc.* The cause is, for that where there is heat and strength enough in the plant to make the leaves odorate, there the smell of the flower is rather evanid and weaker than that of the leaves; as it is in rosemary flowers, lavender flowers, and sweet-briar roses. But where there is less heat, there the spirit of the plant is digested and refined and severed from the grosser juice, in the efflorescence, and not before.

390. MOST odours smell best broken or crushed, as hath been said; but flowers pressed or beaten do lose the freshness and sweetness of their odour. The cause is, for that when they are crushed, the grosser and more earthy spirit cometh out with the finer, and troubleth it; whereas in stronger odours there are no such degrees of the issue of the smell.

Experiments in consort touching the goodness and choice of water.

391. IT is a thing of very good use to discover the goodness of waters. The taste, to those that drink water only, doth somewhat; but other experiments are more sure. First, try waters by weight; wherein you may find some difference, though not much: and the lighter you may account the better.

392. SECONDLY, try them by boiling upon an equal fire: and that which consumeth away fastest, you may account the best.

393. THIRDLY, try them in several bottles, or open vessels, matches in every thing else, and see which of them last longest without stench or corruption. And that which holdeth unputrified longest, you may likewise account the best.

394. FOURTHLY, try them by making drinks stronger or smaller, with the same quantity of malt; and you may conclude, that that water which maketh the stronger drink, is the more concocted and nourishing; though perhaps it be not so good for medicinal use. And such water, commonly, is the water of large and navigable rivers; and likewise in large and clean ponds of standing water: for upon both them the sun hath more power than upon fountains or small rivers. And I conceive that chalk-water is next them the best for going farthest in drink: for that also helpeth concoction; so it be out of a deep well; for then it cureth the rawness of the water; but chalky water, towards the top of the earth, is too fretting; as it appeareth in laundry of cloths, which wear out apace if you use such waters.

395. FIFTHLY, the housewives do find a difference in waters, for the bearing or not bearing of soap: and it is likely that the more fat water will bear soap best; for the hungry water doth kill the unctuous nature of the soap.

396. SIXTHLY, you may make a judgment of waters according to the place whence they spring or come: the rain-water is, by the physicians, esteemed the finest and the best; but yet it is said to putrify soonest; which is likely, because of the fineness of the spirit: and in conservatories of rain-water, such as they have in Venice, *etc.* they are found not so choice waters; the worse, perhaps, because they are covered aloft, and kept from the sun. Snow-water is held unwholesome; insomuch as the people that dwell at the foot of the snow mountains, or otherwise upon the ascent, especially the women, by drinking of snow-water, have great bags
hanging

hanging under their throats. Well-water, except it be upon chalk, or a very plentiful spring, maketh meat red; which is an ill sign. Springs on the tops of high hills are the best: for both they seem to have a lightness and appetite of mounting; and besides, they are most pure and unmingled; and again, are more percolated through a great space of earth. For waters in valleys join in effect underground with all waters of the same level; whereas springs on the tops of hills pass through a great deal of pure earth, with less mixture of other waters.

397. SEVENTHLY, judgment may be made of waters by the soil whereupon the water runneth; as pebble is the cleanest and best tasted, and next to that, clay-water; and thirdly, water upon chalk; fourthly, that upon sand; and worst of all upon mud. Neither may you trust waters that taste sweet; for they are commonly found in rising grounds of great cities; which must needs take in a great deal of filth.

Experiment solitary touching the temperate heat under the equinoctial.

398. IN Peru, and divers parts of the West-Indies, though under the line, the heats are not so intolerable as they be in Barbary, and the skirts of the torrid zone. The causes are, first the great breezes which the motion of the air in great circles, such as are under the girdle of the world, produceth; which do refrigerate; and therefore in those parts noon is nothing so hot, when the breezes are great, as about nine or ten of the clock in the forenoon. Another cause is, for that the length of the night, and the dews thereof, do compensate the heat of the day. A third cause is the stay of the sun; not in respect of day and night, for that we speak of before, but in respect of the season; for under the line the sun crosseth the line, and maketh two summers and two winters, but in the skirts of the torrid zone it doubleth and goeth back again, and so maketh one long summer.

399. THE heat of the sun maketh men black in some countries, as in Æthiopia and Guiney, etc. Fire doth it not, as we see in glass-men, that are continually about the fire. The reason may be, because fire doth lick up the spirits and blood of the body, so as they exhale; so that it ever maketh men look pale and fallow; but the sun, which is a gentler heat, doth but draw the blood to the outward parts; and rather concocteth it than soaketh it; and therefore we see that all Æthiopes are fleshy and plump, and have great lips; all which betoken moisture retained, and not drawn out. We see also, that the Negroes are bred in countries that have plenty of water by rivers or otherwise: for Meroë, which was the metropolis of Æthiopia, was upon a great lake; and Congo, where the Negroes are, is full of rivers. And the confines of the river Niger, where the Negroes also are, are well watered: and the region above Cape Verde is likewise moist, inasmuch as it is pestilent through moisture: but the countries of the Abyssenes, and Barbary, and Peru, where they are tawny, and olivaster, and pale, are generally more sandy and dry. As for the Æthiopes, as they are plump and fleshy, so, it may be, they are sanguine and ruddy-coloured, if their black skin would suffer it to be seen.

Experiment solitary touching motion after the instant of death.

400. SOME creatures do move a good while after their head is off; as birds: some a very little time; as men and all beasts: some move, though cut in several pieces; as snakes, eels, worms, flies, etc. First therefore it is certain, that the immediate cause of death is the resolution or extinguishment of the spirits; and

that the destruction or corruption of the organs is but the mediate cause. But some organs are so peremptorily necessary, that the extinguishment of the spirits doth speedily follow ; but yet so as there is an interim of a small time. It is reported by one of the ancients of credit, that a sacrificed beast hath lowed after the heart hath been severed ; and it is a report also of credit, that the head of a pig hath been opened, and the brain put into the palm of a man's hand, trembling, without breaking any part of it, or severing it from the marrow of the back-bone ; during which time the pig hath been, in all appearance, stark dead, and without motion ; and after a small time the brain hath been replaced, and the skull of the pig closed, and the pig hath a little after gone about. And certain it is, that an eye upon revenge hath been thrust forth, so as it hanged a pretty distance by the visual nerve ; and during that time the eye hath been without any power of sight ; and yet after being replaced recovered sight. Now the spirits are chiefly in the head and cells of the brain, which in men and beasts are large ; and therefore, when the head is off, they move little or nothing. But birds have small heads, and therefore the spirits are a little more dispersed in the sinews, whereby motion remaineth in them a little longer ; infomuch as it is extant in story, that an emperor of Rome, to shew the certainty of his hand, did shoot a great forked arrow at an ostrich, as she ran swiftly upon the stage, and struck off her head ; and yet she continued the race a little way with the head off. As for worms, and flies, and eels, the spirits are diffused almost all over ; and therefore they move in their several pieces.



NATURAL HISTORY.

CENTURY V.

Experiments in consort touching the acceleration of germination.

WE will now inquire of plants or vegetables : and we shall do it with diligence. They are the principal part of the third day's work. They are the first *product*, which is the word of animation : for the other words are but the words of essence. And they are of excellent and general use for food, medicine, and a number of mechanical arts.

401. THERE were sown in a bed, turnip-feed, radish-feed, wheat, cucumber-feed, and peas. The bed we call a hot-bed, and the manner of it is this : there was taken horse-dung, old and well rotted ; this was laid upon a bank half a foot high, and supported round about with planks ; and upon the top was cast sifted earth, some two fingers deep ; and then the seed sprinkled upon it, having been steeped all night in water mixed with cow-dung. The turnip-feed and the wheat came up half an inch above ground within two days after, without any watering. The rest the third day. The experiment was made in October ; and, it may be, in the spring, the accelerating would have been the speedier. This is a noble experiment ; for without this help they would have been four times as long in coming up. But there doth not occur to me, at this present, any use thereof for profit ; except it should be for sowing of peas, which have their price very much increased by the early coming. It may be tried also with cherries, strawberries, and other fruit, which are dearest when they come early.

402. THERE was wheat steeped in water mixed with cow-dung ; other in water mixed with horse-dung ; other in water mixed with pigeon-dung ; other in urine of man ; other in water mixed with chalk powdered ; other in water mixed with foot ; other in water mixed with ashes ; other in water mixed with bay-salt ; other in claret wine ; other in maltsey ; other in spirit of wine. The proportion of the mixture was a fourth part of the ingredients to the water ; save that there was not of the salt above an eighth part. The urine, and wines, and spirit of wine, were simple without mixture of water. The time of the steeping was twelve hours. The time of the year October. There was also other wheat sown unsteeped, but watered twice a day with warm water. There was also other wheat sown simple, to compare it with the rest. The event was ; that those that were in the mixture of dung, and urine, and foot, chalk, ashes, and salt, came up within six days : and those that afterwards proved the highest, thickest, and most lusty, were first the urine ; and then the dungs ; next the chalk ; next the foot ; next the ashes ; next the salt ; next the wheat simple of itself, unsteeped and unwatered ; next the watered twice a day with warm water ; next the claret wine. So that these three last were slower than the ordinary wheat of itself ; and this culture

culture did rather retard than advance. As for those that were steeped in malmsey, and spirit of wine, they came not up at all. This is a rich experiment for profit ; for the most of the steepings are cheap things ; and the goodness of the crop is a great matter of gain ; if the goodness of the crop answer the earliness of the coming up : as it is like it will ; both being from the vigour of the seed ; which also partly appeared in the former experiments, as hath been said. This experiment should be tried in other grains, seeds, and kernels : for it may be some steeping will agree best with some seeds. It should be tried also with roots steeped as before, but for longer time. It should be tried also in several seasons of the year, especially the spring.

403. STRAWBERRIES watered now and then, as once in three days, with water wherein hath been steeped sheeps-dung or pigeons-dung, will prevent and come early. And it is like the same effect would follow in other berries, herbs, flowers, grains, or trees. And therefore it is an experiment, though vulgar in strawberries, yet not brought into use generally : for it is usual to help the ground with muck ; and likewise to recomfort it sometimes with muck put to the roots ; but to water it with muck water, which is like to be more forcible, is not practised.

404. DUNG, or chalk, or blood, applied in substance, seasonably, to the roots of trees, doth set them forwards. But to do it unto herbs, without mixture of water or earth, it may be these helps are too hot.

405. THE former means of helping germination, are either by the goodness and strength of the nourishment ; or by the comforting and exciting the spirits in the plant, to draw the nourishment better. And of this latter kind, concerning the comforting of the spirits of the plant, are also the experiments that follow ; though they be not applications to the root or seed. The planting of trees warm upon a wall against the south, or south-east sun, doth hasten their coming on and ripening ; and the south-east is found to be better than the south-west, though the south-west be the hotter coast. But the cause is chiefly, for that the heat of the morning succeedeth the cold of the night : and partly, because many times the south-west sun is too parching. So likewise the planting of them upon the back of a chimney where a fire is kept, doth hasten their coming on and ripening : nay more, the drawing of the boughs into the inside of a room where a fire is continually kept, worketh the same effect ; which hath been tried with grapes ; inasmuch as they will come a month earlier than the grapes abroad.

406. BESIDES the two means of accelerating germination formerly described ; that is to say, the mending of the nourishment ; and comforting of the spirit of the plant ; there is a third, which is the making way for the easy coming to the nourishment, and drawing it. And therefore gentle digging and loosening of the earth about the roots of trees ; and the removing herbs and flowers into new earth once in two years, which is the same thing, for the new earth is ever looser, doth greatly further the prospering and earliness of plants.

407. BUT the most admirable acceleration by facilitating the nourishment is that of water. For a standard of a damask rose with the root on, was set in a chamber where no fire was, upright in an earthen pan, full of fair water, without any mixture, half a foot under the water, the standard being more than two foot high above the water : within the space of ten days the standard did put forth a fair green leaf, and some other little buds, which stood at a stay, without any shew of decay or withering, more than seven days. But afterwards that leaf faded, but the young buds did sprout

on ;

on ; which afterward opened into fair leaves in the space of three months ; and continued so a while after, till upon removal we left the trial. But note, that the leaves were somewhat paler and lighter-coloured than the leaves used to be abroad. Note, that the first buds were in the end of October ; and it is likely that if it had been in the spring time, it would have put forth with greater strength, and, it may be, to have grown on to bear flowers. By this means you may have, as it seemeth, roses set in the midst of a pool, being supported with some stay ; which is matter of rareness and pleasure, though of small use. This is the more strange, for that the like rose-standards was put at the same time into water mixed with horse-dung, the horse-dung about the fourth part to the water, and in four months space, while it was observed, put not forth any leaf, though divers buds at the first, as the other.

408. A DUTCH flower that had a bulbous root, was likewise put at the same time all under water, some two or three fingers deep ; and within seven days sprouted, and continued long after further growing. There were also put in, a beet-root, a borage-root, and a radish-root, which had all their leaves cut almost close to the roots ; and within six weeks had fair leaves ; and so continued till the end of November.

409. NOTE, that if roots, or peas, or flowers, may be accelerated in their coming and ripening, there is a double profit ; the one in the high price that those things bear when they come early : the other in the swiftness of their returns : for in some grounds which are strong, you shall have a radish, *etc.* come in a month, that in other grounds will not come in two, and so make double returns.

410. WHEAT also was put into the water, and came not forth at all ; so as it seemeth there must be some strength and bulk in the body put into the water, as it is in roots ; for grains, or seeds, the cold of the water will mortify. But casually some wheat lay under the pan, which was somewhat moistened by the suing of the pan ; which in six weeks, as aforesaid, looked mouldy to the eye, but it was sprouted forth half a finger's length.

411. IT seemeth by these instances of water, that for nourishment the water is almost all in all, and that the earth doth but keep the plant upright, and save it from overheating and over-cold ; and therefore is a comfortable experiment for good drinkers. It proveth also that our former opinion, that drink incorporate with flesh or roots, as in capon-beer, *etc.* will nourish more easily, than meat and drink taken severally.

412. THE housing of plants, I conceive, will both accelerate germination, and bring forth flowers and plants in the colder seasons : and as we house hot-country plants, as lemons, oranges, myrtles, to save them ; so we may house our own country plants, to forward them, and make them come in the cold seasons ; in such sort, that you may have violets, strawberries, peas, all winter : so that you sow or remove them at fit times. This experiment is to be referred unto the comforting of the spirit of the plant by warmth, as well as housing their boughs, *etc.* So then the means to accelerate germination, are in particular eight, in general three.

Experiments in consort touching the putting back or retardation of germination.

413. To make roses, or other flowers come late, it is an experiment of pleasure. For the ancients esteemed much of *rosa sera*. And indeed the November rose is the sweetest, having been less exhiled by the sun. The means are these. First, the cutting off their tops immediately after they have done bearing ; and then they will come again the same year about November : but they will not come just on the tops where they were cut, but out of those shoots which were, as it were, water boughs. The cause is,

for that the sap, which otherwise would have fed the top, though after bearing, will, by the discharge of that, divert unto the side sprouts; and they will come to bear, but later.

414. THE second is the pulling off the buds of the rose, when they are newly knotted; for then the side branches will bear. The cause is the same with the former: for cutting off the tops, and pulling off the buds, work the same effect, in retention of the sap for a time, and diversion of it to the sprouts that were not so forward.

415. THE third is the cutting off some few of the top boughs in the spring time, but suffering the lower bows to grow on. The cause is, for that the boughs do help to draw up the sap more strongly; and we see that in polling of trees, many do use to leave a bough or two on the top, to help to draw up the sap. And it is reported also, that if you graft upon the bough of a tree, and cut off some of the old boughs, the new cions will perish.

416. THE fourth is by laying the roots bare about Christmas some days. The cause is plain, for that it doth arrest the sap from going upwards for a time; which arrest is afterwards released by the covering of the root again with earth; and then the sap getteth up, but later.

417. THE fifth is the removing of the tree some month before it buddeth. The cause is, for that some time will be required after the remove for the resettling, before it can draw the juice; and that time being lost, the blossom must needs come forth later.

418. THE sixth is the grafting of roses in May, which commonly gardeners do not till July; and then they bear not till the next year; but if you graft them in May, they will bear the same year, but late.

419. THE seventh is the girding of the body of the tree about with some packthread; for that also in a degree restraineth the sap, and maketh it come up more late and more slowly.

420. THE eighth is the planting of them in a shade, or in a hedge; the cause is, partly the keeping out of the sun, which hasteneth the sap to rise; and partly the robbing of them of nourishment by the stuff in the hedge. These means may be practised upon other, both trees and flowers, *mutatis mutandis*.

421. MEN have entertained a conceit that sheweth prettily; namely, that if you graft a late-coming fruit upon a stock of a fruit-tree that cometh early, the graft will bear fruit early; as a peach upon a cherry; and contrariwise, if an early-coming fruit upon a stock of a fruit-tree that cometh late, the graft will bear fruit late; as a cherry upon a peach. But these are but imaginations, and untrue. The cause is, for that the cion over-ruleth the stock quite; and the stock is but passive only, and giveth aliment, but no motion to the graft.

Experiments in consort touching the melioration of fruits, trees, and plants.

WE will speak now, how to make fruits, flowers, and roots larger, in more plenty, and sweeter than they use to be; and how to make the trees themselves more tall, more spread, and more hasty and sudden than they use to be. Wherein there is no doubt but the former experiments of acceleration will serve much to these purposes. And again, that these experiments, which we shall now set down, do serve also for acceleration, because both effects proceed from the increase of vigour in the tree; but
yet

yet to avoid confusion, and because some of the means are more proper for the one effect, and some for the other, we will handle them apart.

422. IT is an assured experience, that an heap of flint or stone, laid about the bottom of a wild tree, as an oak, elm, ash, *etc.* upon the first planting, doth make it prosper double as much as without it. The cause is, for that it retaineth the moisture which falleth at any time upon the tree, and suffereth it not to be exhaled by the sun. Again, it keepeth the tree warm from cold blasts and frosts, as it were in an house. It may be also there is somewhat in the keeping of it stiddy at the first. *Query*, If laying of straw some height about the body of a tree, will not make the tree forwards. For though the root giveth the sap, yet it is the body that draweth it. But you must note, that if you lay stones about the stalk of lettuce, or other plants that are more soft, it will over-moisten the roots, so as the worms will eat them.

423. A TREE, at the first setting, should not be shaken, until it hath taken root fully: and therefore some have put two little forks about the bottom of their trees to keep them upright; but after a year's rooting, then shaking doth the tree good, by loosening of the earth, and, perhaps, by exercising as it were, and stirring the sap of the tree.

424. GENERALLY the cutting away of boughs and suckers at the root and body doth make trees grow high; and contrariwise, the polling and cutting of the top maketh them grow spread and bushy. As we see in pollards, *etc.*

425. IT is reported, that to make hasty-growing coppice woods, the way is, to take willow, fallow, poplar, alder, of some seven years growth; and to set them, not upright but aslope, a reasonable depth under the ground; and then instead of one root they will put forth many, and so carry more shoots upon a stem.

426. WHEN you would have many new roots of fruit trees, take a low tree and bow it, and lay all his branches asflat upon the ground, and cast earth upon them; and every twig will take root. And this is a very profitable experiment for costly trees, for the boughs will make stocks without charge; such as are apricots, peaches, almonds, cornelians, mulberries, figs, *etc.* The like is continually practised with vines, roses, musk-roses, *etc.*

427. FROM May to July you may take off the bark of any bough, being of the bigness of three or four inches, and cover the bare place, somewhat above and below, with loam well tempered with horse-dung, binding it fast down. Then cut off the bough about Allhollontide in the bare place, and set it in the ground; and it will grow to be a fair tree in one year. The cause may be, for that the baring from the bark keepeth the sap from descending towards winter, and so holdeth it in the bough; and it may be also that the loam and horse-dung applied to the bare place to moisten it, and cherish it, and make it more apt to put forth the root. Note, that this may be a general means for keeping up the sap of trees in their boughs: which may serve to other effects.

428. IT hath been practised in trees that shew fair and bear not, to bore a hole through the heart of the tree, and thereupon it will bear. Which may be, for that the tree before had too much repletion, and was oppressed with its own sap; for repletion is an enemy to generation.

429. IT hath been practised in trees that do not bear, to cleave two or three of the chief roots, and to put into the cleft a small pebble, which may keep it open, and then it will bear. The cause may be, for that a root of a tree may be, as it were, hide-

bound, no less than the body of the tree, but it will not keep open without somewhat put into it.

430. IT is usually practised, to set trees that require much sun upon walls against the south; as apricots, peaches, plums, vines, figs, and the like. It hath a double commodity; the one, the heat of the wall by reflexion; the other, the taking away of the shade; for when a tree groweth round, the upper boughs over-shadow the lower: but when it is spread upon a wall, the sun cometh alike upon the upper and lower branches.

431. IT hath also been practised, by some, to pull off some leaves from the trees so spread, that the sun may come upon the bough and fruit the better. There hath been practised also a curiosity, to set a tree upon the north side of a wall, and at a little height to draw it through the wall, and spread it upon the south side: conceiving that the root and lower part of the stock should enjoy the freshness of the shade; and the upper boughs, and fruit, the comfort of the sun. But it sorted not; the cause is, for that the root requireth some comfort from the sun, though under earth, as well as the body: and the lower part of the body more than the upper, as we see in compassing a tree below with straw.

432. THE lowness of the bough where the fruit cometh, maketh the fruit greater, and to ripen better; for you shall ever see, in apricots, peaches, or melocotones upon a wall, the greatest fruits towards the bottom. And in France, the grapes that make the wine, grow upon low vines bound to small stakes; and the raised vines in arbours make but verjuice. It is true, that in Italy and other countries where they have hotter sun, they raise them upon elms and trees; but I conceive, if the French manner of planting low were brought in use there, their wines would be stronger and sweeter. But it is more chargeable in respect of the props. It were good to try whether a tree grafted somewhat near the ground, and the lower boughs only maintained, and the higher continually pruned off, would not make a larger fruit.

433. To have fruit in greater plenty, the way is to graft not only upon young stocks, but upon divers boughs of an old tree; for they will bear great numbers of fruit: whereas if you graft but upon one stock, the tree can bear but few.

434. THE digging yearly about the roots of trees, which is a great means both to the acceleration and melioration of fruits, is practised in nothing but in vines; which if it were transferred unto other trees and shrubs, as roses, *etc.* I conceive would advance them likewise.

435. IT hath been known, that a fruit tree hath been blown up almost by the roots, and set up again, and the next year bear exceedingly. The cause of this was nothing but the loosening of the earth, which comforteth any tree, and is fit to be practised more than it is in fruit-trees: for trees cannot be so fitly removed into new grounds, as flowers and herbs may.

436. To revive an old tree, the digging of it about the roots, and applying new mould to the roots, is the way. We see also that draught-oxen put into fresh pasture gather new and tender flesh; and in all things better nourishment than hath been used doth help to renew; especially if it be not only better but changed, and differing from the former.

437. If an herb be cut off from the roots in the beginning of winter, and then the earth be troden and beaten down hard with the foot and spade, the roots will become of very great magnitude in summer. The reason is, for that the moisture being forbidden to come up in the plant, stayeth longer in the root, and so dilateth it.

And

And gardeners use to tread down any loose ground after they have sown onions, or turnips, *etc.*

438. IF *panicum* be laid below and about the bottom of a root, it will cause the root to grow to an excessive bigness. The cause is, for that being itself of a spongy substance, it draweth the moisture of the earth to it, and so feedeth the root. This is of greatest use for onions, turnips, parsnips, and carrots.

439. THE shifting of ground is a means to better the tree and fruit; but with this caution, that all things do prosper best when they are advanced to the better: your nursery of stocks ought to be in a more barren ground than the ground is whereunto you remove them. So all graziers prefer their cattle from meaner pastures to better. We see also, that hardness in youth lengtheneth life, because it leaveth a cherishing to the better of the body in age: nay, in exercises, it is good to begin with the hardest, as dancing in thick shoes, *etc.*

440. IT hath been observed, that hacking of trees in their bark, both down-right and across, so as you may make them rather in slices than in continued hacks, doth great good to trees; and especially delivereth them from being hide-bound, and killeth their moss.

441. SHADE to some plants conduceth to make them large and prosperous, more than sun; as in strawberries and bays, *etc.* Therefore amongst strawberries sow here and there some borage seed; and you shall find the strawberries under those leaves far more large than their fellows. And bays you must plant to the north, or defend them from the sun by a hedge-row; and when you sow the berries, weed not the borders for the first half year; for the weed giveth them shade.

442. To increase the crops of plants, there would be considered not only the increasing the lust of the earth, or of the plant, but the saving also of that which is spilt. So they have lately made a trial to set wheat; which nevertheless hath been left off, because of the trouble and pains: yet so much is true, that there is much saved by the setting, in comparison of that which is sown; both by keeping it from being picked up by birds, and by avoiding the shallow lying of it, whereby much that is sown taketh no root.

443. IT is prescribed by some of the ancients, that you take small trees, upon which figs or other fruit grow, being yet unripe, and cover the trees in the middle of autumn with dung until the spring; and then take them up in a warm day, and replant them in good ground; and by that means the former year's tree will be ripe, as by a new birth, when other trees of the same kind do but blossom. But this seemeth to have no great probability.

444. IT is reported, that if you take nitre, and mingle it with water, to the thickness of honey, and therewith anoint the bud, after the vine is cut, it will sprout forth within eight days: The cause is like to be, if the experiment be true, the opening of the bud, and of the parts contiguous, by the spirit of the nitre; for nitre is, as it were, the life of vegetables.

445. TAKE seed, or kernels of apples, pears, oranges; or a peach, or a plum-stone, *etc.* and put them into a squill, which is like a great onion, and they will come up much earlier than in the earth itself. This I conceive to be as a kind of grafting in the root; for as the stock of a graft yieldeth better prepared nourishment to the graft, than the crude earth; so the squill doth the like to the seed. And I suppose the same would be done, by putting kernels into a turnip, or the like; save that the squill is more vigorous and hot. It may be tried also, with putting onion-

seed into an onion-head, which thereby, perhaps, will bring forth a larger and earlier onion.

446. THE pricking of a fruit in several places, when it is almost at its bigness, and before it ripeneth, hath been practised with success, to ripen the fruit more suddenly. We see the example of the biting of wasps or worms upon fruit, whereby it manifestly ripeneth the sooner.

447. IT is reported, that *alga marina*, sea-weed, put under the roots of coleworts, and, perhaps, of other plants, will further their growth. The virtue, no doubt, hath relation to salt, which is a great help to fertility.

448. IT hath been practised, to cut off the stalks of cucumbers, immediately after their bearing, close by the earth; and then to cast a pretty quantity of earth upon the plant that remaineth, and they will bear the next year fruit long before the ordinary time. The cause may be, for that the sap goeth down the sooner, and is not spent in the stalk or leaf, which remaineth after the fruit. Where note, that the dying in the winter of the roots of plants that are annual, seemeth to be partly caused by the over-expende of the sap into stalk and leaves; which being prevented, they will super-annate, if they stand warm.

449. THE pulling off many of the blossoms from a fruit tree, doth make the fruit fairer. The cause is manifest; for that the sap hath the less to nourish. And it is a common experience, that if you do not pull off some blossoms the first time a tree bloometh, it will blossom itself to death.

450. IT were good to try, what would be the effect, if all the blossoms were pulled from a fruit tree; or the acorns and chestnut buds, *etc.* from a wild tree, for two years together. I suppose that the tree will either put forth the third year bigger and more plentiful fruit; or else, the same years, larger leaves, because of the sap stored up.

451. IT hath been generally received, that a plant watered with warm water, will come up sooner and better, than with cold water or with showers. But our experiment of watering wheat with warm water, as hath been said, succeeded not; which may be, because the trial was too late in the year, namely, in the end of October. For the cold then coming upon the seed, after it was made more tender by the warm water, might check it.

452. THERE is no doubt, but that the grafting, for the most part, doth meliorate the fruit. The cause is manifest; for that the nourishment is better prepared in the stock, than in the crude earth: but yet note well, that there be some trees, that are said to come up more happily from the kernel than from the graft; as the peach and melocotone. The cause I suppose to be, for that those plants require a nourishment of great moisture; and though the nourishment of the stock be finer and better prepared, yet it is not so moist and plentiful as the nourishment of the earth. And indeed we see those fruits are very cold fruits in their nature.

453. IT hath been received, that a smaller pear grafted upon a stock that beareth a greater pear, will become great. But I think it is as true, as that of the prime fruit upon the late stock; and *e converso*; which we rejected before: for the cion will govern. Nevertheless, it is probable enough, that if you can get a cion to grow upon a stock of another kind, that is much moister than its own stock, it may make the fruit greater, because it will yield more plentiful nourishment; though it is like it will make the fruit baser. But generally the grafting is upon a drier stock; as the apple upon a crab; the pear upon a thorn; *etc.* Yet it is reported, that in the

Low-Countries

Low-Countries they will graft an apple cion upon the stock of a colewort, and it will bear a great flaggy apple; the kernel of which, if it be set, will be a colewort, and not an apple. It were good to try, whether an apple cion will prosper, if it be grafted upon a fallow, or upon a poplar, or upon an alder, or upon an elm, or upon an horie-plum, which are the moittest of trees. I have heard that it hath been tried upon an elm and succeeded.

454. It is manifest by experience, that flowers removed wax greater, because the nourishment is more easily come by in the loose earth. It may be, that oft re-grafting of the same cion may likewise make fruit greater; as if you take a cion, and graft it upon a stock the first year; and then cut it off, and graft it upon another stock the second year; and so for a third or fourth year; and then let it rest, it will yield afterward, when it beareth, the greater fruit.

Of grafting there are many experiments worth the noting, but those we reserve to a proper place.

455. It maketh figs better, if a fig-tree, when it beginneth to put forth leaves, have his top cut off. The cause is plain, for that the sap hath the lefs to feed, and the lefs way to mount: but it may be the fig will come somewhat later, as was formerly touched. The same may be tried likewise in other trees.

456. It is reported, that mulberries will be fairer, and the trees more fruitful, if you bore the trunk of the tree through in several places, and thrust into the places bored wedges of some hot trees, as turpentine, mastic-tree, guaiacum, juniper, *etc.* The cause may be, for that adventive heat doth clear up the native juice of the tree.

457. It is reported, that trees will grow greater, and bear better fruit, if you put salt, or lees of wine, or blood to the root. The cause may be the increasing the lust or spirit of the root; these things being more forcible than ordinary composts.

458. It is reported by one of the ancients, that artichokes will be lefs prickly, and more tender, if the seeds have their tops dulled, or grated off upon a stone.

459. HERBS will be tenderer and fairer, if you take them out of beds, when they are newly come up, and remove them into pots with better earth. The remove from bed to bed was spoken of before; but that was in several years; this is upon the sudden. The cause is the same with other removes formerly mentioned.

460. COLEWORTS are reported by one of the ancients to prosper exceedingly, and to be better tasted, if they be sometimes watred with salt water; and much more with water mixed with nitre; the spirit of which is lefs adurent than salt.

461. It is reported, that cucumbers will prove more tender and dainty, if their seeds be steeped a little in milk; the cause may be, for that the seed being mollified with the milk, will be too weak to draw the grosser juice of the earth, but only the finer. The same experiment may be made in artichokes and other seeds, when you would take away either their flashiness or bitterness. They speak also, that the like effect followeth of steeping in water mixed with honey; but that seemeth to me not so probable, because honey hath too quick a spirit.

462. It is reported, that cucumbers will be lefs watry, and more melon-like, if in the pit where you set them, you fill it, half-way up, with chaff or small sticks, and then pour earth upon them; for cucumbers, as it seemeth, do extremely affect moisture, and over-drink themselves; which this chaff or chips forbiddeth. Nay, it is farther reported that if, when a cucumber is grown, you set a pot of water about five or six inches distance from it, it will in twenty-four hours shoot so much out as

to touch the pot; which, if it be true, is an experiment of an higher nature than belongeth to this title: for it discovereth perception in plants, to move towards that which should help and comfort them, though it be at a distance. The ancient tradition of the vine is far more strange; it is, that if you set a stake or prop some distance from it, it will grow that way; which is far stranger, as is said, than the other: for that water may work by a sympathy of attraction; but this of the stake seemeth to be a reasonable discourse.

463. IT hath been touched before, that terebration of trees doth make them prosper better. But it is found also, that it maketh the fruit sweeter and better. The cause is, for that, notwithstanding the terebration, they may receive aliment sufficient, and yet no more than they can well turn and digest; and withal do sweat out the coarsest and unprofitablest juice; even as it is in living creatures, which by moderate feeding, and exercise, and sweat, attain the soundest habit of body.

464. As terebration doth meliorate fruit, so upon the like reason doth letting of plants blood; as pricking vines, or other trees, after they be of some growth; and thereby letting forth gum or tears; though this be not to continue, as it is in terebration, but at some seasons. And it is reported, that by this artifice bitter almonds have been turned into sweet.

465. THE ancients for the dulcerating of fruit do commend swines dung above all other dung; which may be because of the moisture of that beast, whereby the excrement hath less acrimony; for we see swines and pigs flesh is the moistest of fleshes.

466. IT is observed by some, that all herbs wax sweeter, both in smell and taste, if after they be grown up some reasonable time, they be cut, and so you take the latter sprout. The cause may be, for that the longer the juice stayeth in the root and stalk, the better it concocteth. For one of the chief causes why grains, seeds, and fruits are more nourishing than leaves, is the length of time in which they grow to maturation. It were not amiss to keep back the sap of herbs, or the like, by some fit means, till the end of summer; whereby, it may be, they will be more nourishing.

467. As grafting doth generally advance and meliorate fruits, above that which they would be if they were set of kernels or stones, in regard the nourishment is better concocted; so, no doubt, even in grafting, for the same cause, the choice of the stock doth much; always provided, that it be somewhat inferior to the cion: for otherwise it dulleth it. They commend much the grafting of pears or apples upon a quince.

468. BESIDES the means of melioration of fruits before mentioned, it is set down as tried, that a mixture of bran and swines dung, or chaff and swines dung, especially laid up together for a month to rot, is a very great nourisher and comforter to a fruit-tree.

469. IT is delivered, that onions wax greater if they be taken out of the earth, and laid a drying twenty days, and then set again; and yet more, if the outermost pill be taken off all over.

470. IT is delivered by some, that if one take the bough of a low fruit-tree newly budded, and draw it gently, without hurting it, into an earthen pot perforate at the bottom to let in the plant, and then cover the pot with earth, it will yield a very large fruit within the ground. Which experiment is nothing but potting of plants without removing, and leaving the fruit in the earth. The like, they say, will be effected

effected by an empty pot without earth in it, put over a fruit, being propped up with a stake, as it hangeth upon the tree; and the better, if some few pertusions be made in the pot. Wherein, besides the defending of the fruit from extremity of sun or weather, some give a reason, that the fruit loving and coveting the open air and sun, is invited by those pertusions to spread and approach as near the open air as it can; and so enlargeth in magnitude.

471. ALL trees in high and sandy grounds are to be set deep; and in watry grounds more shallow. And in all trees, when they be removed, especially fruit-trees, care ought to be taken, that the sides of the trees be coated, north and south, *etc.* as they stood before. The same is said also of stone out of the quarry, to make it more durable; though that seemeth to have less reason; because the stone lieth not so near the sun, as the tree groweth.

472. TIMBER trees in a coppice wood do grow better than in an open field; both because they offer not to spread so much, but shoot up still in height; and chiefly because they are defended from too much sun and wind, which do check the growth of all fruit; and so, no doubt, fruit-trees, or vines, set upon a wall against the sun, between elbows or buttresses of stone, ripen more than upon a plain wall.

473. IT is said, that if potado-roots be set in a pot filled with earth, and then the pot with earth be set likewise within the ground some two or three inches, the roots will grow greater than ordinary. The cause may be, for that having earth enough within the pot to nourish them; and then being stopped by the bottom of the pot from putting strings downward, they must needs grow greater in breadth and thickness. And it may be, that all seeds or roots potted, and so set into the earth, will prosper the better.

474. THE cutting off the leaves of radish, or other roots, in the beginning of winter, before they wither, and covering again the root something high with earth, will preserve the root all winter, and make it bigger in the spring following, as hath been partly touched before. So that there is a double use of this cutting off the leaves; for in plants where the root is the esculent, as radish and parsnips, it will make the root the greater; and so it will do to the heads of onions. And where the fruit is the esculent, by strengthening the root, it will make the fruit also the greater.

475. IT is an experiment of great pleasure, to make the leaves of shady trees larger than ordinary. It hath been tried for certain that a cion of a weech-elm, grafted upon the stock of an ordinary elm, will put forth leaves almost as broad as the brim of one's hat. And it is very likely, that as in fruit-trees the graft maketh a greater fruit; so in trees that bear no fruit, it will make the greater leaves. It would be tried therefore in trees of that kind chiefly, as birch, asp, willow; and especially the shining willow, which they call swallow-tail, because of the pleasure of the leaf.

476. THE barrenness of trees by accident, besides the weakness of the soil, seed, or root; and the injury of the weather, cometh either of their overgrowing with moss, or their being hide-bound, or their planting too deep, or by issuing of the sap too much into the leaves. For all these there are remedies mentioned before.

Experiments in consort touching compound fruits and flowers.

WE see that in living creatures, that have male and female, there is copulation of several kinds; and so compound creatures; as the mule, that is generated be-
tween

twixt the horse and the ass; and some other compounds which we call monsters, though more rare: and it is held that that proverb, *Africa semper aliquid monstri parit*, cometh, for that the fountains of waters there being rare, divers sorts of beasts come from several parts to drink; and so being refreshed, fall to couple, and many times with several kinds. The compounding or mixture of kinds in plants is not found out; which nevertheless, if it be possible, is more at command than that of living creatures; for that their lust requireth a voluntary motion; wherefore it were one of the most noble experiments touching plants to find it out: for so you may have great variety of new fruits and flowers yet unknown. Grafting doth it not: that mendeth the fruit, or doub'th the flowers, *etc.* but it hath not the power to make a new kind. For the cion ever over-ruleth the stock.

477. IT hath been set down by one of the ancients, that if you take two twigs of several fruit-trees, and flat them on the sides, and then bind them close together and set them in the ground, they will come up in one stock; but yet they will put forth their several fruits without any commixture in the fruit. Wherein note, by the way, that unity of continuance is easier to procure than unity of species. It is reported also, that vines of red and white grapes being set in the ground, and the upper parts being flatted and bound close together, will put forth grapes of the several colours upon the same branch; and grape-stones of several colours within the same grape: but the more after a year or two; the unity, as it seemeth, growing more perfect. And this will likewise help, if from the first uniting they be often watered; for all moisture helpeth to union. And it is prescribed also to bind the bud as soon as it cometh forth, as well as the stock, at the least for a time.

478. THEY report, that divers seeds put into a clout, and laid in earth well dunged, will put up plants contiguous; which, afterwards, being bound in, their shoots will incorporate. The like is said of kernels put into a bottle with a narrow mouth filled with earth.

479. IT is reported, that young trees of several kinds set contiguous without any binding, and very oft watered, in a fruitful ground, with the very luxury of the trees will incorporate and grow together. Which seemeth to me the likeliest means that hath been propounded; for that the binding doth hinder the natural swelling of the tree; which while it is in motion doth better unite.

Experiment: in consort touching the sympathy and antipathy of plants.

THERE are many ancient and received traditions and observations touching the sympathy and antipathy of plants; for that some will thrive best growing near others, which they impute to sympathy; and some worse, which they impute to antipathy. But these are idle and ignorant conceits, and forsake the true indication of the causes, as the most part of experiments that concern sympathies and antipathies do. For as to plants, neither is there any such secret friendship or hatred as they imagine; and if we should be content to call it sympathy and antipathy, it is utterly mistaken; and if their sympathy is an antipathy, and their antipathy is a sympathy: for it is thus; Wheresoever one plant draweth such a particular juice out of the earth, as it qualifyeth the earth, so as that juice which remaineth is fit for the other plant; there the neighbourhood doth good, because the nourishments are contrary or several: but where two plants draw much the same juice, there the neighbourhood hurteth, for the one deceiveth the other.

480. **FIRST** therefore, all plants that do draw much nourishment from the earth, and so soak the earth and exhault it, hurt all things that grow by them; as great trees, especially alhes, and such trees as spread their roots near the top of the ground. So the colewort is not an enemy, though that were anciently received, to the vine only; but it is an enemy to any other plant, because it draweth strongly the fattest juice of the earth. And if it be true, that the vine when it creepeth near the colewort will turn away, this may be, because there it findeth worse nourishment; for though the root be where it was, yet, I doubt, the plant will bend as it nourisheth.

481. **WHERE** plants are of several natures, and draw several juices out of the earth, there, as hath been said, the one set by the other helpeth: as it is set down by divers of the ancients, that rue doth prosper much, and becometh stronger, if it be set by a fig-tree; which, we conceive, is caused not by reason of friendship, but by extraction of a contrary juice: the one drawing juice fit to result sweet, the other bitter. So they have set down likewise, that a rose set by garlick is sweeter: which likewise may be, because the more fetid juice of the earth goeth into the garlick, and the more odorate into the rose.

482. **THIS** we see manifestly, that there be certain corn-flowers which come seldom or never in other places, unless they be set, but only amongst corn: as the bluebottle, a kind of yellow marygold, wild poppy, and fumitory. Neither can this be, by reason of the culture of the ground, by ploughing or furrowing; as some herbs and flowers will grow but in ditches new cast; for if the ground lie fallow and unfown, they will not come: so as it should seem to be the corn that qualificeth the earth, and prepareth it for their growth.

483. **THIS** observation, if it holdeth, as it is very probable, is of great use for the meliorating of taste in fruits and esculent herbs, and of the scent of flowers. For I do not doubt, but if the fig tree do make the rue more strong and bitter, as the ancients have noted, good store of rue planted about the fig-tree will make the fig more sweet. Now the tastes that do most offend in fruits, and herbs, and roots, are bitter, harsh, sour, and waterish, or fleshy. It were good therefore to make the trials following:

484. **TAKE** wormwood or rue, and set it near lettuce or coleflory, or artichoke, and see whether the lettuce or the coleflory, *etc.* become not the sweeter.

485. **TAKE** a service-tree, or a cornelian-tree, or an elder-tree, which we know have fruits of harsh and binding juice, and set them near a vine, or fig-tree, and see whether the grapes or figs will not be the sweeter.

486. **TAKE** cucumbers or pumpions, and set them, here and there, amongst musk-melons, and see whether the melons will not be more winy, and better tasted. Set cucumbers, likewise, amongst radish, and see whether the radish will not be made the more biting.

487. **TAKE** sorrel, and set it amongst rasps, and see whether the rasps will not be the sweeter.

488. **TAKE** common briar, and set it amongst violets or wall-flowers, and see whether it will not make the violets or wall-flowers sweeter, and less earthy in their smell. So set lettuce or cucumbers amongst rosemary or bays, and see whether the rosemary or bays will not be the more odorate or aromatical.

489. **CONTRARIWISE**, you must take heed how you set herbs together, that draw much the like juice. And therefore I think rosemary will lose in sweetness, if it be set with lavender, or bays, or the like. But yet if you will correct the

strength of an herb, you shall do well to set other like herbs by him to take him down; as if you should set ransey by angelica, it may be the angelica would be the weaker, and fitter for mixture in perfume. And if you should set rue by common wormwood, it may be the wormwood would turn to be liker Roman wormwood.

490. THIS axiom is of large extent; and therefore would be severed and refined by trial. Neither must you expect to have a gross difference by this kind of culture, but only farther perfection.

491. TRIAL would be also made in herbs poisonous and purgative, whose ill quality, perhaps, may be discharged, or attempered, by setting stronger poisons or purgatives by them.

492. IT is reported, that the shrub called our ladies seal, which is a kind of briony, and coleworts, set near together, one or both will die. The cause is, for that they be both great depredators of the earth, and one of them starveth the other. The like is said of a reed and a brake: both which are succulent; and therefore the one deceiveth the other. And the like of hemlock and rue; both which draw strong juices.

493. SOME of the ancients, and likewise divers of the modern writers, that have laboured in natural magic, have noted a sympathy between the sun, moon, and some principal stars, and certain herbs and plants. And so they have denominated some herbs solar, and some lunar; and such like toys put into great words. It is manifest that there are some flowers that have respect to the sun in two kinds, the one by opening and shutting, and the other by bowing and inclining the head. For marygolds, tulips, pimpernel, and indeed most flowers, do open and spread their leaves abroad when the sun shineth serene and fair: and again, in some part, close them, or gather them inward, either towards night, or when the sky is overcast. Of this there needeth no such solemn reason to be assigned; as to say, that they rejoice at the presence of the sun, and mourn at the absence thereof. For it is nothing else but a little loading of the leaves, and swelling them at the bottom, with the moisture of the air; whereas the dry air doth extend them: and they make it a piece of the wonder, that garden-clover will hide the stalk when the sun sheweth bright; which is nothing but a full expansion of the leaves. For the bowing and inclining the head, it is found in the great flower of the sun, in marygolds, wartwort, mallow flowers, and others. The cause is somewhat more obscure than the former; but I take it to be no other, but that the part against which the sun beateth waxeth more faint and flaccid in the stalk, and thereby less able to support the flower.

494. WHAT a little moisture will do in vegetables, even though they be dead and severed from the earth, appeareth well in the experiment of jugglers. They take the beard of an oat; which, if you mark it well, is wreathed at the bottom, and one smooth entire straw at the top. They take only the part that is wreathed, and cut off the other, leaving the beard half the breadth of a finger in length. Then they make a little cross of a quill, longways of that part of the quill which hath the pith; and cross-ways of that piece of the quill without pith; the whole cross being the breadth of a finger high. Then they prick the bottom where the pith is, and thereinto they put the oaten-beard, leaving half of it sticking forth of the quill: then they take a little white box of wood, to deceive men, as if somewhat

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in the box did work the feat ; in which, with a pin, they make a little hole, enough to take the beard, but not to let the crofs sink down, but to ftick. Then likewise, by way of impofture, they make a queftion ; as, Who is the faireft woman in the company ? or, Who hath a glove or card ? and caufe another to name divers perfons : and upon every naming they ftick the crofs in the box, having firft put it towards their mouth, as if they charmed it ; and the crofs ftirreth not ; but when they come to the perfon that they would take, as they hold the crofs to their mouth, they touch the beard with the tip of their tongue, and wet it ; and fo ftick the crofs in the box ; and then you fhall fee it turn finely and foftly three or four turns ; which is caufed by the untwining of the beard by the moifture. You may fee it more evidently, if you ftick the crofs between your fingers, inftead of the box ; and therefore you may fee, that this motion, which is effected by fo little wet, is ftronger than the clofing or bending of the head of a marygold.

495. It is reported by fome, that the herb called *rofa folis*, whereof they make ftrong waters, will, at the noon-day when the fun fhineth hot and bright, have a great dew upon it. And therefore, that the right name is *ros folis* : which they impute to a delight and fympathy that it hath with the fun. Men favour wonders. It were good firft to be fure, that the dew that is found upon it, be not the dew of the morning preferved, when the dew of other herbs is breathed away ; for it hath a fmooth and thick leaf, that doth not difcharge the dew fofoon as other herbs that are more fpongy and porous. And it may be purflane, or fome other herb, doth the like, and is not marked. But if it be fo, that it hath more dew at noon than in the morning, then fure it feemeth to be an exudation of the herb itfelf. As plums fweat when they are fet into the oven : for you will not, I hope, think, that it is like Gideon's fleece of wool, that the dew fhould fall upon that and no where elfe.

496. It is certain, that the honey dews are found more upon oak leaves, than upon afh, or beech, or the like : but whether any caufe be from the leaf itfelf to concoct the dew ; or whether it be only that the leaf is clofe and fmooth, and therefore drinketh not in the dew, but preferveth it, may be doubted. It would be well enquired, whether manna the drug doth fall but upon certain herbs or leaves only. Flowers that have deep fockets, do gather in the bottom a kind of honey ; as honeysuckles, both the woodbine and the trefoil, lilies, and the like. And in them certainly the flower beareth part with the dew.

497. THE experience is, that the froth which they call woodfeare, being like a kind of fpittle, is found but upon certain herbs, and thofe hot ones ; as lavender, lavender-cotton, fage, hyffop, *etc.* Of the caufe of this enquire farther ; for it feemeth a fecret. There falleth alfo mildew upon corn, and smutteth it ; but it may be, that the fame falleth alfo upon other herbs, and is not obferved.

498. It were good trial were made, whether the great confent between plants and water, which is a principal nourifhment of them, will make an attraction at diftance, and not at touch only. Therefore take a vefiel, and in the middle of it make a falfe bottom of coarfe canvas : fill it with earth above the canvas, and let not the earth be watered ; then fow fome good feeds in that earth ; but under the canvas, fome half a foot in the bottom of the vefiel, lay a great fponge thoroughly wet in water ; and let it lie fo fome ten days, and fee whether the feeds will fprout, and the earth become more moift, and the fponge more dry. The experiment

formerly mentioned of the cucumber creeping to the pot of water, is far stranger than this.

Experiments in consort touching the making herbs and fruits medicinal.

499. THE altering of the scent, colour, or taste of fruit, by infusing, mixing, or letting into the bark, or root of the tree, herb, or flower, any coloured, aromatical, or medicinal substance, are but fancies. The cause is, for that those things have passed their period, and nourish not. And all alteration of vegetables in those qualities must be by somewhat that is apt to go into the nourishment of the plant. But this is true, that where kine feed upon wild garlick, their milk tasteeth plainly of the garlick: and the flesh of muttens is better tasted where the sheep feed upon wild thyme, and other whole-some herbs. Galen also speaketh of the curing of the *scirrus* of the liver, by milk of a cow that feedeth but upon certain herbs; and honey in Spain smelleth apparently of the rosemary or orange, from whence the bee gathereth it: and there is an old tradition of a maiden that was fed with *napellus*; which is counted the strongest poison of all vegetables, which with use did not hurt the maid, but poisoned some that had carnal company with her. So it is observed by some, that there is a virtuous bezoar, and another without virtue, which appear to the shew alike: but the virtuous is taken from the beast that feedeth upon the mountains, where there are theriacal herbs; and that without virtue, from those that feed in the valleys where no such herbs are. Thus far I am of opinion; that as steeped wines and beers are very medicinal; and likewise bread tempered with divers powders; so of meat also, as flesh, fish, milk, and eggs, that they may be made of great use for medicine and diet, if the beasts, fowl, or fish, be fed with a special kind of food fit for the disease. It were a dangerous thing also for secret empoisonments. But whether it may be applied unto plants and herbs, I doubt more; because the nourishment of them is a more common juice; which is hardly capable of any special quality, until the plant do assimilate it.

500. BUT lest our incredulity may prejudice any profitable operations in this kind, especially since many of the ancients have set them down, we think good briefly to propound the four means which they have devised of making plants medicinal. The first is by sitting of the root, and infusing into it the medicine; as hellebore, opium, scammony, treacle, &c. and then binding it up again. This seemeth to me the least probable; because the root draweth immediately from the earth; and so the nourishment is the more common and less qualified: and besides, it is a long time in going up ere it come to the fruit. The second way is to perforate the body of the tree, and there to infuse the medicine; which is somewhat better: for if any virtue be received from the medicine, it hath the less way, and the less time to go up. The third is, the steeping of the seed or kernel in some liquor wherein the medicine is infused: which I have little opinion of, because the seed, I doubt, will not draw the parts of the matter which have the propriety: but it will be far the more likely, if you mingle the medicine with dung; for that the seed naturally drawing the moisture of the dung, may call in withal some of the propriety. The fourth is, the watering of the plant oft with an infusion of the medicine. This, in one respect, may have more force than the rest, because the medication is oft renewed; whereas the

the rest are applied but at one time ; and therefore the virtue may the sooner vanish. But still I doubt, that the root is somewhat too stubborn to receive those fine impressions ; and besides, as I said before, they have a great hill to go up. I judge therefore the likeliest way to be the perforation of the body of the tree in several places one above the other ; and the filling of the holes with dung mingled with the medicine ; and the watering of those lumps of dung with squirts of an infusion of the medicine in duned water, once in three or four days.



NATURAL HISTORY.

CENTURY VI.

Experiments in consort touching curiosities about fruits and plants.

OUR experiments we take care to be, as we have often said, either *experimenta fructifera*, or *lucifera*; either of use, or of discovery: for we hate impostures, and despise curiosities. Yet because we must apply ourselves somewhat to others, we will set down some curiosities touching plants.

501. IT is a curiosity to have several fruits upon one tree; and the more when some of them come early, and some come late; so that you may have upon the same tree ripe fruits all summer. This is easily done by grafting of several cions upon several boughs, of a stock, in a good ground plentifully fed. So you may have all kinds of cherries, and all kinds of plums, and peaches, and apricots, upon one tree; but I conceive the diversity of fruits must be such as will graft upon the same stock. And therefore I doubt, whether you can have apples, or pears, or oranges, upon the same stock upon which you graft plums.

502. IT is a curiosity to have fruits of divers shapes and figures. This is easily performed, by molding them when the fruit is young, with molds of earth or wood. So you may have cucumbers, *etc.* as long as a cane; or as round as a sphere; or formed like a cross. You may have also apples in the form of pears or lemons. You may have also fruit in more accurate figures, as we said of men, beasts, or birds, according as you make the molds. Wherein you must understand, that you make the mold big enough to contain the whole fruit when it is grown to the greatest: for else you will choke the spreading of the fruit; which otherwise would spread itself, and fill the concave, and so be turned into the shape desired; as it is in mold works of liquid things. Some doubt may be conceived, that the keeping of the sun from the fruit may hurt it: but there is ordinary experience of fruit that groweth covered. *Query*, also, whether some small holes may not be made in the wood to let in the sun. And note, that it were best to make the molds partible, glued, or cemented together, that you may open them when you take out the fruit.

503. IT is a curiosity to have inscriptions, or engravings, in fruit or trees. This is easily performed, by writing with a needle, or bodkin, or knife, or the like, when the fruit or trees are young; for as they grow, so the letters will grow more large and graphical.

---- *Tenerisque meos incidere amores
Arboribus; crescent illae, crescentis amores.*

504. You may have trees appareled with flowers or herbs, by boring holes in the bodies of them, and putting into them earth holpen with muck, and setting seeds, or slips,

slips, of violets, strawberries, wild thyme, camomile, and such like in the earth. Wherein they do but grow in the tree as they do in pots; though, perhaps, with some feeding from the trees. It would be tried also with shoots of vines, and roots of red roses; for it may be they being of a more ligneous nature, will incorporate with the tree itself.

505. It is an ordinary curiosity to form trees and shrubs, as rosemary, juniper, and the like, into sundry shapes; which is done by molding them within, and cutting them without. But they are but lame things, being too small to keep figure: great castles made of trees upon frames of timber, with turrets and arches, were matters of magnificence.

506. AMONGST curiosities I shall place coloration, though it be somewhat better: for beauty in flowers is their preeminence. It is observed by some, that gilly-flowers, sweet-williams, violets, that are coloured, if they be neglected, and neither watered, nor new molded, nor transplanted, will turn white. And it is probable that the white with much culture may turn coloured. For this is certain, that the white colour cometh of scarcity of nourishment; except in flowers that are only white, and admit no other colours.

507. It is good therefore to see what natures do accompany what colours; for by that you shall have light how to induce colours, by producing those natures. Whites are more inodorate, for the most part, than flowers of the same kind coloured; as is found in single white violets, white roses, white gilly-flowers, white stock-gilly-flowers, *etc.* We find also that blossoms of trees, that are white, are commonly inodorate, as cherries, pears, plums; whereas those of apples, crabs, almonds, and peaches, are blusky and smell sweet. The cause is, for that the substance that maketh the flower is of the thinnest and finest of the plant, which also maketh flowers to be of so dainty colours. And if it be too sparing and thin, it attaineth no strength of odour, except it be in such plants as are very succulent; whereby they need rather to be scanted in their nourishment than replenished, to have them sweet. As we see in white satyrian, which is of a dainty smell; and in bean-flowers, *etc.* And again, if the plant be of nature to put forth white flowers only, and those not thin or dry, they are commonly of rank and fulsome smell; as may-flowers, and white lilies.

508. CONTRARIWISE, in berries the white is commonly more delicate and sweet in taste than the coloured, as we see in white grapes, in white raspberries, in white strawberries, in white currants, *etc.* The cause is, for that the coloured are more juiced, and coarser juiced, and therefore not so well and equally concocted; but the white are better proportioned to the digestion of the plant.

509. BUT in fruits the white commonly is meaner: as in pear-plums, damascenes, *etc.* and the choicest plums are black; the mulberry, which though they call it a berry, is a fruit, is better the black than the white. The harvest white plum is a base plum; and the verdoccio, and white date-plum, are no very good plums. The cause is, for that they are all over-watry; whereas an higher concoction is required for sweetness, or pleasure of taste; and therefore all your dainty plums are a little dry, and come from the stone; as the muscle-plum, the damascene-plum, the peach, the apricot, *etc.* yet some fruits, which grow not to be black, are of the nature of berries, sweetest such as are paler; as the cœur-cherry, which inclineth more to white, is sweeter than the red; but the egriot is more sour.

510. TAKE gilly-flower seed, of one kind of gilly-flower, as of the clove-gilly-flower, which is the most common, and sow it, and there will come up gilly-flowers, some of one colour, and some of another, casually, as the seed meeteth with nourishment in the earth; so that the gardeners find, that they may have two or three roots amongst an hundred, that are rare and of great price; as purple, carnation of several stripes; the cause is, no doubt, that in earth, though it be contiguous, and in one bed, there are very several juices; and as the seed doth casually meet with them, so it cometh forth. And it is noted especially, that those which do come up purple, do always come up single: the juice, as it seemeth, not being able to suffice a succulent colour, and a double leaf. This experiment of several colours coming up from one seed, would be tried also in larks-foot, monks-hood, poppy and holyoak.

511. FEW fruits are coloured red within; the queen-apple is; and another apple, called the rose apple; mulberries likewise, and grapes, though most toward the skin. There is a peach also that hath a circle of red towards the stone: and the egriot cherry is somewhat red within; but no pear, nor warden, nor plum, nor apricot, although they have, many times, red sides, are coloured red within. The cause may be inquired.

512. THE general colour of plants is green, which is a colour that no flower is of. There is a greenish primrose, but it is pale and scarce a green. The leaves of some trees turn a little murrey or redish; and they be commonly young leaves that do so; as it is in oaks, and vines, and hazle. Leaves rot into a yellow, and some hollies have part of their leaves yellow, and are, to all seeming, as fresh and shining as the green. I suppose also, that yellow is a less succulent colour than green, and a degree nearer white. For it hath been noted, that those yellow leaves of holly stand ever towards the north or north-east. Some roots are yellow, as carrots; and some plants blood-red, stalk and leaf, and all, as amaranthus. Some herbs incline to purple and red; as a kind of sage doth, and a kind of mint, and *rosa solis, etc.* And some have white leaves, as another kind of sage, and another kind of mint; but azure and a fair purple are never found in leaves. This sheweth, that flowers are made of a refined juice of the earth; and so are fruits; but leaves of a more coarse and common.

513. IT is a curiosity also to make flowers double, which is effected by often removing them into new earth; as, on the contrary part, double-flowers, by neglecting and not removing, prove single. And the way to do it speedily, is to sow or set seeds or slips of flowers; and as soon as they come up, to remove them into new ground that is good. Inquire also, whether inoculating of flowers, as stock-gilly-flowers, roses, musk-roses, *etc.* doth not make them double. There is a cherry-tree that hath double blossoms; but that tree beareth no fruit: and it may be, that the same means which, applied to the tree, doth extremely accelerate the sap to rise and break forth, would make the tree spend itself in flowers, and those to become double; which were a great pleasure to see, especially in apple-trees, peach-trees, and almond-trees, that have blossoms bluish-coloured.

514. THE making of fruits without core or stone, is likewise a curiosity, and somewhat better: because whatsoever maketh them so, is like to make them more tender and delicate. If a cion or shoot, fit to be set in the ground, have the pith finely taken forth, and not altogether, but some of it left, the better to save the life, it will bear a fruit with little or no core or stone. And the like is said to be of di-

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viding a quick tree down to the ground, and taking out the pith, and then binding it up again.

515. It is reported also, that a citron grafted upon a quince will have small or no seeds; and it is very probable, that any four fruit grafted upon a stock that beareth a sweeter fruit, may both make the fruit sweeter, and more void of the harsh matter of kernels or seeds.

516. It is reported, that not only the taking out of the pith, but the stopping of the juice of the pith from rising in the midst, and turning it to rise on the outside, will make the fruit without core or stone; as if you should bore a tree clean through, and put a wedge in. It is true, there is some affinity between the pith and the kernel, because they are both of a harsh substance, and both placed in the midst.

517. It is reported, that trees watered perpetually with warm water, will make a fruit with little or no core or stone. And the rule is general, that whatsoever will make a wild tree a garden tree, will make a garden tree to have less core or stone.

Experiments in consort touching the degenerating of plants, and of the transmutation of them one into another.

518. THE rule is certain, that plants for want of culture degenerate to be baser in the same kind; and sometimes so far, as to change into another kind. 1. The standing long, and not being removed, maketh them degenerate. 2. Drought, unless the earth of itself be moist, doth the like. 3. So doth removing into worse earth, or forbearing to compost the earth; as we see that water mint turneth into field mint, and the colewort into rape, by neglect, etc.

519. WHATSOEVER fruit useth to be set upon a root or a slip, if it be sown, will degenerate. Grapes sown, figs, almonds, pomgranate kernels sown, make the fruits degenerate and become wild. And again, most of those fruits that use to be grafted, if they be set of kernels, or stones, degenerate. It is true that peaches, as hath been touched before, do better upon stones set than upon grafting: and the rule of exception should seem to be this: that whatsoever plant requireth much moisture, prospereth better upon the stone or kernel, than upon the graft. For the stock, though it giveth a finer nourishment, yet it giveth a scantier than the earth at large.

520. SEEDS, if they be very old, and yet have strength enough to bring forth a plant, make the plant degenerate. And therefore skilful gardeners make trial of the seeds before they buy them, whether they be good or no, by putting them into water gently boiled; and if they be good, they will sprout within half an hour.

521. It is strange which is reported, that basil too much exposed to the sun doth turn unto wild thyme; although those two herbs seem to have small affinity; but basil is almost the only hot herb that hath rat and succulent leaves; which oiliness, if it be drawn forth by the sun, it is like it will make a very great change.

522. THERE is an old tradition, that boughs of oak put into the earth will put forth wild vines: which if it be true, no doubt it is not the oak that turneth into a vine, but the oak bough putrifying, qualifyeth the earth to put forth a vine of itself.

523. It is not impossible, and I have heard it verified, that upon cutting down of an old timber-tree, the stub hath put out sometimes a tree of another kind; as that

beech hath put forth birch ; which, if it be true, the cause may be, for that the old stub is too scanty of juice to put forth the former tree ; and therefore putteth forth a tree of a smaller kind that needeth less nourishment.

524. THERE is an opinion in the country, that if the same ground be oft sown with the grain that grew upon it, it will in the end grow to be of a baser kind.

525. IT is certain, that in very steril years corn sown will grow to another kind.

*Grandia saepe quibus mandavimus hordea sulcis,
Infelix lolium, et steriles dominantur avenae.*

And generally it is a rule, that plants that are brought forth by culture, as corn, will sooner change into other species, than those that come of themselves ; for that culture giveth but an adventitious nature, which is more easily put off.

THIS work of the transmutation of plants one into another, is *inter magnalia naturae* ; for the transmutation of species is, in the vulgar philosophy, pronounced impossible : and certainly it is a thing of difficulty, and requireth deep search into nature ; but seeing there appear some manifest instances of it, the opinion of impossibility is to be rejected, and the means thereof to be found out. We see, that in living creatures, that come of putrefaction, there is much transmutation of one into another ; as caterpillars turn into flies, *etc.* And it should seem probable, that whatsoever creature, having life, is generated without seed, that creature will change out of one species into another. For it is the seed and the nature of it, which locketh and boundeth in the creature, that it doth not expatiate. So as we may well conclude, that seeing the earth of itself doth put forth plants without seed, therefore plants may well have a transmigration of species. Wherefore, wanting instances which do occur, we shall give directions of the most likely trials : and generally we would not have those that read this our work of *Sylva sylvarum* account it strange, or think that it is an over-haste, that we have set down particulars untried ; for contrariwise, in our own estimation, we account such particulars more worthy than those that are already tried and known : for these latter must be taken as you find them ; but the other do level point-blank at the inventing of causes and axioms.

526. FIRST therefore, you must make account that if you will have one plant change into another, you must have the nourishment over-rule the seed ; and therefore you are to practise it by nourishments as contrary as may be to the nature of the herb, so nevertheless as the herb may grow ; and likewise with seeds that are of the weakest sort, and have least vigour. You shall do well therefore to take marsh-herbs, and plant them upon tops of hills and champaigns ; and such plants as require much moisture, upon sandy and very dry grounds. As for example, marsh-mallows and sedge, upon hills ; cucumber, and lettuce seeds, and coleworts, upon a sandy plot : so contrariwise, plant bushes, heath, ling, and brakes, upon a wet or marsh ground. This I conceive also, that all esculent and garden herbs, set upon the tops of hills, will prove more medicinal, though less esculent than they were before. And it may be likewise, some wild herbs you may make salad-herbs. This is the first rule for transmutation of plants.

527. THE second rule shall be to bury some few seeds of the herb you would change, amongst other seeds ; and then you shall see, whether the juice of those other seeds do not so qualify the earth, as it will alter the seed whereupon you work. As for example ; put parsley seed amongst onion seed, or lettuce seed amongst parsley seed, or basil seed amongst thyme seed ; and see the change of taste or otherwise,

wife. But you shall do well to put the seed you would change into a little linen cloth, that it mingle not with the foreign seed.

528. THE third rule shall be, the making of some medley or mixture of earth with some other plants bruised or shaven either in leaf or root: as for example, make earth with a mixture of colewort leaves stamped, and set in it artichokes or parsnips; so take earth made with marjoram, or origanum, or wild thyme, bruised or stamped, and set in it fennel seed, *etc.* In which operation the process of nature still will be, as I conceive, not that the herb you work upon should draw the juice of the foreign herb, for that opinion we have formerly rejected, but that there will be a new confection of mold, which perhaps will alter the seed, and yet not to the kind of the former herb.

529. THE fourth rule shall be, to mark what herbs some earths do put forth of themselves; and to take that earth, and to pot it, or to vessel it; and in that to set the seed you would change: as for example, take from under walls or the like, where nettles put forth in abundance, the earth which you shall there find, without any string or root of the nettles; and pot that earth, and set in it stock-gilly-flowers, or wall-flowers, *etc.* or sow in the seeds of them; and see what the event will be: or take earth that you have prepared to put forth mushrooms of itself, whereof you shall find some instances following, and sow in it purslane seed, or lettuce seed; for in these experiments, it is likely enough that the earth being accustomed to send forth one kind of nourishment, will alter the new seed.

530. THE fifth rule shall be, to make the herb grow contrary to its nature; as to make ground-herbs rise in height: as for example, carry camomile, or wild thyme, or the green strawberry, upon sticks, as you do hops upon poles; and see what the event will be.

531. THE sixth rule shall be, to make plants grow out of the sun or open air; for that is a great mutation in nature, and may induce a change in the seed: as barrel up earth, and sow some seed in it, and put it in the bottom of a pond; or put it in some great hollow tree; try also the sowing of seeds in the bottoms of caves; and pots with seeds sown, hanged up in wells some distance from the water, and see what the event will be.

Experiments in consort touching the procerity, and lowness, and artificial dwarfing of trees.

532. IT is certain, that timber trees in coppice woods grow more upright, and more free from under-boughs, than those that stand in the fields: the cause whereof is, for that plants have a natural motion to get to the sun; and besides, they are not glutted with too much nourishment; for that the coppice shareth with them; and repletion ever hindereth stature: lastly, they are kept warm; and that ever in plants helpeth mounting.

533. TREES that are of themselves full of heat, which heat appeareth by their inflammable gums, as firs and pines, mount of themselves in height without side-boughs, till they come towards the top. The cause is partly heat, and partly tenuity of juice, both which send the sap upwards. As for juniper, it is but a shrub, and groweth not big enough in body to maintain a tall tree.

534. IT is reported, that a good strong canvas spread over a tree grafted low, soon after it putteth forth, will dwarf it, and make it spread. The cause is plain; for that all things that grow, will grow as they find room.

535. TREES are generally set of roots or kernels ; but if you set them of slips, as of some trees you may, by name the mulberry, some of the slips will take ; and those that take, as is reported, will be dwarf trees. The cause is, for that a slip draweth nourishment more weakly than either a root or kernel.

536. ALL plants that put forth their sap hastily, have their bodies not proportionable to their length ; and therefore they are winders and creepers ; as ivy, bryony, hops, woodbine : whereas dwarfing requireth a slow putting forth, and less vigour of mounting.

Experiments in consort touching the rudiments of plants, and of the excrescences of plants, or super-plants.

THE Scripture saith, that Solomon wrote a Natural History, from the cedar of Libanus, to the moss growing upon the wall : for so the best translations have it. And it is true that moss is but the rudiment of a plant ; and, as it were, the mold of earth or bark.

537. Moss groweth chiefly upon ridges of houses tiled or thatched, and upon the crests of walls : and that moss is of a lightsome and pleasant green. The growing upon slopes is caused, for that moss, as on the one side it cometh of moisture and water, so on the other side the water must but slide, and not stand or pool. And the growing upon tiles, or walls, *etc.* is caused, for that those dried earths, having not moisture sufficient to put forth a plant, do practise germination by putting forth moss ; though when, by age or otherwise, they grow to relent and resolve, they sometimes put forth plants, as wall-flowers. And almost all moss hath here and there little stalks, besides the low thrum.

538. Moss groweth upon alleys, especially such as lie cold and upon the north ; as in divers terraces : and again, if they be much troden ; or if they were at the first graveled ; for wheresoever plants are kept down, the earth putteth forth moss.

539. OLD ground, that hath been long unbroken up, gathereth moss : and therefore husbandmen use to cure their pasture grounds when they grow to moss, by tilling them for a year or two : which also dependeth upon the same cause ; for that the more sparing and starving juice of the earth, insufficient for plants, doth breed moss.

540. OLD trees are more mossy far than young ; for that the sap is not so frank as to rise all to the boughs, but tireth by the way, and putteth out moss.

541. FOUNTAINS have moss growing upon the ground about them ;

Muscosi fontes ;

The cause is, for that the fountains drain the water from the ground adjacent, and leave but sufficient moisture to breed moss : and besides, the coldness of the water conduceth to the same.

542. THE moss of trees is a kind of hair ; for it is the juice of the tree that is excerned, and doth not assimilate. And upon great trees the moss gathereth a figure like a leaf.

543. THE moister sort of trees yield little moss ; as we see in aspens, poplars, willows, beeches, *etc.* which is partly caused for the reason that hath been given, of the frank putting up of the sap into the boughs ; and partly for that the barks of those trees are more close and smooth, than those of oaks and ashes ; whereby the moss can the hardlier issue out.

544. IN clay-grounds all fruit-trees grow full of moss, both upon body and boughs ; which is caused partly by the coldness of the ground, whereby the plants nourish.

nourish less; and partly by the toughness of the earth, whereby the sap is shut in, and cannot get up to spread so frankly as it should do.

545. WE have said heretofore, that if trees be hide-bound, they wax less fruitful, and gather moss; and that they are holpen by hacking, *etc.* And therefore, by the reason of contraries, if trees be bound in with cords, or some outward bands, they will put forth more moss: which, I think, happeneth to trees that stand bleak, and upon the cold winds. It should also be tried, whether, if you cover a tree somewhat thick upon the top after his polling, it will not gather more moss. I think also the watering of trees with cold fountain water, will make them grow full of moss.

546. THERE is a moss the perfumers have, which cometh out of apple trees, that hath an excellent scent. *Query*, particularly for the manner of the growth, and the nature of it. And for this experiment's sake, being a thing of price, I have set down the last experiments how to multiply and call on mosses.

NEXT unto moss, I will speak of mushrooms; which are likewise an imperfect plant. The mushrooms have two strange properties; the one, that they yield so delicious a meat; the other, that they come up so hastily, as in a night; and yet they are unfown. And therefore such as are upstarts in state, they call in reproach mushrooms. It must needs be therefore, that they be made of much moisture; and that moisture, fat, gross, and yet somewhat concocted. And, indeed, we find that mushrooms cause the accident which we call *incubus*, or the mare in the stomach. And therefore the surfeit of them may suffocate and empoison. And this sheweth, that they are windy; and that windiness is gross and swelling, not sharp or griping. And upon the same reason mushrooms are a venereous meat.

547. It is reported, that the bark of white or red poplar, which are of the moistest of trees, cut small, and cast into furrows well dunged, will cause the ground to put forth mushrooms at all seasons of the year fit to be eaten. Some add to the mixture leaven of bread dissolved in water.

548. It is reported, that if a hilly field where the stubble is standing, be set on fire in a showery season, it will put forth great store of mushrooms.

549. It is reported, that hartshorn, shaven, or in small pieces, mixed with dung and watered, putteth up mushrooms. And we know hartshorn is of a fat and clammy substance: and it may be ox-horn would do the like.

550. It hath been reported, though it be scarce credible, that ivy hath grown out of a stag's horn; which they suppose did rather come from a confection of the horn upon the ivy, than from the horn itself. There is not known any substance but earth, and the procedures of earth, as tile, stone, *etc.* that yieldeth any moss or herby substance. There may be trial made of some seeds, as that of fennel-seed, mustard-seed, and rape-seed, put into some little holes made in the horns of stags, or oxen, to see if they will grow.

551. THERE is also another imperfect plant, that in shew is like a great mushroom: and it is sometimes as broad as one's hat; which they call a toad's stool: but it is not esculent; and it groweth, commonly, by a dead stub of a tree, and likewise about the roots of rotten trees: and therefore seemeth to take his juice from wood putrified. Which sheweth, by the way, that wood putrified yieldeth a frank moisture.

552. THERE is a cake that groweth upon the side of a dead tree, that hath gotten no name, but it is large and of a chestnut colour, and hard and pithy; whereby it should seem, that even dead trees forget not their putting forth; no more than the carcases of mens bodies, that put forth hair and nails for a time.

553. THERE

553. THERE is a cod, or bag, that groweth commonly in the fields; that at the first is hard like a tennis-ball, and white; and after groweth of a mushroom colour, and full of light dust upon the breaking; and is thought to be dangerous for the eyes if the powder get into them; and to be good for kibes. Belike it hath a corrosive and fretting nature.

554. THERE is an herb called Jews-ear, that groweth upon the roots and lower parts of the bodies of trees; especially of elders, and sometimes ashes. It hath a strange property; for in warm water it swelleth, and openeth extremely. It is not green, but of a dusky brown colour. And it is used for squinancies and inflammations in the throat; whereby it seemeth to have a mollifying and lenifying virtue.

555. THERE is a kind of spongy excrescence, which groweth chiefly upon the roots of the laser-tree; and sometimes upon cedar and other trees. It is very white, and light, and friable; which we call agaric. It is famous in physick for the purging of tough phlegm. And it is also an excellent opener for the liver; but offensive to the stomach: and in taste, it is at the first sweet, and after bitter.

556. WE find no super-plant that is a formed plant, but misseltoe. They have an idle tradition, that there is a bird called a missel bird, that feedeth upon a seed, which many times she cannot digest, and so expelleth it whole with her excrement: which falling upon a bough of a tree that hath some rift, putteth forth the misseltoe. But this is a fable; for it is not probable that birds should feed upon what they cannot digest. But allow that, yet it cannot be for other reasons: for first, it is found but upon certain trees; and those trees bear no such fruit, as may allure that bird to sit and feed upon them. It may be, that bird feedeth upon the misseltoe-berries, and so is often found there; which may have given occasion to the tale. But that which maketh an end of the question is, that misseltoe hath been found to put forth under the boughs, and not only above the boughs; so it cannot be any thing that falleth upon the bough. Misseltoe groweth chiefly upon crab-trees, apple-trees, sometimes upon hazles, and rarely upon oaks; the misseltoe whereof is counted very medicinal. It is ever green winter and summer; and beareth a white glistening berry: and it is a plant utterly differing from the plant upon which it groweth. Two things therefore may be certainly set down: first, that super-fœtation must be by abundance of sap in the bough that putteth it forth: secondly, that that sap must be such as the tree doth excern, and cannot assimilate; for else it would go into a bough; and besides, it seemeth to be more fat and unctuous than the ordinary sap of the tree; both by the berry, which is clammy; and by that it continueth green winter and summer, which the tree doth not.

557. THIS experiment of misseltoe may give light to other practices. Therefore trial should be made by ripping of the bough of a crab-tree in the bark; and watering of the wound every day with warm water dunded, to see if it would bring forth misseltoe, or any such like thing. But it were yet more likely to try it with some other watering or anointing, that were not so natural to the tree as water is; as oil, or barm of drink, *etc.* so they be such things as kill not the bough.

558. IT were good to try, what plants would put forth, if they be forbidden to put forth their natural boughs: poll therefore a tree, and cover it some thickness with clay on the top, and see what it will put forth. I suppose it will put forth roots; for so will a cion, being turned down into clay: therefore, in this experiment also, the tree should be closed with somewhat that is not so natural to the plant as clay is.

Try

Try it with leather, or cloth, or painting, so it be not hurtful to the tree. And it is certain, that a brake hath been known to grow out of a pollard.

559. A MAN may count the prickles of trees to be a kind of excrescence; for they will never be boughs, nor bear leaves. The plants that have prickles are thorns, black and white; brier, rose, lemon-trees, crab-trees, gooseberry, berberry; these have it in the bough: The plants that have prickles in the leaf are, holly, juniper, whin-bush, thistle; nettles also have a small venomous prickle; so hath borage, but harmless. The cause must be hasty putting forth, want of moisture, and the closeness of the bark; for the haste of the spirit to put forth, and the want of nourishment to put forth a bough, and the closeness of the bark, cause prickles in boughs; and therefore they are ever like a *pyramis*, for that the moisture spendeth after a little putting forth. And for prickles in leaves, they come also of putting forth more juice into the leaf than can spread in the leaf smooth, and therefore the leaves otherwise are rough as borage and nettles are. As for the leaves of holly, they are smooth, but never plain, but as it were with folds, for the same cause.

560. THERE be also plants, that though they have no prickles, yet they have a kind of downy or velvet rind upon their leaves; as rose-campion, stock-gilly-flowers, colts-foot; which down or knap cometh of a subtil spirit, in a soft or fat substance. For it is certain, that both stock-gilly-flowers and rose-campions, stamped, have been applied, with success to the wrists of those that have had tertian and quartan agues; and the vapour of colts-foot hath a sanative virtue towards the lungs; and the leaf also is healing in surgery.

561. ANOTHER kind of excrescence is an exudation of plants joined with putrefaction; as we see in oak-apples, which are found chiefly upon the leaves of oaks, and the like upon willows: and country people have a kind of prediction, that if the oak-apple broken be full of worms, it is a sign of a pestilent year; which is a likely thing, because they grow of corruption.

562. THERE is also upon sweet, or other brier, a fine tuft or brush of moss of divers colours; which if you cut you shall ever find full of little white worms.

Experiments in consort touching the producing of perfect plants without seed.

563. IT is certain, that earth taken out of the foundations of vaults and houses, and bottoms of wells, and then put into pots, will put forth sundry kinds of herbs: but some time is required for the germination; for if it be taken but from a fathom deep, it will put forth the first year; if much deeper, not till after a year or two.

564. THE nature of the plants growing out of earth so taken up, doth follow the nature of the mold itself; as if the mold be soft and fine it putteth forth soft herbs; as grass, plantain, and the like; if the earth be harder and coarser, it putteth forth herbs more rough, as thistles, firs, *etc.*

565. IT is common experience, that where alleys are close gravelled, the earth putteth forth the first year knot grass, and after spire grass. The cause is, for that the hard gravel or pebble at the first laying will not suffer the grass to come forth upright, but turneth it to find his way where it can; but after that the earth is somewhat loosened at the top, the ordinary grass cometh up.

566. IT

566. It is reported, that earth being taken out of shady and watry woods some depth, and potted, will put forth herbs of a fat and juicy substance; as penny-wort, purslane, houseleek, penny-royal, *etc.*

567. THE water also doth send forth plants that have no roots fixed in the bottom; but they are less perfect plants, being almost but leaves, and those small ones; such is that we call duck-weed, which hath a leaf no bigger than a thyme leaf, but of a fresher green, and putteth forth a little string into the water far from the bottom. As for the water lily, it hath a root in the ground; and so have a number of other herbs that grow in ponds.

568. It is reported by some of the ancients, and some modern testimony likewise, that there be some plants that grow upon the top of the sea, being supposed to grow of some concretion of slime from the water, where the sun beateth hot, and where the sea stirreth little. As for *alga marina*, sea weed, and *eryngium*, sea thistle, both have roots; but the sea weed under the water, the sea thistle but upon the shore.

569. THE ancients have noted, that there are some herbs that grow out of snow laid up close together and putrified, and that they are all bitter; and they name one specially, *flopus*, which we call moth-mullein. It is certain, that worms are found in snow commonly, like earth-worms; and therefore it is not unlike, that it may likewise put forth plants.

570. THE ancients have affirmed, that there are some herbs that grow out of stone; which may be, for that it is certain that toads have been found in the middle of a free-stone. We see also that flints, lying above ground, gather moss; and wall-flowers, and some other flowers, grow upon walls; but whether upon the main brick or stone, or whether out of the lime or chinks, is not well observed: for alders and ashes have been seen to grow out of steeples; but they manifestly grow out of clefts; inasmuch as when they grow big, they will disjoin the stone. And besides, it is doubtful whether the mortar itself putteth it forth, or whether some seeds be not let fall by birds. There be likewise rock-herbs; but I suppose those are where there is some mold or earth. It hath likewise been found, that great trees growing upon quarries have put down their root into the stone.

571. IN some mines in Germany, as is reported, there grow in the bottom vegetables; and the work-folks use to say they have magical virtue, and will not suffer men to gather them.

572. The sea sands seldom bear plants. Whereof the cause is yielded by some of the ancients, for that the sun exhaleth the moisture before it can incorporate with the earth, and yield a nourishment for the plant. And it is affirmed also, that sand hath always its root in clay; and that there be no veins of sand any great depth within the earth.

573. IT is certain, that some plants put forth for a time of their own store, without any nourishment from earth, water, stone, *etc.* of which *vide* the experiment 29.

Experiments in consort touching foreign plants.

574. IT is reported, that earth that was brought out of the Indies, and other remote countries for ballast of ships, cast upon some grounds in Italy, did put forth foreign herbs, to us in Europe not known; and that which is more, that of their

roots

roots, barks, and seeds, confused together, and mingled with other earth, and well watered with warm water, there came forth herbs much like the other.

575. PLANTS brought out of hot countries will endeavour to put forth at the same time that they usually do in their own climate; and therefore to preserve them, there is no more required, than to keep them from the injury of putting back by cold. It is reported also, that grain out of the hotter countries translated into the colder, will be more forward than the ordinary grain of the cold country. It is likely that this will prove better in grains than in trees, for that grains are but annual, and so the virtue of the seed is not worn out; whereas in a tree, it is embayed by the ground to which it is removed.

576. MANY plants which grow in the hotter countries, being set in the colder, will nevertheless, even in those cold countries, being sown of seeds late in the spring, come up and abide most part of the summer; as we find it in orange and lemon seeds, *etc.* the seeds whereof sown in the end of April will bring forth excellent salads, mingled with other herbs. And I doubt not, but the seeds of clove trees, and pepper seeds, *etc.* if they could come hither green enough to be sown, would do the like.

Experiments in consort touching the seasons in which plants come forth.

577. THERE be some flowers, blossoms, grains, and fruits, which come more early, and others which come more late in the year. The flowers that come early with us are primroses, violets, anemonies, water-daffadillies, *crocus vernus*, and some early tulips. And they are all cold plants; which therefore, as it should seem, have a quicker perception of the heat of the sun increasing than the hot herbs have; as a cold hand will sooner find a little warmth than an hot. And those that come next after, are wall-flowers, cowslips, hyacinths, rosemary flowers, *etc.* and after them, pinks, roses, flower-de-luces, *etc.* and the latest are gilly-flowers, holyoaks, larksfoot, *etc.* The earliest blossoms are the blossoms of peaches, almonds, cornelians, mezerions, *etc.* and they are of such trees as have much moisture, either watery or oily. And therefore *crocus vernus* also, being an herb that hath an oily juice, putteth forth early; for those also find the sun sooner than the drier trees. The grains are, first rye and wheat; then oats and barley; then peas and beans. For though green peas and beans be eaten sooner, yet the dry ones that are used for horse meat, are ripe last; and it seemeth that the fatter grain cometh first. The earliest fruits are strawberries, cherries, gooseberries, currans; and after them early apples, early pears, apricots, rasps; and after them, damascenes, and most kind of plums, peaches, *etc.* and the latest are apples, wardens, grapes, nuts, quinces, almonds, sloes, brier-berries, hips, medlars, services, cornelians, *etc.*

578. IT is to be noted, that, commonly, trees that ripen latest, blossom soonest; as peaches, cornelians, sloes, almonds, *etc.* and it seemeth to be a work of providence that they blossom so soon; for otherwise they could not have the sun long enough to ripen.

579. THERE be fruits, but rarely, that come twice a year; as some pears, strawberries, *etc.* And it seemeth they are such as abound with nourishment; whereby after one period, before the sun waxeth too weak, they can endure another. The violet also, amongst flowers, cometh twice a year, especially the double white; and that also is a plant full of moisture. Roses come twice, but it is not without cutting, as hath been formerly said.

580. IN Muscovy, though the corn come not up till late spring, yet their harvest is as early as ours. The cause is, for that the strength of the ground is kept in with the snow; and we see with us, that if it be a long winter, it is commonly a more plentiful year: and after those kind of winters likewise, the flowers and corn, which are earlier and later, do come commonly at once, and at the same time; which troubleth the husbandman many times; for you shall have red roses and damask roses come together; and likewise the harvest of wheat and barley. But this happeneth ever, for that the earlier stayeth for the later; and not that the later cometh sooner.

581. THERE be divers fruit trees in the hot countries, which have blossoms, and young fruit, and ripe fruit, almost all the year, succeeding one another. And it is said the orange hath the like with us, for a great part of summer; and so also hath the fig. And no doubt the natural motion of plants is to have so; but that either they want juice to spend; or they meet with the cold of the winter: and therefore this circle of ripening cannot be but in succulent plants and hot countries.

582. SOME herbs are but annual, and die, root and all, once a year; as borage, lettuce, cucumbers, musk-melons, basil, tobacco, mustard-seed, and all kinds of corn: some continue many years; as hyssop, germander, lavender, fennel, *etc.* The cause of the dying is double; the first is the tenderness and weakness of the seed, which maketh the period in a small time; as it is in borage, lettuce, cucumbers, corn, *etc.* and therefore none of these are hot. The other cause is, for that some herbs can worse endure cold; as basil, tobacco, mustard-seed. And these have all much heat.

Experiments in consort touching the lasting of herbs and trees.

583. THE lasting of plants is most in those that are largest of body; as oaks, elm, chestnut, the loat-tree, *etc.* and this holdeth in trees; but in herbs it is often contrary: for borage, colewort, pompions, which are herbs of the largest size, are of small durance; whereas hyssop, winter-savoury, germander, thyme, sage, will last long. The cause is, for that trees last according to the strength and quantity of their sap and juice; being well munited by their bark against the injuries of the air: but herbs draw a weak juice, and have a soft stalk; and therefore those amongst them which last longest, are herbs of strong smell, and with a sticky stalk.

584. TREES that bear mast, and nuts, are commonly more lasting than those that bear fruits; especially the moister fruits: as oaks, beeches, chestnuts, walnuts, almonds, pine trees, *etc.* last longer than apples, pears, plums, *etc.* The cause is the fatness and oiliness of the sap; which ever wasteth less than the more watry.

585. TREES that bring forth their leaves late in the year, and cast them likewise late, are more lasting than those that sprout their leaves early, or shed them betimes. The cause is, for that the late coming forth sheweth a moisture more fixed; and the other more loose, and more easily resolved. And the same cause is, that wild trees last longer than garden trees; and in the same kind, those whose fruit is acid, more than those whose fruit is sweet.

586. NOTHING procureth the lasting of trees, bushes and herbs so much as often cutting: for every cutting causeth a renovation of the juice of the plant; that it neither goeth so far, nor riseth so faintly, as when the plant is not cut; insomuch as annual plants, if you cut them seasonably, and will spare the use of them, and
suffer

suffer them to come up still young, will last more years than one, as hath been partly touched; such as is lettuce, purslane, cucumber, and the like. And for great trees, we see almost all overgrown trees in church-yards, or near ancient buildings, and the like, are pollards, or dottards, and not trees at their full height.

587. **SOME** experiment should be made, how by art to make plants more lasting than their ordinary period; as to make a stalk of wheat, *etc.* last a whole year. You must ever presuppose, that you handle it so as the winter killeth it not; for we speak only of prolonging the natural period. I conceive that the rule will hold, that whatsoever maketh the herb come later than its time; will make it last longer time: it were good to try it in a stalk of wheat, *etc.* set in the shade, and encompassed with a case of wood, not touching the straw, to keep out open air.

As for the preservation of fruits and plants, as well upon the tree or stalk, as gathered, we shall handle it under the title of conservation of bodies.

Experiments in consort touching the several figures of plants.

588. **THE** particular figures of plants we leave to their descriptions; but some few things in general we will observe. Trees and herbs, in the growing forth of their boughs and branches, are not figured, and keep no order. The cause is, for that the sap being restrained in the rind and bark, breaketh not forth at all, as in the bodies of trees, and stalks of herbs, till they begin to branch; and then when they make an eruption, they break forth casually, where they find best way in the bark or rind. It is true, that some trees are more scattered in their boughs; as fallow-trees, warden-trees, quince-trees, medlar-trees, lemon-trees, *etc.* some are more in the form of a pyramis, and come almost to todd; as the pear-tree, which the critics will have to borrow his name of *ωύρ*, fire, orange-trees, fir-trees, service-trees, lime-trees, *etc.* and some are more spread and broad; as beeches, hornbeam, *etc.* the rest are more indifferent. The cause of scattering the boughs, is the hasty breaking forth of the sap; and therefore those trees rise not in a body of any height, but branch near the ground. The cause of the pyramis is the keeping in of the sap long before it branch; and the spending of it, when it beginneth to branch, by equal degrees. The spreading is caused by the carrying up of the sap plentifully, without expence; and then putting it forth speedily and at once.

589. **THERE** be divers herbs, but no-trees, that may be said to have some kind of order in the putting forth of their leaves: for they have joints or knuckles, as it were stops in their germination; as have gilly-flowers, pinks, fennel, corn, reeds, and canes. The cause whereof is, for that the sap ascendeth unequally, and doth, as it were, tire and stop by the way. And it seemeth they have some closeness and hardness in their stalk, which hindereth the sap from going up, until it hath gathered into a knot, and so is more urged to put forth. And therefore they are most of them hollow when the stalk is dry, as fennel-stalk, stubble, and canes.

590. **FLOWERS** all have exquisite figures; and the flower numbers are chiefly five, and four; as in primroses, brier roses, single musk roses, single pinks, and gilly-flowers, *etc.* which have five leaves: lilies, flower-de-luces, borage, bugloss, *etc.* which have four leaves. But some put forth leaves not numbered; but they are ever small ones; as marygold, trefoils, *etc.* We see also, that the sockets and supporters of flowers are figured; as in the five brethren of the rose, sockets of gilly-flowers, *etc.* Leaves also are all figured; some round; some long; none square; and many jagged on the sides; which leaves of flowers seldom are. For I account

the jagging of pinks and gilly-flowers, to be like the inequality of oak leaves, or vine leaves, or the like : but they seldom or never have any small purls.

Experiments in consort touching some principal differences in plants.

591. OF plants, some few put forth their blossoms before their leaves ; as almonds, peaches, cornelians, black thorn, *etc.* but most put forth some leaves before their blossoms ; as apples, pears, plums, cherries, white thorn, *etc.* The cause is, for that those that put forth their blossoms first, have either an acute and sharp spirit, and therefore commonly they all put forth early in the spring, and ripen very late ; as most of the particulars before mentioned, or else an oily juice, which is apter to put out flowers than leaves.

592. OF plants, some are green all winter ; others cast their leaves. There are green all winter, holly, ivy, box, fir, yew, cypress, juniper, bays, rosemary, *etc.* The cause of the holding green, is the close and compact substance of their leaves, and the pedicles of them. And the cause of that again is either the tough and viscous juice of the plant, or the strength and heat thereof. Of the first sort is holly ; which is of so viscous a juice, as they make birdlime of the bark of it. The stalk of ivy is tough, and not fragile, as we see in other small twigs dry. Fir yieldeth pitch. Box is a fast and heavy wood, as we see it in bowls. Yew is a strong and tough wood, as we see it in bows. Of the second sort is juniper, which is a wood odorate ; and maketh a hot fire. Bays is likewise a hot and aromatical wood ; and so is rosemary for a shrub. As for the leaves, their density appeareth, in that either they are smooth and shining, as in bays, holly, ivy, box, *etc.* or in that they are hard and spiry, as in the rest. And trial should be made of grafting of rosemary, and bays, and box, upon a holly-stock ; because they are plants that come all winter. It were good to try it also with grafts of other trees, either fruit trees, or wild trees ; to see whether they will not yield their fruit, or bear their leaves later and longer in the winter ; because the sap of the holly putteth forth most in the winter. It may be also a mezerion-tree, grafted upon a holly, will prove both an earlier and a greater tree.

593. THERE be some plants that bear no flower, and yet bear fruit : there be some that bear flowers and no fruit : there be some that bear neither flowers nor fruit. Most of the great timber trees, as oaks, beeches, *etc.* bear no apparent flowers ; some few likewise of the fruit trees ; as mulberry, walnut, *etc.* and some shrubs, as juniper, holly, *etc.* bear no flowers. Divers herbs also bear seeds, which is as the fruit, and yet bear no flowers ; as purslane, *etc.* Those that bear flowers and no fruit are few ; as the double cherry, the fallow, *etc.* But for the cherry, it is doubtful whether it be not by art or culture ; for if it be by art, then trial should be made, whether apple, and other fruits blossoms, may not be doubled. There are some few that bear neither fruit nor flower ; as the elm, the poplars, box, brakes, *etc.*

594. THERE be some plants that shoot still upwards, and can support themselves ; as the greatest part of trees and plants : there be some other that creep along the ground ; or wind about other trees or props, and cannot support themselves ; as vines, ivy, brier, briony, woodbines, hops, climatis, camomile, *etc.* The cause is, as hath been partly touched, for that all plants naturally move upwards ; but if the sap put up too fast, it maketh a slender stalk, which will not support the weight : and therefore these latter sort are all swift and hasty comers.

Experiments

Experiments in consort touching all manner of composts, and helps of ground.

595. THE first and most ordinary help is stercoration. The sheeps dung is one of the best; and next the dung of kine: and thirdly, that of horses, which is held to be somewhat too hot unless it be mingled. That of pigeons for a garden, or a small quantity of ground, excelleth. The ordering of dung is, if the ground be arable, to spread it immediately before the ploughing and sowing; and so to plough it in: for if you spread it long before, the sun will draw out much of the fatness of the dung: if the ground be grazing ground, to spread it somewhat late towards winter; that the sun may have the less power to dry it up. As for special composts for gardens, as a hot bed, *etc.* we have handled them before.

596. THE second kind of compost is, the spreading of divers kinds of earths; as marle, chalk, sea sand, earth upon earth, pond earth; and the mixtures of them. Marle is thought to be the best, as having most fatness; and not heating the ground too much. The next is sea sand, which no doubt obtaineth a special virtue by the salt: for salt is the first rudiment of life. Chalk over-heateth the ground a little; and therefore is best upon cold clay grounds, or moist grounds: but I heard a great husband say, that it was a common error, to think that chalk helpeth arable grounds, but helpeth not grazing grounds; whereas indeed it helpeth grafs as well as corn: but that which breedeth the error is, because after the chalking of the ground they wear it out with many crops without rest; and then indeed afterwards it will bear little grafs, because the ground is tired out. It were good to try the laying of chalk upon arable grounds a little while before ploughing; and to plough it in as they do the dung; but then it must be friable first by rain or lying. As for earth, it composteth itself; for I knew a great garden that had a field, in a manner, poured upon it; and it did bear fruit excellently the first year of the planting: for the surface of the earth is ever the fruitfullest. And earth so prepared hath a double surface. But it is true, as I conceive, that such earth as hath salt-petre bred in it, if you can procure it without too much charge, doth excel. The way to hasten the breeding of salt-petre, is to forbid the sun, and the growth of vegetables. And therefore if you make a large hovel, thatched, over some quantity of ground; nay if you do but plank the ground over, it will breed salt-petre. As for pond earth, or river earth, it is a very good compost; especially if the pond have been long uncleaned, and so the water be not too hungry: and I judge it will be yet better if there be some mixture of chalk.

597. THE third help of ground is, by some other substances that have a virtue to make ground fertile, though they be not merely earth: wherein ashes excel; inso-much as the countries about Ætna and Vesuvius have a kind of amends made them, for the mischief the irruptions many times do, by the exceeding fruitfulness of the soil, caused by the ashes scattered about. Soot also, though thin spread in a field or garden, is tried to be a very good compost. For salt is too costly; but it is tried, that mingled with seed-corn, and sown together, it doth good: and I am of opinion, that chalk in powder, mingled with seed corn, would do good; perhaps as much as chalking the ground all over. As for the steeping of the seeds in several mixtures with water to give them vigour, or watering grounds with compost water, we have spoken of them before.

598. THE fourth help of ground is, the suffering of vegetables to die into the ground, and so to fatten it; as the stubble of corn, especially peas. Brakes cast upon the ground in the beginning of winter, will make it very fruitful. It were
good

good also to try whether leaves of trees swept together, with some chalk and dung mixed, to give them more heart, would not make a good compost; for there is nothing lost so much as leaves of trees; and as they lie scattered, and without mixture, they rather make the ground sour than otherwise.

599. THE fifth help of ground is, heat and warmth. It hath been anciently practised to burn heath, and ling, and sedge, with the vantage of the wind, upon the ground. We see that warmth of walls and inclosures mendeth ground: we see also, that lying open to the south mendeth ground: we see again, that the foldings of sheep help ground, as well by their warmth, as by their compost: and it may be doubted, whether the covering of the ground with brakes in the beginning of the winter, whereof we spake in the last experiment, helpeth it not, by reason of the warmth. Nay, some very good husbands do suspect, that the gathering up of flints in flinty ground, and laying them on heaps, which is much used, is no good husbandry, for that they would keep the ground warm.

600. THE sixth help of ground is by watering and irrigation; which is in two manners; the one by letting in and shutting out waters at seasonable times: for water at some seasons, and with reasonable stay, doth good; but at some other seasons, and with too long stay, doth hurt: and this serveth only for meadows which are along some river. The other way is, to bring water from some hanging grounds, where there are springs into the lower grounds, carrying it in some long furrows; and from those furrows, drawing it traverse to spread the water. And this maketh an excellent improvement, both for corn and grafs. It is the richer, if those hanging grounds be fruitful, because it washeth off some of the fatness of the earth; but howsoever it profiteth much. Generally where there are great overflows in fens, or the like, the drowning of them in the winter maketh the summer following more fruitful: the cause may be, for that it keepeth the ground warm and nourisheth it. But the fen-men hold, that the sewers must be kept so, as the water may not stay too long in the spring till the weeds and sedge be grown up; for then the ground will be like a wood, which keepeth out the sun, and so continueth the wet; whereby it will never graze to purpose that year. Thus much for irrigation. But for avoidances, and drainings of water, where there is too much, and the helps of ground in that kind, we shall speak of them in another place.

NATURAL HISTORY.

CENTURY VII.

Experiments in consort touching the affinities and differences between plants and inanimate bodies.

601. **T**HE differences between animate and inanimate bodies, we shall handle fully under the title of life, and living spirits, and powers. We shall therefore make but a brief mention of them in this place. The main differences are two. All bodies have spirits, and pneumatical parts within them; but the main differences between animate and inanimate, are two: the first is, that the spirits of things animate are all continued with themselves, and are branched in veins, and secret canals, as blood is: and in living creatures, the spirits have not only branches, but certain cells or seats, where the principal spirits do reside, and whereunto the rest do resort: but the spirits in things inanimate are shut in, and cut off by the tangible parts, and are not pervious one to another, as air is in snow. The second main difference is, that the spirits of animate bodies are all in some degree, more or less, kindled and inflamed; and have a fine commixture of flame, and an aerial substance. But inanimate bodies have their spirits no whit inflamed or kindled. And this difference consisteth not in the heat or coolness of spirits; for cloves and other spices, *naphtha* and *petroleum*, have exceeding hot spirits, hotter a great deal than oil, wax, or tallow, *etc.* but not inflamed. And when any of those weak and temperate bodies come to be inflamed, then they gather a much greater heat than others have un-inflamed, besides their light and motion, *etc.*

602. THE differences, which are secondary, and proceed from these two radical differences, are, first, plants are all figurate and determinate, which inanimate bodies are not; for look how far the spirit is able to spread and continue itself, so far goeth the shape or figure, and then is determined. Secondly, plants do nourish; inanimate bodies do not: they have an accretion, but no alimentation. Thirdly, plants have a period of life, which inanimate bodies have not. Fourthly, they have a succession and propagation of their kind, which is not in bodies inanimate.

603. THE differences between plants, and metals or fossils, besides those four before-mentioned, for metals I hold inanimate, are these: first, metals are more durable than plants: secondly, they are more solid and hard: thirdly, they are wholly subterrany; whereas plants are part above earth, and part under earth.

604. THERE be very few creatures that participate of the nature of plants and metals both; coral is one of the nearest of both kinds: another is vitriol, for that is aptest to sprout with moisture.

605. ANOTHER special affinity is between plants and mould or putrefaction: for all putrefaction, if it dissolve not in arefaction, will in the end issue into plants, or living creatures bred of putrefaction. I account moss, and mushrooms, and agarick, and other of those kinds, to be but moulds of the ground, walls, and trees, and the like.

like. As for flesh, and fish, and plants themselves, and a number of other things, after a mouldiness, or rottenness, or corrupting, they will fall to breed worms. These putrefactions, which have affinity with plants, have this difference from them; that they have no succession or propagation, though they nourish, and have a period of life, and have likewise some figure.

606. I LEFT once by chance a citron cut, in a close room, for three summer months that I was absent, and at my return there were grown forth, out of the pith cut, tufts of hairs an inch long, with little black heads, as if they would have been some herb.

Experiments in consort touching the affinities and differences of plants and living creatures, and the confiners and participles of them.

607. THE affinities and differences between plants and living creatures are these that follow. They have both of them spirits continued, and branched, and also inflamed. But first in living creatures, the spirits have a cell or seat, which plants have not; as was also formerly said. And secondly, the spirits of living creatures hold more of flame than the spirits of plants do. And these two are the radical differences. For the secondary differences, they are as follow. First, plants are all fixed to the earth, whereas all living creatures are severed, and of themselves. Secondly, living creatures have local motion, plants have not. Thirdly, living creatures nourish from their upper parts, by the mouth chiefly; plants nourish from below, namely, from the roots. Fourthly, plants have their seed and seminal parts uppermost; living creatures have them lowermost: and therefore it was said, not elegantly alone, but philosophically; *Homo est planta inversa*; Man is like a plant turned upwards: for the root in plants is as the head in living creatures. Fifthly, living creatures have a more exact figure than plants. Sixthly, living creatures have more diversity of organs within their bodies, and, as it were, inward figures, than plants have. Seventhly, living creatures have sense, which plants have not. Eighthly, living creatures have voluntary motion, which plants have not.

608. FOR the difference of sexes in plants, they are oftentimes by name distinguished; as male-piony, female-piony; male-rosemary, female-rosemary; he-holly, she-holly, *etc.* but generation by copulation certainly extendeth not to plants. The nearest approach of it is between the he-palm and the she-palm, which, as they report, if they grow near, incline the one to the other; inasmuch as, that which is more strange, they doubt not to report, that to keep the trees upright from bending, they tie ropes or lines from the one to the other, that the contact might be enjoyed by the contact of a middle body. But this may be feigned, or at least amplified. Nevertheless, I am apt enough to think, that this same *binarium* of a stronger and a weaker, like unto masculine and feminine, doth hold in all living bodies. It is confounded sometimes; as in some creatures of putrefaction, wherein no marks of distinction appear: and it is doubled sometimes, as in hermaphrodites: but generally there is a degree of strength in most species.

609. THE participles or confiners between plants and living creatures, are such chiefly as are fixed, and have no local motion or remove, though they have a motion in their parts; such as are oysters, cockles, and such like. There is a fabulous narration, that in the northern countries there should be an herb that groweth in the likeness of a lamb, and feedeth upon the grass, in such sort as it will bare the grass round about. But I suppose that the figure maketh the fable; for so, we see, there be

be bee-flowers, *etc.* And as for the grafs, it feemeth the plant having a great ftalk and top doth prey upon the grafs a good way about, by drawing the juice of the earth from it.

Experiments promifcuous touching plants.

610. THE Indian fig boweth its roots down fo low in one year, as of itfelf it taketh root again; and fo multiplieth from root to root, making of one tree a kind of wood. The caufe is the plenty of the fap, and the foftnefs of the ftalk, which maketh the bough, being over-loaden, and not ftiffly upheld, weigh down. It hath leaves as broad as a little target, but the fruit no bigger than beans. The caufe is, for that the continual shade increafeth the leaves, and abateth the fruit, which neverthelefs is of a pleafant tafte. And that no doubt is caufed by the fupplenefs and gentlenefs of the juice of that plant, being that which maketh the boughs alfo fo flexible.

611. It is reported by one of the ancients, that there is a certain Indian tree, having few but very great leaves, three cubits long and two broad; and that the fruit, being of good tafte, groweth out of the bark. It may be, there be plants that pour out the fap fo faft, as they have no leifure either to divide into many leaves, or to put forth ftalks to the fruit. With us trees, generally, have fmall leaves in comparifon. The fig hath the greateft; and next it the vine, mulberry, and fycamore; and the leaft are thofe of the willow, birch, and thorn. But there be found herbs with far greater leaves than any tree; as the burr, gourd, cucumber, and colewort. The caufe is, like to that of the Indian fig, the hafty and plentiful putting forth of the fap.

612. THERE be three things in ufe for fweetnefs; fugar, honey, manna. For fugar, to the ancients it was fcarce known, and little ufed. It is found in canes: *Query*, whether to the firft knuckle, or further up? And whether the very bark of the cane itfelf do yield fugar, or no? For honey, the bee maketh it, or gathereth it; but I have heard from one that was induftrious in husbandry, that the labour of the bee is about the wax; and that he hath known in the beginning of May honey-combs empty of honey; and within a fortnight, when the fweet dewes fall, filled like a cellar. It is reported alfo by fome of the ancients, that there is a tree called Occhus, in the valley of Hyrcania, that diftilleth honey in the mornings. It is not unlike that the fap and tears of fome trees may be fweet. It may be alfo, that fome fweet juices, fit for many ufes, may be concocted out of fruits, to the thicknefs of honey, or perhaps of fugar; the likelielt are raifins of the fun, figs, and currants: the means may be inquired.

613. THE ancients report of a tree by the Perfian fea, upon the fhore-fands, which is nourifhed with the falt water; and when the tide ebbeth, you fhall fee the roots as it were bare without bark, being as it feemeth corroded by the falt, and grafping the fands like a crab; which neverthelefs beareth a fruit. It were good to try fome hard trees, as a fervice-tree, or fir-tree, by fetting them within the fands.

614. THERE be of plants which they ufe for garments, thefe that follow: hemp, flax, cotton, nettles, whereof they make nettle-cloth, *sericum*, which is a growing filk; they make alfo cables of the bark of lime trees. It is the ftalk that maketh the filaceous matter commonly; and fometimes the down that groweth above.

615. THEY have in fome countries a plant of a rofy colour, which fhutteth in the night, openeth in the morning, and openeth wide at noon; which the inhabitants

of those countries say is a plant that sleepeth. There be sleepers enough then; for almost all flowers do the like.

616. SOME plants there are, but rare, that have a mossy or downy root; and likewise that have a number of threads, like beards; as mandrakes; whereof witches and impostures make an ugly image, giving it the form of a face at the top of the root, and leaving those strings to make a broad beard down to the foot. Also there is a kind of nard in Crete, being a kind of *phu*, that hath a root hairy, like a rough-footed dove's foot. So as you may see, there are of roots, bulbous roots, fibrous roots, and hirsute roots. And, I take it, in the bulbous, the sap hasteneth most to the air and sun: in the fibrous, the sap delighteth more in the earth, and therefore putteth downward: and the hirsute is a middle between both, that besides the putting forth upwards and downwards, putteth forth in round.

617. THERE are some tears of trees, which are combed from the beards of goats: for when the goats bite and crop them, especially in the mornings, the dew being on, the tear cometh forth, and hangeth upon their beards: of this sort is some kind of *lucianum*.

618. THE irrigation of the plane-tree by wine, is reported by the ancients to make it fruitful. It should be tried likewise with roots; for upon seeds it worketh no great effects.

619. THE way to carry foreign roots a long way, is to vessel them close in earthen vessels. But if the vessels be not very great, you must make some holes in the bottom, to give some refreshment to the roots; which otherwise, as it seemeth, will decay and suffocate.

620. THE ancient cinnamon was, of all other plants, while it grew, the driest; and those things which are known to comfort other plants, did make that more sterile; for in showers it prospered worst: it grew also amongst bushes of other kinds, where commonly plants do not thrive; neither did it love the sun. There might be one cause of all those effects; namely, the sparing nourishment which that plant required. Query, how far *cassia*, which is now the substitute of cinnamon, doth participate of these things?

621. IT is reported by one of the ancients, that *cassia*, when it is gathered, is put into the skins of beasts newly flayed; and that the skins corrupting and breeding worms, the worms do devour the pith and marrow of it, and so make it hollow; but meddle not with the bark, because to them it is bitter.

622. THERE were in ancient time vines of far greater bodies than we know any; for there have been cups made of them, and an image of Jupiter. But it is like they were wild vines; for the vines that they use for wine, are so often cut, and so much digged and dressed, that their sap spendeth into the grapes, and so the stalk cannot increase much in bulk. The wood of vines is very durable, without rotting. And that which is strange, though no tree hath the twigs, while they are green, so brittle, yet the wood dried is extreme tough; and was used by the captains of armies amongst the Romans for their cudgels.

623. IT is reported, that in some places vines are suffered to grow like herbs, spreading upon the ground; and that the grapes of those vines are very great. It were good to make trial, whether plants that use to be borne up by props, will not put forth greater leaves and greater fruits if they be laid along the ground; as hops, ivy, woodbine, etc.

624. QUIN-

624. QUINCES, or apples, *etc.* if you will keep them long, drown them in honey; but because honey, perhaps, will give them a taste over-luscious, it were good to make trial in powder of sugar, or in syrup of wine, only boiled to height. Both these should likewise be tried in oranges, lemons, and pomgranates; for the powder of sugar, and syrup of wine, will serve for more times than once.

625. THE conservation of fruit should be also tried in vessels filled with fine sand, or with powder of chalk; or in meal and flour; or in dust of oak wood; or in mill.

626. SUCH fruits as you appoint for long keeping, you must gather before they be full ripe; and in a fair and dry day towards noon; and when the wind bloweth not south; and when the moon is under the earth, and in decrease.

627. TAKE grapes, and hang them in an empty vessel well stopped; and set the vessel not in a cellar, but in some dry place; and it is said they will last long. But it is reported by some, they will keep better in a vessel half full of wine, so that the grapes touch not the wine.

628. IT is reported, that the preserving of the stalk helpeth to preserve the grape; especially if the stalk be put into the pith of alder, the alder not touching the fruit.

629. IT is reported by some of the ancients, that fruit put in bottles, and the bottles let down into wells under water, will keep long.

630. OF herbs and plants, some are good to eat raw; as lettuce, endive, purslane, tarragon, cresses, cucumbers, musk-melons, radish, *etc.* others only after they are boiled, or have passed the fire; as parsley, clary, sage, parsnips, turnips, asparagus, artichokes, though they also being young are eaten raw: but a number of herbs are not esculent at all; as wormwood, grass, green corn, centaury, hyssop, lavender, balm, *etc.* The causes are, for that the herbs that are not esculent, do want the two tastes in which nourishment resteth; which are fat and sweet; and have, contrariwise, bitter and over-strong tastes, or a juice so crude as cannot be ripened to the degree of nourishment. Herbs and plants that are esculent raw, have fatness, or sweetness, as all esculent fruits; such are onions, lettuce, *etc.* But then it must be such a fatness, for as for sweet things, they are in effect always esculent, as is not over-gross, and loading of the stomach: for parsnips and leeks have fatness; but it is too gross and heavy without boiling. It must be also in a substance somewhat tender; for we see wheat, barley, artichokes, are no good nourishment till they have passed the fire; but the fire doth ripen, and maketh them soft and tender, and so they become esculent. As for radish and tarragon, and the like, they are for condiments, and not for nourishment. And even some of those herbs which are not esculent, are notwithstanding poculent; as hops, broom, *etc.* Query, what herbs are good for drink besides the two aforementioned; for that it may, perhaps, ease the charge of brewing, if they make beer to require less malt, or make it last longer.

631. PARTS fit for the nourishment of man in plants are, seeds, roots, and fruits; but chiefly seeds and roots. For leaves, they give no nourishment at all, or very little: no more do flowers, or blossoms, or stalks. The reason is, for that roots, and seeds, and fruits, inasmuch as all plants consist of an oily and watery substance commixed, have more of the oily substance; and leaves, flowers, *etc.* of the watery. And secondly, they are more concocted; for the root which continueth ever in the earth, is still concocted by the earth; and fruits and grains we

see are half a year or more in concocting; whereas leaves are out and perfect in a month.

632. PLANTS, for the most part, are more strong both in taste and smell in the seed, than in the leaf and root. The cause is, for that in plants that are not of a fierce and eager spirit, the virtue is increased by concoction and maturation, which is ever most in the seed; but in plants that are of a fierce and eager spirit, they are stronger whilst the spirit is inclosed in the root; and the spirits do but weaken and dissipate when they come to the air and sun; as we see it in onions, garlick, dragon, *etc.* Nay, there be plants that have their roots very hot and aromatical, and their seeds rather insipid; as ginger. The cause is, as was touched before, for that the heat of those plants is very dissipable; which under the earth is contained and held in; but when it cometh to the air it exhalet.

633. THE juices of fruits are either watery or oily. I reckon among the watery, all the fruits out of which drink is expressed; as the grape, the apple, the pear, the cherry, the pomgranate, *etc.* And there are some others which, though they be not in use for drink, yet they appear to be of the same nature; as plums, servises, mulberries, rasps, oranges, lemons, *etc.* and for those juices that are so fleshy, as they cannot make drink by expression, yet, perhaps, they may make drink by mixture of water;

Poculaque admistis imitantur vitea sorbis.

And it may be hips and brier-berries would do the like. Those that have oily juices, are olives, almonds, nuts of all sorts, pine-apples, *etc.* and their juices are all inflammable. And you must observe also, that some of the watery juices, after they have gathered spirit, will burn and inflame; as wine. There is a third kind of fruit that is sweet, without either sharpness or oiliness: such as is the fig and the date.

634. IT hath been noted, that most trees, and specially those that bear mast, are fruitful but once in two years. The cause, no doubt, is the expence of sap; for many orchard trees, well cultured, will bear divers years together.

635. THERE is no tree, which besides the natural fruit, doth bear so many bastard fruits as the oak doth: for besides the acorn, it beareth galls, oak apples, and certain oak nuts, which are inflammable; and certain oak berries, sticking close to the body of the tree without stalk. It beareth also mistletoe, though rarely. The cause of all these may be, the closeness and solidness of the wood and pith of the oak, which maketh several juices find several eruptions. And therefore if you will devise to make any super-plants, you must ever give the sap plentiful rising and hard issue.

636. THERE are two excrescences which grow upon trees; both of them in the nature of mushrooms: the one the Romans called *boletus*; which groweth upon the roots of oaks; and was one of the dainties of their table; the other is medicinal, that is called agarick, whereof we have spoken before, which groweth upon the tops of oaks; though it be affirmed by some, that it groweth also at the roots. I do conceive, that many excrescences of trees grow chiefly where the tree is dead or faded; for that the natural sap of the tree corrupteth into some preternatural substance.

637. THE greater part of trees bear most and best on the lower boughs; as oaks, figs, walnuts, pears, *etc.* but some bear best on the top boughs; as crabs, *etc.* Those that bear best below, are such as shade doth more good to than hurt. For generally all fruits bear best lowest; because the sap tireth not, having but a short way: and therefore

therefore in fruits spread upon walls, the lowest are the greatest, as was formerly said : so it is the shade that hindereth the lower boughs ; except it be in such trees as delight in shade, or at least bear it well. And therefore they are either strong trees, as the oak ; or else they have large leaves, as the walnut and fig ; or else they grow in pyramids, as the pear. But if they require very much sun, they bear best on the top ; as it is in crabs, apples, plums, *etc.*

638. THERE be trees that bear best when they begin to be old ; as almonds, pears, vines, and all trees that give mast. The cause is, for that all trees that bear mast, have an oily fruit ; and young trees have a more watry juice, and less concocted : and of the same kind also is the almond. The pear likewise, though it be not oily, yet it requireth much sap, and well concocted ; for we see it is a heavy fruit and solid ; much more than apples, plums, *etc.* As for the vine, it is noted, that it beareth more grapes when it is young ; but grapes that make better wine when it is old ; for that the juice is better concocted : and we see that wine is inflammable ; so as it hath a kind of oiliness. But the most part of trees, amongst which are apples, plums, *etc.* bear best when they are young.

639. THERE be plants that have a milk in them when they are cut ; as figs, old lettuce, sow-thistles, spurge, *etc.* The cause may be an inception of putrefaction : for those milks have all an acrimony : though one would think they should be lenitive. For if you write upon paper with the milk of the fig, the letters will not be seen, until you hold the paper before the fire, and then they wax brown ; which sheweth that it is sharp or fretting juice : lettuce is thought poisonous, when it is so old as to have milk ; spurge is a kind of poison in itself ; and as for sow-thistles, though coney eat them, yet sheep and cattle will not touch them : and besides, the milk of them rubbed upon warts, in short time weareth them away ; which sheweth the milk of them to be corrosive. We see also that wheat and other corn, sown, if you take them forth of the ground before they sprout, are full of milk ; and the beginning of germination is ever a kind of putrefaction of the seed. Euphorbium also hath a milk, though not very white, which is of a great acrimony : and salladine hath a yellow milk, which hath likewise much acrimony ; for it cleanseth the eyes. It is good also for cataracts.

640. MUS ROOMS are reported to grow, as well upon the bodies of trees, as upon their roots or upon the earth ; and especially upon the oak. The cause is, for that strong trees are towards such excrescences in the nature of earth ; and therefore put forth moss, mushrooms, and the like.

641. THERE is hardly found a plant that yieldeth a red juice in the blade or ear ; except it be the tree that beareth *sanguis draconis* ; which groweth chiefly in the island Socotra : the herb amaranthus indeed is red all over ; and brasil is red in the wood : and so is red sanders. The tree of the *sanguis draconis* groweth in the form of a sugar-loaf. It is like the sap of that plant concocteth in the body of the tree. For we see that grapes and pomgranates are red in the juice, but are green in the tear : and this maketh the tree of *sanguis draconis* lesser towards the top ; because the juice hasteneth not up ; and besides, it is very astringent ; and therefore of slow motion.

642. IT is reported, that sweet moss, besides that upon the apple trees, groweth likewise sometimes upon poplars ; and yet generally the poplar is a smooth tree of bark, and hath little moss. The moss of the larix-tree burneth also sweet, and spark-
let's

leth in the burning. *Query* of the mosses of odorate trees ; as cedar, cypress, *lignum aloës, etc.*

643. THE death that is most without pain, hath been noted to be upon the taking of the potion of hemlock ; which in humanity was the form of execution of capital-offenders in Athens. The poison of the asp, that Cleopatra used, hath some affinity with it. The cause is, for that the torments of death are chiefly raised by the strife of the spirits ; and these vapours quench the spirits by degrees ; like to the death of an extreme old man. I conceive it is less painful than *opium*, because *opium* hath parts of heat mixed.

644. THERE be fruits that are sweet before they be ripe, as myrobalanes ; so fennel feeds are sweet before they ripen, and after grow spicy. And some never ripen to be sweet ; as tamarinds, berberries, crabs, sloes, *etc.* The cause is, for that the former kind have much and subtle heat, which causeth early sweetness ; the latter have a cold and acid juice, which no heat of the sun can sweeten. But as for the myrobalane, it hath parts of contrary natures ; for it is sweet and yet astringent.

645. THERE be few herbs that have a salt taste ; and contrariwise all blood of living creatures hath a saltness. The cause may be, for that salt, though it be the rudiment of life, yet in plants the original taste remaineth not ; for you shall have them bitter, sour, sweet, biting, but seldom salt, but in living creatures, all those high tastes may happen to be sometimes in the humours, but are seldom in the flesh or substance, because it is of a more oily nature ; which is not very susceptible of those tastes ; and the saltness itself of blood is but a light and secret saltness : and even among plants, some do participate of saltness, as *alga marina*, samphire, scurvy-grass, *etc.* And they report, there is in some of the Indian seas a swimming plant, which they call *salgaxus*, spreading over the sea in such sort, as one would think it were a meadow. It is certain, that out of the ashes of all plants they extract a salt which they use in medicines.

646. It is reported by one of the ancients, that there is an herb growing in the water, called *limcostis*, which is full of prickles : this herb putteth forth another small herb out of the leaf ; which is imputed to some moisture that is gathered between the prickles, which putrified by the sun germinateth. But I remember also I have seen, for a great rarity, one rose grow out of another like honey-suckles, that they call top and top-gallants.

647. BARLEY, as appeareth in the malting, being steeped in water three days, and afterwards the water drained from it, and the barley turned upon a dry floor, will sprout half an inch long at least : and if it be let alone, and not turned, much more ; until the heart be out. Wheat will do the same. Try it also with peas and beans. This experiment is not like that of the orpine and *semper-vive* ; for there it is of the old store, for no water is added ; but here it is nourished from the water. The experiment should be farther driven : for it appeareth already, by that which hath been said, that earth is not necessary to the first sprouting of plants ; and we see that rose buds set in water will blow : therefore try whether the sprouts of such grains may not be raised to a farther degree, as to an herb, or flower, with water only, or some small commixture of earth : for if they will, it should seem by the experiments before, both of the malt and of the roses, that they will come far faster on in water than in earth ; for the nourishment is easilier drawn out of water than out of earth. It may give some light also, that drink infused with flesh, as that with the capon, *etc.* will nourish faster and easilier than meat and drink together. Try the same experiment with roots

as well as with grains: as for example, take a turnip, and steep it a while, and then dry it, and see whether it will sprout.

648. MALT in the drenching will swell; and that in such a manner, as after the putting forth in sprouts, and the drying upon the kiln, there will be gained at least a bushel in eight, and yet the sprouts are rubbed off; and there will be a bushel of dust besides the malt: which I suppose to be, not only by the loose and open lying of the parts, but by some addition of substance drawn from the water in which it was steeped.

649. MALT gathereth a sweetness to the taste, which appeareth yet more in the wort. The dulceration of things is worthy to be tried to the full: for that dulceration importeth a degree to nourishment: and the making of things inalimental to become alimental, may be an experiment of great profit for making new victual.

650. MOST seeds in the growing, leave their husk or rind about the root; but the onion will carry it up, that it will be like a cap upon the top of the young onion. The cause may be, for that the skin or husk is not easy to break; as we see by the pilling of onions, what a holding substance the skin is.

651. PLANTS, that have curled leaves, do all abound with moisture; which cometh so fast on, as they cannot spread themselves plain, but must needs gather together. The weakest kind of curling is roughness; as in clary and burr. The second is curling on the sides; as in lettuce, and young cabbage: and the third is folding into an head; as in cabbage full grown, and cabbage-lettuce.

652. It is reported, that fir and pine, especially if they be old and putrified, though they shine not as some rotten woods do, yet in the sudden breaking they will sparkle like hard sugar.

653. THE roots of trees do some of them put downwards deep into the ground; as the oak, pine, fir, *etc.* Some spread more towards the surface of the earth; as the ash, cypress-tree, olive, *etc.* The cause of this latter may be, for that such trees as love the sun, do not willingly descend far into the earth; and therefore they are, commonly, trees that shoot up much; for in their body their desire of approach to the sun maketh them spread the less. And the same reason under ground, to avoid recess from the sun, maketh them spread the more. And we see it cometh to pass in some trees which have been planted too deep in the ground, that for love of approach to the sun, they forsake their first root, and put out another more towards the top of the earth. And we see also, that the olive is full of oily juice; and ash maketh the best fire; and cypress is an hot tree. As for the oak, which is of the former sort, it loveth the earth; and therefore groweth slowly. And for the pine and fir likewise, they have so much heat in themselves, as they need less the heat of the sun. There be herbs also that have the same difference; as the herb they call *morsus diaboli*; which putteth the root down so low, as you cannot pull it up without breaking; which gave occasion to the name and fable; for that it was said, it was so wholesom a root, that the devil, when it was gathered, bit it for envy: and some of the ancients do report, that there was a goodly fir, which they desired to remove whole, that had a root under ground eight cubits deep; and so the root came up broken.

654. It hath been observed, that a branch of a tree, being unbarked some space at the bottom, and so set into the ground, hath grown; even of such trees, as if the branch were set with the bark on, they would not grow; yet contrariwise we see, that a tree pared round in the body above ground, will die. The cause may be,
for

for that the unbarked part draweth the nourishment best, but the bark continueth it only.

655. GRAPES will continue fresh and moist all winter long, if you hang them cluster by cluster in the roof of a warm room; especially if when you gather the cluster, you take off with the cluster some of the stock.

656. THE reed or cane is a watery plant, and groweth not but in the water; it hath these properties; that it is hollow; that it is knuckled both stalk and root; that being dry, it is more hard and fragile than other wood; that it putteth forth no boughs, though many stalks come out of one root. It differeth much in greatness; the smallest being fit for thatching of houses, and stopping the chinks of ships, better than glue or pitch. The second bigness is used for angle-rods and staves; and in China for beating of offenders upon the thighs. The differing kinds of them are; the common reed; the *cassia fistula*; and the sugar reed. Of all plants it boweth the easiest, and riseth again. It seemeth, that amongst plants which are nourished with mixture of earth and water, it draweth most nourishment from water; which maketh it the smoothest of all others in bark, and the hollowest in body.

657. THE sap of trees when they are let blood, is of differing natures. Some more watery and clear; as that of vines, of beeches, of pears: some thick, as apples: some gummy, as cherries: some frothy, as elms: some milky, as figs. In mulberries, the sap seemeth to be almost towards the bark only; for if you cut the tree a little into the bark with a stone, it will come forth; if you pierce it deeper with a tool, it will be dry. The trees which have the moistest juices in their fruit, have commonly the moistest sap in their body; for the vines and pears are very moist; apples somewhat more spongy: the milk of the fig hath the quality of the rennet, to gather cheese: and so have certain four herbs wherewith they make cheese in Lent.

658. THE timber and wood are in some trees more clean, in some more knotty; and it is a good trial, to try it by speaking at one end, and laying the ear at the other: for if it be knotty, the voice will not pass well. Some have the veins more varied and chambletted; as oak, whereof waincot is made; maple, whereof trenchers are made: some more smooth, as fir and walnut: some do more easily breed worms and spiders; some more hardly, as it is said of Irish trees: besides there be a number of differences that concern their use; as oak, cedar, and chestnut, are the best builders; some are best for plough timber, as ash; some for piers, that are sometimes wet and sometimes dry, as elm; some for planchers, as deal; some for tables, cupboards, and desks, as walnuts; some for ship-timber, as oaks that grow in moist grounds; for that maketh the timber tough, and not apt to rift with ordnance; wherein English and Irish timber are thought to excel: some for masts of ships; as fir and pine, because of their length, straightness, and lightness: some for pale, as oak; some for fuel as ash; and so of the rest.

659. THE coming of trees and plants in certain regions, and not in others, is sometimes casual: for many have been translated, and have prospered well; as damask roses, that have not been known in England above an hundred years, and now are so common. But the liking of plants in certain soils more than in others, is merely natural; as the fir and pine love the mountains; the poplar, willow, fallow, and alder, love rivers and moist places; the ash loveth coppices, but is best in standards alone; juniper loveth chalk; and so do most fruit trees; samphire groweth but

but upon rocks ; reeds and osiers grow where they are washed with water ; the vine loveth sides of hills, turning upon the south-east sun, *etc.*

660. THE putting forth of certain herbs discovereth of what nature the ground where they put forth is ; as wild thyme sheweth good feeding ground for cattle ; betony and strawberries shew grounds fit for wood ; camomile sheweth mellow grounds fit for wheat. Mustard-feed, growing after the plough, sheweth a good strong ground also for wheat : burnet sheweth good meadow, and the like.

661. THERE are found in divers countries some other plants that grow out of trees, and plants, besides missetoe : as in Syria, there is an herb called *caffytas*, that groweth out of tall trees, and windeth itself about the same tree where it groweth, and sometimes about thorns. There is a kind of polypode that groweth out of trees, though it windeth not. So likewise an herb called *faunos*, upon the wild olive. And an herb called *hippocreston* upon the fullers thorn : which, they say, is good for the falling sickness.

662. IT hath been observed by some of the ancients, that howsoever cold and easterly winds are thought to be great enemies to fruit, yet nevertheless south winds are also found to do hurt, especially in the blossoming time ; and the more, if showers follow. It seemeth, they call forth the moisture too fast. The west winds are the best. It hath been observed also, that green and open winters do hurt trees ; inso-much as if two or three such winters come together, almond trees, and some other trees, will die. The cause is the same with the former, because the lust of the earth over-spends itself : howsoever some other of the ancients have commended warm winters.

663. SNOWS lying long cause a fruitful year ; for first, they keep in the strength of the earth ; secondly, they water the earth better than rain : for in snow the earth doth, as it were, suck the water as out of the teat : thirdly, the moisture of snow is the finest moisture, for it is the froth of the cloudy waters.

664. SHOWERS, if they come a little before the ripening of fruits, do good to all succulent and moist fruits ; as vines, olives, pomgranates ; yet it is rather for plenty than for goodness ; for the best vines are in the driest vintages : small showers are likewise good for corn, so as parching heats come not upon them. Generally night showers are better than day showers, for that the sun followeth not so fast upon them ; and we see even in watering by the hand, it is best in summer time to water in the evening.

665. THE differences of earths, and the trial of them, are worthy to be diligently inquired. The earth that with showers doth easiest soften, is commended ; and yet some earth of that kind will be very dry and hard before the showers. The earth that casteth up from the plough a great clod, is not so good as that which casteth up a smaller clod. The earth that putteth forth moss easily, and may be called mouldy, is not good. The earth that smelleth well upon the digging, or ploughing, is commended ; as containing the juice of vegetables almost already prepared. It is thought by some, that the ends of low rain-bows fall more upon one kind of earth than upon another ; as it may well be ; for that that earth is most roscid : and therefore it is commended for a sign of good earth. The poorness of the herbs, it is plain, shew the poorness of the earth ; and especially if they be in colour more dark : but if the herbs shew withered, or blasted at the top, it sheweth the earth to be very cold ; and so doth the mossiness of trees. The earth, whereof the grass is soon parched with the sun, and toasted, is commonly forced earth, and barren in its own nature.

The tender, cheffome, and mellow earth, is the best, being mere mould, between the two extremes of clay and sand, especially if it be not loamy and binding. The earth, that after rain will scarce be ploughed, is commonly fruitful: for it is cleaving, and full of juice.

666. IT is strange, which is observed by some of the ancients, that dust helpeth the fruitfulness of trees, and of vines by name; infomuch as they cast dust upon them of purpose. It should seem, that that powdering, when a shower cometh, maketh a kind of foiling to the tree, being earth and water finely laid on. And they note, that countries where the fields and ways are dusty bear the best vines.

667. IT is commended by the ancients for an excellent help to trees, to lay the stalks and leaves of lupins about the roots, or to plough them into the ground where you will sow corn. The burning also of the cuttings of vines, and casting them upon land, doth much good. And it was generally received of old, that dunging of grounds when the west wind bloweth, and in the decrease of the moon, doth greatly help; the earth, as it seemeth, being then more thirsty and open to receive the dung.

668. THE grafting of vines upon vines, as I take it, is not now in use: the ancients had it, and that three ways: the first was incision, which is the ordinary manner of grafting: the second was terebration through the middle of the stock, and putting in the cions there: and the third was paring of two vines that grow together to the marrow, and binding them close.

669. THE diseases and ill accidents of corn are worthy to be inquired; and would be more worthy to be inquired, if it were in mens power to help them; whereas many of them are not to be remedied. The mildew is one of the greatest, which, out of question, cometh by closeness of air; and therefore in hills, or large champain grounds, it seldom cometh; such as is with us York's woald. This cannot be remedied, otherwise than that in countries of small inclosure the grounds be turned into larger fields: which I have known to do good in some farms. Another disease is the putting forth of wild oats, whereinto corn oftentimes, especially barley, doth degenerate. It happeneth chiefly from the weakness of the grain that is sown; for if it be either too old or mouldy, it will bring forth wild oats. Another disease is the satiety of the ground; for if you sow one ground still with the same corn, I mean not the same corn that grew upon the same ground, but the same kind of grain, as wheat, barley, *etc.* it will prosper but poorly: therefore, besides the resting of the ground, you must vary the seed. Another ill accident is from the winds, which hurt at two times; at the flowering, by shaking off the flowers; and at the full ripening, by shaking out the corn. Another ill accident is drought, at the spindling of the corn, which with us is rare, but in hotter countries common; infomuch as the word *calamitas* was first derived from *calamus*, when the corn could not get out of the stalk. Another ill accident is over-wet at sowing time, which with us breedeth much dearth, infomuch as the corn never cometh up; and, many times, they are forced to re-sow summer corn, where they sowed winter corn. Another ill accident is bitter frosts continued without snow, especially in the beginning of the winter, after the seed is new sown. Another disease is worms, which sometimes breed in the root, and happen upon hot suns and showers immediately after the sowing; and another worm breedeth in the ear itself, especially when hot suns break often out of clouds. Another disease is weeds; and they are such as either choke and overshadow the corn, and bear it down; or starve the corn, and deceive it of nourishment. Another disease

disease is over-rankness of the corn; which they use to remedy by mowing it after it is come up; or putting sheep into it. Another ill accident, is laying of corn with great rains, near or in harvest. Another ill accident is, if the seed happen to have touched oil, or any thing that is fat; for those substances have an antipathy with nourishment of water.

670. THE remedies of the diseases of corn have been observed as followeth. The sleeping of the grain, before sowing, a little time in wine, is thought a preservative: the mingling of seed-corn with ashes, is thought to be good: the sowing at the wane of the moon, is thought to make the corn sound: it hath not been practised, but it is thought to be of use, to make some mixture in corn; as if you sow a few beans with wheat, your wheat will be the better. It hath been observed, that the sowing of corn with housleek doth good. Though grain, that toucheth oil or fat, receiveth hurt, yet the sleeping of it in the dregs of oil, when it becometh to putrify, which they call *amurca*, is thought to assure it against worms. It is reported also, that if corn be mowed, it will make the grain longer, but emptier, and having more of the husk.

671. IT hath been noted, that seed of a year old is the best; and of two or three years is worse; and that which is more old is quite barren; though, no doubt, some seed and grains last better than others. The corn which in the fanning lieth lowest is the best: and the corn, which broken or bitten retaineth a little yellowness, is better than that which is very white.

672. IT hath been observed, that of all roots of herbs, the root of sorrel goeth the farthest into the earth; insomuch that it hath been known to go three cubits deep: and that it is the root that continueth fit longest to be set again, of any root that groweth. It is a cold and acid herb, that, as it seemeth, loveth the earth, and is not much drawn by the sun.

673. IT hath been observed that some herbs like best being watered with salt water; as radish, beet, rue, pennyroyal; this trial should be extended to some other herbs; especially such as are strong, as tarragon, mustard-seed, rocket, and the like.

674. IT is strange that is generally received, how some poisonous beasts affect odorate and wholsom herbs; as that the snake loveth fennel; that the toad will be much under sage; that frogs will be in cinquefoil. It may be it is rather the shade, or other coverture, that they take liking in, than the virtue of the herb.

675. IT were a matter of great profit, save that I doubt it is too conjectural to venture upon, if one could discern what corn, herbs, or fruits, are like to be in plenty or scarcity, by some signs and prognostics in the beginning of the year: for as for those that are like to be in plenty, they may be bargained for upon the ground; as the old relation was of Thales; who to shew how easy it was for a philosopher to be rich, when he foresaw a great plenty of olives, made a monopoly of them. And for scarcity, men may make profit in keeping better the old store. Long continuance of snow is believed to make a fruitful year of corn: an early winter, or a very late winter, a barren year of corn: an open and serene winter, an ill year of fruit: these we have partly touched before: but other prognostics of like nature are diligently to be inquired.

676. THERE seem to be in some plants singularities, wherein they differ from all other; the olive hath the oily part only on the outside; whereas all other fruits have it in the nut or kernel. The fir hath, in effect, no stone, nut, nor kernel; ex-

cept you will count the little grains kernels. The pomgranate and pine-apple have only amongst fruits grains distinct in several cells. No herbs have curled leaves, but cabbage and cabbage-lettuce. None have doubled leaves, one belonging to the stalk, another to the fruit or seed, but the artichoke. No flower hath that kind of spread that the woodbine hath. This may be a large field of contemplation; for it sheweth that in the frame of nature, there is, in the producing of some species, a composition of matter, which happeneth oft, and may be much diversified: in others, such as happeneth rarely, and admitteth little variety: for so it is likewise in beasts: dogs have a resemblance with wolves and foxes; horses with asses; kine with buffles; hares with coneys, *etc.* And so in birds: kites and kestrels have a resemblance with hawks; common doves, with ring-doves and turtles; black-birds with thrushes and mavises; crows with ravens, daws, and choughs, *etc.* But elephants and swine amongst beasts; and the bird of paradise and the peacock amongst birds; and some few others have scarce any other species that have affinity with them.

We leave the description of plants, and their virtues, to herbalists, and other like books of natural history; wherein mens diligence hath been great, even to curiosity: for our experiments are only such, as do ever ascend a degree to the deriving of causes, and extracting of axioms, which we are not ignorant but that some both of the ancient and modern writers have also laboured; but their causes and axioms are so full of imagination, and so infected with the old received theories, as they are mere inquisitions of experience, and concoct it not.

Experiment solitary touching healing of wounds.

677. IT hath been observed by some of the ancients, that skins, especially of rams, newly pulled off, and applied to the wounds of stripes, do keep them from swelling and exulcerating; and likewise heal them and close them up; and that the whites of eggs do the same. The cause is a temperate conglutination; for both bodies are clammy and viscous, and do bridle the deflux of humours to the hurts, without penning them in too much.

Experiment solitary touching fat diffused in flesh.

678. YOU may turn almost all flesh into a fatty substance, if you take flesh and cut it into pieces, and put the pieces into a glass covered with parchment; and so let the glass stand six or seven hours in boiling water. It may be an experiment of profit for making of fat or grease for many uses; but then it must be of such flesh as is not edible; as horses, dogs, bears, foxes, badgers, *etc.*

Experiment solitary touching ripening of drink before the time.

679. IT is reported by one of the ancients, that new wine put into vessels well stopped, and the vessels let down into the sea, will accelerate very much the making of them ripe and potable. The same should be tried in wort.

Experiment solitary touching pilosity and plumage.

680. BEASTS are more hairy than men, and savage men more than civil; and the plumage of birds exceedeth the pilosity of beasts. The cause of the smoothness in men is not any abundance of heat and moisture, though that indeed causeth pilosity; but there is requisite to pilosity, not so much heat and moisture, as excrementitious

tious heat and moisture, for whatsoever assimilateth, goeth not into the hair, and excrementitious moisture aboundeth most in beasts, and men that are more savage. Much the same reason is there of the plumage of birds; for birds assimilate less, and excern more than beasts; for their excrements are ever liquid, and their flesh generally more dry: besides, they have not instruments for urine; and so all the excrementitious moisture goeth into the feathers: and therefore it is no marvel, though birds be commonly better meat than beasts, because their flesh doth assimilate more finely, and discerneth more subtilly. Again, the head of man hath hair upon the first birth, which no other part of the body hath. The cause may be want of perspiration; for much of the matter of hair, in the other parts of the body, goeth forth by insensible perspiration; and besides, the skull being of a more solid substance, nourisheth and assimilateth less, and excerneth more; and so likewise doth the chin. We see also, that hair cometh not upon the palms of the hands, nor soles of the feet; which are parts more perspirable. And children likewise are not hairy, for that their skins are more perspirable.

Experiment solitary touching the quickness of motion in birds.

681. BIRDS are of swifter motion than beasts; for the flight of many birds is swifter than the race of any beasts. The cause is, for that the spirits in birds are in greater proportion, in comparison of the bulk of their body, than in beasts: for as for the reason that some give, that they are partly carried, whereas beasts go, that is nothing; for by that reason swimming should be swifter than running: and that kind of carriage also is not without labour of the wing.

Experiment solitary touching the different clearness of the sea.

682. THE sea is clearer when the north wind bloweth, than when the south wind. The cause is for that salt water hath a little oiliness in the surface thereof, as appeareth in very hot days: and again, for that the southern wind relaxeth the water somewhat; and no water boiling is so clear as cold water.

Experiment solitary touching the different heats of fire and boiling water.

683. FIRE burneth wood, making it first luminous; then black and brittle; and lastly, broken and incinerate; scalding water doth none of these. The cause is, for that by fire the spirit of the body is first refined, and then emitted; whereof the refining or attenuation causeth the light; and the emission, first the fragility, and after the dissolution into ashes; neither doth any other body enter: but in water the spirit of the body is not refined so much; and besides part of the water entereth, which doth increase the spirit, and in a degree extinguisheth it: therefore we see that hot water will quench fire. And again we see, that in bodies wherein the water doth not much enter, but only the heat passeth, hot water worketh the effects of fire; as in eggs boiled and roasted, into which the water entereth not at all, there is scarce difference to be discerned; but in fruit, and flesh, whereinto the water entereth in some part, there is much more difference.

Experiment solitary touching the qualification of heat by moisture.

684. THE bottom of a vessel of boiling water, as hath been observed, is not very much heated, so as men may put their hand under the vessel and remove it. The cause is, for that the moisture of water as it quencheth coals where it entereth, so it doth

doth allay heat where it toucheth : and therefore note well, that moisture, although it doth not pass through bodies, without communication of some substance, as heat and cold do, yet it worketh manifest effects ; not by entrance of the body, but by qualifying of the heat and cold ; as we see in this instance : and we see likewise, that the water of things distilled in water, which they call the bath, differeth not much from the water of things distilled by fire. We see also, that pewter-dishes with water in them will not melt easily, but without it they will ; nay we see more, that butter, or oil, which in themselves are inflammable, yet by virtue of their moisture will do the like.

Experiment solitary touching yawning.

685. IT hath been noted by the ancients, that it is dangerous to pick one's ear whilst he yawneeth. The cause is, for that in yawning the inner parchment of the ear is extended, by the drawing in of the spirit and breath ; for in yawning, and sighing both, the spirit is first strongly drawn in, and then strongly expelled.

Experiment solitary touching the hiccough.

686. IT hath been observed by the ancients, that sneezing doth cease the hiccough. The cause is, for that the motion of the hiccough is a lifting up of the stomach, which sneezing doth somewhat depress, and divert the motion another way. For first we see that the hiccough cometh of fulness of meat, especially in children, which causeth an extension of the stomach : we see also it is caused by acid meats, or drinks, which is by the pricking of the stomach ; and this motion is ceased either by diversion, or by detention of the spirits ; diversion, as in sneezing ; detention, as we see holding of the breath doth help somewhat to cease the hiccough ; and putting a man into an earnest study doth the like, as is commonly used : and vinegar put to the nostrils, or gargarized, doth it also ; for that it is astringent, and inhibiteth the motion of the spirits.

Experiment solitary touching sneezing.

687. LOOKING against the sun doth induce sneezing. The cause is not the heating of the nostrils, for then the holding up of the nostrils against the sun, though one wink, would do it ; but the drawing down of the moisture of the brain : for it will make the eyes run with water ; and the drawing of moisture to the eyes, doth draw it to the nostrils by motion of consent ; and so followeth sneezing : as contrariwise, the tickling of the nostrils within, doth draw the moisture to the nostrils, and to the eyes by consent ; for they also will water. But yet it hath been observed, that if one be about to sneeze, the rubbing of the eyes till they run with water, will prevent it. Whereof the cause is, for that the humour which was descending to the nostrils, is diverted to the eyes.

Experiment solitary touching the tenderness of the teeth.

688. THE teeth are more by cold drink, or the like, affected than the other parts. The cause is double ; the one, for that the resistance of bone to cold is greater than of flesh, for that the flesh shrinketh, but the bone resisteth, whereby the cold becometh more eager : the other is, for that the teeth are parts without blood ; whereas blood helpeth to qualify the cold ; and therefore we see that the sinews are much affected with cold, for that they are parts without blood ; so the bones in sharp colds

wax brittle: and therefore it hath been seen, that all contusions of bones in hard weather are more difficult to cure.

Experiment solitary touching the tongue.

689. IT hath been noted, that the tongue receiveth more easily tokens of diseases than the other parts; as of heats within, which appear most in the blackness of the tongue. Again, pyed cattle are spotted in their tongues, *etc.* The cause is, no doubt, the tenderness of the part, which thereby receiveth more easily all alterations, than any other parts of the flesh.

Experiment solitary touching the taste.

690. WHEN the mouth is out of taste, it maketh things taste sometimes salt, chiefly bitter; and sometimes lothsome, but never sweet. The cause is, the corrupting of the moisture about the tongue, which many times turneth bitter, and salt, and lothsome; but sweet never; for the rest are degrees of corruption.

Experiment solitary touching some prognostics of pestilential seasons.

691. IT was observed in the great plague of the last year, that there were seen in divers ditches and low grounds about London, many toads that had tails two or three inches long at the least; whereas toads usually have no tails at all. Which argueth a great disposition to putrefaction in the soil and air. It is reported likewise, that roots, such as carrots and parsnips, are more sweet and luscious in infectious years, than in other years.

Experiment solitary touching special simples for medicines.

692. WISE physicians should with all diligence inquire, what simples nature yieldeth that have extreme subtile parts, without any mordication or acrimony: for they undermine that which is hard; they open that which is stopped and shut; and they expel that which is offensive, gently, without too much perturbation. Of this kind are alder-flowers; which therefore are proper for the stone: of this kind is the dwarf-pine; which is proper for the jaundice: of this kind is hartshorn; which is proper for agues and infections: of this kind is piony; which is proper for stoppings in the head: of this kind is fumitory; which is proper for the spleen: and a number of others. Generally, divers creatures bred of putrefaction, though they be somewhat lothsome to take, are of this kind; as earth-worms, timber-fows, snails, *etc.* And I conceive that the trochisks of vipers, which are so much magnified, and the flesh of snakes some ways condited, and corrected, which of late are grown into some credit, are of the same nature. So the parts of beasts putrified, as *castoreum* and musk, which have extreme subtile parts, are to be placed amongst them. We see also, that putrefactions of plants, as agarick and Jews-ear, are of greatest virtue. The cause is, for that putrefaction is the subtilest of all motions in the parts of bodies: and since we cannot take down the lives of living creatures, which, some of the Paracelsians say, if they could be taken down, would make us immortal; the next is for facility of operation, to take bodies putrified; such as may be safely taken.

Experiments

Experiments in consort touching Venus.

693. It hath been observed by the ancients, that much use of Venus doth dim the sight; and yet eunuchs, which are unable to generate, are nevertheless also dim-sighted. The cause of dimness of sight in the former, is the expence of spirits; in the latter, the over-moisture of the brain: for the over-moisture of the brain doth thicken the spirits visual, and obstructeth their passages; as we see by the decay in the sight in age; where also the diminution of the spirits concurreth as another cause: we see also that blindness cometh by rheums and cataracts. Now in eunuchs, there are all the notes of moisture; as the swelling of their thighs, the looseness of their belly, the smoothness of their skin, *etc.*

694. THE pleasure in the act of Venus is the greatest of the pleasures of the senses; the matching of it with itch is improper, though that also be pleasing to the touch. But the causes are profound. First, all the organs of the senses qualify the motions of the spirits; and make so many several species of motions, and pleasures or displeasures thereupon, as there be diversities of organs. The instruments of sight, hearing, taste, and smell, are of several frame; and so are the parts for generation. Therefore Scaliger doth well to make the pleasure of generation a sixth sense; and if there were any other differing organs, and qualified perforations for the spirits to pass, there would be more than the five senses: neither do we well know, whether some beasts and birds have not senses that we know not; and the very scent of dogs is almost a sense by itself. Secondly, the pleasures of the touch are greater and deeper than those of the other senses; as we see in warming upon cold; or refrigeration upon heat: for as the pains of the touch are greater than the offences of other senses; so likewise are the pleasures. It is true, that the affecting of the spirits immediately, and, as it were, without an organ, is of the greatest pleasure; which is but in two things: sweet smells; and wine, and the like sweet vapours. For smells, we see their great and sudden effect in fetching men again when they swoon: for drink, it is certain that the pleasure of drunkenness is next the pleasure of Venus; and great joys, likewise, make the spirits move and touch themselves: and the pleasure of Venus is somewhat of the same kind.

695. It hath been always observed, that men are more inclined to Venus in the winter, and women in the summer. The cause is, for that the spirits, in a body more hot and dry, as the spirits of men are, by the summer are more exhaled and dissipated: and in the winter more condensed and kept entire: but in bodies that are cold and moist, as womens are, the summer doth cherish the spirits, and calleth them forth; the winter doth dull them. Furthermore, the abstinence, or intermission of the use of Venus in moist and well habituate bodies, breedeth a number of diseases: and especially dangerous impostumations. The reason is evident; for that it is a principal evacuation, especially of the spirits: for of the spirits, there is scarce any evacuation, but in Venus and exercise. And therefore the omission of either of them breedeth all diseases of repletion.

Experiments in consort touching the insects.

THE nature of vivification is very worthy the inquiry: and as the nature of things is commonly better perceived in small than in great; and in imperfect, than in perfect; and in parts, than in whole: so the nature of vivification is best inquired in creatures bred of putrefaction. The contemplation whereof hath many excellent fruits.

fruits. First, in disclosing the original of vivification. Secondly, in disclosing the original of figuration. Thirdly, in disclosing many things in the nature of perfect creatures, which in them lie more hidden. And fourthly, in traducing, by way of operation, some observations in the *insecta*, to work effects upon perfect creatures. Note, that the word *insecta* agreeth not with the matter, but we ever use it for brevity's sake, intending by it creatures bred of putrefaction.

696. THE *insecta* are found to breed out of several matters: some breed of mud or dung; as the earth-worms, eels, snakes, *etc.* For they are both putrefactions: for water in mud doth putrify, as not able to preserve itself: and for dung, all excrements are the refuse and putrefactions of nourishment. Some breed in wood, both growing and cut down. *Query*, in what woods most, and at what seasons? We see that the worms with many feet, which round themselves into balls, are bred chiefly under logs of timber, but not in the timber; and they are said to be found also many times in gardens, where no logs are. But it seemeth their generation requireth a coverture, both from sun and rain or dew, as the timber is; and therefore they are not venomous, but contrariwise are held by the physicians to clarify the blood. It is observed also, that *cimices* are found in the holes of bed-sides. Some breed in the hair of living creatures, as lice and tikes; which are bred by the sweat close kept, and somewhat acried by the hair. The excrements of living creatures do not only breed *insecta* when they are excerned, but also while they are in the body; as in worms, whereto children are most subject, and are chiefly in the guts. And it hath been lately observed by physicians, that in many pestilent diseases, there are worms found in the upper parts of the body, where excrements are not, but only humours putrified. Fleas breed principally of straw or mats, where there hath been a little moisture; or the chamber and bed-straw kept close, and not aired. It is received, that they are killed by strewing wormwood in the rooms. And it is truly observed, that bitter things are apt rather to kill, than engender putrefaction; and they be things that are fat or sweet, that are aptest to putrify. There is a worm that breedeth in meal, of the shape of a large white maggot, which is given as a great dainty to nightingales. The moth breedeth upon cloth, and other lanifices; especially if they be laid up dankish and wet. It delighteth to be about the flame of a candle. There is a worm called a wevil, bred under ground, and that feedeth upon roots; as parsnips, carrots, *etc.* Some breed in waters, especially shaded, but they must be standing waters; as the water-spider that hath six legs. The fly called the gad-fly, breedeth of somewhat that swimmeth upon the top of the water, and is most about ponds. There is a worm that breedeth of the dregs of wine decayed; which afterwards, as is observed by some of the ancients, turneth into a gnat. It hath been observed by the ancients, that there is a worm that breedeth in old snow, and is of colour redish and dull of motion, and dieth soon after it cometh out of snow. Which should shew, that snow hath in it a secret warmth; for else it could hardly vivify. And the reason of the dying of the worm, may be the sudden exhaling of that little spirit, as soon as it cometh out of the cold, which had shut it in. For as butterflies quicken with heat, which were benumbed with cold; so spirits may exhale with heat, which were preserved in cold. It is affirmed both by the ancient and modern observation, that in furnaces of copper and brass, where *chalcites*, which is vitriol, is often cast in to mend the working, there riseth suddenly a fly, which sometimes moveth as if it took hold on the walls of the furnace; sometimes is seen mov-

ing in the fire below ; and dieth presently as soon as it is out of the furnace : which is a noble instance, and worthy to be weighed ; for it sheweth, that as well violent heat of fire, as the gentle heat of living creatures, will vivify, if it have matter proportionable. Now the great axiom of vivification is, that there must be heat to dilate the spirit of the body ; an active spirit to be dilated ; matter viscous or tenacious to hold in the spirit ; and that matter to be put forth and figured. Now a spirit dilated by so ardent a fire as that of the furnace, as soon as ever it cooleth never so little, congealeth presently. And, no doubt, this action is furthered by the *chal-cites*, which hath a spirit that will put forth and germinate, as we see in chemical trials. Briefly, most things putrified bring forth *insecta* of several names ; but we will not take upon us now to enumerate them all.

697. THE *insecta* have been noted by the ancients to feed little : but this hath not been diligently observed ; for grasshoppers eat up the green of whole countries ; and silk-worms devour leaves swiftly ; and ants make great provision. It is true, that creatures that sleep and rest much, eat little ; as dormice, and bats, *etc.* They are all without blood : which may be, for that the juice of their bodies is almost all one ; not blood, and flesh, and skin, and bone, as in perfect creatures ; the integral parts have extreme variety, but the similar parts little. It is true, that they have, some of them, a diaphragm and an intestine ; and they have all skins ; which in most of the *insecta* are cast often. They are not, generally, of long life : yet bees have been known to live seven years : and snakes are thought, the rather for the casting of their spoil, to live till they be old : and eels, which many times breed of putrefaction, will live and grow very long : and those that interchange from worms to flies in the summer, and from flies to worms in the winter, have been kept in boxes four years at the least. Yet there are certain flies that are called *ephemera* that live but a day. The cause is the exility of the spirit, or perhaps the absence of the sun ; for that if they were brought in, or kept close, they might live longer. Many of the *insecta*, as butterflies and other flies, revive easily when they seem dead, being brought to the sun or fire. The cause whereof is the diffusion of the vital spirit, and the easy dilating of it by a little heat. They stir a good while after their heads are off, or that they be cut in pieces ; which is caused also, for that their vital spirits are more diffused throughout all their parts, and less confined to organs than in perfect creatures.

698. THE *insecta* have voluntary motion, and therefore imagination ; and whereas some of the ancients have said, that their motion is indeterminate, and their imagination indefinite, it is negligently observed ; for ants go right forwards to their hills ; and bees do admirably know the way from a flowery heath two or three miles off to their hives. It may be, gnats and flies have their imagination more mutable and giddy, as small birds likewise have. It is said by some of the ancients, that they have only the sense of feeling, which is manifestly untrue ; for if they go forth right to a place, they must needs have sight ; besides, they delight more in one flower or herb than in another, and therefore have taste : and bees are called with sound upon brass, and therefore they have hearing ; which sheweth likewise, that though their spirit be diffused, yet there is a seat of their senses in their head.

OTHER observations concerning the *insecta*, together with the enumeration of them, we refer to that place, where we mean to handle the title of animals in general.

Experiment solitary touching leaping.

699. A MAN leapeth better with weights in his hands than without. The cause is, for that the weight, if it be proportionable, strengtheneth the sinews by contracting them. For otherwise, where no contraction is needful, weight hindereth. As we see in horse-races, men are curious to foresee that there be not the least weight upon the one horse more than upon the other. In leaping with weights the arms are first cast backwards, and then forwards, with so much the greater force; for the hands go backward before they take their rise. *Query*, if the contrary motion of the spirits, immediately before the motion we intend, doth not cause the spirits as it were to break forth with more force? as breath also, drawn and kept in, cometh forth more forcibly: and in calling of any thing, the arms, to make a great swing, are first cast backward.

Experiment solitary touching the pleasures and displeasures of the senses, especially of hearing.

700. OF musical tones and unequal sounds we have spoken before; but touching the pleasure and displeasure of the senses, not so fully. Harsh sounds, as of a saw when it is sharpened; grinding of one stone against another; squeaking or shrieking noise; make a shivering or horror in the body, and set the teeth on edge. The cause is, for that the objects of the ear do affect the spirits, immediately, most with pleasure and offence. We see there is no colour that affecteth the eye much with displeasure: there be sights that are horrible, because they excite the memory of things that are odious or fearful; but the same things painted do little affect. As for smells, tastes, and touches, they be things that do affect by a participation or impulsion of the body of the object. So it is found alone that doth immediately and incorporeally affect most; this is most manifest in music, and concords and discords in music: for all sounds, whether they be sharp or flat, if they be sweet, have a roundness and equality; and if they be harsh, are unequal: for a discord itself is but a harshness of divers sounds meeting. It is true that inequality not stayed upon, but passing, is rather an increase of sweetness; as in the purling of a wreathed string; and in the raucity of a trumpet; and in the nightingale-pipe of a regal; and in a discord straight falling upon a concord; but if you stay upon it, it is offensive: and therefore there be these three degrees of pleasing and displeasing in sounds, sweet sounds, discords, and harsh sounds, which we call by divers names, as shrieking or grating, such as we now speak of. As for the setting of the teeth on edge, we see plainly what an intercourse there is between the teeth and the organ of the hearing, by the taking of the end of a bow between the teeth, and striking upon the string.

NATURAL HISTORY.

CENTURY VIII.

Experiment solitary touching veins of medicinal earth.

701. **T**HERE be minerals and fossils in great variety ; but of veins of earth medicinal, but few : the chief are *terra lemnia*, *terra sigillata communis*, and *bolus armenus* ; whereof *terra lemnia* is the chief. The virtues of them are, for curing of wounds, stanching of blood, stopping of fluxes, and rheums, and arresting the spreading of poison, infection, and putrefaction : and they have of all other simples the perfectest and purest quality of drying, with little or no mixture of any other quality. Yet it is true, that the bole-armoniac is the most cold of them, and that *terra lemnia* is the most hot ; for which cause the island Lemnos, where it is digged, was in the old fabulous ages consecrated to Vulcan.

Experiment solitary touching the growth of sponges.

702. ABOUT the bottom of the Straits are gathered great quantities of sponges, which are gathered from the sides of rocks, being as it were a large but tough moss. It is the more to be noted, because that there be but few substances, plant-like, that grow deep within the sea ; for they are gathered sometimes fifteen fathom deep : and when they are laid on shore, they seem to be of great bulk ; but crushed together, will be transported in a very small room.

Experiment solitary touching sea-fish put in fresh waters.

703. IT seemeth, that fish that are used to the salt water, do nevertheless delight more in fresh. We see, that salmons and smelts love to get into rivers, though it be against the stream. At the haven of Constantinople you shall have great quantities of fish that come from the Euxine sea, that when they come into the fresh water, do inebriate and turn up their bellies, so as you may take them with your hand. I doubt there hath not been sufficient experiment made of putting sea-fish into fresh water, ponds, and pools. It is a thing of great use and pleasure ; for so you may have them new at some good distance from the sea : and besides, it may be, the fish will eat the pleasanter, and may fall to breed. And it is said, that Colchester oysters, which are put into pits, where the sea goeth and cometh, but yet so that there is a fresh water coming alio to them when the sea voideth, become by that means fatter, and more grown.

Experiment solitary touching attraction by similitude of substance.

704. THE Turkish bow giveth a very forcible shoot ; insomuch as it hath been known, that the arrow hath pierced a steel target, or a piece of brass of two inches thick : but that which is more strange, the arrow, if it be headed with wood, hath been known to pierce through a piece of wood of eight inches thick. And it is certain, that we had in use at one time, for sea fight, short arrows, which they called sprights, without any other heads, save wood sharpened ; which were discharged out of muskets, and would pierce through the sides of ships where a bullet would not pierce. But this dependeth upon one of the greatest secrets in all nature ; which is,
that

that similitude of substance will cause attraction, where the body is wholly freed from the motion of gravity: for if that were taken away, lead would draw lead, and gold would draw gold, and iron would draw iron, without the help of the loadstone. But this same motion of weight or gravity, which is a mere motion of the matter, and hath no affinity with the form or kind, doth kill the other motion, except itself be killed by a violent motion, as in these instances of arrows; for then the motion of attraction by similitude of substance beginneth to shew itself. But we shall handle this point of nature fully in due place.

Experiment solitary touching certain drinks in Turkey.

705. THEY have in Turkey and the east certain confections, which they call ser-vets, which are like to candied conserves, and are made of sugar and lemons, or sugar and citrons, or sugar and violets, and some other flowers; and some mixture of amber for the more delicate persons: and those they dissolve in water, and thereof make their drink, because they are forbidden wine by their law. But I do much marvel, that no Englishman, or Dutchman, or German, doth set up brewing in Constantinople; considering they have such quantity of barley. For as for the general sort of men, frugality may be the cause of drinking water; for that it is no small saving to pay nothing for one's drink; but the better sort might well be at the cost. And yet I wonder the less at it, because I see France, Italy, or Spain, have not taken into use beer or ale; which, perhaps, if they did, would better both their healths and their complexions. It is likely it would be matter of great gain to any that should begin it in Turkey.

Experiments in consort touching sweat.

706. IN bathing in hot water, sweat, nevertheless, cometh not in the parts under the water. The cause is; first, for that sweat is a kind of colligation; and that kind of colligation is not made either by an over-dry heat, or an over-moist heat: for over-moisture doth somewhat extinguish the heat, as we see that even hot water quenched fire; and over-dry heat shutteth the pores: and therefore men will sooner sweat covered before the sun or fire, than if they stood naked: and earthen bottles, filled with hot water, do provoke in bed a sweat more daintily than brick-bats hot. Secondly, hot water doth cause evaporation from the skin; so as it spendeth the matter in those parts under the water, before it issueth in sweat. Again, sweat cometh more plentifully, if the heat be increased by degrees, than if it be greatest at first or equal. The cause is, for that the pores are better opened by a gentle heat, than by a more violent; and by their opening, the sweat issueth more abundantly. And therefore physicians may do well when they provoke sweat in bed by bottles, with a decoction of sudorific herbs in hot water, to make two degrees of heat in the bottles; and to lay in the bed the less heated first, and after half an hour, the more heated.

707. SWEAT is salt in taste; the cause is, for that that part of the nourishment which is fresh and sweet, turneth into blood and flesh; and the sweat is only that part which is separate and excerned. Blood also raw hath some saltness more than flesh; because the assimilation into flesh is not without a little and subtile excretion from the blood.

708. SWEAT cometh forth more out of the upper parts of the body than the lower; the reason is, because those parts are more replenished with spirits; and the spirits are they that put forth sweat: besides, they are less fleshy, and sweat issueth, chiefly, out of the parts that are less fleshy, and more dry; as the forehead and breast.

709. MEN sweat more in sleep than waking; and yet sleep doth rather stay other
flux-

fluxions, than cause them; as rheums, looseness of the body, *etc.* The cause is, for that in sleep the heat and spirits do naturally move inwards, and there rest. But when they are collected once within, the heat becometh more violent and irritate; and thereby expelleth sweat.

710. COLD sweats are, many times, mortal, and near death; and always ill, and suspected; as in great fears, hypochondriacal passions, *etc.* The cause is, for that cold sweats come by a relaxation or forsaking of the spirits, whereby the moisture of the body, which heat did keep firm in the parts, severeth and issueth out.

711. IN those diseases which cannot be discharged by sweat, sweat is ill, and rather to be stayed; as in diseases of the lungs, and fluxes of the belly; but in those diseases which are expelled by sweat, it easeth and lighteneth; as in agues, pestilences, *etc.* The cause is, for that sweat in the latter sort is partly critical, and sendeth forth the matter that offendeth; but in the former, it either proceedeth from the labour of the spirits, which sheweth them oppressed; or from motion of consent, when nature not able to expel the disease where it is seated, moveth to an expulsion indifferent over all the body.

Experiment solitary touching the glow-worm.

712. THE nature of the glow-worm is hitherto not well observed. Thus much we see; that they breed chiefly in the hottest months of summer; and that they breed not in champain, but in bushes and hedges. Whereby it may be conceived, that the spirit of them is very fine, and not to be refined but by summer heats: and again, that by reason of the fineness, it doth easily exhale. In Italy, and the hotter countries, there is a fly they call *Lucciole*, that shineth as the glow-worm doth; and it may be is the flying glow-worm. But that fly is chiefly upon fens and marshes. But yet the two former observations hold; for they are not seen but in the heat of summer; and sedge, or other green of the fens, give as good shade as bushes. It may be the glow-worms of the cold countries ripen not so far as to be winged.

Experiments in consort touching the impressions, which the passions of the mind make upon the body.

713. THE passions of the mind work upon the body the impressions following. Fear causeth paleness, trembling, the standing of the hair upright, starting and shrieking. The paleness is caused, for that the blood runneth inward to succour the heart. The trembling is caused, for that through the flight of the spirits inward, the outward parts are destituted, and not sustained. Standing upright of the hair is caused, for that by the shutting of the pores of the skin, the hair that lieth aslope must needs rise. Starting is both an apprehension of the thing feared, and in that kind it is a motion of shrinking, and likewise an inquisition in the beginning, what the matter should be, and in that kind it is a motion of erection, and therefore when a man would listen suddenly to any thing, he starteth; for the starting is an erection of the spirits to attend. Shrieking is an appetite of expelling that which suddenly striketh the spirits: for it must be noted, that many motions, though they be unprofitable to expel that which hurteth, yet they are offers of nature, and cause motions by consent; as in groaning, or crying upon pain.

714. GRIEF and pain cause sighing, sobbing, groaning, screaming, and roaring; tears, distorting of the face, grinding of the teeth, sweating. Sighing is caused by the drawing in of a greater quantity of breath to refresh the heart that laboureth;
like

like a great draught when one is thirsty. Sobbing is the same thing stronger. Groaning and screaming, and roaring, are caused by an appetite of expulsion, as hath been said: for when the spirits cannot expel the thing that hurteth, in their strife to do it, by motion of consent, they expel the voice. And this is when the spirits yield, and give over to resist: for if one do constantly resist pain, he will not groan. Tears are caused by a contraction of the spirits of the brain; which contraction by consequence astringeth the moisture of the brain, and thereby sendeth tears into the eyes. And this contraction or compression, causeth also wringing of the hands; for wringing is a gesture of expression of moisture. The distorting of the face is caused by a contention, first to bear and resist, and then to expel; which maketh the parts knit first, and afterwards open. Grinding of the teeth is caused, likewise, by a gathering and ferring of the spirits together to resist, which maketh the teeth also to fit hard one against another. Sweating is also a compound motion, by the labour of the spirits, first to resist, and then to expel.

715. Joy causeth a chearfulness and vigour in the eyes, singing, leaping, dancing, and sometimes tears. All these are the effects of the dilatation and coming forth of the spirits into the outward parts; which maketh them more lively and stirring. We know it hath been seen, that excessive sudden joy hath caused present death, while the spirits did spread so much as they could not retire again. As for tears, they are the effects of compression of the moisture of the brain, upon dilatation of the spirits. For compression of the spirits worketh an expression of the moisture of the brain by consent, as hath been said in grief. But then in joy, it worketh it diversly; namely, by propulsion of the moisture, when the spirits dilate, and occupy more room.

716. ANGER causeth paleness in some, and the going and coming of the colour in others: also trembling in some; swelling, foaming at the mouth, stamping, bending of the fist. Paleness, and going and coming of the colour, are caused by the burning of the spirits about the heart; which to refresh themselves, call in more spirits from the outward parts. And if the paleness be alone, without sending forth the colour again, it is commonly joined with some fear; but in many there is no paleness at all, but contrariwise redness about the cheeks and gills; which is by the sending forth of the spirits in an appetite to revenge. Trembling in anger is likewise by a calling in of the spirits; and is commonly when anger is joined with fear. Swelling is caused, both by a dilatation of the spirits by over-heating, and by a liquefaction or boiling of the humours thereupon. Foaming at the mouth is from the same cause, being an ebullition. Stamping, and bending of the fist, are caused by an imagination of the act of revenge.

717. LIGHT displeasure or dislike causeth shaking of the head, frowning, and knitting of the brows. These effects arise from the same causes that trembling and horror do; namely, from the retiring of the spirits, but in a less degree. For the shaking of the head is but a slow and definite trembling; and is a gesture of slight refusal: and we see also, that a dislike causeth, often, that gesture of the hand, which we use when we refuse a thing, or warn it away. The frowning and knitting of the brows is a gathering, or ferring of the spirits, to resist in some measure. And we see also this knitting of the brows will follow upon earnest studying, or cogitation of any thing, though it be without dislike.

718. SHAME causeth blushing, and casting down of the eyes. Blushing is the resort of blood to the face; which in the passion of shame is the part that laboureth most. And although the blushing will be seen in the whole breast if it be naked, yet that is but in passage to the face. As for the casting down of the eyes, it proceedeth.

ceedeth of the reverence a man beareth to other men; whereby, when he is ashamed, he cannot indure to look firmly upon others: and we see, that blushing, and the casting down of the eyes both, are more when we come before many; *ore Pompeii quid mollius & nunquam non coram pluribus erubuit*: and likewise when we come before great or reverend persons.

719. PITY causeth sometimes tears; and a flexion or cast of the eye aside. Tears come from the same cause that they do in grief: for pity is but grief in another's behalf. The cast of the eye is a gesture of aversion, or lothness to behold the object of pity.

720. WONDER causeth astonishment, or an immoveable posture of the body; casting up of the eyes to heaven, and lifting up of the hands. For astonishment, it is caused by the fixing of the mind upon one object of cogitation, whereby it doth not spaiate and transcur, as it useth; for in wonder the spirits fly not, as in fear; but only settle, and are made less apt to move. As for the casting up of the eyes, and lifting up of the hands, it is a kind of appeal to the Deity, which is the author, by power and providence, of strange wonders.

721. LAUGHING causeth a dilatation of the mouth and lips; a continued expulsion of the breath, with the loud noise, which maketh the interjection of laughing; shaking of the breasts and sides; running of the eyes with water, if it be violent and continued. Wherein first it is to be understood, that laughing is scarce, properly, a passion, but hath its source from the intellect; for in laughing there ever precedeth a conceit of somewhat ridiculous. And therefore it is proper to man. Secondly, that the cause of laughing is but a light touch of the spirits, and not so deep an impression as in other passions. And therefore, that which hath no affinity with the passions of the mind, it is moved, and that in great vehemency, only by tickling some parts of the body: and we see that men even in a grieved state of mind, yet cannot sometimes forbear laughing. Thirdly, it is ever joined with some degree of delight: and therefore exhilaration hath some affinity with joy, though it be a much lighter motion: *res severa est verum gaudium*. Fourthly, that the object of it is deformity, absurdity, shrewd turns, and the like. Now to speak of the causes of the effects before mentioned, whereunto these general notes give some light. For the dilatation of the mouth and lips, continued expulsion of the breath and voice, and shaking of the breast and sides, they proceed, all, from the dilatation of the spirits; especially being sudden. So likewise, the running of the eyes with water, as hath been formerly touched, where we spake of the tears of joy and grief, is an effect of dilatation of the spirits. And for suddenness, it is a great part of the matter: for we see, that any shrewd turn that lighteth upon another; or any deformity, *etc.* moveth laughter in the instant; which after a little time it doth not. So we cannot laugh at any thing after it is stale, but whilst it is new: and even in tickling, if you tickle the sides, and give warning; or give a hard or continued touch, it doth not move laughter so much.

722. LUST causeth a flagrancy in the eyes and priapism. The cause of both these is, for that in lust, the sight and the touch are the things desired; and therefore the spirits resort to those parts which are most affected. And note well in general, for that great use may be made of the observation, that, evermore, the spirits, in all passions, resort most to the parts that labour most, or are most affected. As in the last which hath been mentioned, they resort to the eyes and venereous parts: in fear and anger to the heart: in shame to the face: and in light dislikes to the head.

Experiments

Experiments in consort touching drunkenness.

723. It hath been observed by the ancients, and is yet believed, that the sperm of drunken men is unfruitful. The cause is, for that it is over-moistened, and wanteth spissitude: and we have a merry saying, that they that go drunk to bed get daughters.

724. DRUNKEN men are taken with a plain defect, or destitution in voluntary motion. They reel; they tremble; they cannot stand, nor speak strongly. The cause is, for that the spirits of the wine oppress the spirits animal, and occupy part of the place where they are; and so make them weak to move. And therefore drunken men are apt to fall asleep: and opiates, and stupefactive, as poppy, henbane, hemlock, *etc.* induce a kind of drunkenness by the grossness of their vapour; as wine doth by the quantity of the vapour. Besides, they rob the spirits animal of their matter whereby they are nourished: for the spirits of the wine prey upon it as well as they: and so they make the spirits less supple and apt to move.

725. DRUNKEN men imagine every thing turneth round; they imagine also that things come upon them; they see not well things afar off; those things that they see near hand, they see out of their place; and, sometimes, they see things double. The cause of the imagination that things turn round is, for that the spirits themselves turn, being compressed by the vapour of the wine, for any liquid body upon compression turneth, as we see in water, and it is all one to the sight, whether the visual spirits move, or the object moveth, or the medium moveth. And we see that long turning round breedeth the same imagination. The cause of the imagination that things come upon them is, for that the spirits visual themselves draw back; which maketh the object seem to come on; and besides, when they see things turn round and move, fear maketh them think they come upon them. The cause that they cannot see things afar off, is the weakness of the spirits; for in every megrim or vertigo, there is an obtenebration joined with a semblance of turning round; which we see also in the lighter sort of swoonings. The cause of seeing things out of their place, is the refraction of the spirits visual; for the vapour is as an unequal medium; and it is as the sight of things out of place in water. The cause of seeing things double is the swift and unquiet motion of the spirits, being oppressed, to and fro; for, as was said before, the motion of the spirits visual, and the motion of the object, make the same appearances; and for the swift motion of the object, we see, that if you fillip a lute-string, it sheweth double or treble.

726. MEN are sooner drunk with small draughts than with great. And again, wine sugared inebriateth less than wine pure. The cause of the former is, for that the wine descendeth not so fast to the bottom of the stomach, but maketh longer stay in the upper part of the stomach, and sendeth vapours faster to the head; and therefore inebriateth sooner. And for the same reason, sops in wine, quantity for quantity, inebriate more than wine of itself. The cause of the latter is, for that the sugar doth inspissate the spirits of the wine, and maketh them not so easy to resolve into vapour. Nay farther, it is thought to be some remedy against inebriating, if wine sugared be taken after wine pure. And the same effect is wrought either by oil or milk, taken upon much drinking.

Experiment solitary touching the help or hurt of wine, though moderately used.

727. THE use of wine in dry and consumed bodies is hurtful; in moist and full bodies it is good. The cause is, for that the spirits of the wine do prey upon the

dew or radical moisture, as they term it, of the body, and so deceive the animal spirits. But where there is moisture enough or superfluous, there wine helpeth to digest, and desiccate the moisture.

Experiment solitary touching caterpillers.

728. THE caterpillar is one of the most general of worms, and breedeth of dew and leaves; for we see infinite number of caterpillers which breed upon trees and hedges, by which the leaves of the trees or hedges are in great part consumed; as well by their breeding out of the leaf, as by their feeding upon the leaf. They breed in the spring chiefly, because then there is both dew and leaf. And they breed commonly when the east winds have much blown; the cause whereof is, the dryness of that wind; for to all vivification upon putrefaction, it is requisite the matter be not too moist: and therefore we see they have cobwebs about them, which is a sign of a slimy dryness; as we see upon the ground, whereupon, by dew and sun, cobwebs breed all over. We see also the green caterpillar breedeth in the inward parts of roses, especially not blown, where the dew sticketh; but especially caterpillers, both the greatest, and the most, breed upon cabbages, which have a fat leaf, and apt to putrify. The caterpillar towards the end of summer waxeth volatile, and turneth to a butterfly, or perhaps some other fly. There is a caterpillar that hath a fur or down upon it, and seemeth to have affinity with the silkworm.

Experiment solitary touching the flies cantharides.

729. THE flies *cantharides* are bred of a worm or caterpillar, but peculiar to certain fruit-trees; as are the fig-tree, the pine-tree, and the wild brier; all which bear sweet fruit, and fruit that hath a kind of secret biting or sharpness: for the fig hath a milk in it that is sweet and corrosive; the pine apple hath a kernel that is strong and absterfive: the fruit of the brier is said to make children, or those that eat them, scabbed. And therefore, no marvel though *cantharides* have such a corrosive and cauterising quality; for there is not any other of the *insecta*, but is bred of a duller matter. The body of the *cantharides* is bright coloured; and it may be, that the delicate-coloured dragon-flies may have likewise some corrosive quality.

Experiments in consort touching lassitude

730. LASSITUDE is remedied by bathing, or anointing with oil and warm water. The cause is, for that all lassitude is a kind of contusion, and compression of the parts; and bathing and anointing give a relaxation or emollition; and the mixture of oil and water is better than either of them alone; because water entereth better into the pores, and oil after entry softneth better. It is found also, that the taking of tobacco doth help and discharge lassitude. The reason whereof is, partly, because by chearing or comforting of the spirits, it openeth the parts compressed or contused; and chiefly, because it refresheth the spirits by the opiate virtue thereof, and so discharge weariness, as sleep likewise doth.

731. IN going up a hill the knees will be most weary; in going down a hill, the thighs. The cause is, for that in the lift of the feet, when a man goeth up the hill, the weight of the body beareth most upon the knees; and in going down the hill, upon the thighs.

Experiment

Experiment solitary touching the casting of the skin and shell in some creatures.

732. THE casting of the skin is by the ancients compared to the breaking of the secundine or caul, but not rightly: for that were to make every casting of the skin a new birth: and besides, the secundine is but a general cover, not shaped according to the parts, but the skin is shaped according to the parts. The creatures that cast their skin are, the snake, the viper, the grasshopper, the lizard, the silk-worm, *etc.* Those that cast their shell are, the lobster, the crab, the crawfish, the hodmandod or dodman, the tortoise, *etc.* The old skins are found, but the old shells never: so as it is like they scale off, and crumble away by degrees. And they are known by the extreme tenderness and softness of the new shell, and sometimes by the freshness of the colour of it. The cause of the casting of skin and shell should seem to be the great quantity of matter in those creatures that is fit to make skin or shell: and again, the looseness of the skin or shell, that sticketh not close to the flesh. For it is certain, that it is the new skin or shell that putteth off the old: so we see, that in deer it is the young horn that putteth off the old; and in birds, the young feathers put off the old: and so birds that have much matter for their beak, cast their beaks, the new beak putting off the old.

Experiments in consort touching the postures of the body.

733. LYING not erect, but hollow, which is in the making of the bed; or with the legs gathered up, which is in the posture of the body, is the more wholesome. The reason is, the better comforting of the stomach, which is by that less pensile: and we see that in weak stomachs, the laying up of the legs high, and the knees almost to the mouth, helpeth and comforteth. We see also that galley-slaves, notwithstanding their misery otherwise, are commonly fat and fleshy; and the reason is, because the stomach is supported somewhat in sitting, and is pensile in standing or going. And therefore, for prolongation of life, it is good to choose those exercises where the limbs move more than the stomach and belly; as in rowing, and in sawing being set.

734. MEGRIMS and giddiness are rather when we rise after long sitting, than while we sit. The cause is, for that the vapours, which were gathered by sitting, by the sudden motion fly more up into the head.

735. LEANING long upon any part maketh it numb, and as we call it, asleep. The cause is, for that the compression of the part suffereth not the spirits to have free access; and therefore when we come out of it, we feel a stinging or pricking, which is the re-entrance of the spirits.

Experiment solitary touching pestilential years.

736. IT hath been noted, that those years are pestilential and unwholesome, when there are great numbers of frogs, flies, locusts, *etc.* The cause is plain; for that those creatures being engender'd of putrefaction, when they abound, shew a general disposition of the year, and constitution of the air, to diseases of putrefaction. And the same prognostic, as hath been said before, holdeth, if you find worms in oak-apples: for the constitution of the air appeareth more subtilly in any of these things, than to the sense of man.

Experiment solitary touching the prognostics of hard winters.

737. IT is an observation amongst country people, that years of store of haws and hips do commonly portend cold winters; and they ascribe it to God's providence, that,

that, as the Scripture faith, reacheth even the falling of a sparrow; and much more is like to reach to the preservation of birds in such seasons. The natural cause also may be the want of heat, and abundance of moisture, in the summer precedent; which putteth forth those fruits, and must needs leave great quantity of cold vapours not dissipated; which causeth the cold of the winter following.

Experiment solitary touching medicines that condense and relieve the spirits.

738. THEY have in Turkey a drink called coffee, made of a berry of the same name, as black as foot, and of a strong scent, but not aromatical; which they take, beaten into powder, in water, as hot as they can drink it: and they take it, and sit at it in their coffee-houses, which are like our taverns. This drink comforteth the brain and heart, and helpeth digestion. Certainly this berry coffee, the root and leaf beetle, the leaf tobacco, and the tear of poppy, *opium*, of which the Turks are great takers, supposing it expelleth all fear, do all condense the spirits, and make them strong and aleger. But it seemeth they are taken after several manners; for coffee and *opium* are taken down, tobacco but in smoke, and beetle is but champ-ed in the mouth with a little lime. It is like there are more of them, if they were well found out, and well corrected. *Query*, of henbane-seed; of mandrake; of *Asarum*, root and flower; of *folium indicum*; of ambergreefe; of the *Affyrrian anemum*, if it may be had; and of the scarlet powder which they call *kermes*; and, generally, of all such things as do inebriate and provoke sleep. Note, that tobacco is not taken in root or seed, which are more forcible ever than leaves.

Experiment solitary touching paintings of the body.

739. THE Turks have a black powder made of a mineral called alcohol, which with a fine long pencil they lay under their eye-lids, which doth colour them black; whereby the white of the eye is set off more white. With the same powder they colour also the hairs of their eye-lids, and of their eye-brows, which they draw into embowed arches. You shall find that Xenophon maketh mention, that the Medes used to paint their eyes. The Turks use with the same tincture to colour the hair of their heads and beards black. And divers with us that are grown gray, and yet would appear young, find means to make their hair black, by combing it, as they say, with a leaden comb, or the like. As for the Chineses, who are of an ill complexion, being olivaster, they paint their cheeks scarlet, especially their king and grandees. Generally, barbarous people, that go naked, do not only paint themselves, but they pounce and raise their skin, that the painting may not be taken forth; and make it into works. So do the West-Indians; and so did the ancient Picts and Britons; so that it seemeth men would have the colours of birds feathers, if they could tell how; or at least, they will have gay skins instead of gay clothes.

Experiment solitary touching the use of bathing and anointing.

740. IT is strange, that the use of bathing, as a part of diet, is left. With the Romans and Grecians it was as usual as eating or sleeping; and so is it amongst the Turks at this day; whereas with us it remaineth but as a part of physick. I am of opinion, that the use of it, as it was with the Romans, was hurtful to health; for that it made the body soft, and easy to waste. For the Turks it is more proper, because that their drinking water and feeding upon rice, and other food of small nourishment, maketh their bodies so solid and hard, as you need not fear that bathing
should

should make them frothy. Besides, the Turks are great fitters, and seldom walk, whereby they sweat less, and need bathing more. But yet certain it is that bathing, and especially anointing, may be so used as it may be a great help to health, and prolongation of life. But hereof we shall speak in due place, when we come to handle experiments medicinal.

Experiment solitary touching cambleting of paper.

741. THE Turks have a pretty art of cambleting of paper, which is not with us in use. They take divers oiled colours, and put them severally, in drops, upon water, and stir the water lightly, and then wet their paper, being of some thickness, with it, and the paper will be waved and veined, like camblet or marble.

Experiment solitary touching cuttle-ink.

742. IT is somewhat strange, that the blood of all birds and beasts and fishes, should be of a red colour, and only the blood of the cuttle should be as black as ink. A man would think, that the cause should be the high concoction of that blood; for we see in ordinary puddings, that the boiling turneth the blood to be black; and the cuttle is accounted a delicate meat, and is much in request.

Experiment solitary touching increase of weight in earth.

743. IT is reported of credit, that if you take earth from land adjoining to the river of Nile, and preserve it that manner that it neither come to be wet nor wasted; and weigh it daily, it will not alter weight until the seventeenth of June, which is the day when the river beginneth to rise; and then it will grow more and more ponderous, till the river cometh to its height. Which if it be true, it cannot be caused but by the air, which then beginneth to condense; and so turneth within that small mold into a degree of moisture, which produceth weight. So it hath been observed, that tobacco cut, and weighed, and then dried by the fire, loseth weight; and after being laid in the open air, recovereth weight again. And it should seem, that as soon as ever the river beginneth to increase, the whole body of the air thereabouts suffereth a change: for, that which is more strange, it is credibly affirmed, that upon that very day when the river first riseth, great plagues in Cairo use suddenly to break up.

Experiments in consort touching sleep.

744. THOSE that are very cold, and especially in their feet, cannot get to sleep: the cause may be, for that in sleep is required a free respiration, which cold doth shut in and hinder; for we see, that in great colds one can scarce draw his breath. Another cause may be, for that cold calleth the spirits to succour; and therefore they cannot so well close, and go together in the head; which is ever requisite to sleep. And for the same cause, pain and noise hinder sleep; and darkness, contrariwise, furthereth sleep.

745. SOME noises, whereof we spake in the hundred and twelfth experiment, help sleep; as the blowing of the wind, the trickling of water, humming of bees, soft fingering, reading, *etc.* The cause is, for that they move in the spirits a gentle attention; and whatsoever moveth attention without too much labour, stilleth the natural and discursive motion of the spirits.

746. SLEEP nourisheth, or at least preserveth bodies, a long time, without other nourishment. Beasts that sleep in the winter, as it is noted of wild bears, during their sleep wax very fat, though they eat nothing. Bats have been found in ovens, and other hollow close places, matted one upon another; and therefore it is likely that they sleep in the winter time, and eat nothing. *Query*, whether bees do not sleep all winter, and spare their honey? Butterflies, and other flies, do not only sleep, but lie as dead all winter; and yet with a little heat of sun or fire, revive again. A dormouse, both winter and summer, will sleep some days together, and eat nothing.

Experiments in consort touching teeth and hard substances in the bodies of living creatures.

To restore teeth in age, were *magnale naturae*. It may be thought of. But howsoever, the nature of the teeth deserveth to be inquired of, as well as the other parts of living creatures bodies.

747. THERE be five parts in the bodies of living creatures, that are of hard substance; the skull, the teeth, the bones, the horns, and the nails. The greatest quantity of hard substance continued, is towards the head. For there is the skull of one intire bone; there are the teeth; there are the maxillary bones; there is the hard bone that is the instrument of hearing; and thence issue the horns: so that the building of living creatures bodies is like the building of a timber house, where the walls and other parts have columns and beams; but the roof is, in the better sort of houses, all tile, or lead, or stone. As for birds, they have three other hard substances proper to them; the bill, which is of like matter with the teeth; for no birds have teeth: the shell of the egg: and their quills: for as for their spur, it is but a nail. But no living creatures, that have shells very hard, as oysters, cockles, muscles, scallops, crabs, lobsters, craw-fish, shrimps, and especially the tortoise, have bones within them, but only little gristles.

748. BONES, after full growth, continue at a stay; and so doth the skull: horns, in some creatures, are cast and renewed: teeth stand at a stay, except their wearing: as for nails, they grow continually: and bills and beaks will overgrow, and sometimes be cast; as in eagles and parrots.

749. MOST of the hard substances fly to the extremes of the body: as skull, horns, teeth, nails, and beaks: only the bones are more inward, and clad with flesh. As for the entrails, they are all without bones; save that a bone is, sometimes, found in the heart of a stag; and it may be in some other creature.

750. THE skull hath brains, as a kind of marrow, within it. The back-bone hath one kind of marrow, which hath an affinity with the brain; and other bones of the body have another. The jaw-bones have no marrow severd, but a little pulp of marrow diffused. Teeth likewise are thought to have a kind of marrow diffused, which causeth the sense of pain; but it is rather sinew; for marrow hath no sense; no more than blood. Horn is alike throughout; and so is the nail.

751. NONE other of the hard substances have sense, but the teeth; and the teeth have sense, not only of pain but of cold.

But we will leave the inquiries of other hard substances to their several places; and now inquire only of the teeth.

752. THE teeth are, in men, of three kinds: sharp, as the fore-teeth; broad, as the back-teeth, which we call the molar-teeth, or grinders; and pointed teeth, or canine,

canine, which are between both. But there have been some men, that have had their teeth undivided, as of one whole bone, with some little mark in the place of the division; as Pyrrhus had. Some creatures have over-long or out-growing teeth, which we call fangs, or tusks; as boars, pikes, falcons, and dogs, though less. Some living creatures have teeth against teeth; as men and horses; and some have teeth, especially their master-teeth, indented one within another like fangs, as lions; and so again have dogs. Some fishes have divers rows of teeth in the roof of their mouths; as pikes, falcons, trouts, *etc.* And many more in salt-waters. Snakes, and other serpents have venomous teeth; which are sometimes mistaken for their sting.

753. No beast that hath horns hath upper teeth; and no beast that hath teeth above wanteth them below: but yet if they be of the same kind, it followeth not, that if the hard matter goeth not into upper teeth, it will go into horns; nor yet *e converso*; for does, that have no horns, have no upper teeth.

754. HORSES have, at three years old, a tooth put forth, which they call the colt's tooth; and at four years old there cometh the mark tooth, which hath a hole as big as you may lay a pea within it; and that weareth shorter and shorter every year; till that at eight years old the tooth is smooth, and the hole gone; and then they say, that the mark is out of the horse's mouth.

755. THE teeth of men breed first, when the child is about a year and half old: and then they cast them, and new come about seven years old. But divers have backward teeth come forth at twenty, yea some at thirty and forty. *Query*, of the manner of the coming of them forth. They tell a tale of the old countess of Desmond, who lived till she was seven-score years old, that she did dentite twice or thrice; casting her old teeth, and others coming in their place.

756. TEETH are much hurt by sweetmeats; and by painting with mercury; and by things over-hot; and by things over-cold; and by rheums. And the pain of the teeth is one of the sharpest of pains.

757. CONCERNING teeth, these things are to be considered. 1. The preserving of them. 2. The keeping of them white. 3. The drawing of them with least pain. 4. The staying and easing of the tooth-ach. 5. The binding in of artificial teeth, where teeth have been stricken out. 6. And last of all, that great one of restoring teeth in age. The instances that give any likelihood of restoring teeth in age, are the late coming of teeth in some; and the renewing of the beaks in birds, which are commaterial with teeth. *Query*, therefore more particularly how that cometh. And again, the renewing of horns. But yet that hath not been known to have been provoked by art; therefore let trial be made, whether horns may be procured to grow in beasts that are not horned, and how? And whether they may be procured to come larger than usual; as to make an ox, or a deer, have a greater head of horns? And whether the head of a deer, that by age is more spitted, may be brought again to be more branched? for these trials, and the like, will shew, whether by art such hard matter can be called and provoked. It may be tried also, whether birds may not have something done to them when they are young, whereby they may be made to have greater or longer bills; or greater and longer talons? And whether children may not have some wash, or something to make their teeth better and stronger? Coral is in use as an help to the teeth of children.

Experiments in consort touching the generation and bearing of living creatures in the womb.

758. SOME living creatures generate but at certain seasons of the year; as deer, sheep, wild conies, *etc.* and most sorts of birds and fishes: others at any time of the year, as men; and all domestic creatures, as horses, hogs, dogs, cats, *etc.* The cause of generation at all seasons seemeth to be fulness: for generation is from redundancy. This fulness ariseth from two causes; either from the nature of the creature, if it be hot, and moist, and sanguine; or from plenty of food. For the first, men, horses, dogs, *etc.* which breed at all seasons, are full of heat and moisture; doves are the fullest of heat and moisture amongst birds, and therefore breed often; the tame dove almost continually. But deer are a melancholy dry creature, as appeareth by their fearfulness, and the hardness of their flesh. Sheep are a cold creature, as appeareth by their mildness, and for that they seldom drink. Most sort of birds are of a dry substance in comparison of beasts. Fishes are cold. For the second cause, fulness of food; men, kine, swine, dogs, *etc.* feed full; and we see that those creatures, which being wild, generate seldom, being tame, generate often; which is from warmth, and fulness of food. We find, that the time of going to rut of deer is in September; for that they need the whole summer's feed and grass to make them fit for generation. And if rain come early about the middle of September, they go to rut somewhat the sooner; if drought, somewhat the later. So sheep, in respect of their small heat, generate about the same time, or somewhat before. But for the most part, creatures that generate at certain seasons, generate in the spring; as birds and fishes: for that the end of the winter, and the heat and comfort of the spring prepareth them. There is also another reason, why some creatures generate at certain seasons; and that is the relation of their time of bearing, to the time of generation; for no creature goeth to generate whilst the female is full; nor whilst she is busy in sitting, or rearing her young. And therefore it is found by experience, that if you take the eggs, or young ones, out of the nests of birds, they will fall to generate again three or four times one after another.

759. OF living creatures, some are longer time in the womb, and some shorter. Women go commonly nine months; the cow and the ewe about six months; does go about nine months; mares eleven months; bitches nine weeks; elephants are said to go two years; for the received tradition of ten years is fabulous. For birds there is double inquiry; the distance between the treading or coupling, and the laying of the egg; and again, between the egg laid, and the disclosing or hatching. And amongst birds, there is less diversity of time, than amongst other creatures; yet some there is; for the hen sitteth but three weeks; the turkey-hen, goose, and duck, a month: *Query*, of others. The cause of the great difference of times amongst living creatures, is, either from the nature of the kind; or from the constitution of the womb. For the former, those that are longer in coming to their maturity or growth, are longer in the womb; as is chiefly seen in men: and so elephants, which are long in the womb, are long time in coming to their full growth. But in most other kinds, the constitution of the womb, that is, the hardness or dryness thereof, is concurrent with the former cause. For the colt hath about four years of growth; and so the fawn; and so the calf. But whelps, which come to their growth, commonly, within three quarters of a year, are but nine weeks in the womb. As for birds, as there is less diversity in the time of their bringing forth;

so there is less diversity in the time of their growth ; most of them coming to their growth within a twelvemonth.

760. SOME creatures bring forth many young ones at a burden : as bitches, hares, conies, *etc.* Some ordinarily but one ; as women, lionesses, *etc.* This may be caused, either by the quantity of sperm required to the producing one of that kind ; which if less be required, may admit greater number ; if more, fewer : or by the partitions and cells of the womb, which may sever the sperm.

Experiments in consort touching species visible.

761. THERE is no doubt, but light by refraction will shew greater, as well as things coloured. For like as a shilling in the bottom of the water will shew greater ; so will a candle in a lanthorn, in the bottom of the water. I have heard of a practice, that glow-worms in glasses were put in the water to make the fish come. But I am not yet informed, whether when a diver diveth, having his eyes open, and swimmeth upon his back ; whether, I say, he seeth things in the air, greater or less. For it is manifest, that when the eye standeth in the finer medium, and the object is in the grosser, things shew greater ; but contrariwise, when the eye is placed in the grosser medium, and the object in the finer, how it worketh I know not.

762. IT would be well bolted out, whether great refractions may not be made upon reflexions, as well as upon direct beams. For example, we see, that take an empty bason, put an angel of gold, or what you will into it ; then go so far from the bason, till you cannot see the angel, because it is not in a right line ; then fill the bason with water, and you shall see it out of its place because of the reflexion. To proceed therefore, put a looking-glass into a bason of water ; I suppose you shall not see the image in a right line, or at equal angles, but aside. I know not whether this experiment may not be extended so, as you might see the image, and not the glass ; which for beauty and strangeness were a fine proof : for then you shall see the image like a spirit in the air. As for example, if there be a cistern or pool of water, you shall place over-against it a picture of the devil, or what you will, so as you do not see the water. Then put a looking-glass in the water : now if you can see the devil's picture aside, not seeing the water, it would look like a devil indeed. They have an old tale in Oxford, that frier Bacon walked between two steeples : which was thought to be done by glasses, when he walked upon the ground.

Experiments in consort touching impulsion and percussio.

763. A WEIGHTY body put into motion, is more easily impelled, than at first when it resteth. The cause is partly because motion doth discuss the torpor of solid bodies ; which, beside their motion of gravity, have in them a natural appetite not to move at all ; and partly, because a body that resteth, doth get, by the resistance of the body upon which it resteth, a stronger compression of parts than it hath of itself : and therefore needeth more force to be put in motion. For if a weighty body be pensile, and hang but by a thread, the percussio will make an impulsion very near as easily as if it were already in motion.

764. A BODY over great or over small, will not be thrown so far as a body of a middle size : so that, it seemeth, there must be a commensuration, or proportion between the body moved and the force, to make it move well. The cause is, because to the impulsion there is requisite the force of the body that moveth, and the re-

sistance of the body that is moved : and if the body be too great, it yieldeth too little : and if it be too small, it resisteth too little.

765. It is common experience, that no weight will prefs or cut so strong, being laid upon a body, as falling or stricken from above. It may be the air hath some part in furthering the percussio; but the chief cause I take to be, for that the parts of the body moved have by impulsio, or by the motion of gravity continued, a compression in them, as well downwards, as they have when they are thrown, or shot through the air, forwards. I conceive also, that the quick loss of that motion preventeth the resistance of the body below ; and priority of the force, always, is of great efficacy, as appeareth in infinite instances.

Experiment solitary touching titillation.

766. TICKLING is most in the soles of the feet, and under the arm-holes, and on the sides. The cause is the thinness of the skin in those parts, joined with the rareness of being touched there : for all tickling is a light motion of the spirits, which the thinness of the skin and suddenness and rareness of touch do further : for we see a feather, or a rush, drawn along the lip or cheek, doth tickle ; whereas a thing more obtuse, or a touch more hard, doth not. And for suddenness, we see no man can tickle himself : we see also that the palm of the hand, though it hath as thin a skin as the other parts mentioned, yet is not ticklish, because it is accustomed to be touched. Tickling also causeth laughter. The cause may be the emission of the spirits, and so of the breath, by a flight from titillation ; for upon tickling we see there is ever a starting or shrinking away of the part to avoid it ; and we see also, that if you tickle the nostrils with a feather, or straw, it procureth sneezing ; which is a sudden emission of the spirits that do likewise expel the moisture. And tickling is ever painful, and not well endured.

Experiment solitary touching the scarcity of rain in Ægypt.

767. It is strange, that the river of Nilus overflowing, as it doth, the country of Ægypt, there should be nevertheless little or no rain in that country. The cause must be either in the nature of the water, or in the nature of the air, or of both. In the water, it may be ascribed either unto the long race of the water ; for swift running waters vapour not so much as standing waters ; or else to the concoction of the water ; for waters well concocted vapour not so much as waters raw ; no more than waters upon the fire do vapour so much after some time of boiling as at the first. And it is true, that the water of Nilus is sweeter than other waters in taste ; and it is excellent good for the stone, and hypochondriacal melancholy, which sheweth it is lenifying ; and it runneth through a country of a hot climate, and flat, without shade, either of woods or hills, whereby the sun must needs have great power to concoct it. As for the air, from whence I conceive this want of showers cometh chiefly, the cause must be, for that the air is of itself thin and thirsty, and as soon as ever it getteth any moisture from the water, it imbibeth and dissipateth it in the whole body of the air, and suffereth it not to remain in vapour, whereby it might breed rain.

Experiment solitary touching clarification.

768. It hath been touched in the title of percolations, namely, such as are inwards, that the whites of eggs and milk do clarify ; and it is certain, that in Ægypt they

they prepare and clarify the water of Nile, by putting it into great jars of stone, and stirring it about with a few stamped almonds, wherewith they also betwixt the mouth of the vessel; and so draw it off, after it hath rested some time. It were good to try this clarifying with almonds in new beer, or mutte, to hasten and perfect the clarifying.

Experiment solitary touching plants without leaves.

769. THERE be scarce to be found any vegetables, that have branches and no leaves, except you allow coral for one. But there is also in the deserts of S. Maccaria in Ægypt, a plant which is long, leafless, brown of colour, and branched like coral, save that it closeth at the top. This being set in water within a house, spreadeth and displayeth strangely; and the people therabouts have a superstitious belief, that in the labour of women it helpeth to the easy deliverance.

Experiment solitary touching the materials of glass.

770. The crystalline Venice glass is reported to be a mixture in equal portions of stones brought from Pavia by the river Ticinum, and the ashes of a weed, called by the Arabs kal, which is gathered in a desert between Alexandria and Rosetta; and is by the Ægyptians used first for fuel; and then they crush the ashes into lumps like a stone, and so sell them to the Venetians for their glass-works.

Experiment solitary touching prohibition of putrefaction, and the long conservation of bodies.

771. It is strange, and well to be noted, how long carcases have continued uncorrupt, and in their former dimensions, as appeareth in the mummies of Ægypt; having lasted, as is conceived, some of them, three thousand years. It is true, they find means to draw forth the brains, and to take forth the entrails, which are the parts aptest to corrupt. But that is nothing to the wonder: for we see what a soft and corruptible substance the flesh of all the other parts of the body is. But it should seem, that, according to our observation and axiom in our hundredth experiment, putrefaction, which we conceive to be so natural a period of bodies, is but an accident; and that matter maketh not that haste to corruption that is conceived. And therefore bodies in shining amber, in quick-silver, in balms, whereof we now speak, in wax, in honey, in gums, and, it may be, in conservatories of snow, *etc.* are preserved very long. It need not go for repetition, if we resume again that which we said in the aforefaid experiment concerning annihilation; namely, that if you provide against three causes of putrefaction, bodies will not corrupt: the first is, that the air be excluded, for that undermineth the body, and conspireth with the spirit of the body to dissolve it. The second is, that the body adjacent and ambient be not commaterial, but merely heterogeneal towards the body that is to be preserved; for if nothing can be received by the one, nothing can issue from the other; such are quick-silver and white amber, to herbs, and flies, and such bodies. The third is, that the body to be preserved be not of that gross that it may corrupt within itself, although no part of it issue into the body adjacent: and therefore it must be rather thin and small, than of bulk. There is a fourth remedy also, which is, that if the body to be preserved be of bulk, as a corps is, then the body that incloseth it must have a virtue to draw forth, and dry the moisture of the inward body; for else the putrefaction will play within, though

nothing issue forth. I remember Livy doth relate, that there were found at a time two coffins of lead in a tomb ; whereof the one contained the body of king Numa, it being some four hundred years after his death : and the other, his books of sacred rites and ceremonies, and the discipline of the pontifs ; and that in the coffin that had the body, there was nothing at all to be seen, but a little light cinders about the sides ; but in the coffin that had the books, they were found as fresh as if they had been but newly written, being written on parchment, and covered over with watch-candles of wax three or four fold. By this it seemeth that the Romans in Numa's time were not so good embalmers as the Ægyptians were ; which was the cause that the body was utterly consumed. But I find in Plutarch, and others, that when Augustus Cæsar visited the sepulchre of Alexander the Great in Alexandria, he found the body to keep its dimension ; but withal, that notwithstanding all the embalming, which no doubt was of the best, the body was so tender, as Cæsar touching but the nose of it defaced it. Which maketh me find it very strange, that the Ægyptian mummies should be reported to be as hard as stone-pitch ; for I find no difference but one, which indeed may be very material ; namely, that the ancient Ægyptian mummies were shrowded in a number of folds of linen, besmeared with gums, in manner of sear-cloth, which it doth not appear was practised upon the body of Alexander.

Experiment solitary touching the abundance of nitre in certain sea-shores.

772. NEAR the castle of Caty, and by the wells of Assan, in the land of Idu-mæa, a great part of the way you would think the sea were near at hand, though it be a good distance off : and it is nothing but the shining of the nitre upon the sea sands, such abundance of nitre the shores there do put forth.

Experiment solitary touching bodies that are born up by water.

773. THE dead-sea, which vomiteth up bitumen, is of that crassitude, as living bodies bound hand and foot cast into it have been born up, and not sunk ; which sheweth, that all sinking into water is but an over-weight of the body put into the water in respect of the water ; so that you may make water so strong and heavy of quick-silver, perhaps, or the like, as may bear up iron ; of which I see no use, but imposture. We see also, that all metals, except gold, for the same reason, swim upon quicksilver.

Experiment solitary touching fuel that consumeth little or nothing.

774. It is reported, that at the foot of a hill near the *mare mortuum* there is a black stone, whereof pilgrims make fires, which burneth like a coal, and diminisheth not, but only waxeth brighter and whiter. That it should do so is not strange ; for we see iron red-hot burneth, and consumeth not ; but the strangeness is, that it should continue any time so : for iron, as soon as it is out of the fire, deadneth straightways. Certainly it were a thing of great use and profit, if you could find out fuel that would burn hot, and yet last long : neither am I altogether incredulous, but there may be such candles as they say are made of salamander's wool ; being a kind of mineral, which whiteneth also in the burning, and consumeth not. The question is this ; flame must be made of somewhat, and commonly it is made of some tangible body which hath weight : but it is not impossible perhaps that it should be made of spirit, or vapour, in a body, which spirit or vapour hath no weight,

weight, such as is the matter of *ignis fatuus*. But then you will say, that that vapour also can last but a short time: to that it may be answered, that by the help of oil, and wax, and other candle-stuff, the flame may continue, and the wick not burn.

Experiment solitary economical touching cheap fuel.

775. SEA-COAL lasts longer than charcoal; and charcoal of roots, being coaled into great pieces, lasts longer than ordinary charcoal. Turf and peat, and cow-sheards, are cheap fuels, and last long. Small-coal, or brier-coal, poured upon charcoal, make them last longer. Sedge is a cheap fuel to brew or bake with; the rather because it is good for nothing else. Trial should be made of some mixture of sea-coal with earth or chalk; for if that mixture be, as the sea-coal men use it, privily, to make the bulk of the coal greater, it is deceit; but if it be used purposely, and be made known, it is saving.

Experiment solitary touching the gathering of wind for freshnes.

776. IT is at this day in use in Gaza, to couch potsherds or vessels of earth in their walls, to gather the wind from the top, and to pass it down in spouts into rooms. It is a device for freshnes in great heats: and it is said, there are some rooms in Italy and Spain for freshnes, and gathering the winds and air in the heats of summer: but they be but pennings of the winds, and enlarging them again, and making them reverberate, and go round in circles, rather than this device of spouts in the wall.

Experiment solitary touching the trials of airs.

777. THERE should be used much diligence in the choice of some bodies and places, as it were, for the tasting of air; to discover the wholesomeness or unwholesomeness, as well of seasons, as of the seats of dwellings. It is certain, that there be some houses wherein confitures and pies will gather mould more than in others. And I am persuaded, that a piece of raw flesh or fish will sooner corrupt in some airs than in others. They be noble experiments that can make this discovery; for they serve for a natural divination of seasons, better than the astronomers can by their figures: and again, they teach men where to choose their dwelling for their better health.

Experiment solitary touching increasing of milk in milch beasts.

778. THERE is a kind of stone about Bethlehem, which they grind to powder, and put into water, whereof cattle drink, which maketh them give more milk. Surely there should be some better trials made of mixtures of water in ponds for cattle, to make them more milch, or to fatten them, or to keep them from murrain. It may be chalk and nitre are of the best.

Experiment solitary touching sand of the nature of glass.

779. IT is reported, that in the valley near the mountain Carmel in Judea there is a sand, which of all other hath most affinity with glass: insomuch as other minerals laid in it turn to a glassy substance without the fire; and again, glass put into it turneth into the mother sand. The thing is very strange, if it be true: and it is likeliest to be caused by some natural furnace or heat in the earth: and yet they do

not

not speak of any eruption of flames. It were good to try in glafs-works, whether the crude materials of glafs, mingled with glafs already made, and remolten, do not facilitate the making of glafs with lefs heat.

Experiment solitary touching the growth of coral.

780. IN the sea, upon the south-west of Sicily, much coral is found. It is a submarine plant. It hath no leaves: it brancheth only when it is under water; it is soft, and green of colour; but being brought into the air, it becometh hard and shining red, as we see. It is said also to have a white berry; but we find it not brought over with the coral. Belike it is cast away as nothing worth: inquire better of it, for the discovery of the nature of the plant.

Experiment solitary touching the gathering of manna.

781. The manna of Calabria is the best, and in most plenty. They gather it from the leaf of the mulberry-tree; but not of such mulberry-trees as grow in the valleys. And manna falleth upon the leaves by night, as other dews do. It should seem, that before those dews come upon trees in the valleys, they dissipate and cannot hold out. It should seem also, the mulberry-leaf itself hath some coagulating virtue, which inspissateth the dew, for that it is not found upon other trees: and we see by the silk-worm which feedeth upon that leaf, what a dainty smooth juice it hath; and the leaves also, especially of the black mulberry, are somewhat bristly, which may help to preserve the dew. Certainly it were not amiss to observe a little better the dews that fall upon trees, or herbs growing on mountains; for it may be many dews fall, that spend before they come to the valleys. And I suppose, that he that would gather the best May-dew for medicine, should gather it from the hills.

Experiment solitary touching the correcting of wine.

782. IT is said they have a manner to prepare their Greek wines, to keep them from fuming and inebriating, by adding some sulphur or alum: whereof the one is unctuous, and the other is astringent. And certain it is, that those two natures do best repress fumes. This experiment should be transferred unto other wine and strong beer, by putting in some like substances while they work; which may make them both to fume less, and to inflame less.

Experiment solitary touching the materials of wild-fire.

783. IT is conceived by some, not improbably, that the reason why wild-fires, whereof the principal ingredient is bitumen, do not quench with water, is, for that the first concretion of bitumen is a mixture of a fiery and watry substance; so is not sulphur. This appeareth, for that in the place near Puteoli, which they call the court of Vulcan, you shall hear under the earth a horrible thundring of fire and water conflicting together: and there break forth also spouts of boiling water. Now that place yieldeth great quantities of bitumen; whereas Ætna and Vesuvius, and the like, which consist upon sulphur, shoot forth smoke, and ashes, and pumice, but no water. It is reported also, that bitumen mingled with lime, and put under water, will make as it were an artificial rock; the substance becometh so hard.

Experiment

Experiment solitary touching plaister growing as hard as marble.

784. THERE is a cement, compounded of flour, whites of eggs, and stone powdered, that becometh hard as marble: wherewith Piscina Mirabilis, near Cuma, is said to have the walls plaistered. And it is certain and tried, that the powder of loadstone and flint, by the addition of whites of eggs and gum-dragon, made into palte, will in a few days harden to the hardness of a stone.

Experiment solitary touching judgment of the cure in some ulcers and hurts.

785. It hath been noted by the ancients, that in full or impure bodies, ulcers or hurts in the legs are hard to cure, and in the head more easy. The cause is, for that ulcers or hurts in the legs require desiccation, which by the defluxion of humours to the lower parts is hindered; whereas hurts and ulcers in the head require it not; but contrariwise dryness maketh them more apt to consolidate. And in modern observation, the like difference hath been found between Frenchmen and Englishmen; whereof the one's constitution is more dry, and the other's more moist. And therefore a hurt of the head is harder to cure in a Frenchman, and of the leg in an Englishman.

Experiment solitary touching the healthfulness or unhealthfulness of the southern wind.

786. It hath been noted by the ancients, that southern winds, blowing much, without rain, do cause a feverous disposition of the year; but with rain, not. The cause is, for that southern winds do of themselves qualify the air, to be apt to cause fevers; but when showers are joined, they do refrigerate in part, and check the sultry heat of the southern wind. Therefore this holdeth not in the sea-coasts, because the vapour of the sea, without showers, doth refresh.

Experiment solitary touching wounds.

787. It hath been noted by the ancients, that wounds which are made with brass heal more easily than wounds made with iron. The cause is, for that brass hath in itself a sanative virtue; and so in the very instant helpeth somewhat: but iron is corrosive, and not sanative. And therefore it were good, that the instruments which are used by chirurgeons about wounds, were rather of brass than iron.

Experiment solitary touching mortification by cold.

788. IN the cold countries, when mens noses and ears are mortified, and, as it were, gangrened with cold, if they come to a fire they rot off presently. The cause is, for that the few spirits that remain in those parts, are suddenly drawn forth, and so putrefaction is made complete. But snow put upon them helpeth; for that it preserveth those spirits that remain, till they can revive; and besides, snow hath in it a secret warmth: as the monk proved out of the text; *qui dat nivem sicut lanam, gelu sicut cineres spargit*. Whereby he did infer, that snow did warm like wool, and frost did fret like ashes. Warm water also doth good; because by little and little it openeth the pores, without any sudden working upon the spirits. This experiment may be transferred to the cure of gangrenes, either coming of themselves, or induced by too much applying of opiates: wherein you must beware of dry heat, and resort to things that are refrigerant, with an inward warmth and virtue of cherishing.

Experiment

Experiment solitary touching weight.

789. WEIGH iron and *aqua fortis* severally; then dissolve the iron in the *aqua fortis*, and weigh the dissolution; and you shall find it to bear as good weight as the bodies did severally; notwithstanding a good deal of waste by a thick vapour that issueth during the working: which sheweth that the opening of a body doth increase the weight. This was tried once or twice, but I know not whether there were any error in the trial.

Experiment solitary touching the super-natation of bodies.

790. TAKE of *aqua fortis* two ounces, of quicksilver two drams, for that charge the *aqua fortis* will bear, the dissolution will not bear a flint as big as a nutmeg: yet, no doubt, the increasing of the weight of water will increase its power of bearing; as we see brine, when it is salt enough, will bear an egg. And I remember well a physician, that used to give some mineral baths for the gout, *etc.* and the body when it was put into the bath, could not get down so easily as in ordinary water. But it seemeth the weight of the quicksilver more than the weight of a stone, doth not compensate the weight of a stone more than the weight of the *aqua fortis*.

Experiment solitary touching the flying of unequal bodies in the air.

791. LET there be a body of unequal weight, as of wood and lead, or bone and lead, if you throw it from you with the light end forward, it will turn, and the weightier end will recover to be forwards; unless the body be over-long. The cause is, for that the more dense body hath a more violent pressure of the parts from the first impulsion; which is the cause, though heretofore not found out, as hath been often said, of all violent motions: and when the hinder part moveth swifter, for that it less endureth pressure of parts, than the forward part can make way for it, it must needs be that the body turn over: for, turned, it can more easily draw forward the lighter part. Galilæus noteth it well, that if an open trough wherein water is, be driven faster than the water can follow, the water gathereth upon an heap towards the hinder end, where the motion began; which he supposeth, holding confidently the motion of the earth, to be the cause of the ebbing and flowing of the ocean; because the earth over-runneeth the water. Which theory, though it be false, yet the first experiment is true. As for the inequality of the pressure of parts, it appeareth manifestly in this; that if you take a body of stone, or iron, and another of wood, of the same magnitude and shape, and throw them with equal force, you cannot possibly throw the wood so far as the stone or iron.

Experiment solitary touching water, that it may be the medium of sounds.

792. IT is certain, as it hath been formerly in part touched, that water may be the medium of sounds. If you dash a stone against a stone in the bottom of the water, it maketh a sound. So a long pole struck upon gravel in the bottom of the water, maketh a sound. Nay, if you should think that the sound cometh up by the pole, and not by the water, you shall find that an anchor let down by a rope maketh a sound; and yet the rope is no solid body whereby the sound can ascend.

Experiment

Experiment solitary of the flight of the spirits upon odious objects.

793. ALL objects of the senses which are very offensive do cause the spirits to retire; and upon their flight, the parts are, in some degree, destitute; and so there is induced in them a trepidation and horror. For sounds, we see that the grating of a saw, or any very harsh noise, will set the teeth on edge, and make all the body shiver. For tastes, we see that in the taking of a potion or pills, the head and the neck shake. For odious smells, the like effect followeth, which is less perceived, because there is a remedy at hand by stopping of the nose; but in horses, that can use no such help, we see the smell of a carrion, especially of a dead horse, maketh them fly away, and take on almost as if they were mad. For feeling, if you come out of the sun suddenly into a shade, there followeth a chilness or shivering in all the body. And even in sight, which hath in effect no odious object, coming into sudden darkness, induceth an offer to shiver.

Experiment solitary touching the super-reflexion of echos.

794. THERE is in the city of Ticinum in Italy, a church that hath windows only from above: it is in length an hundred feet, in breadth twenty feet, and in height near fifty; having a door in the midst. It reporteth the voice twelve or thirteen times, if you stand by the close end-wall over-against the door. The echo fadeth, and dieth by little and little, as the echo at Pont-Charenton doth. And the voice soundeth, as if it came from above the door. And if you stand at the lower end, or on either side of the door, the echo holdeth; but if you stand in the door, or in the midst just over-against the door, not. Note, that all echos sound better against old walls than new; because they are more dry and hollow.

Experiment solitary touching the force of imagination, imitating that of the sense.

795. THOSE effects which are wrought by the percussion of the sense, and by things in fact, are produced likewise in some degree by the imagination. Therefore if a man see another eat sour or acid things, which set the teeth on edge, this object tainteth the imagination. So that he that seeth the thing done by another, hath his own teeth also set on edge. So if a man see another turn swiftly and long; or if he look upon wheels that turn, himself waxeth turn-sick. So if a man be upon an high place without rails or good hold, except he be used to it, he is ready to fall: for imagining a fall, it putteth his spirits into the very action of a fall. So many upon the seeing of others bleed, or strangled, or tortured, themselves are ready to faint, as if they bled, or were in strife.

Experiment solitary touching preservation of bodies.

796. TAKE a stock-gilly-flower, and tie it gently upon a stick, and put them both into a stoop-glass full of quicksilver, so that the flower be covered: then lay a little weight upon the top of the glass, that may keep the stick down; and look upon them after four or five days; and you shall find the flower fresh, and the stalk harder, and less flexible than it was. If you compare it with another flower gathered at the same time, it will be the more manifest. This sheweth that bodies do preserve excellently in quicksilver; and not preserve only, but by the coldness of the quicksilver indurate; for the freshness of the flower may be merely conservation; which is the more to be observed, because the quicksilver presseth the flower; but

the stiffness of the stalk cannot be without induration, from the cold, as it seemeth, of the quicksilver.

Experiment solitary touching the growth or multiplying of metals.

797. It is reported by some of the ancients, that in Cyprus there is a kind of iron, that being cut into little pieces, and put into the ground, if it be well watered, will increase into greater pieces. This is certain, and known of old, that lead will multiply and increase; as hath been seen in old statues of stone which have been put in cellars; the feet of them being bound with leaden bands; where, after a time, there appeared, that the lead did swell; inſomuch as it hanged upon the stone like warts.

Experiment solitary touching the drowning of the more base metal in the more precious.

798. I CALL drowning of metals, when that the baser metal is so incorporate with the more rich, as it can by no means be separated again; which is a kind of verſion, though false: as if silver should be inseparably incorporated with gold; or copper and lead with silver. The ancient electrum had in it a fifth of silver to the gold, and made a compound metal, as fit for most uses as gold, and more resplendent, and more qualified in some other properties; but then that was easily separated. This to do privily, or to make the compound pass for the rich metal simple, is an adulteration or counterfeiting: but if it be done avowedly, and without disguising, it may be a great saving of the richer metal. I remember to have heard of a man skilful in metals, that a fifteenth part of silver incorporated with gold will not be recovered by any water of separation, except you put a greater quantity of silver to draw to it the less; which, he said, is the last refuge in separations. But that is a tedious way, which no man, almost, will think on. This should be better inquired; and the quantity of the fifteenth turned to a twentieth; and likewise with some little additional, that may further the intrinsic incorporation. Note, that silver in gold will be detected, by weight, compared with the dimension; but lead in silver, lead being the weightier metal, will not be detected, if you take so much the more silver, as will countervail the over-weight of the lead.

Experiment solitary touching fixation of bodies.

799. GOLD is the only substance, which hath nothing in it volatile, and yet melteth without much difficulty. The melting sheweth that it is not jejune, or scarce in spirit. So that the fixing of it is not want of spirit to fly out, but the equal spreading of the tangible parts, and the close coacervation of them: whereby they have the less appetite, and no means at all to issue forth. It were good therefore to try, whether glass remolten do lose any weight? for the parts in glass are evenly spread; but they are not so close as in gold; as we see by the easy admission of light, heat, and cold; and by the smallness of the weight. There be other bodies fixed which have little or no spirit; so as there is nothing to fly out; as we see in the stuff whereof coppels are made, which they put into furnaces, upon which fire worketh not: so that there are three causes of fixation; the even spreading both of the spirits and tangible parts, the closeness of the tangible parts, and the jejuneness or extreme comminution of spirits: of which three, the two first may be joined with a nature liquefiable, the last not.

Experiment

Experiment ſolitary touching the reſiſts nature of things in themſelves, and their deſire to change.

800. It is a profound contemplation in nature, to conſider of the emptineſs, as we may call it, or intatſiſfaction of ſeveral bodies, and of their appetite to take in others. Air taketh in lights, and ſounds, and ſmells, and vapours; and it is moſt manifeſt, that it doth it with a kind of thirſt, as not ſatiſfied with its own former conſiſtence; for elſe it would never receive them in ſo ſuddenly and eaſily. Water, and all liquors, do haſtily receive dry and more terrettrial bodies, proportionable: and dry bodies, on the other ſide, drink in waters and liquors: ſo that, as it was well ſaid by one of the ancients, of earthy and watery ſubſtances, one is a glue to another. Parchment, ſkins, cloth, *etc.* drink in liquors, though themſelves be entire bodies, and not comminuted, as ſand and aſhes, nor apparently porous: metals themſelves do receive in readily ſtrong-waters; and ſtrong-waters likewise do readily pierce into metals and ſtones: and that ſtrong water will touch upon gold, that will not touch upon ſilver; and *è converſo*. And gold, which ſeemeth by the weight to be the cloſeſt and moſt ſolid body, doth greedily drink in quickſilver. And it ſeemeth, that this reception of other bodies is not violent: for it is many times reciprocal, and as it were with conſent. Of the cauſe of this, and to what axiom it may be referred, conſider attentively; for as for the pretty aſſertion, that matter is like a common ſtrumpet that deſireth all forms, it is but a wandring notion. Only flame doth not content itſelf to take in any other body, but either to overcome and turn another body into itſelf, as by victory; or itſelf to die, and go out.

NATURAL HISTORY.

CENTURY IX.

Experiments in consort touching perception in bodies insensible, tending to natural divination or subtile trials.

IT is certain, that all bodies whatsoever, though they have no sense, yet they have perception: for when one body is applied to another, there is a kind of election to embrace that which is agreeable, and to exclude or expel that which is ingrate: and whether the body be alterant or altered, evermore a perception precedeth operation; for else all bodies would be alike one to another. And sometimes this perception, in some kind of bodies, is far more subtile than the sense; so that the sense is but a dull thing in comparison of it: we see a weather-glass will find the least difference of the weather, in heat, or cold, when men find it not. And this perception also is sometimes at distance, as well as upon the touch; as when the load-stone draweth iron; or flame fireth naphtha of Babylon, a great distance off. It is therefore a subject of a very noble inquiry, to inquire of the more subtile perceptions; for it is another key to open nature, as well as the sense, and sometimes better. And besides, it is a principal means of natural divination; for that which in these perceptions appeareth early, in the great effects cometh long after. It is true also, that it serveth to discover that which is hid, as well as to foretel that which is to come, as it is in many subtile trials; as to try whether seeds be old or new, the sense cannot inform; but if you boil them in water, the new seeds will sprout sooner: and so of water, the taste will not discover the best water; but the speedy consuming of it, and many other means, which we have heretofore set down, will discover it. So in all physiognomy, the lineaments of the body will discover those natural inclinations of the mind which dissimulation will conceal, or discipline will suppress. We shall therefore now handle only those two perceptions, which pertain to natural divination and discovery; leaving the handling of perception in other things to be disposed elsewhere. Now it is true, that divination is attained by other means; as if you know the causes, if you know the concomitants, you may judge of the effect to follow: and the like may be said of discovery; but we tie ourselves here to that divination and discovery chiefly, which is caused by an early or subtile perception.

The aptness or propension of air, or water, to corrupt or putrify, no doubt, is to be found before it break forth into manifest effects of diseases, blastings, or the like. We will therefore set down some prognostics of pestilential and unwholesome years.

801. THE wind blowing much from the south without rain, and worms in the oak-apple, have been spoken of before. Also the plenty of frogs, grasshoppers, flies, and the like creatures bred of putrefaction, doth portend pestilential years.

802. GREAT

802. GREAT and early heats in the spring, and namely in May, without winds, portend the same; and generally so do years with little wind or thunder.

803. GREAT droughts in summer, lasting till towards the end of August, and some gentle showers upon them, and then some dry weather again, do portend a pestilent summer the year following: for about the end of August all the sweetness of the earth, which goeth into plants and trees, is exhaled, and much more if the August be dry, so that nothing then can breathe forth of the earth but a gross vapour, which is apt to corrupt the air: and that vapour, by the first showers, if they be gentle, is released, and cometh forth abundantly. Therefore they that come abroad soon after those showers, are commonly taken with sickness: and in Africa, no body will stir out of doors after the first showers. But if the showers come vehemently, then they rather wash and fill the earth, than give it leave to breathe forth presently. But if dry weather come again, then it fixeth and continueth the corruption of the air, upon the first showers begun; and maketh it of ill influence, even to the next summer; except a very frosty winter discharge it, which seldom succeedeth such droughts.

804. THE lesser infections, of the small-pox, purple fevers, agues, in the summer precedent, and hovering all winter, do portend a great pestilence in the summer following; for putrefaction doth not rise to its height at once.

805. IT were good to lay a piece of raw flesh or fish in the open air; and if it putrify quickly, it is a sign of a disposition in the air to putrefaction. And because you cannot be informed whether the putrefaction be quick or late, except you compare this experiment with the like experiment in another year, it were not amiss in the same year, and at the same time, to lay one piece of flesh or fish in the open air, and another of the same kind and bigness within doors: for I judge, that if a general disposition be in the air to putrify, the flesh, or fish, will sooner putrify abroad where the air hath more power, than in the house, where it hath less, being many ways corrected. And this experiment should be made about the end of March: for that season is likeliest to discover what the winter hath done, and what the summer following will do, upon the air. And because the air, no doubt, receiveth great tincture and infusion from the earth; it were good to try that exposing of flesh or fish, both upon a stake of wood some height above the earth, and upon the flat of the earth.

806. TAKE May-dew, and see whether it putrify quickly or no; for that likewise may disclose the quality of the air, and vapour of the earth, more or less corrupted.

807. A DRY March and a dry May portend a wholesome summer, if there be a showering April between: but otherwise it is a sign of a pestilential year.

808. As the discovery of the disposition of the air is good for the prognostics of wholesome and unwholesome years; so it is of much more use, for the choice of places to dwell in: at the least, for lodges, and retiring places for health: for mansion-houses respect provisions as well as health, wherein the experiments above-mentioned may serve.

809. BUT for the choice of places, or seats; it is good to make trial, not only of aptness of air to corrupt, but also of the moisture and dryness of the air, and the temper of it, in heat or cold; for that may concern health diversly. We see that there be some houses, wherein sweet-meats will relent, and baked meats will mould, more than in others; and waincoats will also sweat more; so that they will almost

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run with water; all which, no doubt, are caused chiefly by the moistness of the air in those seats. But because it is better to know it before a man buildeth his house than to find it after, take the experiments following.

810. LAY wool, or a sponge, or bread, in the place you would try, comparing it with some other places; and see whether it doth not moisten, and make the wool, or sponge, *etc.* more ponderous than the other: and if it do, you may judge of that place, as situate in a gross and moist air.

811. BECAUSE it is certain, that in some places, either by the nature of the earth, or by the situation of woods and hills, the air is more unequal than in others; and inequality of air is ever an enemy to health; it were good to take two weather-glasses, matches in all things, and to set them, for the same hours of one day, in several places, where no shade is, nor inclosures; and to mark when you set them how far the water cometh; and to compare them, when you come again, how the water standeth then; and if you find them unequal, you may be sure that the place where the water is lowest is in the warmer air, and the other in the colder. And the greater the inequality be, of the ascent or descent of the water, the greater is the inequality of the temper of the air.

812. THE predictions likewise of cold and long winters, and hot and dry summers, are good to be known; as well for the discovery of the causes, as for divers provisions. That of plenty of haws and hips, and brier-berries, hath been spoken of before. If wainscot, or stone, that have used to sweat, be more dry in the beginning of winter, or the drops of the eaves of houses come more slowly down than they use, it portendeth a hard and frosty winter. The cause is, for that it sheweth an inclination of the air to dry weather; which in winter is ever joined with frost.

813. GENERALLY a moist and cool summer portendeth a hard winter. The cause is, for that the vapours of the earth are not dissipated in the summer by the sun; and so they rebound upon the winter.

814. A HOT and dry summer, and autumn, and especially if the heat and drought extend far into September, portendeth an open beginning of winter; and colds to succeed toward the latter part of the winter, and the beginning of the spring: for till then the former heat and drought bear the sway, and the vapours are not sufficiently multiplied.

815. AN open and warm winter portendeth a hot and dry summer: for the vapours disperse into the winter showers; whereas cold and frost keepeth them in, and transporteth them into the late spring, and summer following.

816. BIRDS that use to change countries at certain seasons, if they come earlier, do shew the temperature of weather, according to that country whence they came: as the winter birds, namely, woodcocks, fieldfares, *etc.* if they come earlier, and out of the northern countries, with us shew cold winters. And if it be in the same country, then they shew a temperature of season, like unto that season in which they come: as swallows, bats, cuckooes, *etc.* that come towards summer, if they come early, shew a hot summer to follow.

817. THE prognostics, more immediate, of weather to follow soon after, are more certain than those of seasons. The resounding of the sea upon the shore; and the murmur of winds in the woods, without apparent wind, shew wind to follow; for such winds breathing chiefly out of the earth, are not at the first perceived, except they be pent by water or wood. And therefore a murmur out of caves likewise portendeth as much.

818. THE upper regions of the air perceive the collection of the matter of tempests and winds, before the air here below : and therefore the obscuring of the smaller stars, is a sign of tempest following. And of this kind you shall find a number of instances in our inquisition *De ventis*.

819. GREAT mountains have a perception of the disposition of the air to tempests, sooner than the valleys or plains below : and therefore they say in Wales, when certain hills have their night-caps on, they mean mischief. The cause is, for that tempests, which are for the most part bred above in the middle region, as they call it, are soonest perceived to collect in the places next it.

820. THE air, and fire, have subtle perceptions of wind rising, before men find it. We see the trembling of a candle will discover a wind that otherwise we do not feel : and the flexuous burning of flames doth shew the air becometh to be unquiet ; and so do coals of fire by casting off the ashes more than they use. The cause is, for that no wind at the first, till it hath struck and driven the air, is apparent to the sense : but flame is easier to move than air : and for the ashes, it is no marvel, though wind unperceived shake them off ; for we usually try which way the wind bloweth, by casting up grafs, or chaff, or such light things into the air.

821. WHEN wind expireth from under the sea, as it causeth some resounding of the water, whereof we spake before, so it causeth some light motions of bubbles, and white circles of froth. The cause is, for that the wind cannot be perceived by the sense, until there be an eruption of a great quantity from under the water ; and so it getteth into a body : whereas in the first putting up it cometh in little portions.

822. WE spake of the ashes that coals cast off ; and of grafs and chaff carried by the wind ; so any light thing that moveth when we find no wind, sheweth a wind at hand : as when feathers, or down of thistles, fly to and fro in the air.

FOR prognostics of weather from living creatures, it is to be noted, that creatures that live in the open air, *sub dio*, must needs have a quicker impression from the air, than men that live most within doors ; and especially birds who live in the air freest and clearest ; and are aptest by their voice to tell tales what they find ; and likewise by the motion of their flight to express the same.

823. WATER-fowls, as sea-gulls, moor-hens, *etc.* when they flock and fly together from the sea towards the shores ; and contrariwise, land-birds, as crows, swallows, *etc.* when they fly from the land to the waters, and beat the waters with their wings, do foreshew rain and wind. The cause is, pleasure that both kinds take in the moistness and density of the air ; and so desire to be in motion, and upon the wing, whithersoever they would otherwise go : for it is no marvel, that water-fowl do joy most in that air which is likest water ; and land-birds also, many of them, delight in bathing, and moist air. For the same reason also, many birds do prune their feathers ; and geese do gaggle ; and crows seem to call upon rain : all which is but the comfort they seem to receive in the relenting of the air.

824. THE heron, when she soareth high, so as sometimes she is seen to pass over a cloud, sheweth winds : but kites flying aloft, shew fair and dry weather. The cause may be, for that they both mount most into the air of that temper wherein they delight : and the heron being a water-fowl, taketh pleasure in the air that is condensed ; and besides, being but heavy of wing, needeth the help of the grosser air. But the kite affecteth not so much the grossness of the air, as the cold and firmness thereof ; for being a bird of prey, and therefore hot, she delighteth in the fresh air ; and, many times, flyeth against the wind ; as trouts and salmon swim against the stream.

stream. And yet it is true also, that all birds find an ease in the depth of the air; as swimmers do in a deep water. And therefore when they are aloft, they can uphold themselves with their wings spread, scarce moving them.

825. FISHES, when they play towards the top of the water, do commonly foretel rain. The cause is, for that a fish hating the dry, will not approach the air till it groweth moist; and when it is dry, will fly it, and swim lower.

826. BEASTS do take comfort generally in a moist air; and it maketh them eat their meat better: and therefore sheep will get up betimes in the morning to feed against rain; and cattle, and deer, and conies, will feed hard before rain; and a heifer will put up her nose, and snuff in the air against rain.

827. THE trefoil against rain swelleth in the stalk; and so standeth more upright; for by wet, stalks do erect, and leaves bow down. There is a small red flower in the stubble-fields, which country-people call the wincopie; which if it open in the morning, you may be sure of a fair day to follow.

828. EVEN in men, aches, and hurts, and corns, do engrieve either towards rain, or towards frost: for the one maketh the humours more to abound; and the other maketh them sharper. So we see both extremes bring the gout.

829. WORMS, vermin, *etc.* do foreshew likewise rain: for earth-worms will come forth, and moles will cast up more, and fleas bite more, against rain.

830. SOLID bodies likewise foreshew rain. As stones and wainscot when they sweat: and boxes and pegs of wood, when they draw and wind hard; though the former be but from an outward cause; for that the stone, or wainscot, turneth and beateth back the air against itself; but the latter is an inward swelling of the body of the wood itself.

Experiment solitary touching the nature of appetite in the stomach.

831. APPETITE is moved chiefly by things that are cold and dry; the cause is, for that cold is a kind of indigence of nature, and calleth upon supply; and so is dryness: and therefore all four things, as vinegar, juice of lemons, oil of vitriol, *etc.* provoke appetite. And the disease which they call *appetitus caninus*, consisteth in the matter of an acid and glassy phlegm in the mouth of the stomach. Appetite is also moved by four things; for that four things induce a contraction in the nerves placed in the mouth of the stomach; which is a great cause of appetite. As for the cause why onions, and salt, and pepper, in baked meats, move appetite, it is by vellication of those nerves; for motion whetteth. As for wormwood, olives, capers, and others of that kind, which participate of bitterness, they move appetite by absterfion. So as there be four principal causes of appetite; the refrigeration of the stomach joined with some dryness, contraction, vellication, and absterfion; besides hunger; which is an emptiness: and yet over-fasting doth, many times, cause the appetite to cease; for that want of meat maketh the stomach draw humours, and such humours as are light and choleric, which quench appetite most.

Experiment solitary touching sweetness of odour from the rainbow.

832. IT hath been observed by the ancients, that where a rainbow seemeth to hang over, or to touch, there breatheth forth a sweet smell. The cause is, for that this happeneth but in certain matters, which have in themselves some sweetness; which the gentle dew of the rainbow doth draw forth: and the like do soft showers; for they also make the ground sweet: but none are so delicate as the dew of the rainbow where
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it falleth. It may be also that the water itself hath some sweetness: for the rainbow consisteth of a glomeration of small drops, which cannot possibly fall but from the air that is very low; and therefore may hold the very sweetness of the herbs and flowers, as a distilled water: for rain, and other dew that fall from high, cannot preserve the smell, being dissipated in the drawing up: neither do we know, whether some water itself may not have some degree of sweetness. It is true, that we find it sensibly in no pool, river, nor fountain; but good earth newly turned up, hath a freshness and good scent; which water, if it be not too equal, for equal objects never move the sense, may also have. Certain it is, that bay-salt, which is but a kind of water congealed, will sometimes smell like violets.

Experiment solitary touching sweet smells.

833. To sweet smells heat is requisite to concoct the matter; and some moisture to spread the breath of them. For heat, we see that woods and spices are more odorate in the hot countries than in the cold: for moisture, we see that things too much dried lose their sweetness: and flowers growing, smell better in a morning or evening than at noon. Some sweet smells are destroyed by approach to the fire; as violets, wall-flowers, gilly-flowers, pinks; and generally all flowers that have cool and delicate spirits. Some continue both on the fire, and from the fire; as rose-water, *etc.* Some do scarce come forth, or at least not so pleasantly, as by means of the fire; as juniper, sweet gums, *etc.* and all smells that are enclosed in a fast body: but generally those smells are the most grateful, where the degree of heat is small; or where the strength of the smell is allayed; for these things do rather woo the sense, than satiate it. And therefore the smell of violets and roses exceedeth in sweetness that of spices and gums; and the strongest sort of smells are best in a west afar off.

Experiment solitary touching the corporeal substance of smells.

834. It is certain, that no smell issueth but with emission of some corporeal substance; not as it is in light, and colours, and in sounds. For we see plainly, that smell doth spread nothing that distance that the other do. It is true, that some woods of oranges, and heaths of rosemary, will smell a great way into the sea, perhaps twenty miles; but what is that, since a peal of ordnance will do as much, which moveth in a small compass? Whereas those woods and heaths are of vast spaces; besides, we see that smells do adhere to hard bodies; as in perfuming of gloves, *etc.* which sheweth them corporeal; and do last a great while, which sounds and light do not.

Experiment solitary touching fetid and fragrant odours.

835. THE excrements of most creatures smell ill; chiefly to the same creature that voideth them: for we see, besides that of man, that pigeons and horses thrive best, if their houses and stables be kept sweet; and so of cage-birds: and the cat burieth that which she voideth: and it holdeth chiefly in those beasts which feed upon flesh. Dogs almost only of beasts delight in fetid odours; which sheweth there is somewhat in their sense of smell differing from the smells of other beasts. But the cause why excrements smell ill, is manifest; for that the body itself rejecteth them; much more the spirits: and we see that those excrements that are of the first digestion, smell the worst; as the excrements from the belly: those that are from the second digestion less ill; as urine: and those that are from the third, yet less; for sweat is not so bad

as the other two; especially of some persons, that are full of heat. Likewise most putrefactions are of an odious smell: for they smell either fetid or mouldy. The cause may be, for that putrefaction doth bring forth such a consistence, as is most contrary to the consistence of the body whilst it is found: for it is a mere dissolution of that form. Besides, there is another reason, which is profound: and it is, that the objects that please any of the senses have all some equality, and as it were order in their composition; but where those are wanting, the object is ever ingrate. So mixture of many disagreeing colours is ever unpleasant to the eye: mixture of discordant sounds is unpleasant to the ear: mixture, or hotch-potch of many tastes, is unpleasant to the taste: harshness and ruggedness of bodies is unpleasant to the touch: now it is certain, that all putrefaction, being a dissolution of the first form, is a mere confusion and unformed mixture of the part. Nevertheless it is strange, and seemeth to cross the former observation, that some putrefactions and excrements do yield excellent odours, as civet and musk; and, as some think, ambergrease: for divers take it, though improbably, to come from the sperm of a fish: and the moss we spake of from apple-trees, is little better than an excretion. The reason may be, for that there passeth in the excrements, and remaineth in the putrefactions, some good spirits; especially where they proceed from creatures that are very hot. But it may be also joined with a further cause, which is more subtle; and it is, that the senses love not to be over-pleas'd, but to have a commixture of somewhat that is in itself ingrate. Certainly, we see how discords in musick, falling upon concords, make the sweetest strains: and we see again, what strange tastes delight the taste; as red herrings, caviary, parmesan, *etc.* And it may be the same holdeth in smells: for those kind of smells that we have mentioned, are all strong, and do pull and vellecate the sense. And we find also, that places where men urine, commonly have some smell of violets: and urine, if one hath eaten nutmeg, hath so too.

THE slothful, general, and indefinite contemplations, and notions of the elements and their conjugations; of the influences of heaven; of heat, cold, moisture, drought, qualities active, passive, and the like; have swallowed up the true passages, and processes, and affects, and consistences of matter and natural bodies. Therefore they are to be set aside, being but notional and ill-limited; and definite axioms are to be drawn out of measured instances: and so assent to be made to the more general axioms by scale. And of these kinds of processes of natures and characters of matter, we will now set down some instances.

Experiment solitary touching the causes of putrefaction.

836. ALL putrefactions come chiefly from the inward spirits of the body; and partly also from the ambient body, be it air, liquor, or whatsoever else. And this last, by two means: either by ingress of the substance of the ambient body into the body putrified; or by excitation and sollicitation of the body putrified, and the parts thereof, by the body ambient. As for the received opinion, that putrefaction is caused, either by cold, or peregrine and preternatural heat, it is but nugation: for cold in things inanimate, is the greatest enemy that is to putrefaction; though it extinguisheth vivification, which ever consisteth in spirits attenuate, which the cold doth congeal and coagulate. And as for the peregrine heat, it is thus far true, that if the proportion of the adventive heat be greatly predominant to the natural heat and spirits of the body, it tendeth to dissolution, or notable alteration. But this is wrought
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by emission, or suppression, or suffocation, of the native spirits; and also by the disordination and discomposure of the tangible parts, and other passages of nature, and not by a conflict of heats.

Experiment solitary touching bodies imperfectly mixed.

§ 37. IN versions, or main alterations of bodies, there is a medium between the body, as it is at first, and the body resulting; which medium is *corpus imperfecte medium*, and is transitory, and not durable; as mists, smokes, vapours, chylus in the stomach, living creatures in the first vivification: and the middle action, which produceth such imperfect bodies, is fitly called, by some of the ancients, iniquation or inconcoction, which is a kind of putrefaction: for the parts are in confusion, till they settle one way or other.

Experiment solitary touching concoction and crudity.

§ 38. THE word concoction, or digestion, is chiefly taken into use from living creatures and their organs; and from thence extended to liquors and fruits, *etc.* Therefore they speak of meat concocted; urine and excrements concocted; and the four digestions, in the stomach, in the liver, in the arteries and nerves, and in the several parts of the body, are likewise called concoctions: and they are all made to be the works of heat: all which notions are but ignorant catches of a few things, which are most obvious to mens observations. The constantest notion of concoction is, that it should signify the degrees of alteration of one body into another, from crudity to perfect concoction; which is the ultimity of that action or process: and while the body to be converted and altered is too strong for the efficient that should convert or alter it, whereby it resisteth and holdeth fast in some degree the first form or consistence, it is all that while crude and inconcoct; and the process is to be called crudity and inconcoction. It is true, that concoction is in great part the work of heat, but not the work of heat alone: for all things that further the conversion, or alteration, as rest, mixture of a body already concocted, *etc.* are also means to concoction. And there are of concoction two periods; the one assimilation; or absolute conversion and subaction; the other maturation; whereof the former is most conspicuous in the bodies of living creatures; in which there is an absolute conversion and assimilation of the nourishment into the body: and likewise in the bodies of plants: and again in metals, where there is a full transmutation. The other, which is maturation, is seen in liquors and fruits; wherein there is not desired, nor pretended, an utter conversion, but only an alteration to that form which is most sought for man's use; as in clarifying of drinks, ripening of fruits, *etc.* But note, that there be two kinds of absolute conversions; the one is, when a body is converted into another body, which was before; as when nourishment is turned into flesh; that is it which we call assimilation. The other is, when the conversion is into a body merely new, and which was not before; as if silver should be turned to gold, or iron to copper: and this conversion is better called, for distinction sake, transmutation.

Experiment solitary touching alterations, which may be called majors.

§ 39. THERE are also divers other great alterations of matter and bodies, besides those that tend to concoction and maturation; for whatsoever doth so alter a body, as it returneth not again to that it was, may be called *alteratio major*; as when meat is

boiled, or roasted, or fried, *etc.* or when bread and meat are baked; or when cheese is made of curds, or butter of cream, or coals of wood, or bricks of earth; and a number of others. But to apply notions philosophical to plebeian terms; or to say, where the notions cannot fitly be reconciled, that there wanteth a term or nomenclature for it, as the ancients used, they be but shifts of ignorance; for knowledge will be ever a wandering and indigested thing, if it be but a commixture of a few notions that are at hand and occur, and not excited from a sufficient number of instances, and those well collated.

THE consistences of bodies are very divers: dense; rare, tangible, pneumatical; volatile, fixed; determinate, not determinate; hard, soft; cleaving, not cleaving; congelable, not congelable; liquefiable, not liquefiable; fragile, tough; flexible, inflexible; tractile, or to be drawn forth in length, intractile; porous, solid; equal and smooth, unequal; venous, and fibrous, and with grains, entire; and divers others; all which to refer to heat, and cold, and moisture, and drought, is a compendious and inutile speculation. But of these see principally our *Abecedarium naturæ*; and otherwise *scarsim* in this our *Sylva Sylvarum*: nevertheless, in some good part, we shall handle divers of them now presently.

Experiment solitary touching bodies liquefiable, and not liquefiable.

840. LIQUEFIABLE, and not liquefiable, proceed from these causes: liquefaction is ever caused by the detention of the spirits, which play within the body and open it. Therefore such bodies as are more turgid of spirit; or that have their spirits more straitly imprisoned; or, again, that hold them better pleased and content, are liquefiable: for these three dispositions of bodies do arrest the emission of the spirits. An example of the first two properties is in metals; and of the last in greafe, pitch, sulphur, butter, wax, *etc.* The disposition not to liquefy proceedeth from the easy emission of the spirits, whereby the grosser parts contract; and therefore bodies jejune of spirits, or which part with their spirits more willingly, are not liquefiable; as wood, clay, free-stone, *etc.* But yet even many of those bodies that will not melt, or will hardly melt, will notwithstanding soften; as iron in the forge; and a stick bathed in hot ashes, which thereby becometh more flexible. Moreover there are some bodies which do liquefy or dissolve by fire; as metals, wax, *etc.* and other bodies which dissolve in water; as salt, sugar, *etc.* The cause of the former proceedeth from the dilatation of the spirits by heat: the cause of the latter proceedeth from the opening of the tangible parts, which desire to receive the liquor. Again, there are some bodies that dissolve with both; as gum, *etc.* And those be such bodies, as on the one side have good store of spirit; and on the other side, have the tangible parts indigent of moisture; for the former helpeth to the dilating of the spirits by fire; and the latter stimulateth the parts to receive the liquor.

Experiment solitary touching bodies fragile and tough.

841. OF bodies, some are fragile; and some are tough, and not fragile; and in the breaking, some fragile bodies break but where the force is; some shatter and fly in many places. Of fragility, the cause is an impotency to be extended: and therefore stone is more fragile than metal; and so fictile earth is more fragile than crude earth; and dry wood than green. And the cause of this unaptness to extension, is the small quantity of spirits, for it is the spirit that furthereth the extension or dilata-
tion

tion of bodies, and it is ever concomitant with porosity, and with dryness in the tangible parts: contrariwise, tough bodies have more spirit, and fewer pores, and moister tangible parts: therefore we see that parchment or leather will stretch, paper will not; woollen cloth will tenter, linen scarcely.

Experiment solitary touching the two kinds of pneumatics in bodies.

842. ALL solid bodies consist of parts of two several natures, pneumatical and tangible; and it is well to be noted, that the pneumatical substance is in some bodies the native spirit of the body, and in some other, plain air that is gotten in; as in bodies desiccate by heat or age: for in them, when the native spirit goeth forth, and the moisture with it, the air with time getteth into the pores. And those bodies are ever the more fragile; for the native spirit is more yielding and extensive, especially to follow the parts, than air. The native spirits also admit great diversity; as hot, cold, active, dull, *etc.* whence proceed most of the virtues and qualities, as we call them, of bodies: but the air intermixed is without virtues, and maketh things insipid, and without any extimulation.

Experiment solitary touching concretion and dissolution of bodies.

843. THE concretion of bodies is commonly solved by the contrary; as ice, which is congealed by cold, is dissolved by heat; salt and sugar, which are excocted by heat, are dissolved by cold and moisture. The cause is, for that these operations are rather returns to their former nature, than alterations; so that the contrary cureth. As for oil, it doth neither easily congeal with cold, nor thicken with heat. The cause of both effects, though they be produced by contrary efficient, seemeth to be the same; and that is, because the spirit of the oil by either means exhalet little, for the cold keepeth it in; and the heat, except it be vehement, doth not call it forth. As for cold, though it take hold of the tangible parts, yet as to the spirits, it doth rather make them swell than congeal them: as when ice is congealed in a cup, the ice will swell instead of contracting, and sometimes rift.

Experiment solitary touching hard and soft bodies.

844. OF bodies, some we see are hard, and some soft: the hardness is caused chiefly by the jejuneness of the spirits, and their imparity with the tangible parts: both which, if they be in a greater degree, make them not only hard, but fragile, and less enduring of pressure; as steel, stone, glass, dry wood, *etc.* Softness cometh contrariwise, by the greater quantity of spirits, which ever helpeth to induce yielding and cession, and by the more equal spreading of the tangible parts, which thereby are more sliding and following; as in gold, lead, wax, *etc.* But note, that soft bodies, as we use the word, are of two kinds; the one, that easily giveth place to another body, but altereth not bulk, by rising in other places: and therefore we see that wax, if you put any thing into it, doth not rise in bulk, but only giveth place: for you may not think, that in printing of wax, the wax riseth up at all; but only the depressed part giveth place, and the other remaineth as it was. The other that altereth bulk in the cession, as water, or other liquors, if you put a stone or any thing into them, they give place indeed easily, but then they rise all over; which is a false cession; for it is in place, and not in body.

Experiment

Experiment solitary touching bodies ductile and tensile.

845. ALL bodies ductile and tensile, as metals, that will be drawn into wires; wool and tow, that will be drawn into yarn or thread, have in them the appetite of not discontinuing strong, which maketh them follow the force that pulleth them out; and yet so, as not to discontinue or forsake their own body. Viscous bodies likewise, as pitch, wax, bird-lime, cheese toasted, will draw forth and rope. But the difference between bodies fibrous and bodies viscous is plain; for all wool, and tow, and cotton, and silk, especially raw-silk, have, besides their desire of continuance, in regard of the tenuity of their thread, a greediness of moisture; and by moisture to join and incorporate with other thread; especially if there be a little wreathing; as appeareth by the twisting of thread, and the practice of twirling about of spindles. And we see also, that gold and silver thread cannot be made without twisting.

Experiment solitary touching other passions of matter, and characters of bodies.

846. THE differences of impressible and not impressible, figurable and not figurable; mouldable and not mouldable; scissile and not scissile; and many other passions of matter, are plebeian notions, applied unto the instruments and uses which men ordinarily practise; but they are all but the effects of some of these causes following, which we will enumerate without applying them, because that will be too long. The first is the cession, or not cession of bodies, into a smaller space or room, keeping the outward bulk, and not flying up. The second is the stronger, or weaker appetite in bodies to continuity, and to fly discontinuity. The third is the disposition of bodies to contract or not contract: and again, to extend or not extend. The fourth is the small quantity, or great quantity of the pneumatical in bodies. The fifth is the nature of the pneumatical, whether it be native spirit of the body or common air. The sixth is the nature of the native spirits in the body, whether they be active and eager, or dull and gentle. The seventh is the emission or detention of the spirits in bodies. The eighth is the dilatation or contraction of the spirits in bodies, while they are detained. The ninth is the collocation of the spirits in bodies, whether the collocation be equal or unequal; and again, whether the spirits be co-acervate or diffused. The tenth is the density or rarity of the tangible parts. The eleventh is the equality or inequality of the tangible parts. The twelfth is the digestion, or crudity of the tangible parts. The thirteenth is the nature of the matter, whether sulphureous or mercurial, watery or oily, dry and terrestrial, or moist and liquid; which natures of sulphureous and mercurial, seem to be natures radical and principal. The fourteenth is the placing of the tangible parts in length or transverse, as it is in the warp and the woof of textiles, more inward or more outward, *etc.* The fifteenth is the porosity or imporosity betwixt the tangible parts, and the greatness or smallness of the pores. The sixteenth is the collocation and posture of the pores. There may be more causes; but these do occur for the present.

Experiment solitary touching induration by sympathy.

847. TAKE lead and melt it, and in the midst of it, when it beginneth to congeal, make a little dint or hole, and put quicksilver wrapped in a piece of linen into that hole, and the quicksilver will fix and run no more, and endure the hammer. This is a noble instance of induration, by consent of one body with another, and motion

tion of excitation to imitate; for to ascribe it only to the vapour of lead, is less probable. *Query*, whether the fixing may be in such a degree, as it will be figured like other metals? For if so, you may make works of it for some purposes, so they come not near the fire.

Experiment solitary touching honey and sugar.

848. SUGAR hath put down the use of honey, inasmuch as we have lost those observations and preparations of honey which the ancients had, when it was more in price. First, it seemeth that there was in old time tree-honey, as well as bee-honey, which was the tear or blood issuing from the tree: inasmuch as one of the ancients relateth, that in Trebisond there was honey issuing from the box-trees, which made men mad. Again, in ancient time there was a kind of honey, which either of its own nature, or by art, would grow as hard as sugar, and was not so luscious as ours. They had also a wine of honey, which they made thus. They crushed the honey into a great quantity of water, and then strained the liquor: after they boiled it in a copper to the half; then they poured it into earthen vessels for a small time; and after tunned it into vessels of wood, and kept it for many years. They have also at this day in Russia and those northern countries, mead simple, which, well made and seasoned, is a good wholesome drink, and very clear. They use also in Wales a compound drink of mead, with herbs and spices. But mean while it were good, in recompence of that we have lost in honey, there were brought in use a sugar-mead, for so we may call it, though without any mixture at all of honey; and to brew it, and keep it stale, as they use mead: for certainly, though it would not be so absterfise, and opening, and solutive a drink as mead; yet it will be more grateful to the stomach, and more lenitive and fit to be used in sharp diseases: for we see, that the use of sugar in beer and ale hath good effects in such cases.

Experiment solitary touching the finer sort of base metals.

849. IT is reported by the ancients, that there was a kind of steel in some places, which would polish almost as white and bright as silver. And that there was in India a kind of brass, which, being polished, could scarce be discerned from gold. This was in the natural use; but I am doubtful, whether men have sufficiently refined metals, which we count base; as whether iron, brass, and tin be refined to the height? But when they come to such a fineness, as serveth the ordinary use, they try no farther.

Experiment solitary touching cements and quarries.

850. THERE have been found certain cements under earth that are very soft; and yet, taken forth into the sun, harden as hard as marble: there are also ordinary quarries in Somersetshire, which in the quarry cut soft to any bigness, and in the building prove firm and hard.

Experiment solitary touching the altering of the colour of hairs and feathers.

851. LIVING creatures generally do change their hair with age, turning to be gray and white: as is seen in men, though some earlier, some later; in horses that are dappled, and turn white; in old squirrels that turn grisly; and many others. So do some birds; as cygnets from gray turn white; hawks from brown turn more white. And some birds there be that upon their moulting do turn colour; as robin-red-breasts, after their moulting, grow to be red again by degrees; so do goldfinches upon

upon the head. The cause is, for that moisture doth chiefly colour hair and feathers; and dryness turneth them gray and white; now hair in age waxeth dryer: so do feathers. As for feathers, after moulting, they are young feathers, and so all one as the feathers of young birds. So the beard is younger than the hair of the head, and doth, for the most part, wax hoary later. Out of this ground a man may devise the means of altering the colour of birds, and the retardation of hoary hairs. But of this see in the fifth experiment.

Experiment solitary touching the differences of living creatures, male and female.

852. THE difference between male and female, in some creatures, is not to be discerned, otherwise than in the parts of generation: as in horses and mares, dogs and bitches, doves he and she, and others. But some differ in magnitude, and that diversly; for in most the male is the greater; as in man, pheasants, peacocks, turkeys, and the like: and in some few, as in hawks, the female. Some differ in the hair and feathers, both in the quantity, crispation, and colours of them; as he-lions are hirsute, and have great manes: the she-lions are smooth like cats. Bulls are more crisp upon the forehead than cows; the peacock, and pheasant-cock, and goldfinch-cock, have glorious and fine colours; the hens have not. Generally the males in birds have the fairest feathers. Some differ in divers features; as bucks have horns, does none; rams have more wreathed horns than ewes; cocks have great combs and spurs, hens little or none; boars have great fangs, sows much less: the turkey-cock hath great and swelling gills, the hen hath less; men have generally deeper and stronger voices than women. Some differ in faculty; as the cocks amongst singing-birds are the best singers. The chief cause of all these, no doubt, is, for that the males have more strength of heat than the females; which appeareth manifestly in this, that all young creatures males are like females; and so are eunuchs, and gelt creatures of all kinds, liker females. Now heat causeth greatness of growth, generally, where there is moisture enough to work upon: but if there be found in any creature, which is seen rarely, an over-great heat in proportion to the moisture, in them the female is the greater: as in hawks and sparrows. And if the heat be balanced with the moisture, then there is no difference to be seen between male and female; as in the instances of horses and dogs. We see also, that the horns of oxen and cows, for the most part, are larger than the bulls; which is caused by abundance of moisture, which in the horns of the bull faileth. Again, heat causeth pilosity and crispation, and so likewise beards in men. It also expelleth finer moisture, which want of heat cannot expel; and that is the cause of the beauty and variety of feathers. Again, heat doth put forth many excrescences, and much solid matter, which want of heat cannot do: and this is the cause of horns, and of the greatness of them: and of the greatness of the combs and spurs of cocks, gills of turkey-cocks, and fangs of boars. Heat also dilateth the pipes and organs, which causeth the deepness of the voice. Again, heat refineth the spirits, and that causeth the cock singing-bird to excel the hen.

Experiment solitary touching the comparative magnitude of living creatures.

853. THERE be fishes greater than any beasts; as the whale is far greater than the elephant: and beasts are generally greater than birds. For fishes, the cause may be, that because they live not in the air, they have not their moisture drawn and sucked by the air and sun-beams. Also they rest always in a manner, and are supported by the
water;

water; whereas motion and labour do consume. As for the growths of beasts more than of birds, it is caused, for that beasts stay longer time in the womb than birds, and there nourish and grow; whereas in birds, after the egg laid, there is no further growth or nourishment from the female; for the setting doth vivify, and not nourish.

Experiment solitary touching excision of fruits.

854. WE have partly touched before the means of producing fruits without cores or stones. And this we add farther, that the cause must be abundance of moisture; for that the core and stone are made of a dry sap: and we see, that it is possible to make a tree put forth only in blossom, without fruit; as in cherries with double flowers; much more into fruit without stone or cores. It is reported, that a cion of an apple, grafted upon a colewort-stalk, sendeth forth a great apple without a core. It is not unlikely, that if the inward pith of a tree were taken out, so that the juice came only by the bark, it would work the effect. For it hath been observed, that in pollards, if the water get in on the top, and they become hollow, they put forth the more. We add also, that it is delivered for certain by some, that if the cion be grafted the small end downwards, it will make fruit have little or no cores and stones.

Experiment solitary touching the melioration of tobacco.

855. TOBACCO is a thing of great price, if it be in request: for an acre of it will be worth, as is affirmed, two hundred pounds by the year towards charge. The charge of making the ground and otherwise is great, but nothing to the profit; but the English tobacco hath small credit, as being too dull and earthy: nay, the Virginian tobacco, though that be in a hotter climate, can get no credit for the same cause: so that a trial to make tobacco more aromatical, and better concocted, here in England, were a thing of great profit. Some have gone about to do it by drenching the English tobacco in a decoction or infusion of Indian tobacco: but those are but sophistications and toys; for nothing that is once perfect, and hath run its race, can receive much amendment. You must ever resort to the beginnings of things for melioration. The way of maturation of tobacco must, as in other plants, be from the heat either of the earth or of the sun: we see some leading of this in muskmelons, which are sown upon a hot bed dinged below, upon a bank turned upon the south sun, to give heat by reflexion; laid upon tiles, which increaseth the heat, and covered with straw to keep them from cold. They remove them also, which addeth some life: and by these helps they become as good in England, as in Italy or Provence. These, and the like means, may be tried in tobacco. Inquire also of the steeping of the roots in some such liquor as may give them vigour to put forth strong.

Experiment solitary touching several heats working the same effects.

856. HEAT of the sun for the maturation of fruits; yea, and the heat of vivification of living creatures, are both represented and supplied by the heat of fire; and likewise the heats of the sun, and life, are represented one by the other. Trees set upon the backs of chimneys do ripen fruit sooner. Vines, that have been drawn in at the window of a kitchen, have sent forth grapes ripe a month at least before others. Stoves at the back of walls bring forth oranges here with us. Eggs, as is reported by some, have been hatched in the warmth of an oven. It is reported by

the ancients, that the ostrich layeth her eggs under sand, where the heat of the sun discloseth them.

Experiment solitary touching swelling and dilatation in boiling.

857. BARLEY in the boiling swelleth not much; wheat swelleth more; rice extremely; insomuch as a quarter of a pint unboiled, will arise to a pint boiled. The cause no doubt is, for that the more close and compact the body is, the more it will dilate: now barley is the most hollow; wheat more solid than that; and rice most solid of all. It may be also that some bodies have a kind of lentour, and more deperffible nature than others; as we see it evident in coloration; for a small quantity of saffron will tincture more than a very great quantity of brasil or wine.

Experiment solitary touching the dulcoration of fruits.

858. FRUIT groweth sweet by rolling, or pressing them gently with the hand; as rolling pears, damascenes, *etc.* by rottenness; as medlars, services, sloes, hips, *etc.* by time; as apples, wardens, pomgranates, *etc.* by certain special maturations; as by laying them in hay, straw, *etc.* and by fire; as in roasting, stewing, baking, *etc.* The cause of the sweetness by rolling and pressing, is emolliation, which they properly induce; as in beating of stock-fish, flesh, *etc.* by rottenness is, for that the spirits of the fruit by putrefaction gather heat, and thereby digest the harder part, for in all putrefactions there is a degree of heat: by time and keeping is, because the spirits of the body do ever feed upon the tangible parts, and attenuate them: by several maturations is, by some degree of heat: and by fire is, because it is the proper work of heat to refine and to incorporate; and all sourness consisteth in some grossness of the body; and all incorporation doth make the mixture of the body more equal in all the parts; which ever induceth a milder taste.

Experiment solitary touching flesh edible, and not edible.

859. OF fleshes, some are edible; some, except it be in famine, not. For those that are not edible, the cause is, for that they have commonly too much bitterness of taste; and therefore those creatures, which are fierce and choleric, are not edible; as lions, wolves, squirrels, dogs, foxes, horses, *etc.* As for kine, sheep, goats, deer, swine, conies, hares, *etc.* we see they are mild and fearful. Yet it is true, that horses, which are beasts of courage, have been, and are eaten by some nations; as, the Scythians were called Hippophagi; and the Chineses eat horse-flesh at this day; and some gluttons have used to have colts-flesh baked. In birds, such as are *carnivora*, and birds of prey, are commonly no good meat; but the reason is, rather the choleric nature of those birds, than their feeding upon flesh: for pewets, gulls, shovellers, ducks, do feed upon flesh, and yet are good meat. And we see, that those birds which are of prey, or feed upon flesh, are good meat when they are very young; as hawks, rooks out of the nest, owls, *etc.* Man's flesh is not eaten. The reasons are three: first, because men in humanity do abhor it: secondly, because no living creature that dieth of itself is good to eat: and therefore the cannibals themselves eat no man's flesh of those that die of themselves, but of such as are slain. The third is, because there must be generally some disparity between the nourishment and the body nourished; and they must not be over-near, or like: yet we see, that in great weaknesses and consumptions men have been sustained with woman's milk: and Ficinus fondly, as I conceive, adviseth, for the prolongation of life, that a vein
be

be opened in the arm of some wholesome young man, and the blood to be suck'd. It is said, that witches do greedily eat man's flesh; which if it be true, besides a devilish appetite in them, it is likely to proceed, for that man's flesh may send up high and pleasing vapours, which may stir the imagination; and witches rancidity is chiefly in imagination, as hath been said.

Experiments solitary touching the salamander.

860. There is an ancient received tradition of the salamander, that it liveth in the fire, and hath force also to extinguish it. It must have two things, if it be true, to this operation: the one a very close skin, whereby flame, which in the midst is not so hot, cannot enter; for we see that if the palm of the hand be anointed thick with white of egg, and then *aquavita* be poured upon it, and inflamed, yet one may endure the flame a pretty while.* The other is some extreme cold, and quenching virtue in the body of that creature, which choketh the fire. We see that milk quencheth wild-fire better than water, because it entreteth better.

Experiment solitary touching the contrary operations of time, upon fruits and liquors.

861. TIME doth change fruit, as apples, pears, pomegranates, *etc.* from more sour to more sweet: but contrariwise liquors, even those that are of the juice of fruit, from more sweet to more sour; as wort, must, new verjuice, *etc.* The cause is, the congregation of the spirits together: for in both kinds the spirit is attenuated by time; but in the first kind it is more diffused, and more mastered by the grosser parts, which the spirits do but dig it: but in drinks the spirits do reign, and finding less opposition of the parts, become themselves more strong; which causeth also more strength in the liquor; such as if the spirits be of the hotter sort, the liquor becometh apt to burn: but in time, it causeth likewise, when the higher spirits are evaporated, more sourness.

Experiment solitary touching blows and bruises.

862. IT hath been observed by the ancients, that plates of metal, and especially of brass, applied presently to a blow, will keep it down from swelling. The cause is repercussion, without humectation or entrance of any body: for the plate hath only a virtual cold, which doth not search into the hurt; whereas all plaisters and ointments do enter. Surely, the cause that blows and bruises induce swellings, is; for that the spirits resorting to succour the part that laboureth, draw also the humours with them: for we see, that it is not the repulse and the return of the humour in the part stricken that causeth it; for that gouts and tooth-aches cause swelling, where there is no percussion at all.

Experiment solitary touching the orrice root.

863. THE nature of the orrice root is almost singular; for there be few odoriferous roots: and in those that are in any degree sweet, it is but the same sweetness with the wood or leaf: but the orrice is not sweet in the leaf; neither is the flower any thing so sweet as the root. The root seemeth to have a tender dainty heat; which when it cometh above ground to the sun and the air, vanisheth: for it is a great molliër; and hath a smell like a violet.

Experiment solitary touching the compression of liquors.

864. IT hath been observed by the ancients, that a great vessel full, drawn into bottles; and then the liquor put again into the vessel; will not fill the vessel again so full as it was, but that it may take in more liquor: and that this holdeth more in wine than in water. The cause may be trivial; namely, by the expence of the liquor, in regard some may stick to the sides of the bottles: but there may be a cause more subtile: which is, that the liquor in the vessel is not so much compressed as in the bottle; because in the vessel the liquor meeteth with liquor chiefly; but in the bottles a small quantity of liquor meeteth with the sides of the bottles, which compress it so that it doth not open again.

Experiment solitary touching the working of water upon air contiguous.

865. WATER, being contiguous with air, cooleth it, but moisteneth it not, except it vapour. The cause is, for that heat and cold have a virtual transiion, without communication of substance; but moisture not: and to all madefaction there is required an imbibition: but where the bodies are of such several levity and gravity as they mingle not, there can follow no imbibition. And therefore, oil likewise lieth at the top of the water without commixture: and a drop of water running swiftly over a straw or smooth body, wetteth not.

Experiment solitary touching the nature of air.

866. STAR-light nights, yea and bright moon-shine nights, are colder than cloudy nights. The cause is, the dryness and fineness of the air, which thereby becometh more piercing and sharp; and therefore great continents are colder than islands: and as for the moon, though itself inclineth the air to moisture, yet when it shineth bright, it argueth the air is dry. Also close air is warmer than open air; which, it may be, is, for that the true cause of cold is an expiration from the globe of the earth, which in open places is stronger; and again, air itself, if it be not altered by that expiration, is not without some secret degree of heat; as it is not likewise without some secret degree of light: for otherwise cats and owls could not see in the night; but that air hath a little light, proportionable to the visual spirits of those creatures.

Experiments in consort touching the eyes and sight.

867. THE eyes do move one and the same way; for when one eye moveth to the nostril, the other moveth from the nostril. The cause is motion of consent, which in the spirits and parts spiritual is strong. But yet use will induce the contrary; for some can squint when they will: and the common tradition is, that if children be set upon a table with a candle behind them, both eyes will move outwards, as affecting to see the light, and so induce squinting.

868. WE see more exquisitely with one eye shut, than with both open. The cause is, for that the spirits visual unite themselves more, and so become stronger. For you may see, by looking in a glass, that when you shut one eye, the pupil of the other eye that is open dilateth.

869. THE eyes, if the sight meet not in one angle, see things double. The cause is, for that seeing two things, and seeing one thing twice, worketh the same effect: and therefore a little pellet held between two fingers laid across, seemeth double.

870. PORE-BLIND men see best in the dimmer lights; and likewise have their sight stronger near hand, than those that are not pore-blind; and can read and write smaller letters. The cause is, for that the spirits visual in those that are pore blind, are thinner and rarer than in others; and therefore the greater light disperseth them. For the same cause they need contracting; but being contracted, are more strong than the visual spirits of ordinary eyes are; as when we see through a level, the light is the stronger; and so is it when you gather the eye-lids somewhat close: and it is commonly seen in those that are pore-blind, that they do much gather the eye-lids together. But old men, when they would see to read, put the paper somewhat afar off: the cause is, for that old mens spirits visual, contrary to those of pore-blind men, unite not, but when the object is at some good distance from their eyes.

871. MEN see better, when their eyes are over-against the sun or a candle; if they put their hand a little before their eye. The reason is, for that the glaring of the sun or the candle doth weaken the eye; whereas the light circumfused is enough for the perception. For we see, that an over-light maketh the eyes dazzle; insomuch as perpetual looking against the sun would cause blindness. Again, if men come out of a great light into a dark room; and contrariwise, if they come out of a dark room into a light room, they seem to have a mist before their eyes, and see worse than they shall do after they have stayed a little while, either in the light or in the dark. The cause is, for that the spirits visual are, upon a sudden change, disturbed and put out of order; and till they be recollected, do not perform their function well. For when they are much dilated by light, they cannot contract suddenly; and when they are much contracted by darkness, they cannot dilate suddenly. And excess of both these, that is, of the dilatation and contraction of the spirits visual, if it be long, destroyeth the eye. For as long looking against the sun or fire hurteth the eye by dilatation; so curious painting in small volumes, and reading of small letters, do hurt the eye by contraction.

872. It hath been observed, that in anger the eyes wax red; and in blushing, not the eyes, but the ears, and the parts behind them. The cause is, for that in anger the spirits ascend and wax eager; which is most easily seen in the eyes, because they are translucent; though withal it maketh both the cheeks and the gills red; but in blushing, it is true the spirits ascend likewise to succour both the eyes and the face, which are the parts that labour; but then they are repulsed by the eyes, for that the eyes, in shame, do put back the spirits that ascend to them, as unwilling to look abroad: for no man in that passion doth look strongly, but dejectedly; and that repulsion from the eyes diverteth the spirits and heat more to the ears, and the parts by them.

873. THE objects of the sight may cause a great pleasure and delight in the spirits, but no pain or great offence; except it be by memory, as hath been said. The glimpses and beams of diamonds that strike the eye; Indian feathers, that have glorious colours; the coming into a fair garden; the coming into a fair room richly furnished; a beautiful person; and the like; do delight and exhilarate the spirits much. The reason why it holdeth not in the offence is, for that the sight is the most spiritual of the senses; whereby it hath no object gross enough to offend it. But the cause chiefly is, for that there be no active objects to offend the eye. For harmonical sounds, and discordant sounds, are both active and positive: so are sweet smells and stinks: so are bitter and sweet in tastes: so are over-hot and over-cold in touch; but blackness and darkness are indeed but privatives; and therefore have little or no activity. Somewhat they do contristate, but very little.

Experiment

Experiment solitary touching the colour of the sea, or other water.

874. WATER of the sea, or otherwise, looketh blacker when it is moved, and whiter when it resteth. The cause is, for that by means of the motion, the beams of light pass not straight, and therefore must be darkened; whereas, when it resteth, the beams do pass straight. Besides, splendor hath a degree of whiteness; especially if there be a little repercussion: for a looking-glass with the steel behind, looketh whiter than glass simple. This experiment deserveth to be driven farther, in trying by what means motion may hinder sight.

Experiment solitary touching shell-fish.

875. SHELL-FISH have been, by some of the ancients, compared and sorted with the *insecta*; but I see no reason why they should; for they have male and female as other fish have: neither are they bred of putrefaction; especially such as do move. Nevertheless it is certain, that oysters, and cockles, and mussels, which move not, have no discriminate sex. *Query*, in what time, and how they are bred? It seemeth that shells of oysters are bred where none were before; and it is tried, that the great horse-mussel, with the fine shell that breedeth in ponds, hath bred within thirty years: but then, which is strange, it hath been tried, that they do not only gape and shut as the oysters do, but remove from one place to another.

Experiment solitary touching the right side and the left.

876. THE senses are alike strong, both on the right side and on the left; but the limbs on the right side are stronger. The cause may be, for that the brain, which is the instrument of sense, is alike on both sides; but motion, and abilities of moving, are somewhat holpen from the liver, which lieth on the right side. It may be also, for that the senses are put in exercise indifferently on both sides from the time of our birth; but the limbs are used most on the right side, whereby custom helpeth; for we see, that some are left-handed; which are such as have used the left hand most.

Experiment solitary touching frictions.

877. FRICTIONS make the parts more fleshy and full; as we see both in men, and in currying of horses, *etc.* The cause is, for that they draw greater quantity of spirits and blood to the parts: and again, because they draw the aliment more forcibly from within: and again, because they relax the pores, and so make better passage for the spirits, blood, and aliment: lastly, because they dissipate and digest any inuite or excrementitious moisture which lieth in the flesh; all which help assimilation. Frictions also do more fill and impinguate the body, than exercise. The cause is, for that in frictions the inward parts are at rest; which in exercise are beaten, many times, too much: and for the same reason, as we have noted heretofore, galley-slaves are fat and fleshy, because they stir the limbs more, and the inward parts less.

Experiment solitary touching globes appearing flat at distance.

878. ALL globes afar off appear flat. The cause is, for that distance, being a secondary object of sight, is not otherwise discerned, than by more or less light; which disparity, when it cannot be discerned, all seemeth one: as it is, generally, in objects not distinctly discerned; for so letters, if they be so far off as they cannot be

be discerned, shew but as a dusky paper: and all engravings and embossings, at a distance, appear plain.

Experiment solitary touching shadows.

879. THE uttermost parts of shadows seem ever to tremble. The cause is, for that the little motes which we see in the sun do ever stir, though there be no wind; and therefore those moving, in the meeting of the light and the shadow, from the light to the shadow, and from the shadow to the light, do shew the shadow to move, because the medium moveth.

Experiment solitary touching the rolling and breaking of the seas.

880. SHALLOW and narrow seas break more than deep and large. The cause is, for that the impulsion being the same in both, where there is greater quantity of water, and likewise space enough, there the water rolleth and moveth, both more slowly, and with a slower rise and fall: but where there is less water, and less space, and the water dasheth more against the bottom, there it moveth more swiftly, and more in precipice; for in the breaking of the waves there is ever a precipice.

Experiment solitary touching the dulcoration of salt water.

881. IT hath been observed by the ancients, that salt water boiled, or boiled and cooled again, is more potable, than of itself raw: and yet the taste of salt in distillations by fire riseth not, for the distilled water will be fresh. The cause may be, for that the salt part of the water doth partly rise into a kind of scum on the top, and partly goeth into a sediment in the bottom; and so is rather a separation than an evaporation. But it is too gross to rise into a vapour; and so is a bitter taste likewise; for simple distilled waters, of wormwood, and the like, are not bitter.

Experiment solitary touching the return of saltness in pits upon the sea-shore.

882. IT hath been set down before, that pits upon the sea-shore turn into fresh water, by percolation of the salt through the sand: but it is farther noted, by some of the ancients, that in some places of Africa, after a time, the water in such pits will become brackish again. The cause is, for that after a time, the very sands through which the salt water passeth, become salt; and so the strainer itself is tinctured with salt. The remedy therefore is, to dig still new pits, when the old wax brackish; as if you would change your strainer.

Experiment solitary touching attraction by similitude of substance.

883. IT hath been observed by the ancients, that salt water will dissolve salt put into it, in less time than fresh water will dissolve it. The cause may be, for that the salt in the precedent water doth, by similitude of substance, draw the salt new put in unto it; whereby it diffuseth in the liquor more speedily. This is a noble experiment, if it be true, for it sheweth means of more quick and easy infusions; and it is likewise a good instance of attraction by similitude of substance. Try it with sugar put into water formerly sugared, and into other water unsugared.

Experiment solitary touching attraction.

884. PUT sugar into wine, part of it above, part under the wine, and you shall find, that which may seem strange, that the sugar above the wine will soften and dissolve

dissolve sooner than that within the wine. The cause is, for that the wine entereth that part of the sugar which is under the wine, by simple infusion or spreading; but that part above the wine is likewise forced by sucking; for all spongy bodies expel the air and draw in liquor, if it be contiguous: as we see it also in sponges put part above the water. It is worthy the inquiry, to see how you may make more accurate infusions, by help of attraction.

Experiments solitary touching heat under earth.

885. WATER in wells is warmer in winter than in summer; and so air in caves. The cause is, for that in the hither parts, under the earth, there is a degree of some heat, as appeareth in sulphureous veins, *etc.* which shut close in, as in winter, is the more; but if it perspire, as it doth in summer, it is the less.

Experiment solitary touching flying in the air.

886. IT is reported, that amongst the Leucadians, in ancient time, upon a superstition they did use to precipitate a man from a high cliff into the sea; tying about him with strings, at some distance, many great fowls; and fixing unto his body divers feathers, spread to break the fall. Certainly many birds of good wing, as kites, and the like, would bear up a good weight as they fly; and spreading of feathers thin and close, and in great breadth, will likewise bear up a great weight, being even laid, without tilting upon the sides. The farther extension of this experiment for flying may be thought upon.

Experiment solitary touching the dye of scarlet.

887. THERE is in some places, namely in Cephalonia, a little shrub which they call holly-oak, or dwarf-oak: upon the leaves whereof there riseth a tumor like a blister; which they gather, and rub out of it a certain red dust, that converteth, after a while, into worms, which they kill with wine, as is reported, when they begin to quicken: with this dust they dye scarlet.

Experiments solitary touching masculiating.

888. IN Zant it is very ordinary to make men impotent to accompany with their wives. The like is practised in Gascony; where it is called *nouër l'eguilette*. It is practised always upon the wedding-day. And in Zant the mothers themselves do it, by way of prevention; because thereby they hinder other charms, and can undo their own. It is a thing the civil law taketh knowledge of; and therefore is of no light regard.

Experiment solitary touching the rise of water by means of flame.

889. IT is a common experiment, but the cause is mistaken. Take a pot, or better a glass, because therein you may see the motion, and set a candle lighted in the bottom of a basin of water, and turn the mouth of the pot or glass over the candle, and it will make the water rise. They ascribe it to the drawing of heat; which is not true: for it appeareth plainly to be but a motion of *nexe*, which they call *ne detur vacuum*; and it proceedeth thus. The flame of the candle, as soon as it is covered, being suffocated by the close air, lesseneth by little and little; during which time there is some little ascent of water, but not much: for the flame occupying less and less room, as it lesseneth, the water succeedeth. But upon the instant

of the candle's going out, there is a sudden rise of a great deal of water; for that the body of the flame filleth no more place, and so the air and the water succeed. It worketh the same effect, if instead of water you put flour or sand into the basin: which sheweth, that it is not the flame's drawing the liquor as nourishment, as it is supposed; for all bodies are alike unto it, as it is ever in motion of *nexe*; inasmuch as I have seen the glass, being held by the hand, hath lifted up the basin and all; the motion of *nexe* did so clasp the bottom of the basin. That experiment, when the basin was lifted up, was made with oil, and not with water: nevertheless this is true, that at the very first setting of the mouth of the glass upon the bottom of the basin, it draweth up the water a little, and then standeth at a stay, almost till the candle's going out, as was said. This may shew some attraction at first: but of this we will speak more, when we handle attractions by heat.

Experiment in concert touching the influences of the moon.

OF the power of the celestial bodies, and what more secret influences they have, besides the two manifest influences of heat and light, we shall speak when we handle experiments touching the celestial bodies: mean while we will give some directions for more certain trials of the virtue and influences of the moon, which is our nearest neighbour.

The influences of the moon, most observed, are four; the drawing forth of heat; the inducing of putrefaction; the increase of moisture; the exciting of the motions of spirits.

890. FOR the drawing forth of heat, we have formerly prescribed to take water warm, and to set part of it against the moon-beams, and part of it with a screen between; and to see whether that which standeth exposed to the beams will not cool sooner. But because this is but a small interposition, though in the sun we see a small shade doth much, it were good to try it when the moon shineth, and when the moon shineth not at all; and with water warm in a glass-bottle, as well as in a dish; and with cinders; and with iron red-hot, *etc.*

891. FOR the inducing of putrefaction, it were good to try it with flesh or fish exposed to the moon-beams; and again exposed to the air when the moon shineth not, for the like time; to see whether will corrupt sooner: and try it also with capon, or some other fowl, laid abroad, to see whether it will mortify and become tender sooner; try it also with dead flies, or dead worms, having a little water cast upon them to see whether will putrify sooner. Try it also with an apple or orange, having holes made in their tops, to see whether will rot or mould sooner. Try it also with Holland cheese, having wine put into it, whether will breed mites sooner or greater.

892. FOR the increase of moisture, the opinion received is; that seeds will grow soonest; and hair, and nails, and hedges, and herbs cut, *etc.* will grow soonest, if they be set or cut in the increase of the moon. Also that brains in rabbits, woodcocks, calves, *etc.* are fullest in the full of the moon: and so of marrow in the bones: and so of oysters and cockles, which of all the rest are the easiest tried if you have them in pits.

893. THAT some sorts of roots, as onions, *yc.* and set them at their immediately after the change; and others of the same kind immediately after the full: let them be as thick as can be; the earth also the same as near as may be; and therefore bed in pots. Let the pots also stand where no rain or sun may come to them.

But the difference of the weather confound the experiment: and then see in what time the fish set in the increase of the moon come to a certain length; and how they differ from those that are set in the decrease of the moon.

894. IT is like, that the brain of man waxeth moister and fuller upon the full of the moon: and therefore it were good for those that have moist brains, and are great drinkers, to take some of *Ignum alchis*, rosemary, frankincense, *etc.* about the full of the moon. It is like also; that the humours in mens bodies increase and decrease as the moon doth: and therefore it were good to purge some day or two after the full; for that then the humours will not replenish so soon again.

895. As for the exciting of the motion of the spirits, you must note that the growth of hedges, herbs, hair, *etc.* is caused from the moon, by exciting of the spirits, as well as by increase of the moisture. But for spirits in particular, the great instance is in lunacies.

896. THERE may be other secret effects of the influence of the moon, which are not yet brought into observation. It may be, that if it so fall out that the wind be north, or north-east, in the full of the moon, it increaseth cold; and if south, or south-west, it disposeth the air for a good while to warmth and rain; which should be observed.

897. IT may be, that children, and young cattle, that are brought forth in the full of the moon, are stronger and larger than those that are brought forth in the wane; and those also which are begotten in the full of the moon: so that it might be good husbandry to put rams and bulls to their females, somewhat before the full of the moon. It may be also, that the eggs laid in the full of the moon breed the better bird: and a number of the like effects which may be brought into observation. *Query* also, whether great thunders and earthquakes be not most in the full of the moon.

Experiment sol'try touching vinegar.

898. THE turning of wine to vinegar is a kind of putrefaction: and in making of vinegar, they use to set vessels of wine over-against the noon-sun; which calleth out the more oily spirits, and leaveth the liquor more sour and hard. We see also, that burnt wine is more hard and astringent than wine unburnt. It is said, that cider in navigations under the line ripeneth, when wine or beer foureth. It were good to set a rundlet of verjuice over against the sun in summer, as they do vinegar, to see whether it will ripen and sweeten.

Experiment solit'ry touching creatures that sleep all winter.

899. THERE be divers creatures that sleep all winter, as the bear, the hedge-hog, the bat, the bee, *etc.* These all wax fat when they sleep, and egest not. The cause of their fattening during their sleeping time, may be the want of assimilating; for whatsoever assimilateth not to flesh turneth either to sweat or fat. These creatures, for part of their sleeping time, have been observed not to stir at all; and for the other part, to stir, but not to remove. And they get warm and close places to sleep in. When the Flemings wintered in Nova Zembla, the bears about the middle of November went to sleep; and then the foxes began to come forth, which durst not before. It is noted by some of the ancients, that the she-bear breedeth, and lyeth in with her young, during that time of rest: and that a bear big with young hath seldom been seen.

Experiment

Experiment following touching the generating of creatures by copulation, and by putrefaction.

900. SOME living creatures are procreated by copulation between male and female: some by putrefaction; and of those which come by putrefaction many do, nevertheless, afterwards procreate by copulation. For the cause of both generations: first, it is most certain, that the cause of all vivification is a gentle and proportionable heat, working upon a glutinous and yielding substance: for the heat doth bring forth spirit in that substance: and the substance being glutinous produceth two effects; the one, that the spirit is detained, and cannot break forth: the other, that the matter being gentle and yielding, is driven forwards by the motion of the spirits, after some swelling, into shape and members. Therefore all sperm, all menstruous substance, all matter whereof creatures are produced by putrefaction, have evermore a closeness, lensor, and sequacity. It seemeth therefore, that the generation by sperm only, and by putrefaction, have two different causes: The first is, for that creatures which have a definite and exact shape, as those have which are procreated by copulation, cannot be produced by a weak and casual heat; nor out of matter which is not exactly prepared according to the species. The second is, for that there is a greater time required for maturation of perfect creatures; for if the time required in vivification be of any length, then the spirit will exhale before the creature be mature; except it be inclosed in a place where it may have continuance of the heat, access of some nourishment to maintain it, and closeness that may keep it from exhaling: and such places are the wombs and matrices of the females. And therefore all creatures made of putrefaction, are of more uncertain shape; and are made in shorter time; and need not to perfect an inclosure, though some closeness be commonly required. As for the Heathen opinion, which was, that upon great mutations of the world, perfect creatures were first engendred of concretion; as well as frogs, and worms, and flies, and such like, are now; we know it to be vain: but if any such thing should be admitted, discoursing according to sense, it cannot be, except you admit a chaos first, and commixture of heaven and earth. For the frame of the world, once in order, cannot effect it by any excess or casualty.

N A T U R A L H I S T O R Y.

C E N T U R Y X.

*Experiments in consort touching the transmission and influx of immateriate virtues,
and the force of imagination.*

THE philosophy of Pythagoras, which was full of superstition, did first plant a monstrous imagination, which afterwards was, by the school of Plato and others, watered and nourished. It was, that the world was one entire perfect living creature; insomuch as Apollonius of Tyana, a Pythagorean prophet, affirmed, that the ebbing and flowing of the sea was the respiration of the world, drawing in water as breath, and putting it forth again. They went on, and inferred, that if the world were a living creature, it had a soul and spirit; which also they held, calling it *spiritus mundi*, the spirit or soul of the world: by which they did not intend God, for they did admit of a Deity besides, but only the soul or essential form of the universe. This foundation being laid, they might build upon it what they would; for in a living creature, though never so great, as for example, in a great whale, the sense and the affects of any one part of the body instantly make a transcurfion throughout the whole body: so that by this they did insinuate, that no distance of place, nor want of indisposition of matter, could hinder magical operations; but that, for example, we might here in Europe have sense and feeling of that which was done in China: and likewise we might work any effect without and against matter; and this not holpen by the co-operation of angels or spirits, but only by the unity and harmony of nature. There were some also that staid not here; but went farther, and held, that if the spirit of man, whom they call the microcosm, do give a fit touch to the spirit of the world, by strong imaginations and beliefs, it might command nature; for Paracelsus, and some darksome authors of magic, do ascribe to imagination exalted the power of miracle-working faith. With these vast and bottomless follies men have been in part entertained.

But we, that hold firm to the works of God, and to the sense, which is God's lamp, *lucerna Dei spiraculum hominis*, will inquire with all sobriety and severity, whether there be to be found in the footsteps of nature, any such transmission and influx of immateriate virtues; and what the force of imagination is; either upon the body imaginant, or upon another body: wherein it will be like that labour of Hercules, in purging the stable of Augeas, to separate from superstitious and magical arts and observations, any thing that is clean and pure natural; and not to be either contemned or condemned. And although we shall have occasion to speak of this in more places than one, yet we will now make some entrance
trecento.

Experiments

Experiments in concert, monitory, touching transmission of spirits, and the force of imagination.

901. MEN are to be admonished, that they do not withdraw credit from the operations by transmission of spirits, and force of imagination, because the effects fail sometimes. For as in infection, and contagion from body to body, as the plague, and the like, it is most certain, that the infection is received, many times, by the body passive, but yet is by the strength and good disposition thereof repulsed and wrought out, before it be formed into a disease; so much more in impressions from mind to mind, or from spirit to spirit, the impression taketh, but is encountred and overcome by the mind and spirit, which is passive, before it work any manifest effect. And therefore they work most upon weak minds and spirits: as those of women; sick persons; superstitious and fearful persons: children, and young creatures:

Nescio quis teneros oculus mihi fascinat agnos:

The poet speaketh not of sheep, but of lambs. As for the weakness of the power of them upon kings and magistrates; it may be ascribed, besides the main, which is the protection of God over those that execute his place, to the weakness of the imagination of the imaginant: for it is hard for a witch or a forcerer to put on a belief that they can hurt such persons.

902. MEN are to be admonished, on the other side, that they do not easily give place and credit to these operations, because they succeed many times; for the cause of this success is oft to be truly ascribed unto the force of affection and imagination upon the body agent; and then by a secondary means it may work upon a diverse body: as for example; if a man carry a planet's seal, or a ring, or some part of a beast, believing strongly that it will help him to obtain his love; or to keep him from some danger of hurt in fight; or to prevail in a suit, *etc.* it may make him more active and industrious: and again, more confident and persisting, than otherwise he would be. Now the great effects that may come of industry and perseverance, especially in civil business, who knoweth not? For we see audacity doth almost bind and mate the weaker sort of minds; and the state of human actions is so variable, that to try things oft, and never to give over, doth wonders: therefore it were a mere fallacy and mistaking to ascribe that to the force of imagination upon another body, which is but the force of imagination upon the proper body; for there is no doubt, but that imagination and vehement affection work greatly upon the body of the imaginant; as we shall shew in due place.

903. MEN are to be admonished, that as they are not to mistake the causes of these operations; so much less they are to mistake the fact or effect; and rashly to take that for done which is not done. And therefore as divers wise judges have prescribed and cautioned, men may not too rashly believe the confessions of witches, nor yet the evidence against them. For the witches themselves are imaginative, and believe oft-times they do that which they do not: and people are credulous in that point, and ready to impute accidents and natural operations to witchcraft. It is worthy the observing, that both in ancient and late times, as in the Thessalian witches, and the meetings of witches that have been recorded by so many late confessions, the great wonders which they tell, of carrying in the air, transforming themselves into other bodies, *etc.* are still reported to be wrought, not by incantations or ceremonies, but by ointments, and anointing themselves all over. This may justly move a man
to

to think, that these fables are the effects of imagination: for it is certain, that ointments do all, if they be laid on any thing thick, by stopping of the pores, shutting in the vapours, and sending them to the head extremely. And for the particular ingredients of those magical ointments, it is like they are opiate and soporiferous. For anointing of the forehead, neck, feet, back-bone, we know, is used for procuring dead sleeps: and if any man say that this effect would be better done by inward potions; answer may be made, that the medicines, which go to the ointments, are so strong, that if they were used inwards, they would kill those that use them: and therefore they work potently, though outwards.

We will divide the several kinds of the operations by transmission of spirits and imagination, which will give no small light to the experiments that follow. All operations by transmission of spirits and imagination have this; that they work at distance, and not at touch; and they are these being distinguished.

904. THE first is the transmission or emission of the thinner and more airy parts of bodies; as in odours and infections; and this is, of all the rest, the most corporeal. But you must remember withal, that there be a number of those emissions, both wholesome and unwholesome, that give no smell at all: for the plague, many times when it is taken, giveth no scent at all: and there be many good and healthful airs that do appear by habitation and other proofs, that differ not in smell from other airs. And under this head you may place all imbibitions of air, where the substance is material, odour-like; whereof some nevertheless are strange, and very suddenly diffused; as the alteration which the air receiveth in Ægypt, almost immediately, upon the rising of the river of Nilus, whereof we have spoken.

905. THE second is the transmission or emission of those things that we call spiritual species; as visibles and sounds: the one whereof we have handled, and the other we shall handle in due place. These move swiftly, and at great distance; but then they require a medium well disposed, and their transmission is easily stopped.

906. THE third is the emissions, which cause attraction of certain bodies at distance; wherein though the loadstone be commonly placed in the first rank, yet we think good to except it, and refer it to another head: but the drawing of amber and jet, and other electric bodies, and the attraction in gold of the spirit of quicksilver at distance; and the attraction of heat at distance; and that of fire to naphtha; and that of some herbs to water, though at distance; and divers others; we shall handle, but yet not under this present title, but under the title of attraction in general.

907. THE fourth is the emission of spirits, and immateriate powers and virtues, in those things which work by the universal configuration and sympathy of the world; not by forms or celestial influxes, as is vainly taught and received, but by the primitive nature of matter, and the seeds of things. Of this kind is, as we yet suppose, the working of the loadstone, which is by consent with the globe of the earth: of this kind is the motion of gravity, which is by consent of dense bodies with the globe of the earth: of this kind is some disposition of bodies to rotation, and particularly from east to west: of which kind we conceive the main float and refloat of the sea is, which is by consent of the universe, as part of the diurnal motion. These immateriate virtues have this property differing from others; that the diversity of the medium hindereth them not: but they pass through all mediums, yet at de-
terminate

terminate distances. And of these we shall speak, as they are incident to several titles.

908. THE fifth is the emission of spirits; and this is the principal in our intention to handle now in this place; namely, the operation of the spirits of the mind of man upon other spirits: and this is of a double nature; the operations of the affections, if they be vehement; and the operation of the imagination, if it be strong. But these two are so coupled, as we shall handle them together; for when an envious or amorous affect doth infect the spirits of another, there is joined both affection and imagination.

909. THE sixth is, the influxes of the heavenly bodies, besides those two manifest ones, of heat and light. But these we will handle where we handle the celestial bodies and motions.

910. THE seventh is the operations of sympathy, which the writers of natural magic have brought into an art or precept: and it is this; that if you desire to superinduce any virtue or disposition upon a person, you should take the living creature, in which that virtue is most eminent, and in perfection; of that creature you must take the parts wherein that virtue chiefly is collocate: again, you must take those parts in the time and act when that virtue is most in exercise; and then you must apply it to that part of man wherein that virtue chiefly consisteth. As if you would superinduce courage and fortitude, take a lion or a cock; and take the heart, tooth, or paw of the lion; or the heart or spur of the cock: take those parts immediately after the lion or the cock have been in fight; and let them be worn upon a man's heart or wrist. Of these and such like sympathies, we shall speak under this present title.

911. THE eighth and last is, an emission of immateriate virtues; such as we are a little doubtful to propound; it is so prodigious: but that it is so constantly avouched by many: and we have set it down as a law to ourselves, to examine things to the bottom; and not to receive upon credit, or reject upon improbabilities, until there hath passed a due examination. This is the sympathy of individuals; for as there is a sympathy of species, so it may be there is a sympathy of individuals: that is, that in things, or the parts of things that have been once contiguous or entire, there should remain a transmission of virtue from the one to the other: as between the weapon and the wound. Whereupon is blazed abroad the operation of *unguentum teli*: and so of a piece of lard, or stick of alder, *etc.* that if part of it be consumed or putrefied, it will work upon the other part severed. Now we will pursue the instances themselves.

Experiments in concert touching emission of spirits in vapour or exhalation, odour-like.

912. THE plague is many times taken without manifest sense, as hath been said. And they report, that where it is found, it hath a scent of the smell of a mellow apple; and, as some say, of May-flowers: and it is also received, that smells of flowers that are mellow and luscious, are ill for the plague; as white lilies, cowslips, and hyacinths.

913. THE plague is not easily received by such as continually are about them that have the plague; as keepers of the sick, and physicians; nor again by such as take antidotes, either inward, as mithridate, juniper-berries, rue, leaf and seed, *etc.* or outward, as angelica, zedoary, and the like, in the mouth; tar, *galbanum*, and the like, in perfume; nor again by old people, and such as are of a dry and cold complexion.

plexion. On the other side, the plague taketh soonest hold of those that come out of a fresh air, and of those that are fasting, and of children; and it is likewise noted to go in a blood, more than to a stranger.

914. THE most pernicious infection, next to the plague, is the smell of the jail, when prisoners have been long, and close, and nastily kept; whereof we have had in our time experience twice or thrice; when both the judges that sat upon the jail, and numbers of those that attended the business or were present, sickened upon it, and died. Therefore it were good wisdom, that in such cases the jail were aired before they be brought forth.

915. OUR of question, if such foul smells be made by art, and by the hand, they consist chiefly of man's flesh or sweat putrified; for they are not those stinks which the nostrils straight abhor and expel, that are most pernicious; but such airs as have some similitude with man's body; and so insinuate themselves, and betray the spirits. There may be great danger in using such compositions, in great meetings of people within houses; as in churches, at arraignments, at plays and solemnities, and the like: for poisoning of air is no less dangerous than poisoning of water, which hath been used by the Turks in the wars, and was used by Emmanuel Comnenus towards the Christians, when they passed through his country to the Holy Land. And these impoisonments of air are the more dangerous in meetings of people, because the much breath of people doth further the reception of the infection; and therefore, where any such thing is feared, it were good those public places were perfumed, before the assemblies.

916. THE impoisonment of particular persons by odours, hath been reported to be in perfumed gloves, or the like: and it is like, they mingle the poison that is deadly, with some smells that are sweet, which also maketh it the sooner received. Plagues also have been raised by anointings of the chinks of doors, and the like; not so much by the touch, as for that it is common for men, when they find any thing wet upon their fingers, to put them to their nose; which men therefore should take heed how they do. The best is, that these compositions of infectious airs cannot be made without danger of death to them that make them. But then again, they may have some antidotes to save themselves; so that men ought not to be secure of it.

917. THERE have been in divers countries great plagues, by the putrefaction of great swarms of grasshoppers and locusts, when they have been dead and cast upon heaps.

918. IT happeneth often in mines, that there are damps which kill, either by suffocation, or by the poisonous nature of the mineral: and those that deal much in refining, or other works about metals and minerals, have their brains hurt and stupified by the metalline vapours. Amongst which it is noted, that the spirits of quicksilver either fly to the skull, teeth, or bones; insomuch as gilders use to have a piece of gold in their mouth, to draw the spirits of the quicksilver; which gold afterwards they find to be whitened. There are also certain lakes and pits, such as that of Avernus, that poison birds, as is said; which fly over them, or men that stay too long about them.

919. THE vapour of char-coal, or sea-coal, in a close room, hath killed many; and it is the more dangerous, because it cometh without any ill smell, but stealeth on by little and little, inducing only a faintness, without any manifest strangling. When the Dutchmen wintered at Nova Zembla, and that they could gather no more sticks, they

they fell to make fire of some sea-coal they had, wherewith, at first, they were much refreshed; but a little after they had sat about the fire, there grew a general silence and lothness to speak amongst them; and immediately after, one of the weakest of the company fell down in a swoon; whereupon they doubting what it was, opened their door to let in air, and so saved themselves. The effect, no doubt, is wrought by the inspissation of air; and so of the breath and spirits. The like ensueth in rooms newly plaittered, if a fire be made in them; whereof no less a man than the emperor Jovianus died.

920. VIDE the experiment 803. touching the infectious nature of the air, upon the first showers, after a long drought.

921. IT hath come to pass, that some apothecaries, upon stamping of colloquintida, have been put into a great scouring by the vapour only.

922. IT hath been a practice to burn a pepper they call Guiney-pepper, which hath such a strong spirit, that it provoketh a continual sneezing in those that are in the room.

923. IT is an ancient tradition, that blear-eyes infect sound eyes; and that a menstruous woman, looking upon a glass, doth rust it: nay, they have an opinion which seemeth fabulous; that menstruous women going over a field or garden, do corn and herbs good by killing the worms.

924. THE tradition is no less ancient, that the basilisk killeth by aspect; and that the wolf, if he see a man first, by aspect striketh a man hoarse.

925. PERFUMES convenient do dry and strengthen the brain, and stay rheums and defluxions, as we find in fume of rosemary dried, and *lignum aloës*; and *calamus* taken at the mouth and nostrils: and no doubt there be other perfumes that do moisten and refresh, and are fit to be used in burning agues, consumptions, and too much wakefulness; such as are rose-water, vinegar, lemon peels, violets, the leaves of vines sprinkled with a little rose-water, *etc.*

926. THEY do use in sudden faintings and swoonings to put a handkerchief with rose-water or a little vinegar to the nose; which gathereth together again the spirits, which are upon point to resolve and fall away.

927. TOBACCO comforteth the spirits, and dischargeth weariness, which it worketh partly by opening, but chiefly by the opiate virtue, which condenseth the spirits. It were good therefore to try the taking of fumes by pipes, as they do in tobacco, of other things; as well to dry and comfort, as for other intentions. I wish trial be made of the drying fume of rosemary, and *lignum aloës*, before-mentioned, in pipe; and so of nutmeg, and *folium indum*, *etc.*

928. THE following of the plough hath been approved for refreshing the spirits, and procuring appetite; but to do it in the ploughing for wheat or rye, is not so good, because the earth has spent her sweet breath in vegetables put forth in summer. It is better therefore to do it when you sow barley. But because ploughing is tied to seasons, it is best to take the air of the earth new turned up, by digging with the spade, or standing by him that diggeth. Gentlewomen may do themselves much good by kneeling upon a cushion, and weeding. And these things you may practise in the best seasons; which is ever the early spring, before the earth putteth forth the vegetables, and in the sweetest earth you can choose. It should be done also when the dew is a little off the ground, lest the vapour be too moist. I knew a great man that lived long, who had a clean clod of earth brought to him every morning as he sat in his bed; and he would hold his head over it a good pretty while. I commend

also, sometimes, in digging of new earth, to pour in some Malmsey or Greek wine; that the vapour of the earth and wine together may comfort the spirits the more; provided always it be not taken for a heathen sacrifice, or libation to the Earth.

929. THEY have in physic use of pomanders, and knots of powders, for drying of rheums, comforting of the heart, provoking of sleep, *etc.* For though those things be not so strong as perfumes, yet you may have them continually in your hand; whereas perfumes you can take but at times: and besides, there be divers things that breathe better of themselves, than when they come to the fire; as *nigella romana*, the seed of *melanthium*, *amonium*, *etc.*

930. THERE be two things which, inwardly used, do cool and condense the spirits; and I wish the same to be tried outwardly in vapours. The one is nitre, which I would have dissolved in Malmsey, or Greek wine, and so the smell of the wine taken; or if you would have it more forcible, pour of it upon a fire-pan, well heated, as they do rose-water and vinegar. The other is the distilled water of wild poppy, which I wish to be mingled, at half, with rose-water, and so taken with some mixture of a few cloves in a perfuming-pan. The like should be done with the distilled water of saffron flowers.

931. SMELLS of musk, and amber, and civet, are thought to further venereous appetite; which they may do by the refreshing and calling forth of the spirits.

932. INCENSE and nidorous smells, such as were of sacrifices, were thought to intoxicate the brain, and to dispose men to devotion: which they may do by a kind of sadness, and contristation of the spirits; and partly also by heating and exalting them. We see that amongst the Jews the principal perfume of the sanctuary was forbidden all common uses.

933. THERE be some perfumes prescribed by the writers of natural magic, which procure pleasant dreams: and some others, as they say, that procure prophetic dreams; as the seeds of flax, flea-wort, *etc.*

934. IT is certain, that odours do, in a small degree, nourish; especially the odour of wine: and we see men an hungred do love to smell hot bread. It is related that Democritus, when he lay a dying, heard a woman in the house complain, that she should be kept from being at a feast and solemnity, which she much desired to see, because there would be a corps in the house; whereupon he caused loaves of new bread to be sent for, and opened them, and poured a little wine into them; and so kept himself alive with the odour of them, till the feast was past. I knew a gentleman that would fast, sometimes three or four yea five days, without meat, bread, or drink; but the same man used to have continually a great wisp of herbs that he smelled on: and amongst those herbs, some esculent herbs of strong scent; as onions, garlic, leeks, and the like.

935. THEY do use, for the accident of the mother, to burn feathers and other things of ill odour: and by those ill smells the rising of the mother is put down.

936. THERE be airs which the physicians advise their patients to remove unto, in consumptions or upon recovery of long sicknesses: which, commonly, are plain champains, but grassing, and not over-grown with heath or the like; or else timber-shades, as in forests, and the like. It is noted also, that groves of bays do forbid pestilent airs; which was accounted a great cause of the wholesome air of Antiochia. There be also some soils that put forth odorate herbs of themselves; as wild thyme, wild marjoram, penny-royal, camomile; and in which the brier roses smell

for it almost like musk-roses; which, no doubt, are signs that do discover an excellent air.

937. It were good for men to think of having healthful air in their houses; which will never be if the rooms be low roofed, or full of windows and doors; for the one maketh the air close, and not fresh; and the other maketh it exceeding unequal; which is a great enemy to health. The windows also should not be high up to the roof, which is in use for beauty and magnificence, but low. Also stone-walls are not wholesome; but timber is more wholesome; and especially brick: nay, it hath been used by some with great success to make their walls thick; and to put a lay of chalk between the bricks, to take away all dampness.

Treatment of airy touchings the emissions of spiritual species which affect the senses.

938. THESE emissions, as we said before, are handled, and ought to be handled by themselves under their proper titles: that is, visibles and audibles, each apart: in this place it shall suffice to give some general observations common to both. First, they seem to be incorporeal. Secondly, they work swiftly. Thirdly, they work at large distances. Fourthly, in curious varieties. Fifthly, they are not effective of any thing; nor leave no work behind them; but are energies merely: for their working upon mirrors and places of echo doth not alter any thing in those bodies; but it is the same action with the original, only repercussed. And as for the shaking of windows, or rarifying the air by great noises; and the heat caused by burning-glasses; they are rather concomitants of the audible and visible species, than the effects of them. Sixthly, they seem to be of so tender and weak a nature, as they effect only such a rare and attenuate substance, as is the spirit of living creatures.

Experiment in concert touching the emission of immaterial virtues from the minds and spirits of men, either by affections, or by imaginations, or by other impressions.

939. IT is mentioned in some stories, that where children have been exposed, or taken away young from their parents; and that afterwards they have approached to their parents presence, the parents, though they have not known them, have had a secret joy or other alteration thereupon.

940. THERE was an Ægyptian soothsayer, that made Antonius believe, that his genius, which otherwise was brave and confident, was, in the presence of Octavianus Cæsar, poor and cowardly: and therefore he advised him, to absent himself as much as he could, and remove far from him. This soothsayer was thought to be suborned by Cleopatra, to make him live in Ægypt, and other remote places from Rome. Howsoever the conceit of a predominant or mastering spirit of one man over another, is ancient, and received still, even in vulgar opinion.

941. THERE are conceits, that some men that are of an ill and melancholy nature, do incline the company into which they come to be sad and ill-disposed; and contrariwise, that others that are of a jovial nature, do dispose the company to be merry and chearful. And again, that some men are lucky to be kept company with and employed; and others unlucky. Certainly, it is agreeable to reason, that there are at the least some light effluxions from spirit to spirit, when men are in presence one with another, as well as from body to body.

942. IT hath been observed, that old men who have loved young company, and been conversant continually with them, have been of long life; their spirits, as it

seemeth, being recreated by such company. Such were the ancient sophists and rhetoricians; which ever had young auditors and disciples; as Gorgias, Protagoras, Isocrates, *etc.* who lived till they were an hundred years old. And so likewise did many of the grammarians and school-masters; such as was Orbilius, *etc.*

943. AUDACITY and confidence doth, in civil business, so great effects, as a man may reasonably doubt, that besides the very daring and earnestness, and persisting, and importunity, there should be some secret binding, and stooping of other mens spirits to such persons.

944. THE affections, no doubt, do make the spirits more powerful and active; and especially those affections which draw the spirits into the eyes: which are two; love, and envy, which is called *oculus malus*. As for love, the Platonists, some of them, go so far as to hold that the spirit of the lover doth pass into the spirits of the person loved; which causeth the desire of return into the body whence it was emitted: whereupon followeth that appetite of contact and conjunction which is in lovers. And this is observed likewise, that the aspects which procure love, are not gazings, but sudden glances and dartings of the eye. As for envy, that emitteth some malign and poisonous spirit, which taketh hold of the spirit of another; and is likewise of greatest force when the cast of the eye is oblique. It hath been noted also, that it is most dangerous when an envious eye is cast upon persons in glory, and triumph, and joy. The reason whereof is, for that at such times the spirits come forth most into the outward parts, and so meet the percussio[n] of the envious eye more at hand: and therefore it hath been noted, that after great triumphs, men have been ill-disposed for some days following. We see the opinion of fascination is ancient, for both effects; of procuring love; and sickness caused by envy: and fascination is ever by the eye. But yet if there be any such infection from spirit to spirit, there is no doubt but that it worketh by presence, and not by the eye alone; yet most forcibly by the eye.

945. FEAR and shame are likewise infective; for we see that the starting of one will make another ready to start: and when one man is out of countenance in a company, others do likewise blush in his behalf.

Now we will speak of the force of imagination upon other bodies; and of the means to exalt and strengthen it. Imagination, in this place, I understand to be, the representation of an individual thought. Imagination is of three kinds: the first joined with belief of that which is to come: the second joined with memory of that which is past; and the third is of things present, or as if they were present; for I comprehend in this, imaginations feigned, and at pleasure; as if one should imagine such a man to be in the vestments of a pope; or to have wings. I single out, for this time, that which is with faith or belief of that which is to come. The inquisition of this subject in our way, which is by induction, is wonderful hard: for the things that are reported are full of fables; and new experiments can hardly be made, but with extreme caution; for the reason which we will hereafter declare.

THE power of imagination is of three kinds; the first upon the body of the imaginant, including likewise the child in the mother's womb; the second is, the power of it upon dead bodies, as plants, wood, stone, metal, *etc.* the third is, the power of it upon the spirits of men and living creatures: and with this last we will only meddle.

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THE problem therefore is, whether a man constantly and strongly believing that such a thing shall be, as that such an one will love him; or that such an one will grant him his request; or that such an one shall recover a sickness; or the like, it doth help any thing to the effecting of the thing itself. And here again we must warily distinguish; for it is not meant, as hath been partly said before, that it should help by making a man more stout, or more industrious, in which kind a constant belief doth much, but merely by a secret operation, or binding, or changing the spirit of another: and in this it is hard, as we began to say, to make any new experiment; for I cannot command myself to believe what I will, and so no trial can be made. Nay it is worse; for whatsoever a man imagineth doubtingly, or with fear, must needs do hurt, if imagination have any power at all; for a man representeth that oftner that he feareth, than the contrary.

THE help therefore is, for a man to work by another, in whom he may create belief, and not by himself; until himself have found by experience, that imagination doth prevail; for then experience worketh in himself belief; if the belief that such a thing shall be, be joined with a belief that his imagination may procure it.

946. For example; I related one time to a man, that was curious and vain enough in these things, that I saw a kind of jugler, that had a pair of cards, and would tell a man what card he thought. This pretended learned man told me, it was a mistaking in me; "for, said he, it was not the knowledge of the man's thought, for that is proper to God, but it was the inforcing of a thought upon him, and binding his imagination by a stronger, that he could think no other card." And thereupon he asked me a question or two, which I thought he did but cunningly, knowing before what used to be the feats of the jugler. "Sir, said he, do you remember whether he told the card the man thought, himself, or bade another to tell it?" I answered, as was true, that he bade another tell it. Whereunto he said; "So I thought: for, said he, himself could not have put on so strong an imagination; but by telling the other the card, who believed that the jugler was some strange man, and could do strange things, that other man caught a strong imagination." I hearkened unto him, thinking for a vanity he spoke prettily. Then he asked me another question: saith he, "Do you remember, whether he bade the man think the card first, and afterwards told the other man in his ear what he should think; or else that he did whisper first in the man's ear that should tell the card, telling that such a man should think such a card, and after bade the man think a card?" I told him, as was true; that he did first whisper the man in the ear, that such a man should think such a card: upon this the learned man did much exult and please himself, saying; "Lo, you may see that my opinion is right: for if the man had thought first, his thought had been fixed; but the other imagining first, bound his thought." Which though it did somewhat sink with me, yet I made it lighter than I thought, and said; I thought it was confederacy between the jugler and the two servants: though, indeed, I had no reason so to think, for they were both my father's servants; and he had never played in the house before. The jugler also did cause a garter to be held up; and took upon him to know, that such an one should point in such a place of the garter; as it should be near so many inches to the longer end, and so many to the shorter; and till he did it, by first telling the imaginer, and after bidding the actor think.

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HAVING told this relation, not for the weight thereof, but because it doth handfomely open the nature of the question, I return to that I said; that experiments of imagination must be practised by others, and not by a man's self. For there be three means to fortify belief: the first is experience; the second is reason; and the third is authority: and that of these which is far the most potent, is authority; for belief upon reason, or experience, will stagger.

947. FOR authority, it is of two kinds; belief in an art; and belief in a man. And for things of belief in an art, a man may exercise them by himself; but for belief in a man, it must be by another. Therefore if a man believe in astrology, and find a figure prosperous; or believe in natural magic, and that a ring with such a stone, or such a piece of a living creature, carried, will do good; it may help his imagination: but the belief in a man is far the more active. But howsoever, all authority must be out of a man's self, turned, as was said, either upon an art, or upon a man: and where authority is from one man to another, there the second must be ignorant, and not learned, or full of thoughts; and such are, for the most part, all witches and superstitious persons; whose beliefs, tied to their teachers and traditions, are no whit controlled either by reason or experience; and upon the same reason, in magic, they use for the most part boys and young people, whose spirits easiest take belief and imagination.

Now to fortify imagination, there be three ways: the authority whence the belief is derived; means to quicken and corroborate the imagination; and means to repeat it and refresh it.

948. FOR the authority, we have already spoken: as for the second, namely the means to quicken and corroborate the imagination; we see what hath been used in magic, if there be in those practices any thing that is purely natural, as vestments, characters, words, seals; some parts of plants, or living creatures; stones; choice of the hour; gestures and motions; also incenses and odours; choice of society, which increaseth imagination; diets and preparations for some time before. And for words, there have been ever used, either barbarous words, of no sense, lest they should disturb the imagination; or words of similitude, that may second and feed the imagination: and this was ever as well in heathen charms, as in charms of latter times. There are used also Scripture words; for that the belief that religious texts and words have power, may strengthen the imagination. And for the same reason, Hebrew words, which amongst us is counted the holy tongue, and the words more mystical, are often used.

949. FOR the refreshing of the imagination, which was the third means of exalting it, we see the practices of magic, as in images of wax, and the like, that should melt by little and little; or some other things buried in muck, that should putrify by little and little; or the like: for so oft as the imaginant doth think of those things, so oft doth he represent to his imagination the effect of that he desireth.

950. If there be any power in imagination, it is less credible that it should be so incorporeal and immaterial a virtue as to work at great distances, or through all mediums, or upon all bodies: but that the distance must be competent, the medium not adverse, and the body apt and proportionate. Therefore if there be any operation upon bodies in absence by nature, it is like to be conveyed from man to man, as fame is; as if a witch, by imagination, should hurt any afar off, it cannot be naturally; but by working upon the spirit of some that cometh to the witch; and from that party

party upon the imagination of another; and so upon another; till it come to one that hath resort to the party intended; and so by him to the party intended himself. And although they speak, that it sufficeth to take a point, or a piece of the garment, or the name of the party, or the like; yet there is less credit to be given to those things, except it be by working of evil spirits.

THE experiments, which may certainly demonstrate the power of imagination upon other bodies, are few or none: for the experiments of witchcraft are no clear proofs; for that they may be by a tacit operation of malign spirits: we shall therefore be forced, in this inquiry, to resort to new experiments; wherein we can give only directions of trials, and not any positive experiments. And if any man think that we ought to have stayed till we had made experiment of some of them ourselves, as we do commonly in other titles, the truth is, that these effects of imagination upon other bodies have so little credit with us, as we shall try them at leisure; but in the mean time we will lead others the way.

951. WHEN you work by the imagination of another, it is necessary that he, by whom you work, have a precedent opinion of you that you can do strange things; or that you are a man of art, as they call it; for else the simple affirmation to another, that this or that shall be, can work but a weak impression in his imagination.

952. IT were good, because you cannot discern fully of the strength of imagination in one man more than another, that you did use the imagination of more than one, that so you may light upon a strong one. As if a physician should tell three or four of his patient's servants, that their master shall surely recover.

953. THE imagination of one that you shall use, such is the variety of mens minds, cannot be always alike constant and strong; and if the success follow not speedily, it will faint and lose strength. To remedy this, you must pretend to him, whose imagination you use, several degrees of means, by which to operate: as to prescribe him that every three days, if he find not the success apparent, he do use another root, or part of a beast, or ring, *etc.* as being of more force; and if that fail, another; and if that, another, till seven times. Also you must prescribe a good large time for the effect you promise; as if you should tell a servant of a sick man that his master shall recover, but it will be fourteen days ere he findeth it apparently, *etc.* All this to entertain the imagination that it waver less.

954. IT is certain, that potions, or things taken into the body; incenses and perfumes taken at the nostrils; and ointments of some parts, do naturally work upon the imagination of him that taketh them. And therefore it must needs greatly co-operate with the imagination of him whom you use, if you prescribe him, before he do use the receipt, for the work which he desireth, that he do take such a pill, or a spoonful of liquor; or burn such an incense; or anoint his temples, or the soles of his feet, with such an ointment or oil: and you must choose, for the composition of such pill, perfume or ointment, such ingredients as do make the spirits a little more gross or muddy; whereby the imagination will fix the better.

955. THE body passive, and to be wrought upon, I mean not of the imaginant, is better wrought upon, as hath been partly touched, at some times than at others: as if you should prescribe a servant about a sick person, whom you have possessed that his master shall recover, when his master is fast asleep, to use such a root, or such a root. For imagination is like to work better upon sleeping men, than men awake; as we shall shew when we handle dreams.

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956. WE find in the art of memory, that images visible work better than other conceits : as if you would remember the word philosophy, you shall more surely do it, by imagining, that such a man, for men are best places, is reading upon Aristotle's *Physics* ; than if you should imagine him to say, " I'll go study philosophy." And therefore this observation should be translated to the subject we now speak of : for the more lustrous the imagination is, it filleth and fixeth the better. And therefore I conceive, that you shall, in that experiment, whereof we spake before, of binding of thoughts, less fail, if you tell one that such an one shall name one of twenty men, than if it were one of twenty cards. The experiment of binding of thoughts would be diversified and tried to the full : and you are to note, whether it hit for the most part, though not always.

957. IT is good to consider, upon what things imagination hath most force : and the rule, as I conceive, is, that it hath most force upon things that have the lightest and easiest motions. And therefore above all, upon the spirits of men : and in them, upon such affections as move lightest ; as upon procuring of love ; binding of lust, which is ever with imagination ; upon men in fear ; or men in irresolution ; and the like. Whatsoever is of this kind should be thoroughly inquired. Trials likewise should be made upon plants, and that diligently : as if you should tell a man, that such a tree would die this year ; and will him at these and these times to go unto it, to see how it thriveth. As for inanimate things, it is true, that the motions of shuffling of cards, or casting of dice, are very light motions : and there is a folly very usual, that gamesters imagine, that some that stand by them bring them ill luck. There should be trial also made, of holding a ring by a thread in a glass, and telling him that holdeth it, before, that it shall strike so many times against the side of the glass, and no more ; or of holding a key between two mens fingers, without a charm ; and to tell those that hold it, that at such a name it shall go off their fingers : for these two are extreme light motions. And howsoever I have no opinion of these things, yet so much I conceive to be true ; That strong imagination hath more force upon things living, or that have been living, than things merely inanimate : and more force likewise upon light and subtile motions, than upon motions vehement or ponderous.

958. IT is an usual observation, that if the body of one murdered be brought before the murderer, the wounds will bleed afresh. Some do affirm, that the dead body, upon the presence of the murderer, hath opened the eyes ; and that there have been such like motions, as well where the parties murdered have been strangled or drowned, as where they have been killed by wounds. It may be, that this participateth of a miracle, by God's just judgment, who usually bringeth murders to light : but if it be natural, it must be referred to imagination.

959. THE tying of the point upon the day of marriage, to make men impotent towards their wives, which, as we have formerly touched, is so frequent in Zant and Gascony, if it be natural, must be referred to the imagination of him that tieth the point. I conceive it to have the less affinity with witchcraft, because not peculiar persons only, such as witches are, but any body may do it.

Experiments in consort touching the secret virtue of sympathy and antipathy.

960. THERE be many things that work upon the spirits of man by secret sympathy and antipathy : the virtues of precious stones worn, have been anciently and generally received, and curiously assigned to work several effects. So much is true ;
that

that stones have in them fine spirits, as appeareth by their splendor; and therefore they may work by consent upon the spirits of men, to comfort and exhilarate them. Those that are the best, for that effect, are the diamond, the emerald, the hyacinth oriental, and the gold stone, which is the yellow topaz. As for their particular proprieties, there is no credit to be given to them. But it is manifest, that light, above all things, excelleth in comforting the spirits of men: and it is very probable, that light varied doth the same effect, with more novelty. And this is one of the causes why precious stones comfort. And therefore it were good to have tintured lanterns, or tintured screens, of glass coloured into green, blue, carnation, crimson, purple, *etc.* and to use them with candles in the night. So likewise to have round glasses, not only of glass coloured through, but with colours laid between crystals, with handles to hold in one's hand. Prisms are also comfortable things. They have of Paris-work, looking-glasses, bordered with broad borders of small crystal, and great counterfeit precious stones of all colours, that are most glorious and pleasant to behold; especially in the night. The pictures of Indian feathers are likewise comfortable and pleasant to behold. So also fair and clear pools do greatly comfort the eyes and spirits, especially when the sun is not glaring, but over-cast; or when the moon shineth.

961. THERE be divers sorts of bracelets fit to comfort the spirits; and they be of three intentions; refrigerant, corroborant, and aperient. For refrigerant, I wish them to be of pearl, or of coral, as is used; and it hath been noted that coral, if the party that weareth it be indisposed, will wax pale; which I believe to be true, because otherwise distemper of heat will make coral lose colour. I commend also beads, or little plates of *lapis lazuli*; and beads of nitre, either alone, or with some cordial mixture.

962. FOR corroboration and confortation, take such bodies as are of astringent quality, without manifest cold. I commend bead-amber, which is full of astringency, but yet is unctuous, and not cold; and is conceived to impinguate those that wear such beads: I commend also beads of hartshorn and ivory, which are of the like nature; also orange beads; also beads of *lignum aloës*, macerated first in rose-water, and dried.

963. FOR opening, I commend beads, or pieces of the roots of *carduus benedictus*: also of the roots of piony the male; and of orrice; and of *calamus aromaticus*; and of rue.

964. THE cramp, no doubt, cometh of contraction of sinews; which is manifest, in that it cometh either by cold or dryness; as after consumptions, and long agues; for cold and dryness do, both of them, contract and corrugate. We see also, that chafing a little above the place in pain, easeth the cramp; which is wrought by the dilatation of the contracted sinews by heat. There are in use, for the prevention of the cramp, two things; the one rings of sea-horse teeth worn upon the fingers; the other bands of green periwinkle, the herb, tied about the calf of the leg, or the thigh, *etc.* where the cramp useth to come. I do find this the more strange, because neither of these have any relaxing virtue, but rather the contrary. I judge therefore, that their working is rather upon the spirits, within the nerves, to make them strive less, than upon the bodily substance of the nerves.

965. I would have trial made of two other kinds of bracelets, for comforting the heart and spirits; the one of the trochisk of vipers, made into little pieces of beads; for since they do great good inwards, especially for peccilent agues, it is like they

will be effectual outwards; where they may be applied in greater quantity. There should be trochisk likewise made of snakes; whose flesh dried is thought to have a very opening and cordial virtue. The other is, of beads made of the scarlet powder, which they call *kermes*; which is the principal ingredient in their cordial confection *alkermes*: the beads should be made up with ambergrease, and some pomander.

966. IT hath been long received and confirmed by divers trials, that the root of the male-piony dried, tied to the neck, doth help the falling sickness; and likewise the *incubus*, which we call the mare. The cause of both these diseases, and especially of the epilepsy from the stomach, is the grossness of the vapours which rise and enter into the cells of the brain: and therefore the working is by extreme and subtle attenuation; which that simple hath. I judge the like to be in *castoreum*, mutk, rue-feed, *agnus castus* feed, etc.

967. THERE is a stone which they call the blood-stone, which worn is thought to be good for them that bleed at the nose: which, no doubt, is by astringion and cooling of the spirits. Query, if the stone taken out of the toad's head, be not of the like virtue; for the toad loveth shade and coolness.

968. LIGHT may be taken from the experiment of the horse-tooth ring, and the garland of periwinkle, how that those things which assuage the strife of the spirits, do help diseases contrary to the intention desired: for in the curing of the cramp, the intention is to relax the sinews; but the contraction of the spirits, that they strive less, is the best help: so to procure easy travails of women, the intention is to bring down the child; but the best help is, to stay the coming down too fast: whereunto they say, the toad-stone likewise helpeth. So in pestilent fevers, the intention is to expel the infection by sweat and evaporation: but the best means to do it is by nitre, diascordium, and other cool things, which do for a time arrest the expulsion, till nature can do it more quietly. For as one saith prettily; "In the quenching of the flame of a pestilent ague, nature is like people that come to quench the fire of a house; which are so busy, as one of them letteth another." Surely it is an excellent axiom, and of manifold use, that whatsoever appeaseth the contention of the spirits, furthereth their action.

969. THE writers of natural magic commend the wearing of the spoil of a snake, for preserving of health. I doubt it is but a conceit; for that the snake is thought to renew her youth, by casting her spoil. They might as well take the beak of an eagle, or a piece of a hart's horn, because those renew.

970. IT hath been anciently received, for Pericles the Athenian used it, and it is yet in use, to wear little bladders of quicksilver, or tablets of arsenic, as preservatives against the plague: not as they conceive for any comfort they yield to the spirits, but for that being poisons themselves, they draw the venom to them from the spirits.

791. VIDE the experiments 95, 96, and 97, touching the several sympathies and antipathies for medicinal use.

792. IT is said, that the guts or skin of a wolf being applied to the belly, do cure the colic. It is true, that the wolf is a beast of great edacity and digestion; and so it may be the parts of him comfort the bowels.

973. WE see scare-crows are set up to keep birds from corn and fruit; it is reported by some, that the head of a wolf, whole, dried, and hanged up in a dove-house, will scare away vermin; such as are weasles, pole-cats, and the like. It may be

be the head of a dog will do as much; for those vermin with us, know dogs better than wolves.

974. THE brains of some creatures, when their heads are roasted, taken in wine, are said to strengthen the memory; as the brains of hares, brains of hens, brains of deers, *etc.* And it seemeth to be incident to the brains of those creatures that are fearful.

975. THE ointment that witches use, is reported to be made of the fat of children digged out of their graves; of the juices of smalage, wolf-bane, and cinquefoil, mingled with the meal of fine wheat. But I suppose, that the soporiferous medicines are likest to do it; which are henbane, hemlock, mandrake, moonshade, tobacco, opium, saffron, poplar-leaves, *etc.*

976. IT is reported by some, that the affections of beasts when they are in strength, do add some virtue unto inanimate things; as that the skin of a sheep devoured by a wolf, moveth itching; that a stone bitten by a dog in anger, being thrown at him, drunk in powder, provoketh choler.

977. IT hath been observed, that the diet of women with child doth work much upon the infant; as if the mother eat quinces much, and coriander-feed, the nature of both which is to repress and stay vapours that ascend to the brain, it will make the child ingenious: and on the contrary side, if the mother eat much onions or beans, or such vaporious food; or drink wine, or strong drink immoderately; or fast much; or be given to much musing, all which send or draw vapours to the head, it endangereth the child to become lunatic, or of imperfect memory: and I make the same judgment of tobacco often taken by the mother.

978. THE writers of natural magic report, that the heart of an ape, worn near the heart, comforteth the heart, and increaseth audacity. It is true, that the ape is a merry and bold beast. And that the same heart likewise of an ape, applied to the neck or head, helpeth the wit; and is good for the falling-sickness: the ape also is a witty beast, and hath a dry brain; which may be some cause of attenuation of vapours in the head. Yet it is said to move dreams also. It may be the heart of a man would do more, but that it is more against mens minds to use it; except it be in such as wear the reliques of faints.

979. THE flesh of a hedge-hog, dressed and eaten, is said to be a great drier: it is true, that the juice of a hedge-hog must needs be harsh and dry, because it putteth forth so many prickles: for plants also that are full of prickles are generally dry; as briars, thorns, berberries; and therefore the ashes of an hedge-hog are said to be a great desiccative of fistulas.

980. MUMMY hath great force in stanching of blood; which, as it may be ascribed to the mixture of balms that are glutinous; so it may also partake of a secret propriety, in that the blood draweth man's flesh. And it is approved, that the moss which groweth upon the skull of a dead man unburied, will stanch blood potently: and so do the dregs, or powder of blood, severed from the water, and dried.

981. IT hath been practised, to make white swallows, by anointing of the eggs with oil. Which effect may be produced, by the stopping of the pores of the shell, and making the juice that putteth forth the feathers afterwards more penurious. And it may be, the anointing of the eggs will be as effectual, as the anointing of the body; of which *vide* the experiment 93.

982. It is reported, that the white of an egg, or blood, mingled with falt-water, doth gather the faltnefs, and maketh the water sweeter. This may be by adhesion; as in the fixth experiment of clarification: it may be also, that blood, and the white of an egg, which is the matter of a living creature, have some sympathy with falt: for all life hath a sympathy with falt. We see, that falt laid to a cut finger healeth it; so as it seemeth falt draweth blood, as well as blood draweth falt.

983. It hath been anciently received, that the sea-hare hath an antipathy with the lungs, if it cometh near the body, and erodeth them. Whereof the cause is conceived to be, a quality it hath of heating the breath and spirits; as cantharides have upon the watry parts of the body, as urine and hydropical water. And it is a good rule, that whatsoever hath an operation upon certain kinds of matters, that, in man's body, worketh most upon those parts wherein that kind of matter aboundeth.

984. GENERALLY that which is dead or corrupted, or excerned, hath antipathy with the same thing when it is alive, and when it is found; and with those parts which do excern: as a carcase of man is most infectious and odious to man; a carrion of an horse to an horse, *etc.* purulent matter of wounds, and ulcers, carbuncles, pocks, scabs, leprosy, to found flesh; and the excrement of every species to that creature that excerneth them: but the excrements are less pernicious than the corruptions.

985. IT is a common experience, that dogs know the dog-killer; when, as in times of infection, some petty fellow is sent out to kill the dogs; and that though they have never seen him before, yet they will all come forth, and bark, and fly at him.

986. THE relations touching the force of imagination, and the secret instincts of nature, are so uncertain, as they require a great deal of examination ere we conclude upon them. I would have it first thoroughly inquired, whether there be any secret passages of sympathy between persons of near blood; as parents, children, brothers, sisters, nurse-children, husbands, wives, *etc.* There be many reports in history, that upon the death of persons of such nearness, men have had an inward feeling of it. I myself remember, that being in Paris, and my father dying in London, two or three days before my father's death, I had a dream, which I told to divers English gentlemen; that my father's house in the country was plaistered all over with black mortar. There is an opinion abroad, whether idle or no I cannot say, that loving and kind husbands have a sense of their wives breeding children, by some accident in their own body.

987. NEXT to those that are near in blood, there may be the like passage, and instincts of nature, between great friends and enemies: and sometimes the revealing is unto another person, and not to the party himself. I remember Philipus Commineus, a grave writer, reporteth, that the archbishop of Vienna, a reverend prelate, said one day after mass to king Lewis the eleventh of France: "Sir, your mortal enemy is dead;" what time duke Charles of Burgundy was slain at the battle of Granson against the Switzers. Some trial also should be made, whether pact or agreement do any thing; as if two friends should agree, that such a day in every week, they being in far distant places, should pray one for another; or should put on a ring or tablet one for another's sake; whether if one of them
should

should break their vow and promise, the other should have any feeling of it in absence.

988. IF there be any force in imaginations and affections of singular persons, it is probable the force is much more in the joint imaginations and affections of multitudes: as if a victory should be won or lost in remote parts, whether is there not some sense thereof in the people whom it concerneth; because of the great joy or grief that many men are possessed with at once? Pius Quintus, at the very time when that memorable victory was won by the Christians against the Turks, at the naval battle of Lepanto, being then hearing of caules in contutory, brake off suddenly, and said to thole about him, "It is now more time we should give thanks to God, for the great victory he hath granted us against the Turks:" it is true, that victory had a sympathy with his spirit; for it was merely his work to conclude that league. It may be that revelation was divine; but what shall we say then to a number of examples amongst the Grecians and Romans? where the people being in theaters at plays, have had news of victories and overthrows, some few days before any messenger could come.

It is true, that that may hold in these things, which is the general root of superstition: namely, that men observe when things hit, and not when they miss; and commit to memory the one, and forget and pass over the other. But touching divination, and the misgiving of minds, we shall speak more when we handle in general the nature of minds, and souls, and spirits.

989. WE have given formerly some rules of imagination; and touching the fortifying of the same. We have set down also some few instances and directions, of the force of imagination upon beasts, birds, *etc.* upon plants, and upon inanimate bodies: wherein you must still observe, that your trials be upon subtle and light motions, and not the contrary; for you will sooner by imagination bind a bird from singing, than from eating or flying: and I leave it to every man, to choose experiments, which himself thinketh most commodious; giving now but a few examples of every of the three kinds.

990. Use some imaginant, observing the rules formerly prescribed, for binding of a bird from singing; and the like of a dog from barking. Try also the imagination of some, whom you shall accommodate with things to fortify it, in cock-fights, to make one cock more hardy, and the other more cowardly. It should be tried also in flying of hawks; or in coursing of a deer, or hare, with grayhounds: or in horse-races; and the like comparative motions: for you may sooner by imagination quicken or slack a motion, than raise or cease it; as it is easier to make a dog go slower, than to make him stand still, that he may not run.

991. IN plants also you may try the force of imagination upon the lighter sort of motions: as upon the sudden fading, or lively coming up of herbs; or upon their bending one way or other; or upon their closing and opening, *etc.*

992. FOR inanimate things, you may try the force of imagination, upon staying the working of beer when the barm is put in; or upon the coming of butter or cheese, after the churning, or the rennet be put in.

993. It is an ancient tradition every where alledged, for example of secret proprieties and influxes, that the *torpedo marina*, if it be touched with a long stick, doth stupify the hand of him that toucheth it. It is one degree of working at distance, to work by the continuance of a fit medium; as for it will be consi-
 cyed.

veyed to the ear, by striking upon a bow-string, if the horn of the bow be held to the ear.

994. THE writers of natural magic do attribute much to the virtues that come from the parts of living creatures; so as they be taken from them, the creatures remaining still alive: as if the creatures still living did infuse some immateriate virtue and vigour into the part fevered. So much may be true; that any part taken from a living creature newly slain, may be of greater force, than if it were taken from the like creature dying of itself, because it is fuller of spirit.

995. TRIAL should be made of the like parts of individuals in plants and living creatures; as to cut off a stock of a tree, and to lay that which you cut off to putrify, to see whether it will decay the rest of the stock: or if you should cut off part of the tail, or leg of a dog or a cat, and lay it to putrify, and so see whether it will fester, or keep from healing the part which remaineth.

996. IT is received, that it helpeth to continue love, if one wear a ring, or a bracelet, of the hair of the party beloved. But that may be by the exciting of the imagination: and perhaps a glove, or other like favour, may as well do it.

997. THE sympathy of individuals, that have been entire, or have touched, is of all others the most incredible: yet according to our faithful manner of examination of nature, we will make some little mention of it. The taking away of warts, by rubbing them with somewhat that afterwards is put to waste and consume, is a common experiment; and I do apprehend it the rather because of my own experience. I had from my childhood a wart upon one of my fingers: afterwards when I was about sixteen years old, being then at Paris, there grew upon both my hands a number of warts, at the least an hundred, in a month's space. The English ambassador's lady, who was a woman far from superstition, told me one day, she would help me away with my warts: whereupon she got a piece of lard with the skin on, and rubbed the warts all over with the fat side; and amongst the rest, that wart which I had had from my childhood; then she nailed the piece of lard, with the fat towards the sun, upon a post of her chamber-window, which was to the south. The success was, that within five weeks space all the warts went quite away: and that wart which I had so long endured, for company. But at the rest I did little marvel, because, they came in a short time, and might go away in a short time again: but the going away of that which had stayed so long doth yet stick with me. They say the like is done by the rubbing of warts with a green alder stick, and then burying the stick to rot in muck. It should be tried with corns and wens, and such other excrescences. I would have it also tried with some parts of living creatures, that are nearest the nature of excrescences; as the combs of cocks, the spurs of cocks, the horns of beasts, *etc.* And I would have it tried both ways; both by rubbing those parts with lard, or alder, as before; and by cutting off some piece of those parts, and laying it to consume: to see whether it will work any effect towards the consumption of that part which was once joined with it.

998. IT is constantly received and avouched, that the anointing of the weapon that maketh the wound, will heal the wound itself. In this experiment, upon the relation of men of credit, though myself, as yet, am not fully inclined to believe it, you shall note the points following: first, the ointment wherewith this is done, is made of divers ingredients; whereof the strangest and hardest to come by, are the moss upon the skull of a dead man unburied; and the fats of a boar and a bear
killed

killed in the act of generation. These two last I could easily suspect to be prescribed as a starting hole; that if the experiment proved not, it might be pretended that the beasts were not killed in the due time; for as for the moss, it is certain there is great quantity of it in Ireland, upon slain bodies, laid on heaps unburied. The other ingredients are, the blood-stone in powder, and some other things, which seem to have a virtue to stanch blood; as also the moss hath. And the description of the whole ointment is to be found in the chemical dispensatory of Crollius. Secondly, the same kind of ointment applied to the hurt itself, worketh not the effect; but only applied to the weapon. Thirdly, which I like well, they do not observe the consecrating of the ointment under any certain constellation, which commonly is the excuse of magical medicines when they fail, that they were not made under a fit figure of heaven. Fourthly, it may be applied to the weapon, though the party hurt be at great distance. Fifthly, it seemeth the imagination of the party to be cured is not needful to concur; for it may be done without the knowledge of the party wounded: and thus much has been tried, that the ointment, for experiment's sake, hath been wiped off the weapon, without the knowledge of the party hurt, and presently the party hurt has been in great rage of pain, till the weapon was re-anointed. Sixthly, it is affirmed, that if you cannot get the weapon, yet if you put an instrument of iron or wood, resembling the weapon, into the wound, whereby it bleedeth, the anointing of that instrument will serve and work the effect. This I doubt should be a device to keep this strange form of cure in request and use: because many times you cannot come by the weapon itself. Seventhly, the wound must be at first washed clean with white wine, or the party's own water; and then bound up close in fine linen, and no more dressing renewed till it be whole. Eighthly, the sword itself must be wrapped up close, as far as the ointment goeth, that it taketh no wind. Ninthly, the ointment, if you wipe it off from the sword and keep it, will serve again; and rather increase in virtue than diminish. Tenthly, it will cure in far shorter time, than ointments of wounds commonly do. Lastly, it will cure a beast as well as a man; which I like best of all the rest, because it subjecteth the matter to an easy trial.

Experiment solitary touching secret proprieties.

999. I WOULD have men know, that though I reprehend the easy passing over the causes of things, by ascribing them to secret and hidden virtues, and proprieties, for this hath arrested and laid asleep all true inquiry and indications, yet I do not understand, but that in the practical part of knowledge, much will be left to experience and probation, whereunto indication cannot so fully reach: and this not only *in specie*, but *in individuo*. So in physic; if you will cure the jaundice, it is not enough to say, that the medicine must not be cooling; for that will hinder the opening which the disease requireth: that it must not be hot; for that will exasperate choler: that it must go to the gall; for there is the obstruction which causeth the disease, *etc.* But you must receive from experience that powder of *Chamaeipyris*, or the like, drunk in beer, is good for the jaundice. So again a wise physician doth not continue still the same medicine to a patient; but he will vary, if the first medicine doth not apparently succeed: for of those remedies that are good for the jaundice, stone, agues, *etc.* that will do good in one body, which
will

will not do good in another ; according to the correspondence the medicine hath to the individual body.

Experiment solitary touching the general sympathy of mens spirits.

1000. THE delight which men have in popularity, fame, honour, submission, and subjection of other mens minds, wills, or affections, although these things may be desired for other ends, seemeth to be a thing in itself, without contemplation of consequence, grateful and agreeable to the nature of man. This thing, surely, is not without some signification, as if all spirits and souls of men came forth out of one divine *limbus* ; else why should men be so much affected with that which others think or say ? The best temper of minds desireth good name and true honour : the lighter, popularity and applause : the more depraved, subjection and tyranny ; as is seen in great conquerors and troublers of the world : and yet more in arch-heretics ; for the introducing of new doctrines is likewise an affectation of tyranny over the understandings and beliefs of men.



N E W

A T L A N T I S.

A Work unfinished.

T O T H E
R E A D E R.

THIS fable my lord devised, to the end that he might exhibit therein a model or description of a college, instituted for the interpreting of nature, and the producing of great and marvellous works, for the benefit of men; under the name of Solomon's house, or the College of the six days works. And even so far his lordship hath proceeded, as to finish that part. Certainly the model is more vast and high, than can possibly be imitated in all things; notwithstanding most things therein are within mens power to effect. His lordship thought also in this present fable, to have composed a frame of laws, or of the best state or mould of a commonwealth; but foreseeing it would be a long work, his desire of collecting the Natural History diverted him, which he preferred many degrees before it.

This work of the New Atlantis, as much as concerneth the English edition, his lordship designed for this place; in regard it hath so near affinity, in one part of it, with the preceding Natural History.

W. R A W L E Y.

N E W

NEW ATLANTIS.

WE failed from Peru, where we had continued by the space of one whole year, for China and Japan, by the south sea, taking with us victuals for twelve months ; and had good winds from the east, though soft and weak, for five months space and more. But then the wind came about, and settled in the west for many days, so as we could make little or no way, and were sometimes in purpose to turn back. But then again there arose strong and great winds from the south, with a point east, which carried us up, for all that we could do, towards the north : by which time our victuals failed us, though we had made good spare of them. So that finding ourselves in the midst of the greatest wilderness of waters in the world, without victual, we gave ourselves for lost men, and prepared for death. Yet we did lift up our hearts and voices to God above, who sheweth *his wonders in the deep* ; beseeching him of his mercy, that as in the beginning he discovered the face of the deep, and brought forth dry land ; so he would now discover land to us, that we might not perish. And it came to pass, that the next day about evening, we saw within a kenning before us, towards the north, as it were thick clouds, which did put us in some hope of land ; knowing how that part of the south sea was utterly unknown ; and might have islands or continents, that hitherto were not come to light. Wherefore we bent our course thither, where we saw the appearance of land all that night ; and in the dawning of the next day, we might plainly discern that it was a land, flat to our sight, and full of bosage, which made it shew the more dark. And after an hour and a half's sailing, we entered into a good haven, being the port of a fair city ; not great indeed, but well built, and that gave a pleasant view from the sea : and we thinking every minute long till we were on land, came close to the shore, and offered to land. But straightways we saw divers of the people with bastons in their hands, as it were, forbidding us to land ; yet without any cries or fierceness, but only as warning us off by signs that they made. Whereupon being not a little discomfited, we were advising with ourselves what we should do. During which time there made forth to us a small boat, with about eight persons in it ; whereof one of them had in his hand a tipstaff of a yellow cane, tipped at both ends with blue, who came aboard our ship, without any shew of distrust at all. And when he saw one of our number present himself somewhat afore the rest, he drew forth a little scroll of parchment, somewhat yellower than our parchment, and shining like the leaves of writing tables, but otherwise soft and flexible, and delivered it to our foremost man. In which scroll were written in ancient Hebrew, and in ancient Greek, and in good Latin of the school, and in Spanish, these words ; “ Land ye not, none of you, and provide to be gone from this coast within sixteen days, except you have farther time given you : mean while, if you want fresh water, or victual, or help for your sick, or that your ship needeth repair, write down your wants, and you shall have that which belongeth to mercy.” This scroll was signed with a stamp of cherubims wings, not spread, but hanging downwards, and by them a cross. This being delivered, the officer

returned, and left only a servant with us to receive our answer. Consulting hereupon amongst ourselves, we were much perplexed. The denial of landing, and hasty warning us away, troubled us much; on the other side, to find that the people had languages, and were so full of humanity, did comfort us not a little. And above all, the sign of the cross to that instrument was to us a great rejoicing, and as it were a certain presage of good. Our answer was in the Spanish tongue; "That for our ship, it was well; for we had rather met with calms and contrary winds than any tempests. For our sick, they were many, and in very ill case; so that if they were not permitted to land, they ran in danger of their lives." Our other wants we set down in particular; adding, "that we had some little store of merchandise, which if it pleased them to deal for, it might supply our wants without being chargeable unto them." We offered some reward in pistolets unto the servant, and a piece of crimson velvet to be presented to the officer: but the servant took them not, nor would scarce look upon them; and so left us, and went back in another little boat which was sent for him.

About three hours after we had dispatched our answer, there came towards us a person, as it seemed, of place. He had on him a gown with wide sleeves, of a kind of water camlet, of an excellent azure colour, far more glossy than ours; his under-apparel was green, and so was his hat, being in the form of a turban, daintily made, and not so huge as the Turkish turbans; and the locks of his hair came down below the brims of it. A reverend man was he to behold. He came in a boat, gilt in some part of it, with four persons more only in that boat; and was followed by another boat, wherein were some twenty. When he was come within a flight shot of our ship, signs were made to us, that we should send forth some to meet him upon the water, which we presently did in our ship-boat, sending the principal man amongst us save one, and four of our number with him. When we were come within six yards of their boat, they called to us to stay, and not to approach farther; which we did. And thereupon the man, whom I before described, stood up, and with a loud voice in Spanish, asked, "Are ye Christians?" We answered, "we were;" fearing the less, because of the cross we had seen in the subscription. At which answer the said person lift up his right hand towards heaven, and drew it softly to his mouth, which is the gesture they use when they thank God, and then said: "If ye will swear, all of you, by the merits of the Saviour, that ye are no pirates; nor have shed blood lawfully nor unlawfully within forty days past; you may have licence to come on land." We said, "we were all ready to take that oath." Whereupon one of those that were with him, being, as it seemed, a notary, made an entry of this act. Which done, another of the attendants of the great person, which was with him in the same boat, after his lord had spoken a little to him, said aloud; "My lord would have you know, that it is not of pride or greatness, that he cometh not aboard your ship; but for that, in your answer, you declare, that you have many sick amongst you, he was warned by the conservator of health of the city, that he should keep a distance." We bowed ourselves towards him, and answered, "we were his humble servants; and accounted for great honour, and singular humanity towards us, that which was already done; but hoped well, that the nature of the sickness of our men was not infectious." So he returned; and a while after came the notary to us aboard our ship; holding in his hand a fruit of that country, like an orange, but of colour between orange-tawny and scarlet, which cast a most excellent odour. He used it, as it seemeth, for a preservative against infection.

tion. He gave us our oath; "By the name of Jesus, and his merits:" and after told us, that the next day by six of the clock in the morning we should be sent to, and brought to the Strangers house, so he called it, where we should be accommodated with things, both for our whole, and for our sick. So he left us; and when we offered him some pistolets, he smiling, said; "he must not be twice paid for one labour:" meaning, as I take it, that he had salary sufficient of the State for his service. For, as I afterwards learned, they call an officer that taketh rewards, Twice-paid.

The next morning early, there came to us the same officer that come to us at first with his cane, and told us, "he came to conduct us to the Strangers house; and that he had prevented the hour, because we might have the whole day before us for our business. For, said he, if you will follow my advice, there shall first go with me some few of you, and see the place, and how it may be made convenient for you; and then you may send for your sick, and the rest of your number, which ye will bring on land." We thanked him, and said, that his care, which he took of desolate strangers, God would reward. And so six of us went on land with him: and when we were on land, he went before us, and turned to us, and said; "he was but our servant, and our guide." He led us through three fair streets; and all the way we went there were gathered some people on both sides, standing in a row; but in so civil a fashion, as if it had been, not to wonder at us, but to welcome us; and divers of them, as we passed by them, put their arms a little abroad; which is their gesture, when they bid any welcome. The Strangers house is a fair and spacious house, built of brick, of somewhat a bluer colour than our brick; and with handsome windows, some of glass, some of a kind of cambric oiled. He brought us first into a fair parlour above stairs, and then asked us, "What number of persons we were? And how many sick?" We answered, "we were in all, sick and whole, one and fifty persons, whereof our sick were seven-
"ten." He desired us to have patience a little, and to stay till he came back to us, which was about an hour after; and then he led us to see the chambers, which were provided for us, being in number nineteen: They having cast it, as it seemeth, that four of those chambers, which were better than the rest, might receive four of the principal men of our company, and lodge them alone by themselves; and the other fifteen chambers, were to lodge us two and two together. The chambers were handsome and chearful chambers, and furnished civilly. Then he led us to a long gallery, like a dorture, where he shewed us all along the one side, for the other side was but wall and window, seventeen cells, very neat ones, having partitions of cedar wood. Which gallery and cells, being in all forty, many more than we needed, were instituted as an infirmary for sick persons. And he told us withal, that as any of our sick waxed well, he might be removed from his cell to a chamber: for which purpose there were set forth ten spare chambers, besides the number we spake of before. This done, he brought us back to the parlour, and lifting up his cane a little, as they do when they give any charge or command, said to us, "Ye are to know that the custom of the land requireth, that after this day and to-morrow, which we give you for removing of your people from your ship, you are to keep within doors for three days. But let it not trouble you, nor do not think yourselves restrained, but rather left to your rest and ease. You shall want nothing, and there are six of our people appointed to attend you, for any business you may have abroad." We gave him thanks, with all affection and respect, and said; "God surely is ma-
"nifested

“ nifested in this land.” We offered him also twenty pistolets; but he smiled, and only said; “ What? twice paid!” And so he left us. Soon after our dinner was served in; which was right good viands, both for bread and meat: better than any collegiate diet that I have known in Europe. We had also drink of three sorts, all wholsom and good; wine of the grape; a drink of grain, such as is with us our ale, but more clear: and a kind of cider made of a fruit of that country; a wonderful pleasing and refreshing drink. Besides, there were brought in to us great store of those scarlet oranges for our sick; which, they said, were an assured remedy for sickness taken at sea. There was given us also, a box of small gray or whitish pills, which they wished our sick should take, one of the pills every night before sleep; which, they said, would hasten their recovery. The next day, after that our trouble of carriage, and removing of our men, and goods out of our ship, was somewhat settled and quiet, I thought good to call our company together; and when they were assembled, said unto them; “ My dear friends, let us know ourselves, and how it standeth with us. We are men cast on land, as Jonas was, out of the whale’s belly, when we were as buried in the deep: and now we are on land, we are but between death and life; for we are beyond both the old world and the new; and whether ever we shall see Europe, God only knoweth. It is a kind of miracle hath brought us hither: and it must be little less that shall bring us hence. Therefore in regard of our deliverance past, and our danger present and to come, let us look up to God, and every man reform his own ways. Besides we are come here among a christian people, full of piety and humanity: let us not bring that confusion of face upon ourselves, as to shew our vices or unworthiness before them. Yet there is more: for they have by commandment, though in form of courtesy, cloistered us within these walls for three days: who knoweth whether it be not to take some taste of our manners and conditions? And if they find them bad, to banish us straightways; if good, to give us farther time. For these men, that they have given us for attendance, may withal have an eye upon us. Therefore for God’s love, and as we love the weale of our souls and bodies, let us so behave ourselves as we may be at peace with God, and may find grace in the eyes of this people.” Our company with one voice thanked me for my good admonition, and promised me to live soberly and civilly, and without giving any the least occasion of offence. So we spent our three days joyfully, and without care, in expectation what would be done with us when they were expired. During which time, we had every hour joy of the amendment of our sick; who thought themselves cast into some divine pool of healing; they mended so kindly and so fast.

The morrow after our three days were past, there came to us a new man, that we had not seen before, clothed in blue as the former was, save that his turban was white, with a small red cross on the top. He had also a tippet of fine linen. At his coming in he did bend to us a little, and put his arms abroad. We of our parts saluted him in a very lowly and submissive manner; as looking that from him we should receive sentence of life or death. He desired to speak with some few of us: whereupon six of us only stayed, and the rest avoided the room. He said; “ I am by office governor of this House of strangers, and by vocation I am a Christian priest; and therefore am come to you, to offer you my service, both as strangers, and chiefly as Christians. Some things I may tell you, which I think you will not be unwilling to hear. The state hath given you licence to stay on land for the space of six weeks: and let it not trouble you if your occasions ask farther
“ time,

“ time, for the law in this point is not precise; and I do not doubt but myself shall
 “ be able to obtain for you such farther time as may be convenient. Ye shall also
 “ understand, that the Strangers house is at this time rich, and much aforehand;
 “ for it hath laid up revenue these thirty seven years; for so long it is since any
 “ stranger arrived in this part: and therefore take ye no care; the state will defray
 “ you all the time you stay; neither shall you stay one day the less for that. As for
 “ any merchandise you have brought, ye shall be well used, and have your return
 “ either in merchandise, or in gold and silver: for to us it is all one. And if you
 “ have any other request to make, hide it not. For ye shall find, we will not make
 “ your countenance to fall by the answer ye shall receive. Only this I must tell you,
 “ that none of you must go above a *keran*, that is with them a mile and an half,
 “ from the walls of the city without special leave.” We answered, after we had looked
 awhile one upon another, admiring this gracious and parent-like usage; “ that we
 “ could not tell what to say: for we wanted words to express our thanks; and his
 “ noble free offers left us nothing to ask. It seemed to us, that we had before us
 “ a picture of our salvation in heaven: for we that were awhile since in the jaws of
 “ death, were now brought into a place where we found nothing but consolations.
 “ For the commandment laid upon us, we would not fail to obey it, though it was
 “ impossible but our hearts should be inflamed to tread farther upon this happy and
 “ holy ground. We added; that our tongues should first cleave to the roofs of
 “ our mouths, ere we should forget either his reverend person, or this whole na-
 “ tion in our prayers.” We also most humbly besought him to accept of us as his
 true servants, by as just a right as ever men on earth were bounden, laying and pre-
 senting, both our persons, and all we had at his feet. He said; “ he was a priest,
 “ and looked for a priest’s reward; which was our brotherly love, and the good of
 “ our souls and bodies.” So he went from us, not without tears of tenderness in
 his eyes; and left us also confused with joy and kindness, saying amongst our-
 selves, “ that we were come into a land of angels, which did appear to us daily, and
 “ prevent us with comforts which we thought not of, much less expected.”

The next day about ten of the clock the governor came to us again, and after
 salutations said familiarly, that he was come to visit us; and called for a chair, and
 sat him down: and we being some ten of us, the rest were of the meaner sort, or else
 gone abroad, sat down with him. And when we were set, he began thus: “ We of
 “ this island of Bensalem, for so they call it in their language, have this; that by
 “ means of their solitary situation, and of the laws of secrecy which we have for our
 “ travellers, and our rare admission of strangers; we know well most part of the
 “ habitable world, and are ourselves unknown. Therefore because he that know-
 “ eth least is fittest to ask questions, it is more reason for the entertainment of the
 “ time, that ye ask me questions, than that I ask you.” We answered; “ That we
 “ humbly thanked him that he would give us leave so to do: and that we con-
 “ ceived by the taste we had already, that there was no worldly thing on earth
 “ more worthy to be known than the state of that happy land. But above all, we
 “ said, since that we were met from the several ends of the world, and hoped assuredly
 “ that we should meet one day in the kingdom of heaven, for that we were both
 “ parts Christians, we desired to know, in respect that land was so remote, and so
 “ divided by vast and unknown seas, from the land where our Saviour walked on
 “ earth, who was the Apostle of that nation, and how it was converted to the
 “ faith?” It appeared in his face that he took great contentment in this our question:

he

he said, "Ye knit my heart to you, by asking this question in the first place; for it sheweth that you *first seek the kingdom of heaven*; and I shall gladly and briefly satisfy your demand.

"About twenty years after the ascension of our Saviour, it came to pass, that there was seen by the people of Renfusa, a city upon the eastern coast of our island, within night, the night was cloudy and calm, as it might be some mile into the sea, a great pillar of light; not sharp, but in form of a column or cylinder rising from the sea, a great way up towards heaven; and on the top of it was seen a large cross of light, more bright and resplendent than the body of the pillar. Upon which so strange a spectacle, the people of the city gathered apace together upon the sands to wonder; and so after put themselves into a number of small boats, to go nearer to this marvellous sight. But when the boats were come within about sixty yards of the pillar, they found themselves all bound, and could go no farther, yet so as they might move to go about, but might not approach nearer: so as the boats stood all as in a theatre, beholding this light as an heavenly sign. It so fell out, that there was in one of the boats one of the wise men of the society of Solomon's house, which house or college, my good brethren, is the very eye of this kingdom; who having a while attentively and devoutly viewed and contemplated this pillar and cross, fell down upon his face; and then raised himself upon his knees, and lifting up his hands to heaven, made his prayers in this manner:

"*Lord God of heaven and earth; thou hast vouchsafed of thy grace, to those of our order, to know thy works of creation, and the secrets of them; and to discern, as far as appertaineth to the generations of men, between divine miracles, works of nature, works of art, and impostures and illusions of all sorts. I do here acknowledge and testify before this people, that the thing which we now see before our eyes, is thy finger, and a true miracle; and forasmuch as we learn in our books, that thou never workest miracles, but to a divine and excellent end, for the laws of nature are thine own laws, and thou exceedest them not but upon great cause, we most humbly beseech thee to prosper this great sign, and to give us the interpretation and use of it in mercy; which thou dost in some part secretly promise by sending it unto us.*

"When he had made his prayer, he presently found the boat he was in moveable and unbound; whereas all the rest remained still fast; and taking that for an assurance of leave to approach, he caused the boat to be softly and with silence rowed towards the pillar. But ere he came near it, the pillar and cross of light brake up, and cast itself abroad, as it were into a firmament of many stars; which also vanished soon after, and there was nothing left to be seen but a small ark or chest of cedar, dry, and not wet at all with water, though it swam. And in the fore-end of it which was towards him, grew a small green branch of palm; and when the wise man had taken it with all reverence into his boat, it opened of itself, and there were found in it a book and a letter; both written in fine parchment, and wrapped in bindons of linen. The book contained all the canonical books of the Old and New Testament, according as you have them, for we know well what the churches with you receive, and the Apocalypse itself: and some other books of the New Testament, which were not at that time written, were nevertheless in the book: and for the letter it was in these words:

"*I Bartholomew, a servant of the Highest, and Apostle of Jesus Christ, was warned by an angel that appeared to me in a vision of glory, that I should commit this ark to the*
"floods

“ *floods of the sea. Therefore I do testify and declare, unto that people where God shall ordain this ark to come to land, that in the same day is come unto them salvation, and peace, and good-will, from the Father, and from the Lord Jesus.*”

“ There was also in both these writings, as well the book as the letter, wrought a great miracle, conform to that of the Apostles in the original gift of tongues. For there being at that time in this land, Hebrews, Persians, and Indians, besides the natives, every one read the book and letter, as if they had been written in his own language. And thus was this land saved from infidelity, as the remnant of the old world was from water, by an ark, through the apostolical and miraculous evangelism of St. Bartholomew.” And here he paused, and a messenger came, and called him from us. So this was all that passed in that conference.

The next day the same governor came again to us immediately after dinner, and excused himself, saying; “ that the day before he was called from us somewhat abruptly, but now he would make us amends, and spend time with us, if we held his company and conference agreeable :” we answered; “ that we held it so agreeable and pleasing to us, as we forgot both dangers past and fears to come, for the time we heard him speak; and that we thought an hour spent with him, was worth years of our former life.” He bowed himself a little to us, and after we were set again, he said; “ Well, the questions are on your part.” One of our number said, after a little pause; “ that there was a matter we were no less desirous to know than fearful to ask, lest we might presume too far. But encouraged by his rare humanity towards us, that could scarce think ourselves strangers, being his vowed and professed servants, we would take the hardiness to propound it: humbly beseeching him, if he thought it not fit to be answered, that he would pardon it, though he rejected it.” We said; “ we well observed those his words, which he formerly spake, that this happy island where we now stood, was known to few, and yet knew most of the nations of the world; which we found to be true, considering they had the languages of Europe, and knew much of our state and business; and yet we in Europe, notwithstanding all the remote discoveries and navigations of this last age, never heard any the least inkling or glimpse of this island. This we found wonderful strange; for that all nations have interknowledge one of another, either by voyage into foreign parts, or by strangers that come to them: and though the traveller into a foreign country doth commonly know more by the eye, than he that stayeth at home can by relation of the traveller; yet both ways suffice to make a mutual knowledge, in some degree, on both parts. But for this island, we never heard tell of any ship of theirs, that had been seen to arrive upon any shore of Europe; no, nor of either the East or West Indies, nor yet of any ship of any other part of the world, that had made return from them. And yet the marvel rested not in this. For the situation of it, as his lordship said, in the secret conclave of such a vast sea might cause it. But then, that they should have knowledge of the languages, books, affairs of those that lie such a distance from them, it was a thing we could not tell what to make of; for that it seemed to us a condition and propriety of divine powers and beings, to be hidden and unseen to others, and yet to have others open, and as in a light to them.” At this speech the governor gave a gracious smile, and said; “ that we did well to ask pardon for this question we now asked; for that it imported, as if we thought this land a land of magicians, that sent forth spirits of the air into all parts,

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“ to bring them news and intelligence of other countries.” It was answered by us all, in all possible humbleness, but yet with a countenance taking knowledge that we knew that he spake it but merrily, “ That we were apt enough to think there “ was something supernatural in this island, but yet rather as angelical than magi- “ cal. But to let his lordship know truly, what it was that made us tender and “ doubtful to ask this question, it was not any such conceit, but because we re- “ membered, he had given a touch in his former speech, that this land had laws of “ secrecy touching strangers.” To this he said; “ You remember it aright; “ and therefore in that I shall say to you, I must reserve some particulars, which “ it is not lawful for me to reveal; but there will be enough left to give you sa- “ tisfaction.

“ You shall understand, that which perhaps you will scarce think credible, that “ about three thousand years ago, or somewhat more, the navigation of the world, “ especially for remote voyages, was greater than at this day. Do not think with “ yourselves, that I know not how much it is increased with you within these six- “ score years: I know it well; and yet I say greater then than now: whether it “ was, that the example of the ark, that saved the remnant of men from the univer- “ sal deluge, gave men confidence to adventure upon the waters, or what it was, “ but such is the truth. The Phœnicians, and especially the Tyrians, had great “ fleets. So had the Carthaginians their colony, which is yet farther west. To- “ ward the east, the shipping of Ægypt, and of Palæstine, was likewise great. “ China also, and the great Atlantis, that you call America, which have now but “ junks and canoes, abounded then in tall ships. This island, as appeareth by “ faithful registers of those times, had then fifteen hundred strong ships, of great “ content. Of all this, there is with you sparing memory, or none; but we have “ large knowledge thereof.

“ At that time, this land was known and frequented by the ships and vessels of “ all the nations before named. And, as it cometh to pass, they had many times “ men of other countries, that were no sailors, that came with them; as Persians, “ Chaldæans, Arabians, so as almost all nations of might and fame resorted hither; “ of whom we have some stirps and little tribes with us at this day. And for our “ own ships, they went fundry voyages, as well to your Straits, which you call the “ pillars of Hercules, as to other parts in the Atlantic and Mediterranean seas; as to “ Peguin, which is the same with Cambaline, and Quinzy, upon the oriental seas, “ as far as to the borders of the east Tartary.

“ At the same time, and an age after, or more, the inhabitants of the great At- “ lantis did flourish. For though the narration and description which is made by a “ great man with you, that the descendents of Neptune planted there; and of the “ magnificent temple, palace, city, and hill; and the manifold streams of goodly “ navigable rivers, which, as so many chains, environed the same site and temple; “ and the several degrees of ascent, whereby men did climb up to the same, as if it “ had been a *scali cali*; be all poetical and fabulous: yet so much is true, that the “ said country of Atlantis, as well that of Peru then called Coya, as that of Mexico “ then named Tyrambel, were mighty and proud kingdoms, in arms, shipping, “ and riches: so mighty, as at one time, or at least within the space of ten years, “ they both made two great expeditions, they of Tyrambel, through the Atlantic “ to the Mediterranean Sea; and they of Coya, through the South Sea upon this “ our island: and for the former of these, which was into Europe, the same author “ amongst

“ amongst you, as it seemeth, had some relation from the Ægyptian priest whom
 “ he citeth. For assuredly, such a thing there was, but whether it were the an-
 “ cient Athenians that had the glory of the repulse and resistance of those forces, I
 “ can say nothing: but certain it is, there never came back either ship, or man,
 “ from that voyage. Neither had the other voyage of those of Coya upon us had
 “ better fortune, if they had not met with enemies of greater clemency. For the
 “ king of this island, by name Altabin, a wise man, and a great warrior; knowing
 “ well both his own strength, and that of his enemies; handled the matter so, as
 “ he cut off their land forces from their ships, and entailed both their navy, and
 “ their camp, with a greater power than theirs, both by sea and land; and com-
 “ pelled them to render themselves without striking stroke: and after they were at
 “ his mercy, contenting himself only with their oath, that they should no more
 “ bear arms against him, dismissed them all in safety. But the divine revenge over-
 “ took not long after those proud enterprises. For within less than the space of
 “ one hundred years, the great Atlantis was utterly lost and destroyed: not by a
 “ great earthquake, as your man saith, for that whole tract is little subject to earth-
 “ quakes, but by a particular deluge, or inundation: those countries having, at this
 “ day, far greater rivers, and far higher mountains, to pour down waters, than any
 “ part of the old world. But it is true, that the same inundation was not deep; not
 “ past forty foot, in most places, from the ground. so that although it destroyed
 “ man and beast generally, yet some few wild inhabitants of the wood escaped. Birds
 “ also were saved by flying to the high trees and woods. For as for men, although
 “ they had buildings in many places, higher than the depth of the water; yet that
 “ inundation, though it were shallow, had a long continuance; whereby they of the
 “ vale, that were not drowned, perished for want of food, and other things necessary.
 “ So as marvel you not at the thin population of America, nor at the rudeness
 “ and ignorance of the people; for you must account your inhabitants of America
 “ as a young people; younger a thousand years, at the least, than the rest of the
 “ world: for that there was so much time between the universal flood, and their
 “ particular inundation. For the poor remnant of human seed, which remained
 “ in their mountains, peopled the country again slowly, by little and little; and
 “ being simple and savage people, not like Noah and his sons, which was the
 “ chief family of the earth, they were not able to leave letters, arts, and civility to
 “ their posterity; and having likewise in their mountainous habitations been used,
 “ in respect of the extreme cold of those regions, to clothe themselves with the
 “ skins of tygers, bears, and great hairy goats, that they have in those parts; when
 “ after they came down into the valley, and found the intolerable heats which are
 “ there, and knew no means of lighter apparel, they were forced to begin the custom
 “ of going naked, which continueth at this day. Only they take great pride and de-
 “ light in the feathers of birds; and this also they took from those their ancestors
 “ of the mountains, who were invited unto it by the infinite flights of birds, that
 “ came up to the high grounds while the waters stood below. So you see, by
 “ this main accident of time, we lost our traffic with the Americans, with whom,
 “ of all others, in regard they lay nearest to us, we had most commerce. As for
 “ the other parts of the world, it is most manifest, that in the ages following,
 “ whether it were in respect of wars, or by a natural revolution of time, naviga-
 “ tion did every where greatly decay; and especially far voyages, the rather by the
 “ use of galleys, and such vessels as could hardly brook the ocean, were altogether
 “ left

“ left and omitted. So then, that part of intercourse which could be from other
 “ nations to sail to us, you see how it hath long since ceased; except it were by
 “ some rare accident, as this of yours. But now of the cessation of that other part
 “ of intercourse, which might be by our sailing to other nations, I must yield you
 “ some other cause. For I cannot say, if I shall say truly, but our shipping, for
 “ number, strength, mariners, pilots, and all things that appertain to navigation,
 “ is as great as ever: and therefore why we should sit at home, I shall now give you
 “ an account by itself; and it will draw nearer to give you satisfaction, to your
 “ principal question.

“ There reigned in this island, about nineteen hundred years ago, a king, whose
 “ memory of all others we most adore; not superstitiously, but as a divine instru-
 “ ment, though a mortal man; his name was Solomona: and we esteem him as
 “ the lawgiver of our nation. This king had a large heart, inscrutable for good,
 “ and was wholly bent to make his kingdom and people happy. He therefore tak-
 “ ing into consideration, how sufficient and substantive this land was to maintain it-
 “ self without any aid at all of the foreigner, being five thousand six hundred miles
 “ in circuit, and of rare fertility of soil, in the greatest part thereof; and finding
 “ also the shipping of this country might be plentifully set on work, both by fishing
 “ and by transportations from port to port, and likewise by sailing unto some small
 “ islands that are not far from us, and are under the crown and laws of this state;
 “ and recalling into his memory the happy and flourishing estate wherein this land
 “ then was; so as it might be a thousand ways altered to the worse, but scarce any
 “ one way to the better; thought nothing wanted to his noble and heroic inten-
 “ tions, but only, as far as human foresight might reach, to give perpetuity to that,
 “ which was in his time so happily established. Therefore amongst his other funda-
 “ mental laws of this kingdom, he did ordain the interdicts and prohibitions, which
 “ we have touching entrance of strangers; which at that time, though it was after
 “ the calamity of America, was frequent; doubting novelties, and commixture of
 “ manners. It is true, the like law, against the admission of strangers without li-
 “ cence, is an ancient law in the kingdom of China, and yet continued in use: but
 “ there it is a poor thing; and hath made them a curious, ignorant, fearful, foolish
 “ nation. But our lawgiver made his law of another temper. For first, he hath pre-
 “ served all points of humanity, in taking order, and making provision for the re-
 “ lief of strangers distressed, whereof you have tasted.” At which speech, as reason-
 “ was, we all rose up and bowed ourselves. He went on. “ That the king also still
 “ desiring to join humanity and policy together; and thinking it against humanity,
 “ to detain strangers here against their wills; and against policy that they should re-
 “ turn, and discover their knowledge of this estate, he took this course: he did or-
 “ dain, that of the strangers that should be permitted to land, as many, at all times,
 “ might depart as would; but as many as would stay, should have very good con-
 “ ditions, and means to live from the state. Wherein he saw so far, that now in
 “ so many ages since the prohibition, we have memory, not of one ship that ever
 “ returned, and but of thirteen persons only, at several times, that chose to return
 “ in our bottoms. What those few that returned may have reported abroad I know
 “ not: but you must think, whatsoever they have said, could be taken where they
 “ came but for a dream. Now for our travelling from hence into parts abroad, our
 “ lawgiver thought fit altogether to restrain it. So is it not in China. For the
 “ Chineses sail where they will or can; which sheweth, that their law of keeping
 “ out

“ out strangers, is a law of pusillanimity and fear. But this restraint of ours hath
 “ one only exception, which is admirable; preserving the good which cometh
 “ by communicating with strangers, and avoiding the hurt; and I will now open
 “ it to you. And here I shall seem a little to digress, but you will by and by find
 “ it pertinent. Ye shall understand, my dear friends, that amongst the excellent
 “ acts of that king, one above all hath the preeminence. It was the erection
 “ and institution of an order or society which we call Solomon’s house; the noblest
 “ foundation, as we think, that ever was upon the earth; and the lanthorn of this
 “ kingdom. It is dedicated to the study of the works and creatures of God. Some
 “ think it beareth the founder’s name a little corrupted, as if it should be Solo-
 “ mona’s house. But the records write it, as it is spoken. So as I take it to be
 “ denominate of the king of the Hebrews, which is famous with you, and no stranger
 “ to us; for we have some parts of his works, which with you are lost; namely,
 “ that Natural History which he wrote of all plants, *from the cedar of Libanus, to*
 “ *the moss that groweth out of the wall*; and of all things that have life and motion.
 “ This maketh me think, that our king finding himself to symbolize in many
 “ things with that king of the Hebrews, which lived many years before him, ho-
 “ noured him with the title of this foundation. And I am the rather induced to be
 “ of this opinion, for that I find in ancient records this order or society is some-
 “ times called Solomon’s house, and sometimes the college of the six days works;
 “ whereby I am satisfied, that our excellent king had learned from the Hebrews,
 “ that God had created the world, and all that therein is, within six days; and
 “ therefore he instituting that house for the finding out of the true nature of all
 “ things, whereby God might have the more glory in the workmanship of them,
 “ and men the more fruit in the use of them, did give it also that second name.
 “ But now to come to our present purpose. When the king had forbidden to all
 “ his people navigation into any part, that was not under his crown, he made never-
 “ theless this ordinance; that every twelve years there should be set forth, out of
 “ this kingdom, two ships appointed to several voyages; that in either of these
 “ ships there should be a million of three of the fellows or brethren of Solomon’s
 “ house; whose errand was only to give us knowledge of the affairs and state of
 “ those countries to which they were designed; and especially of the sciences, arts,
 “ manufactures, and inventions of all the world; and withal to bring unto us books,
 “ instruments, and patterns, in every kind: that the ships, after they had landed
 “ the brethren, should return; and that the brethren should stay abroad till the
 “ new mission. These ships are not otherwise fraught, than with store of victuals,
 “ and good quantity of treasure to remain with the brethren, for the buying of
 “ such things, and rewarding of such persons, as they should think fit. Now for
 “ me to tell you how the vulgar sort of mariners are contained from being discover-
 “ ed at land; and how they that must be put on shore for any time, colour them-
 “ selves under the names of other nations; and to what places these voyages have
 “ been designed; and what places of rendezvous are appointed for the new missions;
 “ and the like circumstances of the practise; I may not do it: neither is it much to
 “ your desire. But thus you see we maintain a trade, not for gold, silver, or jewels;
 “ nor for silks; nor for spices; nor any other commodity of matter; but only for
 “ God’s first creature, which was light: to have light, I say, of the growth of all
 “ parts of the world.” And when he had said this he was silent; and so were we
 “ all. For indeed we were all astonished to hear so strange things so probably told.

And

And he perceiving that we were willing to say somewhat, but had it not ready, in great courtesy took us off, and descended to ask us questions of our voyage and fortunes, and in the end concluded, that we might do well to think with ourselves, what time of stay we would demand of the state; and bad us not to scant ourselves; for he would procure such time as we desired. Whereupon we all rose up, and presented ourselves to kiss the skirt of his tippet, but he would not suffer us; and so took his leave. But when it came once amongst our people, that the state used to offer conditions to strangers that would stay, we had work enough to get any of our men to look to our ship; and to keep them from going presently to the governor to crave conditions. But with much ado we refrained them, till we might agree what course to take.

We took ourselves now for free men, seeing there was no danger of our utter perdition; and lived most joyfully, going abroad and seeing what was to be seen in the city and places adjacent within our tedder; and obtaining acquaintance with many of the city, not of the meanest quality; at whose hands we found such humanity, and such a freedom and desire to take strangers as it were into their bosom, as was enough to make us forget all that was dear to us in our own countries: and continually we met with many things, right worthy of observation and relation; as indeed, if there be a mirror in the world worthy to hold mens eyes, it is that country. One day there were two of our company bidden to a feast of the family, as they call it. A most natural, pious, and reverend custom it is, shewing that nation to be compounded of all goodness. This is the manner of it. It is granted to any man, that shall live to see thirty persons descended of his body alive together, and all above three years old, to make this feast, which is done at the cost of the state. The father of the family, whom they call the Tirsan, two days before the feast, taketh to him three of such friends as he liketh to choose; and is assisted also by the governor of the city, or place, where the feast is celebrated; and all the persons of the family of both sexes are summoned to attend him. These two days the Tirsan sitteth in consultation concerning the good estate of the family. There, if there be any discord or suits between any of the family, they are compounded and appeased. There, if any of the family be distressed or decayed, order is taken for their relief, and competent means to live. There, if any be subject to vice, or take ill courses, they are reprov'd and censured. So likewise direction is given touching marriages, and the courses of life which any of them should take, with divers other the like orders and advices. The governor assisteth, to the end to put in execution, by his public authority, the decrees and orders of the Tirsan, if they should be disobeyed; though that seldom needeth; such reverence and obedience they give to the order of nature. The Tirsan doth also then ever choose one man from amongst his sons, to live in the house with him: who is called ever after, the Son of the vine. The reason will hereafter appear. On the feast-day, the father, or Tirsan, cometh forth after divine service into a large room where the feast is celebrated; which room hath an half pace at the upper end. Against the wall, in the middle of the half pace, is a chair placed for him, with a table and carpet before it. Over the chair is a state made round or oval, and it is of ivy; an ivy somewhat whiter than ours, like the leaf of a silver asp, but more shining; for it is green all winter. And the state is curiously wrought with silver and silk of divers colours, broiding or binding in the ivy; and is ever of the work of some of the daughters of the family; and veiled over at the top with a fine net of silk and silver. But the sub-
stance

stance of it is true ivy ; whereof, after it is taken down, the friends of the family are desirous to have some leaf or sprig to keep. The Tirsan cometh forth with all his generation or lineage, the males before him, and the females following him; and if there be a mother, from whose body the whole lineage is descended, there is a traverse placed in a loft above on the right hand of the chair, with a privy door, and a carved window of glass, leaded with gold and blue ; where she sitteth, but is not seen. When the Tirsan is come forth, he sitteth down in the chair ; and all the lineage place themselves against the wall, both at his back, and upon the return of the half pace, in order of their years, without difference of sex, and stand upon their feet. When he is set, the room being always full of company, but well kept, and without disorder ; after some pause there cometh in from the lower end of the room a taratan, which is as much as an herald, and on either side of him two young lads ; whereof one carrieth a scroll of their shining yellow parchment ; and the other a cluster of grapes of gold, with a long foot or stalk. The herald and children are clothed with mantles of sea-water green sattin ; but the herald's mantle is streamed with gold, and hath a train. Then the herald with three curtseys, or rather inclinations, cometh up as far as the half pace ; and there first taketh into his hand the scroll. This scroll is the king's charter, containing gift of revenue, and many privileges, exemptions, and points of honour, granted to the father of the family ; and is ever stiled and directed, " To such an one, our well-beloved friend and creditor : " which is a title proper only to this case. For they say, the king is debtor to no man, but for propagation of his subjects. The seal set to the king's charter, is the king's image, imbossed or moulded in gold ; and though such charters be expedited of course, and as of right, yet they are varied by discretion, according to the number and dignity of the family. This charter the herald readeth aloud : and while it is read, the father or Tirsan standeth up, supported by two of his sons, such as he chooseth. Then the herald mounteth the half pace, and delivereth the charter into his hand : and with that there is an acclamation by all that are present in their language, which is thus much ; " Happy are the people of Bensalem." Then the herald taketh into his hand from the other child the cluster of grapes, which is of gold both the stalk and the grapes. But the grapes are daintily enamelled ; and if the males of the family be the greater number, the grapes are enamelled purple, with a little sun set on the top ; if the females, then they are enamelled into a greenish yellow with a crescent on the top. The grapes are in number as many as there are descendents of the family. This golden cluster the herald delivereth also to the Tirsan ; who presently delivereth it over to that son, that he had formerly chosen to be in the house with him : who beareth it before his father as an ensign of honour, when he goeth in public ever after ; and is thereupon called the Son of the vine. After this ceremony ended, the father or Tirsan retireth ; and after some time cometh forth again to dinner, where he sitteth alone under the state as before ; and none of his descendents sit with him, of what degree or dignity soever, except he hap to be of Solomon's house. He is served only by his own children, such as are male ; who perform unto him all service of the table upon the knee ; and the women only stand about him, leaning against the wall. The room below the half pace, hath tables on the sides for the guests that are bidden ; who are served with great and comely order ; and towards the end of dinner, which, in the greatest feasts with them, lasteth never above an hour and a half, there is an hymn sung, varied according to the invention of him that composeth it, for they have excellent poesy, but the subject of it is,

always,

always, the praises of Adam, and Noah, and Abraham; whereof the former two peopled the world, and the last was the father of the faithful: concluding ever with a thanksgiving for the nativity of our Saviour, in whose birth the births of all are only blessed. Dinner being done, the Tirfan retireth again; and having withdrawn himself alone into a place, where he maketh some private prayers, he cometh forth the third time to give the blessing; with all his descendents, who stand about him as at the first. Then he calleth them forth by one and by one, by name, as he pleaseth, though seldom the order of age be inverted. The person that is called, the table being before removed, kneeleth down before the chair, and the father layeth his hand upon his head, or her head, and giveth the blessing in these words: "Son of Bensalem, or daughter of Bensalem, thy father saith it; the man by whom thou hast breath and life speaketh the word; The blessing of the everlasting Father, the Prince of peace, and the Holy Dove be upon thee, and make the days of thy pilgrimage good and many." This he saith to every of them; and that done, if there be any of his sons of eminent merit and virtue, so they be not above two, he calleth for them again; and saith, laying his arm over their shoulders, they standing; "Sons, it is well ye are born, give God the praise, and persevere to the end." And withal he delivereth to either of them a jewel, made in the figure of an ear of wheat, which they ever after wear in the front of their turban or hat. This done, they fall to music and dances, and other recreations, after their manner, for the rest of the day. This is the full order of that-feast.

By that time six or seven days were spent, I was fallen into strait acquaintance with a merchant of that city, whose name was Joabin. He was a Jew, and circumcised: for they have some few stirps of Jews yet remaining among them, whom they leave to their own religion: which they may the better do, because they are of a far differing disposition from the Jews in other parts. For whereas they hate the name of Christ, and have a secret inbred rancour against the people amongst whom they live; these, contrariwise, give unto our Saviour many high attributes, and love the nation of Bensalem extremely. Surely this man of whom I speak, would ever acknowledge that Christ was born of a virgin; and that he was more than a man; and he would tell how God made him ruler of the seraphims which guard his throne; and they call him also the milken way, and the Eliah of the Messias; and many other high names; which though they be inferior to his divine Majesty, yet they are far from the language of other Jews. And for the country of Bensalem, this man would make no end of commending it: being desirous by tradition among the Jews there, to have it believed, that the people thereof were of the generations of Abraham, by another son, whom they call Nachoran; and that Moses, by a secret cabala, ordained the laws of Bensalem which they now use; and that when the Messias should come, and sit in his throne at Hierusalem, the king of Bensalem should sit at his feet, whereas other kings should keep a great distance. But yet setting aside these Jewish dreams, the man was a wise man, and learned, and of great policy, and excellently seen in the laws and customs of that nation. Amongst other discourses, one day I told him I was much affected with the relation I had from some of the company, of their custom in holding the feast of the family; for that, methought, I had never heard of a solemnity wherein nature did so much preside. And because propagation of families proceedeth from the nuptial copulation, I desired to know of him, what laws and customs they had concerning marriage; and whether they kept marriage well; and whether they were tied to one wife?

For

For that where population is so much affected, and such as with them it seemed to be, there is commonly permission of plurality of wives. To this he said, " You have
 " reason for to commend that excellent institution of the feast of the family ; and
 " indeed we have experience, that those families that are partakers of the blessing
 " of that feast, do flourish and prosper ever after in an extraordinary manner. But
 " hear me now, and I will tell you what I know. You shall understand, that there
 " is not under the heavens so chaste a nation as this of Bensalem ; nor so free from
 " all pollution or foulness. It is the virgin of the world. I remember I have read
 " in one of your European books, of an holy hermit among you, that desired to see
 " the spirit of fornication ; and there appeared to him a little foul ugly Æthiop ;
 " but if he had desired to see the spirit of chastity of Bensalem, it would have appear-
 " ed to him in the likeness of a fair beautiful cherubin. For there is nothing
 " amongst mortal men more fair and admirable, than the chaste minds of this people.
 " Know therefore that with them there are no stews, no dissolute houses, no courtes-
 " ans, nor any thing of that kind. Nay, they wonder, with detestation, at you in
 " Europe, which permit such things. They say, ye have put marriage out of office :
 " for marriage is ordained a remedy for unlawful concupiscence ; and natural concu-
 " piscence seemeth as a spur to marriage. But when men have at hand a remedy
 " more agreeable to their corrupt will, marriage is almost expelled. And therefore
 " there are with you seen infinite men that marry not, but choose rather a libertine
 " and impure single life, than to be yoked in marriage ; and many that do marry,
 " marry late, when the prime and strength of their years is past. And when they do
 " marry, what is marriage to them but a very bargain ; wherein is sought alliance,
 " or portion, or reputation, with some desire, almost indifferent, of issue ; and not the
 " faithful nuptial union of man and wife, that was first instituted. Neither is it pos-
 " sible, that those who have cast away so basely so much of their strength should great-
 " ly esteem children, being of the same matter, as chaste men do. So likewise
 " during marriage, Is the case much amended, as it ought to be if those things were
 " tolerated only for necessity ? No, for they remain still as a very affront to marriage.
 " The haunting of those dissolute places, or resort to courtesans, are no more punished
 " in married men than in bachelors. And the depraved custom of change, and the
 " delight in meretricious embracements, where sin is turned into art, maketh mar-
 " riage a dull thing, and a kind of imposition or tax. They hear you defend these
 " things, as done to avoid greater evils ; as advoutries, deflowering of virgins, unna-
 " tural lust, and the like. But they say, this is a preposterous wisdom ; and they call
 " it Lot's offer, who to save his guests from abusing, offered his daughters : nay, they
 " say farther, that there is little gained in this ; for that the same vices and appetites
 " do still remain and abound ; unlawful lust being like a furnace, that if you stop the
 " flames altogether it will quench ; but if you give it any vent it will rage. As for
 " masculine love, they have no touch of it ; and yet there are not so faithful and in-
 " violate friendships in the world again as are there ; and to speak generally, as I
 " said before, I have not read of any such chastity in any people as theirs. And their
 " usual saying is, That whosoever is unchaste cannot reverence himself : and they
 " say, That the reverence of a man's self is, next religion, the chiefest bridle of all
 " vices." And when he had said this, the good Jew paused a little ; whereupon I, far
 " more willing to hear him speak on than to speak myself ; yet thinking it decent, that
 " upon his pause of speech I should not be altogether silent, said only this ; " that I
 " would say to him, as the widow of Sarepta said to Elias ; that he was come to
 " VOL. I. A a a " bring

“ bring to memory our sins ; and that I confefs the righteousnefs of Bensalem was
 “ greater than the righteousnefs of Europe.” At which speech he bowed his head,
 and went on in this manner : “ They have also many wife and excellent laws touch-
 “ ing marriage. They allow no polygamy ; they have ordained that none do inter-
 “ marry, or contract, until a month be past from their first interview. Marriage
 “ without consent of parents they do not make void, but they mulct it in the inhe-
 “ ritors : for the children of such marriages are not admitted to inherit above a third
 “ part of their parents inheritance. I have read in a book of one of your men, of
 “ a feigned commonwealth, where the married couple are permitted before they con-
 “ tract, to see one another naked. This they dislike ; for they think it a scorn
 “ to give a refusal after so familiar knowledge : but because of many hidden defects
 “ in men and womens bodies, they have a more civil way : for they have near every
 “ town a couple of pools, which they call Adam and Eve’s pools, where it is per-
 “ mitted to one of the friends of the man, and another of the friends of the woman,
 “ to see them severally bathe naked.”

And as we were thus in conference, there came out one that seemed to be a messenger, in a rich huke, that spake with the Jew : whereupon he turned to me, and said ;
 “ You will pardon me, for I am commanded away in haste.” The next morning
 he came to me again joyful, as it seemed, and said, “ There is word come to the
 “ governor of the city, that one of the fathers of Solomon’s house will be here this
 “ day seven-night : we have seen none of them this dozen years. His coming is in
 “ state ; but the cause of his coming is secret. I will provide you and your fellows
 “ of a good standing to see his entry.” I thanked him and told him, I was most
 glad of the news. The day being come, he made his entry. He was a man of
 middle stature and age, comely of person, and had an aspect as if he pitied men.
 He was clothed in a robe of fine black cloth, with wide sleeves and a cape. His un-
 der garment was of excellent white linen down to the foot, girt with a girdle of the
 same ; and a sindon or tippet of the same about his neck. He had gloves that were
 curious, and set with stone ; and shoes of peach-coloured velvet. His neck was bare
 to the shoulders. His hat was like a helmet, or Spanish Montera ; and his locks
 curled below it decently : they were of colour brown. His beard was cut round, and
 of the same colour with his hair, somewhat lighter. He was carried in a rich chariot
 without wheels, litter-wise, with two horses at either end, richly trapped in blue velvet
 embroidered ; and two footmen on each side in the like attire. The chariot was all
 of cedar, gilt, and adorned with crystal ; save that the fore-end had pannels of sap-
 phires, set in borders of gold, and the hinder end the like of emeralds of the Peru
 colour. There was also a sun of gold, radiant upon the top, in the midst ; and on
 the top before a small cherub of gold, with wings displayed. The chariot was cover-
 ed with cloth of gold tissued upon blue. He had before him fifty attendants, young
 men all, in white fatten loose coats to the mid-leg, and stockings of white silk ; and
 shoes of blue velvet ; and hats of blue velvet ; with fine plumes of divers colours,
 set round like hat-bands. Next before the chariot went two men bare-headed, in
 linen garments down to the foot, girt, and shoes of blue velvet, who carried the one
 a crozier, the other a pastoral staff, like a sheep-hook ; neither of them of metal, but
 the crozier of balm wood, the pastoral staff of cedar. Horsemen he had none, neither
 before nor behind his chariot : as it seemeth, to avoid all tumult and trouble. Be-
 hind his chariot went all the officers and principals of the companies of the city. He
 sat alone, upon cushions of a kind of excellent plush, blue ; and under his foot curi-
 ous

ous carpets of silk of divers colours, like the Persian, but far finer. He held up his bare hand as he went, as blessing the people, but in silence. The street was wonderfully well kept; so that there was never any army had their men stand in better battle array, than the people stood. The windows likewise were not crowded, but every one stood in them as if they had been placed. When the Jew was past, the Jew said to me; "I shall not be able to attend you as I would, in regard of some charge the city hath laid upon me, for the entertaining of this great person." Three days after the Jew came to me again, and said; "Ye are happy men; for the father of Solomon's house taketh knowledge of your being here, and commanded me to tell you, that he will admit all your company to his presence, and have private conference with one of you that ye shall choose: and for this hath appointed the next day after to-morrow. And because he meaneth to give you his blessing, he hath appointed it in the forenoon." We came at our day and hour, and I was chosen by my fellows for the private access. We found him in a fair chamber, richly hanged, and carpeted under foot, without any degrees to the state; he was set upon a low throne richly adorned, and a rich cloth of state over his head, of blue fatten embroidered. He was alone, save that he had two pages of honour, on either hand one, finely attired in white. His under garments were like what we saw him wear in the chariot; but instead of his gown, he had on him a mantle with a cap, of the same fine black, fastened about him. When we came in, as we were taught, we bowed low at our first entrance; and when we were come near his chair, he stood up, holding forth his hand ungloved, and in posture of blessing; and we every one of us stooped down, and kissed the hem of his tippet. That done, the rest departed, and I remained. Then he warned the pages forth of the room, and caused me to sit down beside him, and spake to me thus in the Spanish tongue.

"GOD blefs thee, my son; I will give thee the greatest jewel that I have. For I will impart unto thee, for the love of God and men, a relation of the true state of Solomon's house. Son, to make you know the true state of Solomon's house, I will keep this order. First, I will set forth unto you the end of our foundation. Secondly, the preparations and instruments we have for our works. Thirdly, the several employments and functions whereto our fellows are assigned. And, fourthly, the ordinances and rites which we observe.

"THE end of our foundation is the knowledge of causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible.

"THE preparations and instruments are these. We have large and deep caves of several depths: the deepest are sunk six hundred fathom; and some of them are digged and made under great hills and mountains: so that if you reckon together the depth of the hill, and the depth of the cave, they are, some of them, above three miles deep. For we find that the depth of an hill, and the depth of a cave from the flat, is the same thing; both remote alike from the sun and heavens beams, and from the open air. These caves we call the lower region. And we use them for all coagulations, indurations, refrigerations, and conservations of bodies. We use them likewise for the imitation of natural mines: and the producing also of new artificial metals, by compositions and materials which we use and

“ lay there for many years: We use them also sometimes, which may seem strange,
 “ for curing of some diseases, and for prolongation of life, in some hermits that choose
 “ to live there, well accommodated of all things necessary, and indeed live very long;
 “ by whom also we learn many things.

“ We have burials in several earths, where we put divers cements, as the Chineses
 “ do their porcellane. But we have them in greater variety, and some of them more
 “ fine. We have also great variety of composts, and soils, for the making of the
 “ earth fruitful.

“ We have high towers; the highest about half a mile in height; and some of
 “ them likewise set upon high mountains; so that the vantage of the hill with the
 “ tower, is in the highest of them three miles at least. And these places we call the
 “ upper region: accounting the air between the high places and the low, as a middle
 “ region. We use these towers, according to their several heights and situations,
 “ for insolation, refrigeration, conservation, and for the view of divers meteors; as
 “ winds, rain, snow, hail, and some of the fiery meteors also. And upon them, in
 “ some places, are dwellings of hermits, whom we visit sometimes, and instruct
 “ what to observe.

“ We have great lakes both salt and fresh, whereof we have use for the fish and
 “ fowl. We use them also for burials of some natural bodies: for we find a differ-
 “ ence in things buried in earth, or in air below the earth; and things buried in
 “ water. We have also pools, of which some do strain fresh water out of salt; and
 “ others by art do turn fresh water into salt. We have also some rocks in the midst
 “ of the sea: and some bays upon the shore for some works, wherein is required the
 “ air and vapour of the sea. We have likewise violent streams and cataracts, which
 “ serve us for many motions: and likewise engines for multiplying and enforcing of
 “ winds, to set also on going divers motions.

“ We have also a number of artificial wells and fountains, made in imitation of
 “ the natural sources and baths; as tinctured on vitriol, sulphur, steel, brass,
 “ lead, nitre, and other minerals. And again, we have little wells for infusions
 “ of many things, where the waters take the virtue quicker and better, than in vessels
 “ or basons. And amongst them we have a water, which we call water of para-
 “ dise, being, by that we do to it, made very sovereign for health and prolonga-
 “ tion of life.

“ We have also great and spacious houses, where we imitate and demonstrate
 “ meteors; as snow, hail, rain, some artificial rains of bodies, and not of water,
 “ thunders, lightnings; also generations of bodies in air; as frogs, flies, and di-
 “ vers others.

“ We have also certain chambers, which we call chambers of health, where we
 “ qualify the air as we think good and proper for the cure of divers diseases, and
 “ preservation of health.

“ We have also fair and large baths, of several mixtures, for the cure of diseases,
 “ and the restoring of man's body from arefaction: and others, for the confirming
 “ of it in strength of sinews, vital parts, and the very juice and substance of the
 “ body.

“ We have also large and various orchards and gardens, wherein we do not so
 “ much respect beauty, as variety of ground and soil, proper for divers trees and
 “ herbs: and some very spacious, where trees and berries are set, whereof we make
 “ divers kinds of drinks, besides the vineyards. In these we practise likewise all

“ conclusions

“ conclusions of grafting and inoculating, as well of wild trees as of fruit trees,
 “ which produceth many effects. And we make, by art, in the same orchards and
 “ gardens, trees and flowers to come earlier or later than their seasons; and to come
 “ up and bear more speedily than by their natural course they do. We make them
 “ also by art greater much than their nature; and their fruit greater, and sweeter,
 “ and of differing taste, smell, colour, and figure, from their nature. And many
 “ of them we so order, as they become of medicinal use.

“ We have also means to make divers plants rise by mixtures of earths without
 “ seeds; and likewise to make divers new plants, differing from the vulgar; and to
 “ make one tree or plant turn into another.

“ We have also parks and inclosures of all sorts of beasts and birds, which we
 “ use not only for view or rareness, but likewise for dissections and trials; that
 “ thereby we may take light, what may be wrought upon the body of man. Where-
 “ in we find many strange effects; as continuing life in them, though divers parts,
 “ which you account vital, be perished and taken forth; resuscitating of some that
 “ seem dead in appearance; and the like. We try also all poisons and other medicines
 “ upon them, as well of chirurgery as physic. By art likewise, we make them
 “ greater or taller, than their kind is; and contrariwise dwarf them, and stay their
 “ growth: we make them more fruitful and bearing than their kind is; and contra-
 “ riwise barren, and not generative. Also we make them differ in colour, shape,
 “ activity, many ways. We find means to make commixtures and copulations of
 “ divers kinds, which have produced many new kinds, and them not barren, as the
 “ general opinion is. We make a number of kinds of serpents, worms, flies, fishes,
 “ of putrefaction; whereof some are advanced in effect to be perfect creatures, like
 “ beasts, or birds; and have sexes, and do propagate. Neither do we this by
 “ chance, but we know beforehand, of what matter and commixture, what kind of
 “ those creatures will arise.

“ We have also particular pools, where we make trials upon fishes, as we have
 “ said before of beasts and birds.

“ We have also places for breed and generation of those kinds of worms, and
 “ flies, which are of special use; such as are with you your silk-worms and bees.

“ I will not hold you long with recounting of our brew-houses, bake-houses,
 “ and kitchens, where are made divers drinks, breads, and meats, rare, and of
 “ special effects. Wines we have of grapes; and drinks of other juice, of fruits,
 “ of grains, and of roots: and of mixtures with honey, sugar, manna, and fruits
 “ dried and decocted. Also of the tears or woundings of trees, and of the pulp of
 “ canes. And these drinks are of several ages, some to the age or last of forty
 “ years. We have drinks also brewed with several herbs, and roots, and spices;
 “ yea, with several fleshes, and white-meats; whereof some of the drinks are such
 “ as they are in effect meat and drink both: so that divers, especially in age, do
 “ desire to live with them, with little or no meat, or bread. And above all, we
 “ strive to have drinks of extreme thin parts, to insinuate into the body, and yet
 “ without all biting, sharpness, or fretting; insomuch as some of them put upon
 “ the back of your hand, will, with a little stay, pass through to the palm, and
 “ yet taste mild to the mouth. We have also waters which we ripen in that fashion
 “ as they become nourishing; so that they are indeed excellent drink; and many
 “ will use no other. Breads we have of several grains, roots, and kernels: yea,
 “ and some of them, and fish, dried; with divers kinds of leavenings and seasonings;

“ so that some do extremely move appetites ; some do nourish so, as divers do live
 “ on them, without any other meat ; who live very long. So for meats, we have
 “ some of them so beaten, and made tender, and mortified, yet without all cor-
 “ rupting, as a weak heat of the stomach will turn them into good chylus, as well
 “ as a strong heat would meat otherwise prepared. We have some meats also, and
 “ breads and drinks, which taken by men, enable them to fast long after ; and some
 “ other, that used make the very flesh of mens bodies sensibly more hard and tough,
 “ and their strength far greater than otherwise it would be.

“ We have dispensatories, or shops of medicines ; wherein you may easily think,
 “ if we have such variety of plants and living creatures more than you have in
 “ Europe, for we know what you have, the simples, drugs, and ingredients of
 “ medicines, must likewise be in so much the greater variety. We have them like-
 “ wise of divers ages, and long fermentations. And for their preparations, we have
 “ not only all manner of exquisite distillations and separations, and especially by
 “ gentle heats and percolations through divers strainers, yea, and substances ; but
 “ also exact forms of composition, whereby they incorporate almost as they were
 “ natural simples.

“ We have also divers mechanical arts, which you have not ; and stuffs made by
 “ them ; as papers, linen, silks, tissues ; dainty works of feathers of wonderful
 “ lustre ; excellent dyes, and many others : and shops likewise as well for such as
 “ are not brought into vulgar use amongst us, as for those that are. For you must
 “ know, that of the things before recited, many of them are grown into use
 “ throughout the kingdom ; but yet, if they did flow from our invention, we have
 “ of them also for patterns and principals.

“ We have also furnaces of great diversities, and that keep great diversity of heats ;
 “ fierce and quick ; strong and constant ; soft and mild ; blown, quiet, dry, moist ;
 “ and the like. But above all, we have heats in imitation of the sun’s and heavenly
 “ bodies heats, that pass divers inequalities, and, as it were, orb, progresses, and
 “ returns, whereby we produce admirable effects. Besides, we have heats of dungs,
 “ and of bellies and maws of living creatures, and of their blood and bodies ; and
 “ of hays and herbs laid up moist ; of lime unquenched ; and such like. Instruments
 “ also which generate heat only by motion. And farther, places for strong insola-
 “ tions : and again, places under the earth, which by nature or art, yield heat. These
 “ divers heats we use, as the nature of the operation which we intend requireth.

“ We have also perspective houses, where we make demonstrations of all lights
 “ and radiations ; and of all colours ; and out of things uncoloured and transparent,
 “ we can represent unto you all several colours : not in rain-bows, as it is in gems
 “ and prisms, but of themselves single. We represent also all multiplications of
 “ light, which we carry to great distance ; and make so sharp, as to discern small
 “ points and lines : also all colorations of light : all delusions and deceits of the
 “ light, in figures, magnitudes, motions, colours : all demonstrations of shadows.
 “ We find also divers means yet unknown to you, of producing of light originally
 “ from divers bodies. We procure means of seeing objects afar off ; as in the hea-
 “ ven, and remote places ; and represent things near as far off ; and things afar off
 “ as near ; making feigned distances. We have also helps for the sight, far above
 “ spectacles and glasses in use. We have also glasses and means, to see small and
 “ minute bodies perfectly and distinctly ; as the shapes and colours of small flies and
 “ worms, grains, and flaws in gems, which cannot otherwise be seen ; observations
 “ in

“ in urine and blood, not otherwise to be seen. We make artificial rain-bows, halos, and circles about light. We represent also all manner of reflexions, refractions, and multiplications of visual beams of objects.

“ We have also precious stones of all kinds, many of them of great beauty, and to you unknown; crystals likewise; and glasses of divers kinds; and amongst them some of metals vitrified, and other materials, besides those of which you make glass. Also a number of fossils, and imperfect minerals, which you have not. Likewise loadstones of prodigious virtue; and other rare stones, both natural and artificial.

“ We have also sound-houses, where we practise and demonstrate all sounds, and their generation. We have harmonies which you have not, of quarter-sounds, and lesser slides of sounds. Divers instruments of music likewise to you unknown, some sweeter than any you have; together with bells and rings that are dainty and sweet. We represent small sounds as great and deep; likewise great sounds extenuate and sharp; we make divers tremblings and warblings of sounds, which in their original are entire. We represent and imitate all articulate sounds and letters, and the voices and notes of beasts and birds. We have certain helps, which set to the ear do further the hearing greatly. We have also divers strange and artificial echoes, reflecting the voice many times, and as it were tossing it: and some that give back the voice louder than it came; some shriller, and some deeper; yea, some rendering the voice differing in the letters or articulate sound from that they receive. We have also means to convey sounds in trunks and pipes, in straight lines and distances.

“ We have also perfume-houses; wherewith we join also practices of taste. We multiply smells, which may seem strange. We imitate smells, making all smells to breathe out of other mixtures than those that give them. We make divers imitations of taste likewise, so that they will deceive any man's taste. And in this house we contain also a confiture-house; where we make all sweet-meats, dry and moist; and divers pleasant wines, milks, broths, and salads, in far greater variety than you have.

“ We have also engine-houses, where are prepared engines and instruments for all sorts of motions. There we imitate and practise to make swifter motions than any you have, either out of your muskets, or any engine that you have; and to make them, and multiply them more easily, and with small force, by wheels and other means: and to make them stronger, and more violent than yours are; exceeding your greatest cannons and basilisks. We represent also ordnance and instruments of war, and engines of all kinds: and likewise new mixtures and compositions of gun-powder, wild-fires burning in water, and unquenchable. Also fire-works of all variety both for pleasure and use. We imitate also flights of birds; we have some degrees of flying in the air; we have ships and boats for going under water, and brooking of seas; also swimming-girdles and supporters. We have divers curious clocks, and other like motions of return, and some perpetual motions. We imitate also motions of living creatures, by images of men, beasts, birds, fishes, and serpents; we have also a great number of other various motions, strange for equality, fineness, and subtilty.

“ We have also a mathematical house, where are represented all instruments, as well of geometry, as astronomy, exquisitely made.

“ We

“ We have alſo houſes of deceits of the ſenſes ; where we repreſent all manner
 “ of feats of juggling, falſe apparitions, impoſtures, and illuſions ; and their fallacies.
 “ And ſurely you will eaſily believe, that we that have ſo many things truly natural,
 “ which induce admiration, could in a world of particulars deceive the ſenſes, if
 “ we would diſguiſe thoſe things, and labour to make them ſeem more miraculous.
 “ But we do hate all impoſtures and lies : inſomuch as we have ſeverely forbidden
 “ it to all our fellows, under pain of ignominy and fines, that they do not ſhew
 “ any natural work or thing, adorned or ſwelling ; but only pure as it is, and
 “ without all affectation of ſtrangenefs.

“ Theſe are, my ſon, the riches of Solomon’s houſe.

“ For the ſeveral employments and offices of our fellows ; we have twelve that
 “ ſail into foreign countries, under the names of other nations, for our own we conceal,
 “ who bring us the books, and abſtracts, and patterns of experiments of all
 “ other parts. Theſe we call merchants of light.

“ We have three that collect the experiments which are in all books. Theſe we
 “ call depredators.

“ We have three that collect the experiments of all mechanical arts ; and alſo
 “ of liberal ſciences ; and alſo of practices which are not brought into arts. Theſe
 “ we call mystery-men.

“ We have three that try new experiments, ſuch as themſelves think good. Theſe
 “ we call pioneers or miners.

“ We have three that draw the experiments of the former four into titles, and
 “ tables, to give the better light for the drawing of obſervations and axioms out of
 “ them. Theſe we call compilers.

“ We have three that bend themſelves, looking into the experiments of their fel-
 “ lows, and caſt about how to draw out of them things of uſe and practice for man’s
 “ life and knowledge, as well for works, as for plain demonſtration of cauſes, means
 “ of natural divinations, and the eaſy and clear diſcovery of the virtues and parts of
 “ bodies. Theſe we call dowry-men or benefactors.

“ Then after divers meetings and conſults of our whole number, to conſider of
 “ the former labours and collections, we have three that take care, out of them, to
 “ direct new experiments, of a higher light, more penetrating into nature than
 “ the former. Theſe we call lamps.

“ We have three others that do execute the experiments ſo directed, and report
 “ them. Theſe we call inoculators.

“ Laſtly, we have three that raiſe the former diſcoveries by experiments into
 “ greater obſervations, axioms, and aphoriſms. Theſe we call interpreters of
 “ nature.

“ We have alſo, as you muſt think, novices and apprentices, that the ſucceſſion of
 “ the former employed men do not fail : beſides a great number of ſervants, and at-
 “ tendants, men and women. And this we do alſo : we have conſultations, which
 “ of the inventions and experiences which we have diſcovered ſhall be publiſhed,
 “ and which not : and take all an oath of ſecrecy, for the concealing of thoſe which
 “ we think fit to keep ſecret : though ſome of thoſe we do reveal ſometimes to the
 “ ſtate, and ſome not.

“ FOR

“ For our ordinances and rites : we have two very long and fair galleries : in one
 “ of these we place patterns and samples of all manner of the more rare and excel-
 “ lent inventions : in the other we place the statues of all principal inventors. There
 “ we have the statue of your Columbus, that discovered the West Indies : also the
 “ inventor of ships : your monk that was the inventor of ordnance, and of gun-
 “ powder : the inventor of music : the inventor of letters : the inventor of printing :
 “ the inventor of observations of astronomy : the inventor of works in metal : the
 “ inventor of glass : the inventor of silk of the worm : the inventor of wine : the
 “ inventor of corn and bread : the inventor of fogs : and all these by more certain
 “ tradition than you have. Then have we divers inventors of our own of excellent
 “ works ; which since you have not seen, it were too long to make descriptions of
 “ them ; and besides, in the right understanding of those descriptions, you might
 “ easily err. For upon every invention of value we erect a statue to the inventor,
 “ and give him a liberal and honourable reward. These statues are, some of brass ;
 “ some of marble and touch-stone ; some of cedar, and other special woods gilt and
 “ adorned : some of iron ; some of silver ; some of gold.

“ We have certain hymns and services, which we say daily, of laud and thanks
 “ to God for his marvellous works : and forms of prayers, imploring his aid and
 “ blessing for the illumination of our labours ; and the turning of them into good
 “ and holy uses.

“ Lastly, we have circuits or visits of divers principal cities of the kingdom ;
 “ where, as it cometh to pass, we do publish such new profitable inventions as we
 “ think good. And we do also declare natural divinations of diseases, plagues,
 “ swarms of hurtful creatures, scarcity, tempests, earthquakes, great inun-
 “ dations, comets, temperature of the year, and divers other things ; and we
 “ give counsel thereupon what the people shall do for the prevention and remedy of
 “ them.”

AND when he had said this, he stood up ; and I, as I had been taught, kneeled
 down ; and he laid his right hand upon my head, and said ; “ God bless thee, my son,
 “ and God bless this relation which I have made. I give thee leave to publish it for
 “ the good of other nations ; for we here are in God’s bosom, a land unknown.”
 And so he left me ; having assigned a value of about two thousand ducats, for a
 bounty to me and my fellows. For they give great largesses where they come upon
 all occasions.

The rest was not perfected.

Mr. B A C O N

In praise of KNOWLEDGE.

SILENCE were the best celebration of that, which I mean to commend; for who would not use silence, where silence is not made? and what crier can make silence in such a noise and tumult of vain and popular opinions? My praise shall be dedicated to the mind itself. The mind is the man, and the knowledge of the mind. A man is but what he knoweth. The mind itself is but an accident to knowledge; for knowledge is a double of that which is. The truth of being, and the truth of knowing, is all one. And the pleasures of the affections greater than the pleasures of the senses. And are not the pleasures of the intellect greater than the pleasures of the affections? Is it not a true and only natural pleasure, whereof there is no satiety? Is it not knowledge that doth alone clear the mind of all perturbations? How many things are there which we imagine not? How many things do we esteem and value otherwise than they are? This ill proportioned estimation, these vain imaginations, these be the clouds of error that turn into the storms of perturbation. Is there any such happiness as for a man's mind to be raised above the confusion of things; where he may have the prospect of the order of nature, and the error of men? Is this but a vein only of delight, and not of discovery? of contentment, and not of benefit? Shall we not as well discern the riches of nature's warehouse, as the benefit of her shop? Is truth ever barren? Shall he not be able thereby to produce worthy effects, and to endow the life of man with infinite commodities? But shall I make this garland to be put upon a wrong head? Would any body believe me, if I should verify this, upon the knowledge that is now in use? Are we the richer by one poor invention, by reason of all the learning that hath been these many hundred years? The industry of artificers maketh some small improvement of things invented; and chance sometimes in experimenting, maketh us to stumble upon somewhat which is new: but all the disputation of the learned never brought to light one effect of nature before unknown. When things are known and found out, then they can descant upon them, they can knit them into certain causes, they can reduce them to their principles. If any instance of experience stand against them, they can range it in order by some distinctions. But all this is but a web of the wit, it can work nothing. I do not doubt but that common notions which we call reason, and the knitting of them together, which we call logic, are the art of reason and studies. But they rather cast obscurity, than gain light to the contemplation of nature. All the philosophy of nature which is now received, is either the philosophy of the Grecians, or that other of the alchemists. That of the Grecians hath the foundations in words, in ostentation, in confutation, in sects, in schools, in disputations. The Grecians were, as one of themselves sayeth, *you Grecians, ever children.* They knew little antiquity; they
knew,

knew, except fables, not much above five hundred years before themselves. They knew but a small portion of the world. That of the alchemists hath the foundation in imposture, in auricular traditions and obscurity. It was catching hold of religion, but the principle of it is, *Populus vult decipi*. So that I know no great difference between these great philosophers, but that the one is a loud crying folly, and the other is a whispering folly. The one is gathered out of a few vulgar observations, and the other out of a few experiments of a furnace. The one never faileth to multiply words, and the other ever faileth to multiply gold. Who would not smile at Aristotle, when he admireth the eternity and invariableness of the heavens, as there were not the like in the bowels of the earth? Those be the confines and borders of these two kingdoms, where the continual alteration and incurfion are. The superficies and upper parts of the earth are full of varieties. The superficies and lower parts of the heavens, which we call the middle region of the air, is full of variety. There is much spirit in the one part, that cannot be brought into mass. There is much massy body in the other place, that cannot be refined to spirit. The common air is as the waste ground between the borders. Who would not smile at the astronomers, I mean not these few carmen which drive the earth about, but the ancient astronomers, which feign the moon to be the swiftest of the planets in motion, and the rest in order, the higher the slower; and so are compelled to imagine a double motion: whereas how evident is it, that that which they call a contrary motion, is but an abatement of motion? The fixed stars overgo Saturn, and so in them and the rest, all is but one motion, and the nearer the earth the slower. A motion also whereof air and water do participate, though much interrupted. But why do I in a conference of pleasure enter into these great matters, in sort that pretending to know much, I should forget what is seasonable? Pardon me, it was because all things may be endowed and adorned with speeches, but knowledge itself is more beautiful than any apparel of words that can be put upon it. And let not me seem arrogant without respect to these great reputed authors. Let me so give every man his due, as I give Time his due, which is to discover truth. Many of these men had greater wits, far above mine own, and so are many in the universities of Europe at this day. But alas, they learn nothing there but to believe: first to believe that others know that which they know not; and after themselves know that which they know not. But indeed facility to believe, impatience to doubt, temerity to answer, glory to know, doubt to contradict, end to gain, sloth to search, seeking things in words, resting in part of nature; these, and the like, have been the things which have forbidden the happy match between the mind of man, and the nature of things; and in place thereof have married it to vain notions and blind experiments: and what the posterity and issue of so honourable a match may be, it is not hard to consider. Printing, a gross invention; artillery, a thing that lay not far out of the way; the needle, a thing partly known before: what a change have these three made in the world in these times; the one in the state of learning, the other in the state of war, the third in the state of treasure, commodities, and navigation? And those, I say, were but stumbled upon and lighted upon by chance. Therefore, no doubt the sovereignty of man lieth hid in knowledge; wherein many things are reserved, which kings with their treasure cannot buy, nor with their force command; their spials and intelligencers can give no news of them, their seamen and discoverers cannot sail where they grow: now we govern nature in opinions, but we are thrall unto her in necessity; but if we would be led by her in invention, we should command her in action.

VALERIUS TERMINUS
OF THE
INTERPRETATION OF NATURE:
WITH THE
ANNOTATIONS OF HERMES STELLA.

A few fragments of the first book.

[None of the Annotations of Stella are set down in these fragments.]

CHAP. I. *Of the limits and end of knowledge.*

IN the divine nature, both religion and philosophy have acknowledged goodness in perfection, science or providence comprehending all things, and absolute sovereignty or kingdom. In aspiring to the throne of power, the angels transgressed and fell; in presuming to come within the oracle of knowledge, man transgressed and fell; but in pursuit towards the similitude of God's goodness or love, which is one thing, for love is nothing else but goodness put in motion or applied, neither man or spirit ever have transgressed, or shall transgress.

The angel of light that was, when he presumed before his fall, said within himself, *I will ascend and be like unto the Highest*; not God, but the Highest. To be like to God in goodness, was no part of his emulation: knowledge, being in creation an angel of light, was not the want which did most solicit him; only because he was a minister he aimed at a supremacy; therefore his climbing or ascension was turned into a throwing down or precipitation.

Man on the other side, when he was tempted before he fell, had offered unto him this suggestion, *that he should be like unto God*. But how? not simply, but in this part, *knowing good and evil*. For being in his creation invested with sovereignty of all inferior creatures, he was not needy of power or dominion. But again, being a spirit newly inclosed in a body of earth, he was fittest to be allured with appetite of light and liberty of knowledge. Therefore this approaching and intruding into God's secrets and mysteries, was rewarded with a further removing and estranging from God's presence. But as to the goodness of God, there is no danger in contending or advancing towards a similitude thereof; as that which is open and propounded to our imitation. For that voice, whereof the heathen and all other errors of religion have ever confessed that it sounds not like man, *Love your enemies; be you like unto your heavenly Father, that suffereth his rain to fall both upon*

upon the just and the unjust, doth well declare, that we can in that point commit no excess. So again we find it often repeated in the old law, *Be you holy as I am holy*; and what is holiness else but goodness, as we consider it separate, and guarded from all mixture, and all access of evil?

Wherefore seeing that knowledge is of the number of those things which are to be accepted of with caution and distinction; being now to open a fountain, such as it is not easy to discern where the issues and streams thereof will take and fall; I thought it good and necessary in the first place, to make a strong and sound head or bank to rule and guide the course of the waters; by setting down this position or firmament, namely, *That all knowledge is to be limited by religion, and to be referred to use and action.*

For if any man shall think, by view and enquiry into these sensible and material things, to attain to any light for the revealing of the nature or will of God; he shall dangerously abuse himself. It is true, that the contemplation of the creatures of God hath for end, as to the natures of the creatures themselves, knowledge; but as to the nature of God, no knowledge, but wonder: which is nothing else but contemplation broken off, or losing itself. Nay further, as it was aptly said by one of Plato's school, *the sense of man resembles the sun, which openeth and revealeth the terrestrial globe, but obscureth and concealeth the celestial*; so doth the sense discover natural things, but darken and shut up divine. And this appeareth sufficiently in that there is no proceeding in invention of knowledge, but by similitude; and God is only self-like, having nothing in common with any creature, otherwise than as in shadow and trope. Therefore attend his will as himself openeth it, and give unto faith that which unto faith belongeth; for more worthy it is to believe, than to think or know, considering that in knowledge, as we now are capable of it, the mind suffereth from inferior natures; but in all belief it suffereth from a spirit, which it holdeth superior, and more authorized than itself.

To conclude; the prejudice hath been infinite, that both divine and human knowledge hath received by the intermingling and tempering of the one with the other; as that which hath filled the one full of heresies, and the other full of speculative fictions and vanities.

But now there are again, which, in a contrary extremity to those which give to contemplation an over-large scope, do offer too great a restraint to natural and lawful knowledge; being unjustly jealous that every reach and depth of knowledge wherewith their conceits have not been acquainted, should be too high an elevation of man's wit, and a searching and ravelling too far into God's secrets; an opinion that ariseth either of envy, which is proud weakness, and to be censured and not confuted, or else of a deceitful simplicity. For if they mean that the ignorance of a second cause doth make men more devoutly to depend upon the providence of God, as supposing the effects to come immediately from his hand; I demand of them, as Job demanded of his friends, *Will you lye for God, as man will for man to gratify him?* But if any man, without any sinister humour, doth indeed make doubt that this digging further and further into the mine of natural knowledge, is a thing without example, and uncommended in the Scriptures, or fruitless; let him remember and be instructed: for behold it was not that pure light of natural knowledge, whereby man in paradise was able to give unto every living creature a name according to his propriety, which gave occasion to the fall; but it was an aspiring desire to attain to that part of moral knowledge, which

OF THE INTERPRETATION

which defineth of good and evil, whereby to dispute God's commandments, and not to depend upon the revelation of his will, which was the original temptation. And the first holy records, which within those brief memorials of things which passed before the flood, entered few things as worthy to be registred, but only linages and propagations, yet nevertheless honour the remembrance of the inventor both of music and works in metal. Moses again, who was the reporter, is said to have been seen in all the Egyptian learning, which nation was early and leading in matter of knowledge. And Solomon the king, as out of a branch of his wisdom extraordinarily petitioned and granted from God, is said to have written a natural history of all that is green, from the cedar to the moss, which is but a rudiment between putrefaction and an herb, and also of all that liveth and moveth. And if the book of Job be turned over, it will be found to have much asperision of natural philosophy. Nay, the same Solomon the king affirmeth directly, that the glory of God is to conceal a thing, but the glory of the king is to find it out, as if, according to the innocent play of children, the divine Majesty took delight to hide his works, to the end to have them found out; for in naming the king he intendeth man, taking such a condition of man as hath most excellency and greatest commandment of wits and means, alluding also to his own person, being truly one of those clearest burning lamps, whereof himself speaketh in another place, when he saith, *The spirit of man is as the lamp of God, wherewith he searcheth all inwardness*; which nature of the soul the same Solomon holding precious and inestimable, and therein conspiring with the affection of Socrates, who scorned the pretended learned men of his time for raising great benefit of their learning, whereas Anaxagoras contrariwise, and divers others, being born to ample patrimonies, decayed them in contemplation, delivereth in precept yet remaining, *Buy the truth, and sell it not; and so of wisdom and knowledge.*

And lest any man should retain a scruple, as if this thirst of knowledge were rather an humour of the mind, than an emptiness or want in nature, and an instinct from God; the same author defineth of it fully, saying, *God hath made every thing in beauty according to season; also he hath set the world in man's heart, yet can he not find out the work which God worketh from the beginning to the end*: declaring not obscurely that God hath framed the mind of man as a glass, capable of the image of the universal world, joying to receive the signature thereof, as the eye is of light; yea, not only satisfied in beholding the variety of things, and vicissitude of times, but raised also to find out and discern those ordinances and decrees, which throughout all these changes are infallibly observed. And although the highest generality of motion, or summary law of nature, God should still reserve within his own curtain; yet many and noble are the inferior and secondary operations which are within man's founding. This is a thing which I cannot tell whether I may so plainly speak as truly conceive, that as all knowledge appeareth to be a plant of God's own planting, so it may seem the spreading and flourishing, or at least the bearing and fructifying of this plant, by a providence of God, nay, not only by a general providence, but by a special proph. cy, was appointed to this autumn of the world: for to my understanding, it is not violent to the letter, and safe now after the event, so to interpret that place in the prophecy of Daniel, where, speaking of the latter times, it is said, *Many shall pass to and fro, and science shall be increased*; as if the opening of the world by navigation and commerce, and the further discovery of knowledge, should meet in one time or age.

But

But howsoever that be, there are besides the authorities of Scriptures before recited, two reasons of exceeding great weight and force, why religion should dearly protect all increase of natural knowledge the one, because it leadeth to the greater exaltation of the glory of God; for as the Psalms and other Scriptures do often invite us to consider, and to magnify the great and wonderful works of God; so if we should rest only in the contemplation of those shews which first offer themselves to our senses, we should do a like injury to the majesty of God, as if we should judge of the store of some excellent jeweller, by that only which is set out to the street in his shop. The other reason is, because it is a singular help and a preservative against unbelief and error: for saith our Saviour, *You err, not knowing the Scriptures, nor the power of God*; laying before us two books or volumes to study, if we will be secured from error; first, the Scriptures revealing the will of God, and then the creatures expressing his power; for that latter book will certify us, that nothing which the first teacheth shall be thought impossible. And most sure it is, and a true conclusion of experience, that a little natural philosophy inclineth the mind to atheism, but a further proceeding bringeth the mind back to religion.

To conclude then: Let no man presume to check the liberality of God's gifts, who, as was said, *hath set the world in man's heart*. So as whatsoever is not God, but parcel of the world, he hath fitted it to the comprehension of man's mind, if man will open and dilate the powers of his understanding as he may.

But yet evermore it must be remembered, that the least part of knowledge passed to man by this so large a charter from God, must be subject to that use for which God hath granted it, which is the benefit and relief of the state and society of man; for otherwise all manner of knowledge becometh malign and serpentine, and therefore, as carrying the quality of the serpent's sting and malice, it maketh the mind of man to swell; as the Scripture saith excellently, *Knowledge bloweth up, but charity buildeth up*. And again, the same author doth notably disavow both power and knowledge, such as is not dedicated to goodness or love; for saith he, *If I have all faith, so as I could remove mountains, there is power active, if I render my body to the fire, there is power passive, if I speak with the tongues of men and angels, there is knowledge, for language is but the conveyance of knowledge, all were nothing*.

And therefore it is not the pleasure of curiosity, nor the quiet of resolution, nor the raising of the spirit, nor victory of wit, nor faculty of speech, nor lucre of profession, nor ambition of honour or fame, or inablement for business, that are the true ends of knowledge; some of these being more worthy than other, though all inferior and degenerate: but it is a restitution and reinvesting, in great part, of man to the sovereignty and power, for whensoever he shall be able to call the creatures by their true names, he shall again command them, which he had in his first state of creation. And to speak plainly and clearly, it is a discovery of all operations and possibilities of operations from immortality, if it were possible, to the meanest mechanical practice. And therefore knowledge, that tendeth but to satisfaction, is but as a courtesan, which is for pleasure, and not for fruit or generation. And knowledge that tendeth to profit or profession, or glory, is but as the golden ball thrown before Atalanta; which while she goeth aside, and stoopeth to take up, she hindreth the race. And knowledge referred to some particular point of use, is but as Haræodius, which putteth down one tyrant: and not like Hercules, who did perambulate the world to suppress tyrants and giants and monsters in every part.

It is true, that in two points the curse is peremptory, and not to be removed: the one, that vanity must be the end in all human effects; eternity being resumed, though the revolutions and periods may be delayed. The other, that the consent of the creature being now turned into reluctance, this power cannot otherwise be exercised and administered but with labour, as well in inventing as in executing; yet nevertheless chiefly that labour and travel which is described by the sweat of the brows, more than of the body; that is, such travel as is joined with the working and discussion of the spirits in the brain: for as Solomon saith excellently, *The fool putteth to more strength, but the wise man considereth which way*; signifying the election of the mean to be more material than the multiplication of endeavour. It is true also, that there is a limitation rather potential than actual, which is when the effect is possible, but the time or place yieldeth not the matter or basis whereupon man should work. But notwithstanding these precincts and bounds, let it be believed, and appeal thereof made to time, with renunciation nevertheless to all the vain and abusing promises of alchemists and magicians, and such like light, idle, ignorant, credulous, and fantastical wits and sects, that the new-found world of land was not greater addition to the ancient continent, than there remaineth at this day a world of inventions and sciences unknown, having respect to those that are known, with this difference, that the ancient regions of knowledge will seem as barbarous, compared with the new; as the new regions of people seem barbarous, compared to many of the old.

The dignity of this end, of endowment of man's life with new commodities, appeareth by the estimation that antiquity made of such as guided thereunto; for whereas founders of states, lawgivers, extirpers of tyrants, fathers of the people, were honoured but with the titles of worthies or demi-gods, inventors were ever consecrated amongst the gods themselves. And if the ordinary ambitions of men lead them to seek the amplification of their own power in their countries, and a better ambition than that hath moved men to seek the amplification of the power of their own countries amongst other nations; better again and more worthy must that aspiring be, which seeketh the amplification of the power and kingdom of mankind over the world: the rather, because the other two prosecutions are ever culpable of much perturbation and injustice; but this is a work truly divine, which cometh *in aura leni*, without noise or observation.

The access also to this work hath been by that port or passage, which the divine Majesty, who is unchangeable in his ways, doth infallibly continue and observe; that is, the felicity wherewith he hath blessed an humility of mind, such as rather labour-eth to spell, and so by degrees to read in the volumes of his creatures, than to solicit and urge, and as it were to invoke a man's own spirit to divine, and give oracles unto him. For as in the inquiry of divine truth, the pride of man hath ever inclined to leave the oracles of God's word, and to vanish in the mixture of their own inventions; so in the self-same manner, in inquisition of nature, they have ever left the oracles of God's works, and adored the deceiving and deformed imagery, which the unequal mirrors of their own minds have represented unto them. Nay, it is a point fit and necessary in the front, and beginning of this work, without hesitation or reservation to be professed, that it is no less true in this human kingdom of knowledge, than in God's kingdom of heaven, that no man shall enter into it, *except he become first as a little child*.

Of

Of the impediments of knowledge.

Being the IVth chapter, the preface only of it.

IN some things it is more hard to attempt than to atchieve; which falleth out, when the difficulty is not so much in the matter or subject, as it is in the crofiness and indisposition of the mind of man to think of any such thing, to will or to resolve it; and therefore Titus Livius in his declamatory digression, wherein he doth deprefs and extenuate the honour of Alexander's conquests, saith, *Nihil aliud quam bene ausus vana contemnere*: in which sort of things it is the manner of men first to wonder that any such thing should be possible, and after it is found out, to wonder again how the world should misse it so long. Of this nature, I take to be the invention and discovery of knowledge, *etc.*

The impediments which have been in the times, and in diversion of wits.

Being the Vth chapter, a small fragment in the beginning of that chapter.

THE incounters of the times have been nothing favourable and prosperous for the invention of knowledge, so as it is not only the daintiness of the seed to take, and the ill mixture and unliking of the ground to nourish or raise this plant, but the ill season also of the weather, by which it hath been checked and blasted. Especially in that the seasons have been proper to bring up and set forward other more halty and indifferent plants, whereby this of knowledge hath been starved and overgrown; for in the descent of times always there hath been somewhat else in reign and reputation, which hath generally alienated and diverted wits and labours from that employment.

For as for the uttermost antiquity, which is like fame that muffles her head, and tells tales, I cannot presume much of it; for I would not willingly imitate the manner of those that describe maps, which when they come to some far countries, whereof they have no knowledge, set down how there be great wastes and deserts there: so I am not apt to affirm that they knew little, because what they knew is little known to us. But if you will judge of them by the last traces that remain to us, you will conclude, though not so scornfully as Aristotle doth, that saith our ancestors were extreme gross, as those that came newly from being moulded out of the clay, or some earthly substance; yet reasonably and probably thus, that it was with them in matter of knowledge, but as the dawning or break of day. For at that time the world was altogether home-bred, every nation looked little beyond their own confines or territories, and the world had no thorough lights then, as it hath had since by commerce and navigation, whereby there would neither be that contribution of wits one to help another, nor that variety of particulars for the correcting the customary conceits.

And as there could be no great collection of wits of several parts or nations, so neither could there be any succession of wits of several times, whereby one might refine the other, in regard they had not history to any purpose. And the manner of their traditions was utterly unfit and unproper for amplification of knowledge. And again, the studies of those times, you shall find, besides wars, incurfions, and rapines,

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which were then almost every where betwixt states adjoining, the use of leagues and confederacies being not then known, were to populate by multitude of wives and generation, a thing at this day in the waster part of the West-Indies principally affected; and to build, sometimes for habitation, towns and cities; sometimes, for fame and memory, monuments, pyramids, colosses, and the like. And if there happened to rise up any more civil wits; then would he found and erect some new laws, customs and usages, such as now of late years, when the world was revoluted almost to the like rudeness and obscurity, we see both in our own nation and abroad many examples of, as well in a number of tenures reserved upon mens lands, as in divers customs of towns and manors, being the devises that such wits wrought upon in such times of deep ignorance, *etc.*

The impediments of knowledge for want of a true succession of wits, and that hitherto the length of one man's life hath been the greatest measure of knowledge.

Being the VIth chapter, the whole chapter.

IN arts mechanical the first devise cometh shortest, and time addeth and perfecteth. But in sciences of conceit, the first author goeth furthest, and time leeseeth and corrupteth. Painting, artillery, sailing, and the like grossly managed at first, by time accommodate and refined. The philosophies and sciences of Aristotle, Plato, Democritus, Hippocrates, of most vigour at first, by time degenerated and imbased. In the former many wits and industries contributed in one. In the latter many mens wits spent to deprave the wit of one.

The error is both in the deliverer and in the receiver. He that delivereth knowledge, desireth to deliver it in such form as may be soonest believed, and not as may easiest be examined. He that receiveth knowledge, desireth rather present satisfaction than expectant search, and so rather not to doubt than not to err. Glory maketh the author not to lay open his weakness: and sloth maketh the disciple not to know his strength.

Then begin men to aspire to the second prizes, to be a profound interpreter and commenter, to be a sharp champion and defender, to be a methodical compounder and abridger. And this is the unfortunate succession of wits which the world hath yet had, whereby the patrimony of all knowledge goeth not on husbanded or improved, but wasted and decayed. For knowledge is like a water, that will never arise again higher than the level from which it fell. And therefore to go beyond Aristotle by the light of Aristotle, is to think that a borrowed light can increase the original light from whom it is taken. So then, no true succession of wits having been in the world; either we must conclude, that knowledge is but a task for one man's life, and then vain was the complaint, that *life is short, and art is long*: or else, that the knowledge that now is, is but a shrub; and not that tree which is never dangerous, but where it is to the purpose of knowing good and evil; which desire ever riseth upon an appetite to elect, and not to obey, and so containeth in it a manifest defection.

That

That the pretended succession of wits hath been evil placed, for as much as after variety of sects and opinions, the most popular and not the truest prevaileth and weareth out the rest.

Being the VIIth chapter, a fragment.

IT is sensible to think, that when men enter first into search and inquiry, according to the several frames and compositions of their understanding, they light upon differing conceits, and so all opinions and doubts are beaten over; and then men having made a taste of all, wax weary of variety, and so reject the worst, and hold themselves to the best, either some one, if it be eminent; or some two or three, if they be in some equality; which afterwards are received and carried on, and the rest extinct.

But truth is contrary; and that time is like a river, which carrieth down things which are light and blown up, and sinketh and drowneth that which is sad and weighty. For howsoever governments have several forms, sometimes one governing, sometimes few, sometimes the multitude; yet the state of knowledge is ever a democracy, and that prevaileth which is most agreeable to the senses and conceits of people. As for example, there is no great doubt, but he that did put the beginnings of things to be solid, void, and motion to the center, was in better earnest than he that put matter, form, and shift; or he that put the mind, motion, and matter. For no man shall enter into inquisition of nature, but shall pass by that opinion of Democritus; whereas he shall never come near the other two opinions, but leave them aloof, for the schools and table-talk. Yet those of Aristotle and Plato, because they be both agreeable to popular sense, and the one was uttered with subtilty and the spirit of contradiction, and the other with a stile of ornament and majesty, did hold out, and the other gave place, *etc.*

Of the impediments of knowledge, in handling it by parts, and in slipping off particular sciences from the root and stock of universal knowledge.

Being the VIIIth chapter, the whole chapter.

CICERO the orator, willing to magnify his own profession, and thereupon spending many words to maintain that eloquence was not a shop of good words and elegancies, but a treasury and receipt of all knowledges, so far forth as may appertain to the handling and moving of the minds and affections of men by speech; maketh great complaint of the school of Socrates; that whereas before his time the same professors of wisdom in Greece did pretend to teach an universal sapience and knowledge both of matter and words, Socrates divorced them, and withdrew philosophy, and left rhetoric to itself, which by that destitution became but a barren and un noble science. And in particular sciences we see, that if men fall to subdivide their labours, as to be an oculist in physic, or to be perfect in some one title of the law or the like, they may prove ready and subtile, but not deep or sufficient, no not in that subject which they do particularly attend, because of that consent which it hath with the rest. And it is a matter of common discourse, of the chain of sciences, how they are linked together, insomuch as the Grecians, who had terms at will, have fitted it of a name of Circle-Learning. Nevertheless I that hold it for a great impediment towards the advance-

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ment and further invention of knowledge, that particular arts and sciences have been disincorporated from general knowledge, do not understand one and the same thing, which Cicero's discourse and the note and conceit of the Grecians in their word Circle-Learning do intend. For I mean not that use which one science hath of another for ornament or help in practice, as the orator hath of knowledge of affections for moving, or as military science may have use of geometry for fortifications; but I mean it directly of that use by way of supply of light and information, which the particulars and instances of one science do yield and present for the framing or correcting of the axioms of another science in their very truth and notion. And therefore that example of oculists and title lawyers doth come nearer my conceit than the other two; for sciences distinguished have a dependence upon universal knowledge to be augmented and rectified by the superior light thereof; as well as the parts and members of a science have upon the maxims of the same science, and the mutual light and consent which one part receiveth of another. And therefore the opinion of Copernicus in astronomy, which astronomy itself cannot correct, because it is not repugnant to any of the appearances; yet natural philosophy doth correct. On the other side, if some of the ancient philosophers had been perfect in the observations of astronomy, and had called them to counsel when they made their principles and first axioms, they would never have divided their philosophy, as the cosmographers do their descriptions by globes, making one philosophy for heaven, and another for under heaven, as in effect they do.

So if the moral philosophers, that have spent such an infinite quantity of debate touching good and the highest good, had cast their eye abroad upon nature, and beheld the appetite that is in all things to receive and to give; the one motion affecting preservation, and the other multiplication; which appetites are most evidently seen in living creatures, in the pleasure of nourishment and generation; and in man do make the aptest and most natural division of all his desires, being either of sense of pleasure, or sense of power; and in the universal frame of the world are figured, the one in the beams of heaven which issue forth, and the other in the lap of the earth which takes in: and again, if they had observed the motion of congruity, or situation of the parts in respect of the whole, evident in so many particulars: and lastly, if they had considered the motion, familiar in attraction of things, to approach to that which is higher in the same kind: when by these observations, so easy and concurring in natural philosophy, they should have found out this quaternion of good, in enjoying or fruition, effecting or operation, consenting or proportion, and approach or assumption; they would have saved and abridged much of their long and wandering discourses of pleasure, virtue, duty, and religion. So likewise in this same logic and rhetoric, or acts of argument and grace of speech, if the great masters of them would but have gone a form lower, and looked but into the observations of grammar concerning the kinds of words, their derivations, deflexions and syntax, specially enriching the same with the helps of several languages, with their differing proprieties of words, phrases and tropes; they might have found out more and better footsteps of common reason, help of disputation, and advantages of cavillation, than many of these which they have propounded. So again, a man should be thought to dally, if he did note how the figures of rhetoric and music are many of them the same. The repetitions and traductions in speech, and the reports and hauntings of sounds in music, are the very same things. Plutarch hath almost made a book of the Lacedemonian kind of jesting, which joined ever pleasure with distaste. "Si," said a man of art to Philip king of Macedon, when he controlled

trolled him in his faculty, "God forbid your fortune should be such as to know these things better than I." In taxing his ignorance in his art, he represented to him the perpetual greatness of his fortune, leaving him no vacant time for so mean a skill. Now in music it is one of the ordinarieſt flowers to fall from a diſcord, or hard tune, upon a ſweet accord. The figure that Cicero and the reſt commend, as one of the beſt points of elegancy, which is the fine checking of expectation, is no leſs well known to the muſicians, when they have a ſpecial grace in flying the cloſe or cadence. And theſe are no alluſions but direct communities, the ſame delights of the mind being to be found not only in muſic, rhetoric, but in moral philoſophy, policy, and other knowledges, and that obſcure in the one, which is more apparent in the other; yea, and that diſcovered in the one, which is not found at all in the other; and ſo one ſcience greatly aiding to the invention and augmentation of another. And therefore, without this intercourſe, the axioms of ſciences will fall out to be neither full nor true; but will be ſuch opinions, as Ariſtotle in ſome places doth wiſely cenſure, when he ſaith, "Theſe are the opinions of perſons that have reſpect but to a few things." So then we ſee, that this note leadeth us to an adminiſtration of knowledge in ſome ſuch order and policy, as the king of Spain, in regard of his great dominions, uſeth in ſtate: who though he hath particular councils for ſeveral countries and affairs, yet hath one council of ſtate, or laſt reſort, that receiveth the advertiſements and certificates from all the reſt. Hitherto of the diverſion, ſucceſſion, and conference of wits.

That the end and ſcope of knowledge hath been generally miſtaken, and that men were never well adviſed what it was they ſought.

Being the IXth chapter, immediately preceding the Inventory, and inducing the ſame.

IT appeareth then how rarely the wits and labours of men have been converted to the ſevere and original inquiſition of knowledge; and in thoſe who have pretended, what hurt had been done by the affectation of profeſſors, and the diſtraction of ſuch as were no profeſſors; and how there was never in effect any conjunction or combination of wits in the firſt and inducing ſearch, but that every man wrought apart, and would either have his own way, or elſe would go no further than his guide, having in the one caſe the honour of a firſt, and in the other the eaſe of a ſecond; and laſtly, how in the deſcent and continuance of wits and labours, the ſucceſſion hath been in the moſt popular and weak opinions, like unto the weakeſt natures, which many times have moſt children; and in them alſo the condition of ſucceſſion hath been rather to defend and to adorn, than to add; and if to add, yet that addition to be rather a refining of a part, than an increaſe of the whole. But the impediments of time and accidents, though they have wrought a general indiſpoſition, yet are they not ſo pre-emptory and binding, as the internal impediments and clouds in the mind and ſpirit of man, whereof it now followeth to ſpeak.

The Scripture, ſpeaking of the worſt fort of error, ſaith, *Errare fecit eos in invio et non in via.* For a man may wander in the way, by rounding up and down; but if men have failed in their very direction and addreſs, that error will never by good fortune correct itſelf. Now it hath ſared with men in their contemplations, as Seneca ſaith it ſareth with them in their actions, *De partibus vitæ quiſque deliberat, de ſumma*
nemo.

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nemo. A course very ordinary with men who receive for the most part their final ends from the inclination of their nature, or from common example and opinion, never questioning or examining them, nor reducing them to any clear certainty; and use only to call themselves to account and deliberation touching the means and second ends, and thereby set themselves in the right way to the wrong place. So likewise upon the natural curiosity and desire to know, they have put themselves in way without foresight or consideration of their journey's end.

For I find that even those that have sought knowledge for itself, and not for benefit, or ostentation, or any practical inablement in the course of their life, have nevertheless propounded to themselves a wrong mark, - namely satisfaction, which men call truth, and not operation. For as in the courts and services of princes and states, it is a much easier matter to give satisfaction than to do the business; so in the enquiring of causes and reasons it is much easier to find out such causes as will satisfy the mind of man and quiet objections, than such causes as will direct him and give him light to new experiences and inventions. And this did Celsus note wisely and truly, how that the causes which are in use, and whereof the knowledges now received do consist, were in time minors and subsequents to the knowledge of the particulars, out of which they were induced and collected; and that it was not the light of those causes which discovered particulars, but only the particulars being first found, men did fall on glossing and discoursing of the causes; which is the reason, why the learning that now is hath the curse of barrenness, and is courtesan-like, for pleasure, and not for fruit. Nay, to compare it rightly, the strange fiction of the poets of the transformation of Scylla, seemeth to be a lively emblem of this philosophy and knowledge: a fair woman upward in the parts of show, but when you come to the parts of use and generation, barking monsters; for no better are the endless distorted questions, which ever have been, and of necessity must be, the end and womb of such knowledge.

But yet nevertheless, here I may be mistaken, by reason of some which have much in their pen the referring sciences to action and the use of man, which mean quite another matter than I do. For they mean a contriving of directions, and precepts for readiness of practice, which I discommend not, so it be not occasion that some quantity of the science be lost; for else it will be such a piece of husbandry, as to put away a manor lying somewhat scattered, to buy in a close that lieth handsomely about a dwelling. But my intention contrariwise is to increase and multiply the revenues and possessions of man, and not to trim up only, or order with conveniency the grounds whereof he is already stated. Wherefore the better to make myself understood, that I mean nothing else than words, and directly to demonstrate the point which we are now upon, that is, what is the true end, scope, or office of knowledge, which I have set down to consist not in any plausible, delectable, reverend or admired discourse, or any satisfactory arguments, but in effecting and working, and in discovery of particulars not revealed before, for the better endowment and help of man's life; I have thought good to make, as it were a kalendar or inventory of the wealth, furniture, or means of man, according to his present estate, as far as it is known; which I do not to shew any universality of sense or knowledge, and much less to make a satire of reprehension in respect of wants and errors, but partly because cogitations new had need of some grossness, and inculcation to make them perceived, and chiefly to the end, that for the time to come, upon the account and state now made and cast up, it may appear what increase this new manner of use and administration of the stock, if
it

it be once planted, shall bring with it hereafter ; and for the time present, in case I should be prevented by death to propound and reveal this new light as I purpose, yet I may at the least give some awaking note, both of the wants in man's present condition, and the nature of the supplies to be wished ; though for mine own part neither do I much build upon my present anticipations, neither do I think ourselves yet learned or wise enough to wish reasonably : for as it asks some knowledge to demand a question not impertinent ; so it asketh some sense, to make a wish not absurd.

The Inventory, or an enumeration and view of inventions already discovered in use, together with a note of the wants, and the nature of the supplies.

Being the Xth chapter ; and this a small fragment thereof, being the preface to the Inventory.

THE plainest method, and most directly pertinent to this intention, will be to make distribution of sciences, arts, inventions, works, and their portions, according to the use and tribute which they yield and render to the conditions of man's life, and under those several uses, being as several offices of provisions, to charge and tax what may be reasonably exacted or demanded, not guiding ourselves neither by the poverty of experience and probations, nor according to the vanity of credulous imaginations ; and then upon those charges and taxations to distinguish and present, as it were in several columns, what is extant and already found, and what is defective and further to be provided. Of which provisions, because in many of them, after the manner of slothful and faulty officers and accomptants, it will be returned, by way of excuse, that no such are to be had, it will be fit to give some light of the nature of the supplies, whereby it will evidently appear, that they are to be compassed and procured. And yet nevertheless on the other side again, it will be as fit to check and controul the vain and void assignations and gifts, whereby certain ignorant, extravagant, and abusing wits have pretended to indue the state of man with wonders, differing as much from truth in nature, as Cæsar's commentaries differeth from the acts of King Arthur, or Huon of Bourdeaux, in story. For it is true that Cæsar did greater things than those idle wits had the audacity to feign their supposed worthies to have done ; but he did them not in that monstrous and fabulous manner.

The chapter immediately following the Inventory.

Being the XIth in order, a part thereof.

IT appeareth then what is now in proposition, not by a general circumlocution, but by particular note, no former philosophy varied in terms or method ; no new places or speculation upon particulars already known ; no referring to action, by any manual of practice ; but the revealing and discovering of new inventions and operations. This to be done without the errors and conjectures of art, or the length or difficulties of experience ; the nature and kinds of which inventions have been described as they could be discovered ; for your eye cannot pass one kenning without further failing : only we have stood upon the best advantages of the notions received, as upon a mount, to shew the knowledges adjacent and confining. If therefore the true end of know-
ledge,

ledge, not propounded, hath bred large error, the best and perfectest condition of the same end, not perceived, will cause some declination. For when the butt is set up, men need not rove, but except the white be placed, men cannot level. This perfection we mean, not in the worth of the effects, but in the nature of the direction, for our purpose is not to stir up mens hopes, but to guide their travels. The fulness of direction to work, and produce any effect, consisteth in two conditions, certainty and liberty. Certainty is, when the direction is not only true for the most part, but infallible. Liberty is, when the direction is not restrained to some definite means, but comprehendeth all the means and ways possible; for the poet saith well, *Sapientibus undique latae sunt viae*; and where there is the greatest plurality of change, there is the greatest singularity of choice. Besides, as a conjectural direction maketh a casual effect, so a particular and restrained direction is no less casual than uncertain. For those particular means whereunto it is tied, may be out of your power, or may be accompanied with an overvalue of prejudice; and so if for want of certainty in direction, you are frustrated in success, for want of variety in direction, you are stopped in attempt. If therefore your direction be certain, it must refer you, and point you to somewhat, which if it be present, the effect you seek will of necessity follow, else may you perform and not obtain. If it be free then must it refer you to somewhat, which if it be absent, the effect you seek will of necessity withdraw, else may you have power and not attempt. This notion Aristotle had in light, though not in use. For the two commended rules by him set down, whereby the axioms of sciences are precepted to be made convertible, and which the latter men have not without elegance furnished, the one the rule of truth, because it preventeth deceit; the other the rule of prudence, because it freeth election; are the same thing in speculation and affirmation, which we now observe. An example will make my meaning attained, and yet perchance make it thought that they attained it not.

Let the effect to be produced be whiteness; let the first direction be, that if air and water be intermingled, or broken in small portions together, whiteness will ensue; as in snow, in the breaking of the ways of the sea and rivers, and the like. This direction is certain, but very particular; and restrained, being tied but to air and water. Let the second direction be, that if air be mingled as before with any transparent body, such nevertheless as is uncoloured and more grossly transparent than air itself, that then, *etc.* as glass or crystal, being beaten to fine powder, by the interposition of the air becometh white; the white of an egg, being clear of itself, receiving air by agitation, becometh white, receiving air by concoction becometh white; here you are freed from water, and advanced to a clear body, and still tied to air. Let the third direction exclude or remove the restraint of an uncoloured body, as in amber, sapphires, *etc.* which beaten to fine powder, become white in wine and beer; which brought to froth, become white. Let the fourth direction exclude the restraint of a body more grossly transparent than air, as in flame, being a body compounded between air and a finer substance than air; which flame if it were not for the smoke, which is the third substance that incorporateth itself and dieth, the flame would be more perfect white. In all these four directions air still beareth a part. Let the fifth direction then be, that if any bodies, both transparent, but in an unequal degree, be mingled as before, whiteness will follow: as oil and water beaten to an ointment, though by settling, the air which gathereth in the agitation be evaporated, yet remaineth white; and the powder of glass or crystal, put into water, whereby the air giveth place, yet remaineth white, though not so perfect. Now are you freed from air, but still you
are

are tied to transparent bodies. To ascend further by scale I do forbear, partly because it would draw on the example to an over-great length, but chiefly because it would open that which in this work I determine to reserve; for to pass through the whole history and observation of colours and objects visible, were too long a digression; and our purpose is now to give an example of a free direction, thereby to distinguish and describe it; and not to set down a form of interpretation how to recover and attain it. But as we intend not now to reveal, so we are circumspect not to mislead; and therefore, this warning being given, returning to our purpose in hand, we admit the sixth direction to be, that all bodies, or parts of bodies, which are unequal equally, that is, in a simple proportion, do represent whiteness; we will explain this, though we induce it not. It is then to be understood, that absolute equality produceth transparency, inequality in simple order or proportion produceth whiteness, inequality in compound or respective order or proportion produceth other colours, and absolute or orderless inequality produceth blackness; which diversity, if so gross a demonstration be needful, may be signified by four tables; a blank, a chequer, a fret, and a medley; whereof the fret is evident to admit great variety. Out of this assertion are satisfied a multitude of effects and observations, as that whiteness and blackness are most incompatible with transparency; that whiteness keepeth light, and blackness stoppeth light, but neither passeth it; that whiteness or blackness are never produced in rainbows, diamonds, crystals, and the like; that white giveth no dye, and black hardly taketh dye; that whiteness seemeth to have an affinity with dryness, and blackness with moisture; that aduision causeth blackness, and calcination whiteness; that flowers are generally of fresh colours, and rarely black, *etc.* all which I do now mention confusedly by way of derivation, and not by way of induction. This sixth direction which I have thus explained, is of good and competent liberty, for whiteness fixed and inherent; but not for whiteness fantastical, or appearing, as shall be afterwards touched. But first do you need a reduction back to certainty or verity; for it is not all position or contexture of unequal bodies that will produce colours; for *aqua fortis*, oil of vitriol, *etc.* more manifestly, and many other substances more obscurely, do consist of very unequal parts, which yet are transparent and clear. Therefore the reduction must be, that the bodies or parts of bodies so intermingled as before, be of a certain grossness or magnitude; for the unequalities which move the sight must have a further dimension and quantity, than those which operate many other effects. Some few grains of saffron will give a tincture to a tun of water, but so many grains of civet will give a perfume to a whole chamber of air. And therefore when Democritus, from whom Epicurus did borrow it, held that the position of the solid portions was the cause of colours; yet in the very truth of this assertion he should have added, that the portions are required to be of some magnitude. And this is one cause why colours have little inwardness, and necessity with the nature and proprieties of things, those things resembling in colour, which otherwise differ most, as salt and sugar; and contrariwise differing in colour, which otherwise resemble most, as the white and blue violets, and the several veins of one agate or marble. by reason that other virtues consist in more subtle proportions than colours do; and yet are there virtues and natures, which require a grosser magnitude than colours, as well as scents and divers other require a more subtle; for as the portion of a body will give forth scent, which is too small to be seen, so the portion of a body will shew colours, which is too small to be endued with weight: and therefore one of the prophets with great elegance describing how all creatures carry no proportion towards God the creator, saith, *that all the*

nations in respect of him are like the dust upon the balance; which is a thing appeareth, but weigheth not. But to return, there resteth a further freeing of this sixth direction; for the clearness of a river or stream sheweth white at a distance, and crytalline glasses deliver the face or any other object falsified in whiteness, and long beholding the snow, to a weak eye, giveth an impression of azure, rather than of whiteness. So as for whiteness in apparition only, and representation, by the qualifying of the light, altering the *intermedium*, or affecting the eye itself, it reacheth not. But you must free your direction to the producing of such an incidence, impression, or operation, as may cause a precise and determinate passion of the eye, a matter which is much more easy to induce than that which we have past through; but yet because it hath a full coherence both with that act of radiation, which hath hitherto been conceived and termed so improperly and untruly, by some, an effluxion of spiritual species, and by others, an investing of the *intermedium*, with a motion which successively is conveyed to the eye, and with the act of sense, wherein I should likewise open that which I think good to withdraw, I will omit.

Neither do I contend, but that this notion, which I call the freeing of a direction in the received philosophies, as far as a swimming anticipation could take hold, might be perceived and discerned; being not much other matter than that which they did not only aim at the two rules of axioms before remembered, but more nearly also than that which they term the form or formal cause, or that which they call the true difference; both which nevertheless, it seemeth, they propound rather as impossibilities and wishes, than as things within the compass of human comprehension: for Plato casteth his burden, and saith, *that he will revere him as a God, that can truly divide and define*; which cannot be but by true forms and differences, wherein I join hands with him, confessing as much, as yet assuming to myself little; for if any man can, by the strength of his anticipations, find out forms, I will magnify him with the foremost. But as any of them would say, that if divers things, which many men know by instruction and observation, another knew by revelation, and without those means, they would take him for somewhat supernatural and divine; so I do acknowledge, that if any man can by anticipations reach to that which a weak and inferior wit may attain to by interpretation, he cannot receive too high a title. Nay, I for my part do indeed admire to see how far some of them have proceeded by their anticipations; but how? it is as I wonder at some blind men to see what shift they make without their eyesight; thinking with myself that if I were blind, I could hardly do it. Again, Aristotle's school confesseth, that there is no true knowledge but by causes, no true cause but the form, no true form known except one, which they are pleased to allow; and therefore thus far their evidence standeth with us, that both hitherto there hath been nothing but a shadow of knowledge, and that we propound now that which is agreed to be worthiest to be sought, and hardest to be found. There wanteth now a part very necessary, not by way of supply, but by way of caution: for as it is seen for the most part, that the outward tokens and badge of excellency and perfection are more incident to things merely counterfeit, than to that which is true, but for a meaner and baser sort; as a dubline is more like a perfect ruby than a spinel, and a counterfeit angel is made more like a true angel, than if it were an angel coined of China gold; in like manner, the direction carrieth a resemblance of a true direction in verity and liberty, which indeed is no direction at all. For though your direction seem to be certain and free, by pointing you to nature that is unseparable from the nature you inquire upon; yet if it do not carry you on a degree or remove nearer

to action, operation or light, to make or produce, it is but superficial and counterfeit. Wherefore to secure and warrant what is a true direction, though that general note I have given be perspicuous in itself, for a man shall soon cast with himself whether he be ever the near to effect and operate or no, or whether he have won but an abstract or varied notion, yet for better instruction I will deliver three particular notes of caution. The first is, that the nature discovered be more original than the nature supposed, and not more secondary, or of the like degree; as to make a stone bright, or to make it smooth, it is a good direction to say, make it even; but to make a stone even, it is no good direction to say, make it bright, or make it smooth: for the rule is, that the disposition of any thing referring to the state of it in itself, or the parts, is more original than that which is relative or transitive towards another thing. So evenness is the disposition of the stone in itself, but smooth is to the hand, and bright to the eye, and yet nevertheless they all cluster and concur; and yet the direction is more imperfect, if it do appoint you to such a relative, as is in the same kind, and not in a diverse. For in the direction, to produce brightness by smoothness, although properly it win no degree, and will never teach you any new particulars before unknown, yet by way of suggestion, or bringing to mind, it may draw your consideration to some particulars known but not remembered; as you shall sooner remember some practical means of making smoothness, than if you had fixed your consideration only upon brightness; but if the direction had been to make brightness, by making reflexion, as thus, make it such as you may see your face in it; this is merely secondary, and helpeth neither by way of informing, nor by way of suggesting. So if in the inquiry of whiteness you were directed to make such a colour as should be seen furthest in a dark light; here you are advanced nothing at all. For these kinds of natures are but proprieties, effects, circumstances, concurrences, or what else you shall like to call them, and not radical and formative natures towards the nature supposed. The second caution is, that the nature inquired be collected by division before composition, or to speak more properly, by composition subaltern, before you ascend to composition absolute, *etc.*

Of the internal and profound errors and superstitions in the nature of the mind, and of the four sorts of idols or fictions which offer themselves to the understanding in the inquisition of knowledge.

Being the XVIth chapter, and this a small fragment thereof, being a preface to the inward elenches of the mind.

THE opinion of Epicurus, that the gods were of human shape, was rather justly derided, than seriously confuted by the other facts, demanding whether every kind of sensible creatures did not think their own figure fairest, as the horse, the bull, and the like, which found no beauty but in their own forms, as in appetite of lust appeared. And the heresy of the Anthropomorphites was ever censured for a gross conceit, bred in the obscure cells of solitary monks that never looked abroad. Again, the fable so well known of *Quis pinxit leonem*, doth set forth well, that there is an error of pride and partiality, as well as of custom and familiarity. The reflexion also from glasses so usually resembled to the imagery of the mind, every man knoweth to receive error and variety both in colour, magnitude, and shape, according to the quality of the

But yet no use hath been made of these and many the like observations to move men to search out, and upon search to give true cautions of the native and inherent errors in the mind of man, which have coloured and corrupted all his notions and impressions.

I do find therefore in this enchanted glass four idols, or false appearances of several and distinct sorts, every sort comprehending many subdivisions: the first sort, I call idols of the nation or tribe; the second, idols of the palace; the third, idols of the cave; and the fourth, idols of the theatre, *etc.*

Here followeth an abridgment of divers chapters of the first book of the
INTERPRETATION OF NATURE.

C H A P. XII.

THAT in deciding and determining of the truth of knowledge, men have put themselves upon trials not competent. That antiquity and authority, common and confessed notions, the natural and yielding consent of the mind, the harmony and coherence of a knowledge in itself, the establishing of principles with the touch and reduction of other propositions unto them, inductions without instances contradictory, and the report of the senses, are none of them absolute and infallible evidences of truth; and bring no security sufficient for effects and operations. That the discovery of new works or active directions not known before, is the only trial to be accepted of; and yet not that neither, in case where one particular giveth light to another; but where particulars induce an axiom or observation, which axiom found out, discovereth and designeth new particulars. That the nature of this trial is not only upon the point, whether the knowledge be profitable or no, but even upon the point, whether the knowledge be true or no. Not because you may always conclude, that the axiom which discovereth new instances is true; but contrariwise you may safely conclude, that if it discover not any new instance, it is vain and untrue. That by new instances are not always to be understood new recipes, but new assignations; and of the diversity between these two. That the subtilty of words, arguments, notions, yea of the senses themselves, is but rude and gross in comparison of the subtilty of things. And of the slothful and flattering opinions of those which pretended to honour the mind of man in withdrawing and abstracting it from particulars; and of the inducements and motives whereupon such opinions have been conceived and received.

C H A P. XIII.

OF the error in propounding chiefly the search of causes and productions of things concrete, which are infinite and transitory; and not of abstract natures, which are few and permanent. That these natures are as the alphabet or simple letters, whereof the variety of things consisteth; or as the colours mingled in the painter's shell, wherewith he is able to make infinite variety of faces or shapes. An enumeration of them according to popular note. That at the first one would conceive that in the schools by natural philosophy were meant the knowledge of the efficiencies of things concrete; and by metaphysic the knowledge of the forms of natures simple; which is a good and fit division of knowledge: but upon examination there is no such matter by them intended. That the little enquiry into the
production

production of simple natures, sheweth well that works were not sought; because by the former knowledge some small and superficial delusions from the ordinary generations and productions may be found out, but the discovery of all profound and radical alteration must arise out of the latter knowledge.

C H A P. XIV.

OF the error in propounding the search of the materials, or dead beginnings or principles of things, and not the nature of motions, inclinations, and applications. That the whole scope of the former search is impertinent and vain; both because there are no such beginnings, and if there were they could not be known. That the latter manner of search, which is all, they pass over compendiously and slightly as a bye matter. That the several conceits in that kind; as that the lively and moving beginnings of things should be shift or appetite of matter to privation; the spirit of the world, working in matter according to platform; the proceeding or fructifying of distinct kinds according to their proprieties; the intercourse of the elements by mediation of their common qualities; the appetite of like portions to unite themselves; amity and discord, or sympathy and antipathy; motion to the centre, with motion of stripe or press; the casual agitation, aggregation, and essays of the solid portions in the void space; motion of shuttings and openings; are all mere nugations. And that the calculating and ordination of the true degrees, moments, limits and laws of motions and alterations, by means whereof all works and effects are produced, is a matter of a far other nature, than to consist in such easy and wild generalities.

C H A P. XV.

OF the great error of inquiring knowledge in anticipations. That I call anticipations, the voluntary collections that the mind maketh of knowledge, which is every man's reason. That though this be a solemn thing, and serves the turn to negotiate between man and man, because of the conformity and participation of mens minds in the like errors, yet towards enquiry of the truth of things and works, it is of no value. That civil respects are a lett that this pretended reason should not be so contemptibly spoken of, as were fit and medicinable, in regard that hath been too much exalted and glorified, to the infinite detriment of man's estate. Of the nature of words, and their facility and aptness to cover and grace the defects of anticipations. That it is no marvel if these anticipations have brought forth such diversity and repugnance in opinions, theories or philosophies, as so many fable, of several arguments. That had not the nature of civil customs and government been in most times somewhat adverse to such innovations, though contemplative, there might have been, and would have been many more. That the second school of the Academics and the sect of Pyrrho, or the considerers, that denied comprehension as to the disabling of man's knowledge, entertained in anticipations, is well to be allowed: but that they ought, when they had overthrown and purged the floor of the ruins, to have sought to build better in place. And more especially that they did unjustly and prejudicially, to charge the deceit upon the report of the senses, which admitteth very sparing remedy; being indeed to have been charged upon the anticipations of the mind, which admitteth a perfect remedy. That the information of the senses

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is sufficient, not because they err not, but because the use of the sense in discovering of knowledge is for the most part not immediate. So that it is the work, effect, or instance, that trieth the axiom, and the sense doth but try the work done or not done, being or not being. That the mind of man in collecting knowledge needeth great variety of helps, as well as the hand of man in manual and mechanical practices needeth great variety of instruments. And that it were a poor work, that if instruments were removed, men would overcome with their naked hands. And of the distinct points of want and insufficiency in the mind of man.

C H A P. XVI.

THAT the mind of a man, as it is not a vessel of that content or receipt to comprehend knowledge without helps and supplies; so again it is not sincere, but of an ill and corrupt tincture. Of the inherent and profound errors and superstitions in the nature of the mind, and of the four sorts of idols or false appearances that offer themselves to the understanding in the inquisition of knowledge; that is to say, the idols of the tribe, the idols of the palace, the idols of the cave, and the idols of the theatre: That these four, added to the incapacity of the mind, and the vanity and malignity of the affections, leave nothing but impotency and confusion. A recital of the particular kinds of these four idols, with some chosen examples of the opinions they have begot, such of them as have supplanted the state of knowledge most.

C H A P. XVII.

OF the errors of such as have descended and applied themselves to experience, and attempted to induce knowledge upon particulars. That they have not had the resolution and strength of mind to free themselves wholly from anticipations, but have made a confusion and intermixture of anticipations and observations, and so vanished. That if any have had the strength of mind generally to purge away and discharge all anticipations; they have not had that greater and double strength and patience of mind, as well to repel new anticipations after the view and search of particulars, as to reject old which were in their mind before; but have from particulars and history flown up to principles without the mean degrees, and so framed all the middle generalities or axioms, not by way of scale or ascension from particulars, but by way of derivation from principles, whence hath issued the infinite chaos of shadows and moths, wherewith both books and minds have been hitherto, and may be yet hereafter much more pestered. That in the course of those derivations to make them yet the more unprofitable, they have used, when any light of new instance opposite to any assertion appeared, rather to reconcile the instance, than to amend the rule. That if any have had, or shall have the power and resolution to fortify and inclose his mind against all anticipations, yet if he have not been or shall not be cautioned by the full understanding of the nature of the mind and spirit of man, and therein of the states, pores and passages both of knowledge and error, he hath not been nor shall not be possibly able to guide or keep on his course aright. That those that have been conversant in experience and observation, have used, when they have intended to discover the cause of any effect, to fix their consideration narrowly and exactly upon that effect itself, with all the circumstances thereof,
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and to vary the trial thereof as many ways as can be devised; which course amounteth but to a tedious curiosity, and ever breaketh off in wondring, and not in knowing. And that they have not used to enlarge their observation to match and sort that effect with instances of a diverse subject, which must of necessity be before any cause be found out. That they have passed over the observation of instances vulgar and ignoble, and stayed their attention chiefly upon instances of mark; whereas the other sort are for the most part more significant, and of better light and information. That every particular that worketh any effect, is a thing compounded, more or less, of diverse single natures, more manifest and more obscure, and that it appeareth not to whether of the natures the effect is to be ascribed; and yet notwithstanding they have taken a course without breaking particulars, and reducing them by exclusions and inclusions to a definite point, to conclude upon inductions in gross; which empirical course is no less vain than the scholastical. That all such as have sought action and work out of their enquiry, have been hasty and pressing to discover some practices for present use, and not to discover axioms, joining with them the new assignations as their sureties. That the forerunning of the mind to frame recipes upon axioms at the entrance, is like Atalanta's golden ball that hindereth and interrupteth the course; and is to be inhibited till you have ascended to a certain stage and degree of generalities; which forbearance will be liberally recompensed in the end: and that chance discovereth new inventions by one and one, but science by knots and clusters. That they have not collected sufficient quantity of particulars, nor them in sufficient certainty and subtilty, nor of all several kinds, nor with those advantages and discretions in the entry and sorting which are requisite; and of the weak manner of collecting natural history, which hath been used. Lastly, that they had no knowledge of the formulary of interpretation, the work whereof is to abridge experience, and to make things as certainly found out by axiom in short time, as by infinite experiences in ages.

C H A P. XVIII.

THAT the cautions and devices put in practice in the delivery of knowledge for the covering and palliating of ignorance, and the gracing and over-valuing of that they utter, are without number; but none more bold and more hurtful than two: the one, that men have used of a few observations upon any subject to make a solemn and formal air; by filling it up with discourse, accommodating it with some circumstances and directions to practice, and digesting it into method, whereby men grow satisfied and secure, as if no more enquiry were to be made of that matter; the other, that men have used to discharge ignorance with credit, in defining all those effects which they cannot attain unto, to be out of the compass of art and human endeavour. That the very styles and forms of utterance are so many characters of imposture, some choosing a style of pugnacity and contention, some of satire and reprehension, some of plausible and tempting similitudes and examples, some of great words and high discourse, some of short and dark sentences, some of exactness of method, all of positive affirmation; without disclosing the true motives and proofs of their opinions, or free confessing their ignorance or doubts, except it be now and then for a grace, and in cunning to win the more credit in the rest, and not in good faith. That although men be free from these errors and incumbrances in the will and affection, yet it is not a thing so easy as is conceived, to convey

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the conceit of one man's mind into the mind of another, without loss or mistaking, especially in notions new and differing from those that are received. That never any knowledge was delivered in the same order it was invented, no not in the mathematics, though it should seem otherwise, in regard that the propositions placed last do use the propositions or grants placed first for their proof and demonstration. That there are forms and methods of tradition wholly distinct and differing, according to their ends whereto they are directed. That there are two ends of tradition of knowledge, the one to teach and instruct for use and practice, the other to impart or intimate for re-examination and progression. That the former of these ends requireth a method not the same, whereby it was invented and induced, but such as is most compendious and ready, whereby it may be used and applied. That the latter of the ends, which is where a knowledge is delivered to be continued and spun on by a succession of labours, requireth a method whereby it may be transposed to another in the same manner as it was collected, to the end it may be discerned both where the work is weak, and where it breaketh off. That this latter method is not only unfit for the former end, but also impossible for all knowledge gathered and insinuated by anticipations, because the mind working inwardly of itself, no man can give a just account how he came to that knowledge which he hath received, and that therefore this method is peculiar for knowledge gathered by interpretation. That the discretion anciently observed, though by the precedent of many vain persons and deceivers disgraced, of publishing part and reserving part to a private succession, and of publishing in a manner whereby it shall not be to the capacity nor taste of all, but shall as it were single and adopt his reader, is not to be laid aside, both for the avoiding of abuse in the excluded, and the strengthening of affection in the admitted. That there are other virtues of tradition, as that there be no occasion given to error, and that it carry a vigour to root and spread against the vanity of wits and injuries of time; all which, if they were ever due to any knowledge delivered, or if they were never due to any human knowledge heretofore delivered, yet are now due to the knowledge propounded.

C H A P. XIX.

○ F the impediments which have been in the affections, the principal whereof hath been despair or diffidence, and the strong apprehension of the difficulty, obscurity, and infiniteness which belongeth to the invention of knowledge, and that men have not known their own strength; and that the supposed difficulties and vastness of the work are rather in shew and muster, than in state or substance, where the true way is taken. That this diffidence hath moved and caused some never to enter into search, and others, when they have been entred, either to give over, or to seek a more compendious course than can stand with the nature of true search. That of those that have refused and prejudged enquiry, the more sober and grave sort of wits have depended upon authors and traditions, and the more vain and credulous resorted to revelation and intelligence with spirits and higher natures. That of those that have entred into search, some having fallen upon some conceits, which they after consider to be the same which they have found in former authors, have suddenly taken a persuasion that a man shall but, with much labour, incur and light upon the same inventions which he might with ease receive from others, and that it is but a vanity and self-pleasing of the wit to go about again, as one that would rather
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have a flower of his own gathering, than much better gathered to his hand. That the same humour of sloth and diffidence suggesteth, that a man shall but revive some ancient opinion which was long ago propounded, examined and rejected. And that it is easy to err in conceit, that a man's observation or notion is the same with a former opinion, both because new conceits must of necessity be uttered in old words, and because upon true and erroneous grounds men may meet in consequence or conclusion, as several lines or circles that cut in some one point. That the greatest part of those that have descended into search have chosen for the most artificial and compendious course, to induce principles out of particulars, and to reduce all other propositions to principles; and so instead of the nearest way have been led to no way, or a mere labyrinth. That the two contemplative ways have some resemblance with the old parable of the two moral ways, the one beginning with uncertainty and difficulty, and ending in plainness and certainty; and the other beginning with shew of plainness and certainty, and ending in difficulty and uncertainty. Of the great and manifest error and untrue conceit or estimation of the infiniteness of particulars; whereas indeed all prolixity is in discourse and derivations; and of the infinite and most laborious expence of wit that hath been employed upon toys and matters of no fruit or value. That although the period of one age cannot advance men to the furthest point of interpretation of nature, except the work should be undertaken with greater helps than can be expected, yet it cannot fail in much less space of time to make return of many singular commodities towards the state and occasions of man's life. That there is less reason of distrust in the course of interpretation now propounded, than in any knowledge formerly delivered, because this course doth in sort equal mens wits, and leaveth no great advantage or preeminence to the perfect and excellent motions of the spirit. That to draw a straight line, or to make a circle perfect round by aim of hand only, there must be a great difference between an unsteady and unpractised hand and a steady and practised; but to do it by rule or compass, it is much alike.

C H A P. XXI.

OF the impediments which have been in the two extreme humours of admiration of antiquity and love of novelty; and again, of over-fervile reverence, or over-light scorn of the opinions of others.

C H A P. XXII.

OF the impediments which have been in the affection of pride, specially of one kind, which is the disdain of dwelling and being conversant much in experiences and particulars, especially such as are vulgar in occurrence, and base and ignoble in use. That besides certain higher mysteries of pride, generalities seem to have a dignity and solemnity, in that they do not put men in mind of their familiar actions, in that they have less affinity with arts mechanical and illiberal, in that they are not so subject to be controlled by persons of mean observation, in that they seem to teach men what they know not, and not to refer them to what they know. All which conditions directly feeding the humour of pride, particulars do want. That the majesty of generalities, and the divine nature of the mind in taking them, if they be truly collected, and be indeed the direct reflexions of things, cannot be too much

magnified. And that it is true, that interpretation is the very natural and direct intention, action, and progression of the understanding, delivered from impediments. And that all anticipation is but a deflexion or declination by accident.

C H A P. XXV.

OF the impediments which have been in the state of heathen religion, and other superstitions and errors of religion. And that in the true religion there hath not, nor is any impediment, except it be by accident or intermixture of humour. That a religion which consisteth in rites and forms of adoration, and not in confessions and beliefs, is adverse to knowledge; because men having liberty to inquire and discourse of theology at pleasure, it cometh to pass that all inquisition of nature endeth and limiteth itself in such metaphysical or theological discourse; whereas if mens wits be shut out of that port, it turneth them again to discover, and so to seek reason of reason more deeply. And that such was the religion of the Heathen. That a religion that is jealous of the variety of learning, discourse, opinions, and sects, as misdoubting it may shake the foundations, or that cherisheth devotion upon simplicity and ignorance, as ascribing ordinary effects to the immediate working of God, is adverse to knowledge. That such is the religion of the Turk, and such hath been the abuse of Christian religion at some several times, and in some several factions. And of the singular advantage which the Christian religion hath towards the furtherance of true knowledge, in that it excludeth and interdicteth human reason, whether by interpretation or anticipation, from examining or discussing of the mysteries and principles of faith.

C H A P. XXVI.

OF the impediments which have been in the nature of society, and the policies of state. That there is no composition of estate or society, nor order or quality of persons, which have not some point of contrariety towards true knowledge. That monarchies incline wits to profit and pleasure, and commonwealths to glory and vanity. That universities incline wits to sophistry and affectation; cloisters to fables and unprofitable subtilty; study at large to variety; and that it is hard to say, whether mixture of contemplations with an active life, or retiring wholly to contemplations, do disable and hinder the mind more.

FILUM LABYRINTHI,
SIVE
FORMULA INQUISITIONIS.
AD FILIOS.
PARS PRIMA.

1. **F**RANCIS BACON thought in this manner. The knowledge whereof the world is now possessed, especially that of nature, extendeth not to magnitude and certainty of works. The physician pronounceth many diseases incurable, and faileth oft in the rest. The alchemists wax old and die in hopes. The magicians perform nothing that is permanent and profitable. The mechanics take small light from natural philosophy, and do but spin on their own little threads. Chance sometimes discovereth inventions; but that worketh not in years, but ages. So he saw well, that the inventions known are very imperfect, and that new are not like to be brought to light but in great length of time; and that those which are, came not to light by philosophy.

2. He thought also this state of knowledge was the worse, because men strive against themselves to save the credit of ignorance, and to satisfy themselves in this poverty. For the physician, besides the cauteles of practice, hath this general cautele of art, that he dischargeth the weakness of his art upon supposed impossibilities; neither can his art be condemned when itself judgeth. That philosophy also, out of which the knowledge of physic which now is in use is hewed, receiveth certain positions and opinions, which, if they be well weighed, induce this persuasion, that no great works are to be expected from art, and the hand of man; as, in particular, that opinion, that *the heat of the sun and fire differ in kind*; and that other, *that composition is the work of man, and mixture is the work of nature*, and the like; all tending to the circumscription of man's power, and to artificial despair; killing in men not only the comfort of imagination, but the industry of trial: only upon vain-glory, to have their art thought perfect, and that all is impossible that is not already found. The alchemist dischargeth his art upon his own errors, either supposing a misunderstanding of the words of his authors, which maketh him listen after auricular traditions; or else a failing in the true proportions and scruples of practice, which maketh him renew infinitely his trials; and finding also that he lighteth upon some mean experiments and conclusions by the way, feedeth upon them, and magnifieth them to the most, and supplieth the rest in hopes. The magician, when he findeth something, as he conceiveth, above nature, effected, thinketh, when a breach is

once made in nature, that it is all one to perform great things and small; not seeing, that they are but subjects of a certain kind, wherein magic and superstition hath played in all times. The mechanical person, if he can refine an invention, or put two or three observations or practices together in one, or couple things better with their use, or make the work in less or greater volume, taketh himself for an inventor. So he saw well, that men either persuade themselves of new inventions as of impossibilities; or else think they are already extant, but in secret and in few hands; or that they account of those little industries and additions, as of inventions: all which turneth to the averting of their minds from any just and constant labour, to invent further in any quantity.

3. He thought also, when men did set before themselves the variety and perfection of works produced by mechanical arts, they are apt rather to admire the provisions of man, than to apprehend his wants; not considering, that the original inventions and conclusions of nature, which are the life of all that variety, are not many, nor deeply fetched; and that the rest is but the subtle and ruled motion of the instrument and hand; and that the shop therein is not unlike the library, which in such number of books containeth, for the far greater part, nothing but iterations, varied sometimes in form but not new in substance. So he saw plainly, that opinion of store was a cause of want; and that both works and doctrines appear many, and are few.

4. He thought also, that knowledge is uttered to men in a form, as if every thing were finished; for it is reduced into arts and methods; which in their divisions do seem to include all that may be. And how weakly soever the parts are filled, yet they carry the shew and reason of a total; and thereby the writings of some received authors go for the very art: whereas antiquity used to deliver the knowledge which the mind of man had gathered, in observations, aphorisms, or short and dispersed sentences, or small tractates of some parts that they had diligently meditated and laboured; which did invite men, both to ponder that which was invented, and to add and supply further. But now sciences are delivered to be believed and accepted, and not to be examined and further discovered; and the succession is between master and disciple, and not between inventor and continuer or advancer; and therefore sciences stand at a stay, and have done for many ages, and that which is positive is fixed, and that which is question is kept question, so as the columns of no further proceeding are pitched. And therefore he saw plainly men had cut themselves off from further invention; and that it is no marvel; that that is not obtained which hath not been attempted, but rather shut out and debarred.

5. He thought also, that knowledge is almost generally sought either for delight and satisfaction, or for gain or profession, or for credit and ornament, and that every of these are as Atalanta's balls, which hinder the race of invention. For men are so far in these courses from seeking to increase the mass of knowledge, as of that mass which is they will take no more than will serve their turn: and if any one amongst so many seeketh knowledge for itself, yet he rather seeketh to know the variety of things, than to discern of the truth and causes of them; and if his inquisition be yet more severe, yet it tendeth rather to judgment than to invention; and rather to discover truth in controversy, than new matter; and if his heart be so large as he propoundeth to himself further discovery or invention, yet it is rather of new discourse and speculation of causes, than of effects and operations. And as for those that have so much in their mouths, action and use and practice, and the referring of sciences thereunto;

thereunto; they mean it of application of that which is known, and not of a discovery of that which is unknown. So he saw plainly, that this mark, namely, invention of further means to endow the condition and life of man with new powers or works, was almost never yet set up and resolved in man's intention and inquiry.

6. He thought also that, amongst other knowledges, natural philosophy hath been the least followed and laboured. For since the christian faith, the greatest number of wits have been employed, and the greatest helps and rewards have been converted upon divinity. And before-time likewise, the greatest part of the studies of philosophers was consumed in moral philosophy, which was as the heathen divinity. And in both times a great part of the best wits betook themselves to law, pleadings, and causes of estate; specially in the time of the greatness of the Romans, who by reason of their large empire needed the service of all their able men for civil businets. And the time amongst the Grecians, in which natural philosophy seemed most to flourish, was but a short space; and that also rather abused in differing sects and conflicts of opinions than profitably spent. Since which time, natural philosophy was never any profession, nor never possessed any whole man, except perchance some monk in a cloister, or some gentleman in the country, and that very rarely; but became a science of passage, to season a little young and unripe wits, and to serve for an introduction to other arts, especially physic and the practical mathematics. So as he saw plainly, that natural philosophy hath been intended by few persons, and in them hath occupied the least part of their time; and that in the weakest of their age and judgment.

7. He thought also, how great opposition and prejudice natural philosophy had received by superstition, and the immoderate and blind zeal of religion; for he found that some of the Grecians, which first gave the reason of thunder, had been condemned of impiety; and that the cosmographers, which first discovered and described the roundness of the earth, and the consequence thereof touching the Antipodes, were not much otherwise censured by the ancient fathers of the Christian church; and that the case is now much worse, in regard of the boldness of the schoolmen and their dependences in the monasteries, who having made divinity into an art, have almost incorporated the contentous philosophy of Aristotle into the body of Christian religion; and generally he perceived in men of devout simplicity this opinion, that the secrets of nature were the secrets of God; and part of that glory whereinto the mind of man, if it seek to press, shall be oppressed; and that the desire in men to attain to so great and hidden knowledge, hath a resemblance with that temptation which caused the original fall; and on the other side, in men of a devout policy, he noted an inclination to have the people depend upon God the more, when they are less acquainted with second causes; and to have no stirring in philosophy, lest it may lead to an innovation in divinity, or else should discover matter of further contradiction to divinity. But in this part, resorting to the authority of the Scriptures, and holy examples, and to reason, he rested not satisfied alone, but much confirmed. For first, he considered that the knowledge of nature, by the light whereof man discerned of every living creature, and imposed names according to their propriety, was not the occasion of the fall; but the moral knowledge of good and evil, affected to the end to depend no more upon God's commandments, but for man to direct himself. Neither could he find in any Scripture, that the inquiry and science of man in any thing, under the mysteries of the Deity, is determined and restrained, but contrari-

wise.

FILUM LABYRINTHI.

wife allowed and provoked. For concerning all other knowledge the Scripture pronounceth, *That it is the glory of God to conceal, but it is the glory of man, (or of the king, for the king is but the excellency of man) to invent*; and again, *The spirit of man is as the lamp of God, wherewith he searcheth every secret*; and again most effectually, *That God hath made all things beautiful and decent, according to the return of their seasons*; also *that he hath set the world in man's heart, and yet man cannot find out the work which God worketh from the beginning to the end*: shewing that the heart of man is a continent of that concave or capacity, wherein the content of the world, that is, all forms of the creatures, and whatsoever is not God, may be placed, or received; and complaining, that through the variety of things, and vicissitudes of times, which are but impediments and not impuissances, man cannot accomplish his invention. In precedent also he set before his eyes, that in those few memorials before the flood, the Scripture honoureth the name of the inventors of music and works in metal; that Moses had this addition of praise, that he was seen in all the learning of the Egyptians; that Solomon, in his grant of wisdom from God, had contained, as a branch thereof, that knowledge whereby he wrote a natural history of all verdure, from the cedar to the moss, and of all that breatheth; that the book of Job, and many places of the prophets, have great asperision of natural philosophy; that the church in the bosom and lap thereof, in the greatest injuries of times, ever preserved, as holy relicks, the books of philosophy and all heathen learning; and that when Gregory the bishop of Rome became adverse and unjust to the memory of heathen antiquity, it was censured for pusillanimity in him, and the honour thereof soon after restored, and his own memory almost persecuted by his successor Sabinian; and lastly, in our times, and the ages of our fathers, when Luther and the divines of the Protestant church on the one side, and the Jesuits on the other, have enterprised to reform, the one the doctrine, the other the discipline and manners of the church of Rome, he saw well how both of them have awaked to their great honour and succour all human learning. And for reason, there cannot be a greater and more evident than this, that all knowledge, and specially that of natural philosophy, tendeth highly to the magnifying of the glory of God in his power, providence and benefits, appearing and engraven in his works, which without this knowledge are beheld but as through a veil: for if the heavens in the body of them do declare the glory of God to the eye, much more do they in the rule and decrees of them declare it to the understanding. And another reason, not inferior to this, is, that the same natural philosophy principally amongst all other human knowledge, doth give an excellent defence against both extremes of religion, superstition and infidelity; for both it freeth the mind from a number of weak fancies and imaginations, and it raiseth the mind to acknowledge that to God all things are possible: for to that purpose speaketh our Saviour in that first canon against heresies, delivered upon the case of the resurrection, *Non erit, not knowing the Scriptures, nor the power of God*; teaching, that there are but two fountains of heresy, not knowing the will of God revealed in the Scriptures, and not knowing the power of God revealed or at least made most sensible in his creatures. So as he saw well, that natural philosophy was of excellent use to the exaltation of the Divine Majesty; and, that which is admirable, that being a remedy of superstition, it is nevertheless an help to faith. He saw likewise, that the former opinions to the prejudice hereof had no true ground; but must spring either out of mere ignorance, or out of an excess of devotion, to have divinity all in all, whereas it should be only above all; both which states of mind may be best pardoned; or else
out

out of worfe causes, namely out of envy, which is proud weaknes, and deſerveth to be deſpised; or out of ſome mixture of impoſture, to tell a lie for God's cauſe; or out of an impious diffidence, as if men ſhould fear to diſcover ſome things in nature which might ſubvert faith. But ſtill he ſaw well, howeever theſe opinions are in right reaſon reproved, yet they leave not to be moſt effectual hinderances to natural philoſophy and invention.

8. He thought alſo, that there wanted not great contrariety to the further diſcovery of ſciences in regard of the orders and cuſtoms of univerſities, and alſo in regard of common opinion. For in univerſities and colleges mens ſtudies are almoſt confined to certain authors, from which if any diſſenteth or propoundeth matter of redargution, it is enough to make him thought a perſon turbulent; whereas if it be well adviſed, there is a great difference to be made between matters contemplative and active. For in government change is ſuſpected, though to the better; but it is natural to arts to be in perpetual agitation and growth. Neither is the danger alike of new light, and of new motion or remove; and for vulgar and received opinions, nothing is more uſual, or more uſually complained of, than that it is impoſed for arrogancy and preſumption, for men to authoriſe themſelves againſt antiquity and authors, towards whom envy is ceaſed, and reverence by time amortiſed; it not being conſidered what Ariſtotle himſelf did, upon whom the philoſophy that now is chiefly dependeth, who came with a profeſſed contradiction to all the world, and did put all his opinions upon his own authority and argument, and never ſo much as nameth an author, but to confute and reprove him; and yet his ſucceſs well fulfilled the obſervation of him that ſaid, *If a man come in his own name, him will you receive.* Men think likewise, that if they ſhould give themſelves to the liberty of invention and travail of inquiry, that they ſhall light again upon ſome conceits and contemplations which have been formerly offered to the world, and have been put down by better, which have prevailed and brought them to oblivion; not ſeeing, that howſoever the property and breeding of knowledges is in great and excellent wits, yet the eſtimation and price of them is in the multitude, or in the inclinations of princes and great perſons meanly learned. So as theſe knowledges are like to be received and honoured, which have their foundation in the ſubtility or fineſt trial of common ſenſe, or ſuch as fill the imagination, and not ſuch knowledge as is digged out of the hard mine of hiſtory and experience, and falleth out to be in ſome points as adverſe to common ſenſe, or popular reaſon, as religion, or more. Which kind of knowledge, except it be delivered with ſtrange advantages of eloquence and power, may be likely to appear and diſcloſe a little to the world, and ſtraight to vaniſh and ſhut again. So that time ſeemeth to be of the nature of a river or flood, that bringeth down to us that which is light and blown up, and ſinketh and drowneth that which is ſolid and grave. So he ſaw well, that in the ſtate of religion, and in the adminiſtration of learning, and in common opinion, there were many and continual ſtops and traverſes to the courſe of invention.

9. He thought alſo, that the invention of works and further poſſibility was prejudiced in a more ſpecial manner than that of ſpeculative truth; for beſides the impediments common to both, it hath by itſelf been notably hurt and diſcredited by the vain promiſes and pretences of alchemy, magic, aſtrology, and ſuch other arts, which, as they now paſs, hold much more of imagination and belief, than of ſenſe and demonſtration. But to uſe the poet's language, men ought to have remembered, that although Ixion of a cloud in the likenets of Juno begot Centaurs and Chimaerae,
yet

yet Jupiter also of the true Juno begat Vulcan and Hebe. Neither is it just to deny credit to the greatness of the acts of Alexander, because the like or more strange have been feigned of an Amadis or an Arthur, or other fabulous worthies. But though this in true reason should be, and that men ought not to make a confusion of unbelief; yet he saw well, it could not otherwise be in event, but that experience of untruth had made access to truth more difficult, and that the ignominy of vanity had abated all greatness of mind.

10. He thought also, there was found in the mind of man an affection naturally bred and fortified, and furthered by discourse and doctrine, which did pervert the true proceeding towards active and operative knowledge. This was a false estimation, that it should be as a diminution to the mind of man to be much conversant in experiences and particulars, subject to sense and bound in matter, and which are laborious to search, ignoble to meditate, harsh to deliver, illiberal to practise, infinite as is supposed in number, and no ways accommodated to the glory of arts. This opinion or state of mind received much credit and strength by the school of Plato, who thinking that particulars rather revived the notions, or excited the faculties of the mind, than merely informed; and having mingled his philosophy with superstition, which never favoureth the sense, extolleth too much the understanding of man in the inward light thereof. And again, Aristotle's school, which giveth the dew to the sense in assertion, denieth it in practice much more than that of Plato. For we see the schoolmen, Aristotle's successors, which were utterly ignorant of history, rested only upon agitation of wit; whereas Plato giveth good example of inquiry by induction and view of particulars; though in such a wandering manner as is of no force or fruit. So that he saw well, that the supposition of the sufficiency of man's mind hath lost the means thereof.

SEQUELA CHARTARUM;
SIVE
INQUISITIO LEGITIMA
DE
CALORE et FRIGORE.

SECTIO ORDINIS.

Charta suggestionis, sive memoria fixa.

THE sun-beams hot to sense.

The moon-beams not hot, but rather conceived to have a quality of cold, for that the greatest colds are noted to be about the full, and the greatest heats about the change. *Query.*

The beams of the stars have no sensible heat by themselves; but are conceived to have an augmentative heat of the sun beams by the instance following. The same climate arctic and antarctic are observed to differ in cold, namely, that the antarctic is the more cold, and it is manifest the antarctic hemisphere is thinner planted with stars.

The heats observed to be greater in July than in June; at which time the sun is nearest the greatest fixed stars, namely, *Cor Leonis, Cauda Leonis, Spica Virginis, Syrius, Canicula.*

The conjunction of any two of the three highest planets noted to cause great heats: Comets conceived by some to be as well causes as effects of heat, much more the stars.

The sun-beams have greater heat when they are more perpendicular than when they are more oblique; as appeareth in difference of regions, and the difference of the times of summer and winter in the same region; and chiefly in the difference of the hours of mid-day, mornings, evenings in the same day.

The heats more extreme in July and August than in May or June, commonly imputed to the stay and continuance of heat.

The heats more extreme under the tropics than under the line: commonly imputed to the stay and continuance of heat, because the sun there doth as it were double a cape.

The heats more about three or four of clock than at noon; commonly imputed to the stay and continuance of heat.

The sun noted to be hotter when it shineth forth between clouds, than when the sky is open and serene.

The middle region of the air hath manifest effects of cold, notwithstanding locally it be nearer the sun, commonly imputed to antiperistasis, assuming that the beams of the sun are hot either by approach or by reflexion, and that falleth in the middle term between both; or if, as some conceive, it be only by reflexion, then the cold

of that region resteth chiefly upon distance. The instances shewing the cold of that region, are the snows which descend, the hails which descend, and the snows and extreme colds which are upon high mountains.

But *Query*, of such mountains as adjoin to sandy vales, and not to fruitful vales, which minister no vapours; or of mountains above the region of vapours, as is reported of Olympus, where any inscription upon the ashes of the altar remained untouched of wind or dew. And note, it is also reported, that men carry up sponges with vinegar to thicken their breath, the air growing too fine for respiration, which seemeth not to stand with coldness.

The clouds make a mitigation of the heat of the sun. So doth the interposition of any body, which we term shades; but yet the nights in summer are many times as hot to the feeling of mens bodies as the days are within doors, where the beams of the sun actually beat not.

There is no other nature of heat known from the celestial bodies or from the air, but that which cometh by the sun-beams. For in the countries near the pole, we see the extreme colds end in the summer months, as in the voyage of Nova Zembla, where they could not disengage their barks from the ice, no not in July, and met with great mountains of ice, some floating, some fixed, at that time of the year, being the heart of summer.

The caves under the earth noted to be warmer in winter than in summer, and so the waters that spring from within the earth.

Great quantity of sulphur, and sometimes naturally burning after the manner of *Ætna*, in Iceland; the like written of Groenland, and divers other the cold countries †.

The trees in the cold countries are such as are fuller of rosin, pitch, tar, which are matters apt for fire, and the woods themselves more combustible than those in much hotter countries; as for example, fir, pine-apple, juniper: *Query*, whether their trees of the same kind that ours are, as oak and ash, bear not, in the more cold countries a wood more brittle and ready to take fire than the same kinds with us?

The sun-beams heat manifestly by reflexion, as in countries pent in with hills, upon walls or buildings, upon pavements, upon gravel more than earth, upon arable more than grass, upon rivers if they be not very open, *etc.*

The uniting or collection of the sun-beams multiplieth heat, as in burning-glasses, which are made thinner in the middle than on the sides, as I take it contrary to spectacles; and the operation of them is, as I remember, first to place them between the sun and the body to be fired, and then to draw them upward towards the sun, which it is true maketh the angle of the cone sharper. But then I take it if the glass had been first placed at the same distance, to which it is after drawn, it would not have had that force, and yet that had been all one to the sharpness of the angle. *Query.*

So in that the sun's beams are hotter perpendicularly than obliquely, it may be imputed to the union of the beams, which in case of perpendicularity reflect into the very same lines with the direct; and the further from perpendicularity the more obtuse the angle, and the greater distance between the direct beam and the reflected beam.

† No doubt the heat of the sun hath great power in cold countries, though it be not to the analogy of men, and fruits, *etc.*

The sun-beams raise vapours out of the earth, and when they withdraw they fall back in dews.

The sun-beams do many times scatter the mists which are in the mornings.

The sun-beams cause the divers returns of the herbs, plants, and fruits of the earth; for we see in lemon-trees and the like, that there is coming on at once fruit ripe, fruit unripe, and blossoms; which may shew that the plant worketh to put forth continually, were it not for the variations of the accesses and recesses of the sun, which call forth, and put back.

The excessive heat of the sun doth wither and destroy vegetables, as well as the cold doth nip and blast them.

The heat or beams of the sun doth take away the smell of flowers, specially such as are of a milder odour.

The beams of the sun do disclose summer flowers, as the pimpernel, marigold, and almost all flowers else, for they close commonly morning and evening, or in over-cast weather, and open in the brightness of the sun; which is but imputed to dryness and moisture, which doth make the beams heavy or erect; and not to any other propriety in the sun-beams: so they report not only a closing, but a bending or inclining in the *beliotropium* and *calendula*. *Query*.

The sun-beams do ripen all fruits, and addeth to them a sweetness or fatness; and yet some sultry hot days overcast, are noted to ripen more than bright days.

The sun-beams are thought to mend distilled waters, the glasses being well stopp'd, and to make them more virtuous and fragrant.

The sun-beams do turn wine into vinegar; but *Query*, whether they would not sweeten verjuice?

The sun-beams do pall any wine or beer that is set in them.

The sun-beams do take away the lustre of any silks or arras.

There is almost no mine but lieth some depth in the earth; gold is conceived to lie highest and in the hottest countries; yet Thracia and Hungary are cold, and the hills of Scotland have yielded gold, but in small grains or quantity.

If you set a root of a tree too deep in the ground, that root will perish, and the stock will put forth a new root nearer the superficies of the earth.

Some trees and plants prosper best in the shade; as the bayes, strawberries, some wood-flowers.

Almost all flies love the sun-beams, so do snakes; toads and worms contrary.

The sun-beams tanneth the skin of man; and in some places turneth it to black.

The sun-beams are hardly endured by many, but cause head-ach, faintness, and with many they cause rheums; yet to aged men they are comfortable.

The sun causes pestilence, which with us rage about autumn; but it is reported, in Barbary they break up about June, and rage most in winter.

The heat of the sun, and of fire, and living creatures, agree in some things which pertain to vivification; as the back of a chimney will set forward an apricot-tree as well as the sun; the fire will raise a dead butterfly as well as the sun; and so will the heat of a living creature. The heat of the sun in sand will hatch an egg. *Query*.

The heat of the sun in the hottest countries is nothing so violent as that of fire, no not scarcely so hot to the sense as that of a living creature.

The sun, a fountain of light as well as heat. The other celestial bodies manifest

in light, and yet *non constat* whether all borrowed, as in the moon; but obscure in heat.

The southern and western wind with us is the warmest, whereof the one bloweth from the sun, the other from the sea; the northern and eastern the more cold. *Query*, whether in the coast of Florida, or at Brasil, the east wind be not the warmest, and the west the coldest; and so beyond the antarctic tropic, the southern wind the coldest.

The air useth to be extreme hot before thunders.

The sea and air ambient, appeareth to be hotter than that at land; for in the northern voyages two or three degrees farther at the open sea, they find less ice than two or three degrees more south near land: but *Query*, for that may be by reason of the shores and shallows.

The snows dissolve fastest upon the sea-coasts, yet the winds are counted the bitterest from the sea, and such as trees will bend from. *Query*,

The streams or clouds of brightness which appear in the firmament, being such through which the stars may be seen, and shoot not, but rest, are signs of heat.

The pillars of light which are so upright, and do commonly shoot and vary, are signs of cold; but both these are signs of drought.

The air when it is moved is to the sense colder; as in winds, fannings, *ventilabra*.

The air in things fibrous, as fleeces, furs, *etc.* warm; and those stuffs to the feeling warm.

The water to man's body seemeth colder than the air; and so in summer, in swimming it seemeth at the first going in; and yet after one hath been in a while, at the coming forth again, the air seemeth colder than the water.

The snow more cold to the sense than water, and the ice than snow; and they have in Italy means to keep snow and ice for the cooling of their drinks; *Query*, whether it be so in froth in respect of the liquor.

Baths of hot water feel hottest at the first going in.

The frost dew which we see in hoar frost, and in the rymes upon trees or the like, accounted more mortifying cold than snow; for snow cherisheth the ground, and any thing sowed in it; the other biteth and killeth.

Stone and metal exceeding cold to the feeling more than wood: yea more than jet or amber, or horn, which are no less smooth.

The snow is ever in the winter season, but the hail, which is more of the nature of ice, is ever in the summer season; whereupon it is conceived, that as the hollows of the earth are warmest in the winter, so that region of the air is coldest in the summer; as if they were a fugue of the nature of either from the contrary, and a collecting itself to an union, and so to a further strength.

So in the shades under trees, in the summer, which stand in an open field, the shade noted to be colder than in a wood.

Cold effecteth congelation in liquors, so as they do consist and hold together, which before did run.

Cold breaketh glasses; if they be close-stopped, in frost, when the liquor freezeth within.

Cold in extreme maketh metals, that are dry and brittle, cleft and crack, *Aerque dissiliunt*; so of pots of earth and glass.

Cold maketh bones of living creatures more fragile.

Cold.

Cold maketh living creatures to swell in the joints, and the blood to clot, and turn more blue.

Bitter frosts do make all drinks to taste more dead and flat.

Cold maketh the arteries and flesh more asper and rough.

Cold causes rheums and distillations by compressing the brain, and laxes by like reason.

Cold increases appetite in the stomach, and willingness to stir.

Cold maketh the fire to scald and sparkle.

Paracelsus reporteth, that if a glass of wine be set upon a terras in a bitter frost, it will leave some liquor unfrozen in the center of the glass, which excelleth *spiritus vini* drawn by fire.

Cold in Muscovy, and the like countries, causes those parts which are voidest of blood, as the nose, the ears, the toes, the fingers, to mortify and rot; especially if you come suddenly to fire, after you have been in the air abroad, they are sure to moulder and dissolve. They use for remedy, as is said, washing in snow water.

If a man come out of a bitter cold suddenly to the fire, he is ready to swoon or be overcome.

So contrariwise at Nova Zembla, when they opened their door at times to go forth, he that opened the door was in danger to be overcome.

The quantity of fish in the cold countries, Norway, *etc.* very abundant.

The quantity of fowl and eggs laid in the cliffs in great abundance.

In Nova Zembla they found no beast but bears and foxes, whereof the bears gave over to be seen about September, and the foxes began.

Meat will keep from putrifying longer in frosty weather, than at other times.

In Iceland they keep fish, by exposing it to the cold, from putrifying without salt.

The nature of man endureth the colds in the countries of Scricfinnia, Biarmia, Lappia, Iceland, Groenland; and that not by perpetual keeping in in stoves in the winter time, as they do in Russia; but contrariwise, their chief fairs and intercourse is written to be in the winter, because the ice evens and levelleth the passages of waters, plasnes, *etc.*

A thaw after a frost doth greatly rot and mellow the ground.

Extreme cold hurteth the eyes, and causeth blindness in many beasts, as is reported.

The cold maketh any solid substance, as wood, stone, metal, put to the flesh, to cleave to it, and to pull the flesh after it, and so put to any cloth that is moist.

Cold maketh the pilage of beasts more thick and long, as foxes of Muscovy, fables, *etc.*

Cold maketh the pilage of most beasts incline to grayness or whiteness, as foxes, bears, and so the plumage of fowls; and maketh also the crests of cocks and their feet white, as is reported.

Extreme cold will make nails leap out of the walls, and out of locks, and the like.

Extreme cold maketh leather to be stiff like horn.

In frosty weather the stars appear clearest and most sparkling.

In the change from frost to open weather, or from open weather to frosts, commonly great mists.

DE CALORE ET FRIGORE.

In extreme colds any thing never so little which arresteth the air maketh it to congeal; as we see in cobwebs in windows, which is one of the least and weakest threads that is, and yet drops gather about it like chains of pearl.

So in frosts, the inside of glass windows gathereth a dew; *Query*, if not more without.

Query, Whether the sweating of marble and stones be in frost, or towards rain.

Oil in time of frost gathereth to a substance, as of tallow: and it is said to sparkle some time, so as it giveth a light in the dark.

The countries which lie covered with snow, have a hastier maturation of all grain than in other countries, all being within three months, or thereabouts.

Query, It is said, that compositions of honey, as mead, do ripen, and are most pleasant in the great colds.

The frosts with us are casual, and not tied to any months, so as they are not merely caused by the recess of the sun, but mixed with some inferior causes. In the inland of the northern countries, as in Russia, the weather for the three or four months of November, December, January, February, is constant, namely, clear and perpetual frost, without snows or rains.

There is nothing in our region, which, by approach of a matter hot, will not take heat by transition or excitation.

There is nothing hot here with us but is in a kind of consumption, if it carry heat in itself; for all fired things are ready to consume; chafed things are ready to fire; and the heat of mens bodies needeth aliment to restore.

The transition of heat is without any imparting of substance, and yet remaineth after the body heated is withdrawn; for it is not like smells, for they leave some airs or parts; not like light, for that abideth not when the first body is removed; not unlike to the motion of the loadstone, which is lent without adhesion of substance, for if the iron be filed where it was rubbed, yet it will draw or turn.



PHYSIOLOGICAL REMAINS.

Inquisitions touching the compounding of metals.

TO make proof of the incorporation of iron with flint, or other stone. For if it can be incorporated without over-great charge, or other incommodity, the cheapness of the flint or stone doth make the compound stuff profitable for divers uses. The doubts may be three in number.

First, Whether they will incorporate at all, otherwise than to a body that will not hold well together, but become brittle and uneven ?

Secondly, Although it should incorporate well, yet whether the stuff will not be so stubborn as it will not work well with a hammer, whereby the charge in working will overthrow the cheapness of the material ?

Thirdly, Whether they will incorporate, except the iron and stone be first calcined into powder ? And if not, whether the charge of the calcination will not eat out the cheapness of the material ?

The uses are most probable to be ; first for the implements of the kitchen ; as spits, ranges, cobirons, pots, *etc.* then for the wars, as ordnance, portcullises, grates, chains, *etc.*

Note ; the finer works of iron are not so probable to be served with such a stuff ; as locks, clocks, small chains, *etc.* because the stuff is not like to be tough enough.

For the better use, in comparison of iron, it is like the stuff will be far lighter : for the weight of iron to flint is double and a third part ; and, secondly, it is like to rust not so easily, but to be more clean.

The ways of trial are two : first, by the iron and stone of themselves, wherein it must be inquired, what are the stones that do easiliest melt. Secondly, with an additament, wherein brimstone is approved to help to the melting of iron or steel. But then it must be considered, whether the charge of the additament will not destroy the profit.

It must be known also, what proportion of the stone the iron will receive to incorporate well with it, and that with once melting ; for if either the proportion be too small, or that it cannot be received but piece-meal by several meltings, the work cannot be of value.

To make proof of the incorporating of iron and brass. For the cheapness of the iron in comparison of the brass, if the uses may be served, doth promise profit. The doubt will be touching their incorporating ; for that it is approved, that iron will not incorporate, neither with brass nor other metals, of itself, by simple fire : so as the inquiry must be upon the calcination, and the additament, and the charge of them.

The uses will be for such things as are now made of brass, and might be as well served by the compound stuff ; wherein the doubts will be chiefly of the toughness, and of the beauty.

First,

First, therefore, if brass ordnance could be made of the compound stuff, in respect of the cheapness of the iron, it would be of great use.

The advantage which brass ordnance hath over iron, is chiefly, as I suppose, because it will hold the blow, though it be driven far thinner than the iron can be; whereby it saveth both in the quantity of the material, and in the charge and commodity of mounting and carriage, in regard, by reason of the thinness, it beareth much less weight: there may be also somewhat in being not so easily over-heated.

Secondly, for the beauty. Those things wherein the beauty or lustre are esteemed, are andirons, and all manner of images, and statues, and columns, and tombs, and the like. So as the doubt will be double for the beauty; the one, whether the colour will please so well, because it will not be so like gold as brass? The other, whether it will polish so well? Wherein for the latter it is probable it will; for steel glosses are more resplendent than the like plates of brass would be; and so is the glittering of a blade. And besides, I take it, andiron brass, which they call white brass, hath some mixture of tin to help the lustre. And for the golden colour, it may be by some small mixture of orpiment, such as they use to brass in the yellow alchemy; it will easily recover that which the iron loseth. Of this the eye must be the judge upon proof made.

But now for pans, pots, curfews, counters, and the like, the beauty will not be so much respected, so as the compound stuff is like to pass.

For the better use of the compound stuff, it will be sweeter and cleaner than brass alone, which yieldeth a smell or soileness; and therefore may be better for the vessels of the kitchen and brewing. It will also be harder than brass, where hardness may be required.

For the trial the doubts will be two: first, the over-weight of brass towards iron, which will make iron float on the top in the melting. This perhaps will be holpen with the calaminar stone, which consenteth so well with brass, and as I take it, is lighter than iron. The other doubt will be, the stiffness and driness of iron to melt; which must be holpen either by moistening the iron, or opening it. For the first, perhaps some mixture of lead will help. Which is as much more liquid than brass, as iron is less liquid. The opening may be holpen by some mixture of sulphur: so as the trials would be with brass, iron, calamin stone and sulphur; and then again with the same composition, and an addition of some lead; and in all this the charge must be considered, whether it eat not out the profit of the cheapness of iron?

There be two proofs to be made of incorporation of metals, for magnificence and delicacy. The one for the eye, and the other for the ear. Statue-metal, and bell-metal, and trumpet-metal, and string-metal; in all these, though the mixture of brass or copper should be dearer than the brass itself, yet the pleasure will advance the price to profit.

First therefore for statue-metal, see Pliny's mixtures, which are almost forgotten, and consider the charge.

Try likewise the mixture of tin in larger portion with copper, and observe the colour and beauty, it being polished. But chiefly let proof be made of the incorporating of copper or brass with glass-metal, for that is cheap, and is like to add a great glory and shining.

For bell-metal. First, it is to be known what is the composition which is now in use. Secondly, it is probable that it is the driness of the metal that doth help the clearness

clearness of the found, and the moistness that dulleth it: and therefore the mixtures that are probable, are steel, tin, glass-metal.

For string-metal, or trumpet-metal, it is the same reason; save that glass-metal may not be used, because it will make it too brittle; and trial may be made with mixture of silver, it being but a delicacy, with iron or brass.

To make proof of the incorporation of silver and tin in equal quantity, or with two parts silver, and one part tin, and to observe whether it be of equal beauty and lustre with pure silver; and also whether it yield no softness more than silver? And again, whether it will endure the ordinary fire which belongeth to chafing-dishes, poinets, and such other silver vessels? And if it do not endure the fire, yet whether by some mixture of iron it may not be made more fixt? For if it be in beauty and all the uses aforesaid equal to silver, it were a thing of singular profit to the state, and to all particular persons, to change silver plate or vessels into the compound stuff, being a kind of silver electrum, and to turn the rest into coin. It may be also questioned, whether the compound stuff will receive gilding as well as silver, and with equal lustre? It is to be noted, that the common alloy of silver coin is brass, which doth discolour more, and is not so neat as tin.

The drownings of metals within other metals, in such sort as they can never rise again, is a thing of great profit. For if a quantity of silver can be so buried in gold, as it will never be reduced again, neither by fire, nor parting waters, nor otherwise: and also that it serve all uses as well as pure gold, it is in effect all one as if so much silver were turned into gold; only the weight will discover it; yet that taketh off but half of the profit; for gold is not fully double weight to silver, but gold is twelve times price to silver.

The burial must be by one of these two ways, either by the smallness of the proportion, as perhaps fifty to one, which will be but six-pence gains in fifty shillings; or it must be holpen by somewhat which may fix the silver, never to be restored or vapoured away, when it is incorporated into such a mass of gold; for the less quantity is ever the harder to sever: and for this purpose iron is the likest, or coppel stuff, upon which the fire hath no power of consumption.

The making of gold seemeth a thing scarcely possible; because gold is the heaviest of metals, and to add matter is impossible: and again, to drive metals into a narrower room than their natural extent beareth, is a condensation hardly to be expected. But to make silver seemeth more easy, because both quicksilver and lead are weightier than silver; so as there needeth only fixing, and not condensing. The degree unto this that is already known, is infusing of quicksilver in a parchment, or otherwise, in the midst of molten lead when it cooleth; for this stupifieth the quicksilver that it runneth no more. This trial is to be advanced three ways. First, by iterating the melting of the lead, to see whether it will not make the quicksilver harder and harder. Secondly, to put realgar hot into the midst of the quicksilver, whereby it may be condensed, as well from within as without. Thirdly, to try it in the midst of molten iron, or molten steel, which is a body more likely to fix the quicksilver than lead. It may be also tried, by incorporating powder of steel, or coppel dust, by pouncing, into the quicksilver, and so to proceed to the stupifying.

Upon glass four things should be put in proof. The first, means to make the glass more crystalline. The second, to make it more strong for falls, and for fire, though it come not to the degree to be malleable. The third, to make it coloured

by tinctures, comparable to or exceeding precious stones. The fourth, to make a compound body of glass and galletyle; that is, to have the colour milky like a chalcidon, being a stuff between a porcelane and a glass.

For the first, it is good first to know exactly the several materials whereof the glass in use is made; window-glass, Normandy and Burgundy, ale-house glass, English drinking-glass: and then thereupon to consider what the reason is of the coarseness or clearness; and from thence to rise to a consideration how to make some additions to the coarser materials, to raise them to the whiteness and crystalline splendor of the finest.

For the second; we see pebbles, and some other stones, will cut as fine as crystal, which if they will melt, may be a mixture for glass, and may make it more tough and more crystalline. Besides we see metals will vitrify; and perhaps some portion of the glass of metal vitrified, mixed in the pot of ordinary glass-metal, will make the whole mass more tough.

For the third; it were good to have of coloured window-glass, such as is coloured in the pot, and not by colours-----

It is to be known of what stuff galletyle is made, and how the colours in it are varied; and thereupon to consider how to make the mixture of glass-metal and them, whereof I have seen the example.

Inquire what be the stones that do easiest melt. Of them take half a pound, and of iron a pound and a half, and an ounce of brimstone, and see whether they will incorporate, being whole, with a strong fire. If not, try the same quantities calcined: and if they will incorporate make a plate of them, and burnish it as they do iron.

Take a pound and a half of brass, and half a pound of iron; two ounces of the calamar stone, an ounce and a half of brimstone, an ounce of lead; calcine them and see what body they make; and if they incorporate, make a plate of it burnished.

Take of copper an ounce and a half, of tin an ounce, and melt them together, and make a plate of them burnished.

Take of copper an ounce and a half, of tin an ounce, of glass-metal half an ounce; stir them well in the boiling, and if they incorporate, make a plate of them burnished.

Take of copper a pound and a half, tin four ounces, brass two ounces; make a plate of them burnished.

Take of silver two ounces, tin half an ounce; make a little say-cup of it, and burnish it.

To inquire of the materials of every of the kind of glasses, coarser and finer, and of the proportions.

Take an equal quantity of glass-metal, of stone calcined, and bring a pattern.

Take an ounce of vitrified metal, and a pound of ordinary glass-metal, and see whether they will incorporate, and bring a pattern.

Bring examples of all coloured glasses, and learn the ingredients whereby they are coloured.

Inquire of the substance of galletyle.

ARTICLES OF
QUESTIONS touching MINERALS.

The Lord BACON's questions, with Dr. MEVEREL's solutions.

Concerning the compounding, incorporating, or union of metals or minerals.

Which subject is the first letter of his Lordship's Alphabet.

WITH what metals gold will incorporate by simple colliquefaction, and with what not? And in what quantity it will incorporate; and what kind of body the compound makes?

Gold with silver, which was the ancient *electrum*: gold with quick-silver: gold with lead: gold with copper: gold with brass: gold with iron: gold with tin.

So likewise of silver: silver with quick-silver: silver with lead: silver with copper: silver with brass: silver with iron: *Plinius secund. lib. xxxiii. 9. Misquit denario triumvir Antonius ferrum*, silver with tin.

So likewise of quick-silver: quick-silver with lead: quick-silver with copper: quick-silver with brass: quick-silver with iron: quick-silver with tin.

So of lead: lead with copper: lead with brass: lead with iron: lead with tin. *Plin. xxxiv. 9.*

So of copper: copper with brass: copper with iron: copper with tin.

So of brass: brass with iron: brass with tin.

So of iron: iron with tin.

What be the compound metals that are common and known? And what are the proportions of their mixtures? As,

Latten of brass, and the calaminar stone.

Pewter of tin and lead.

Bell-metal of *etc.* and the counterfeit plate, which they call alchemy.

The decomposites of three metals or more, are too long to inquire of, except there be some compositions of them already observed.

It is also to be observed, whether any two metals, which will not mingle of themselves, will mingle with the help of another; and what.

What compounds will be made of metal with stone and other fossils; as latten is made with brass and the calaminar stone; as all the metals incorporate with vitriol; all with iron powdered; all with flint, *etc.*

Some few of these should be inquired of, to disclose the nature of the rest.

Whether metals or other fossils will incorporate with molten glass, and what body it makes?

The quantity in the mixture should be well considered; for some small quantity perhaps will incorporate, as in the allays of gold and silver coin.

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Upon

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Upon the compound body, three things are chiefly to be observed: the colour; the fragility or pliantness; the volatility or fixation, compared with the simple bodies.

For present use or profit, this is the rule: consider the price of the two simple bodies; consider again the dignity of the one above the other in use; then see if you can make a compound, that will save more in price, than it will lose in dignity of the use.

As for example; consider the price of brass ordnance; consider again the price of iron ordnance, and then consider wherein the brass ordnance doth excel the iron ordnance in use: then if you can make a compound of brass and iron that will be near as good in use, and much cheaper in price, then there is profit both to the private and the commonwealth. So of gold and silver, the price is double of twelve: the dignity of gold above silver is not much, the splendor is alike, and more pleasing to some eyes, as in cloth of silver, silvered rapiers, *etc.* The main dignity is, that gold bears the fire, which silver doth not: but that is an excellency in nature, but it is nothing at all in use; for any dignity in use I know none, but that silvering will fully and canker more than gilding; which if it might be corrected with a little mixture of gold, there is profit: and I do somewhat marvel, that the latter ages have lost the ancient *electrum*, which was a mixture of silver with gold: whereof I conceive there may be much use, both in coin, plate, and gilding.

It is to be noted, that there is in the version of metals impossibility, or at least great difficulty, as in making of gold, silver, copper. On the other side, in the adulterating or counterfeiting of metals, there is deceit and villany. But it should seem there is a middle way, and that is by new compounds, if the ways of incorporating were well known.

What incorporation or imbibition metals will receive from vegetables, without being dissolved in their substance: as when the armourers make their steel more tough and pliant, by aspersing of water or juice of herbs; when gold being grown somewhat churlish by recovering, is made more pliant by throwing in shreds of tanned leather, or by leather oiled.

Note; that in these and the like shews of imbibition, it were good to try by the weights, whether the weight be increased, or no; for if it be not, it is to be doubted that there is no imbibition of substance, but only that the application of that other body doth dispose and invite the metal to another posture of parts, than of itself it would have taken.

After the incorporation of metals by simple colliquefaction, for the better discovery of the nature and consents and dissents of metals, it should be likewise tried by incorporating of their dissolutions. What metals being dissolved in strong waters will incorporate well together, and what not? Which is to be inquired particularly, as it was in colliquefactions.

There is to be observed in those dissolutions which will not easily incorporate, what the effects are: as the bullition; the precipitation to the bottom; the ejaculation towards the top; the suspension in the midst; and the like.

Note; that the dissents of the menstrual or strong waters may hinder the incorporation, as well as the dissents of the metals themselves; therefore where the *menstrua* are the same, and yet the incorporation followeth not, you may conclude the dissent is in the metals; but where the *menstrua* are several, not so certain.

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Dr. Meeverell's answers to the foregoing questions, concerning the compounding, incorporating, or union of metals and minerals.

GOLD will incorporate with silver in any proportion. *Plin. lib. xxxiii. cap. 4. Omni auro inest argentum vario pondere; alibi dena, alibi nona, alibi octava parte -----Ubiunque quinta argenti portio invenitur, electrum vocatur.* The body remains fixt, solid, and coloured, according to the proportion of the two metals.

Gold with quick-silver easily mixeth, but the product is imperfectly fixed; and so are all other metals incorporate with mercury.

Gold incorporates with lead in any proportion.

Gold incorporates with copper in any proportion, the common allay.

Gold incorporates with brass in any proportion. And what is said of copper is true of brass, in the union of other metals.

Gold will not incorporate with iron.

Gold incorporates with tin, the ancient allay, *Isa. i. 25.*

What was said of gold and quick-silver, may be said of quick-silver and the rest of metals.

Silver with lead in any proportion.

Silver incorporates with copper. Pliny mentions such a mixture for *triumphales statuae*, *lib. xxxiii. 9. Miscentur argento, tertia pars aeris Cyprii tenuissimi, quod coronarium vocant, et sulphuris vivi quantum argenti.* The same is true of brass.

Silver incorporates not with iron. Wherefore I wonder at that which Pliny hath, *lib. xxxiii. 9. Misceuit denario triumvir Antonius ferrum.* And what is said of this is true in the rest; for iron incorporateth with none of them.

Silver mixes with tin.

Lead incorporates with copper. Such a mixture was the pot-metal whereof Pliny speaks, *lib. xxxiv. 9. Ternis aut quaternis libris plumbi argentarii in centenas aeris additis.*

Lead incorporates with tin. The mixture of these two in equal proportions, is that which was anciently called *plumbum argentarium*, *Plin. lib. xxxiv. 17.*

Copper incorporates with tin. Of such a mixture were the mirrors of the Romans. *Plin. Atque ut omnia de speculis peragantur hoc loco, optima apud majores erant Brunifusa, stanno et aere mixta. Lib. xxxiii. 9.*

Compound metals now in use.

1. Fine tin. The mixture is thus: pure tin a thousand pound, temper fifty pounds, glass of tin three pounds.

2. Coarse pewter is made of fine tin and lead. Temper is thus made: the drops of pure tin, four pound and a half; copper, half a pound.

3. Brass is made of copper and *calaminaris*.

4. Bell-metal. Copper, a thousand pound; tin, from three hundred to two hundred pound; brass, a hundred and fifty pound.

5. Pot-metal, copper and lead.

6. White alchemy is made of pan-brass one pound, and *arsenicum* three ounces.

7. Red alchemy is made of copper and auripigment.

There be divers imperfect minerals, which will incorporate with the metals: being indeed metals inwardly, but clothed with earths and stones: as *pyritis, calaminaris, mag, calcinus, fer, arsenicum,*

Metals.

PHYSIOLOGICAL REMAINS.

Metals incorporate not with glafs, except they be brought into the form of glafs.

Metals diffolved. The diffolution of gold and filver difagree, fo that in their mixture there is great ebullition, darknefs, and in the end a precipitation of a black powder.

The mixture of gold and mercury agree.

Gold agrees with iron. In a word, the diffolution of mercury and iron agree with all the reft.

Silver and copper difagree, and fo do filver and lead. Silver and tin agree.

The fecond letter of the crofs-row, touching the feperation of metals and minerals.

SEPARATION is of three forts; the firft, is the feparating of the pure metal from the ore or dross, which we call refining. The fecond, is the drawing one metal or mineral out of another, which we call extracting. The third, is the feparating of any metal into its original or *materia prima*, or element, or call them what you will; which work we will call principiation.

1. For refining, we are to inquire of it according to the feveral metals; as gold, filver, *etc.* Incidentally we are to inquire of the firft ftone, or ore, or spar, or marcasite of metals feverally, and what kind of bodies they are, and of the degrees of richnefs. Alfo we are to inquire of the means of feparating, whether by fire, parting waters, or otherwife. Alfo for the manner of refining, you are to fee how you can multiply the heat, or haften the opening, and fo fave the charge in the fining.

The means of this in three manners; that is to fay, in the blast of the fire; in the manner of the furnace, to multiply heat by union and reflexion; and by fome additament, or medicines which will help the bodies to open them the fooner.

Note, the quickning of the blast, and the multiplying of the heat in the furnace, may be the fame for all metals; but the additaments muft be feveral, according to the nature of the metals. Note again, that if you think that multiplying of the additaments in the fame proportion that you multiply the ore, the work will follow, you may be deceived: for quantity in the paffive will add more refiftance, than the fame quantity in the active will add force.

2. For extracting, you are to inquire what metals contain others, and likewise what not; as lead, filver; copper, filver, *etc.*

Note, although the charge of extraction fhould exceed the worth, yet that is not the matter: for at leaft it will difcover nature and poffibility, the other may be thought on afterwards.

We are likewise to inquire what the differences are of thofe metals which contain more or lefs other metals, and how that agrees with the poornefs or richnefs of the metals or ore in themfelves. As the lead that contains moft filver is accounted to be more brittle, and yet otherwife poorer in itfelf.

3. For principiation, I cannot affirm whether there be any fuch thing or not; and I think the chemifts make too much ado about it: but howfoever it be, be it folution or extraction, or a kind of converfion by the fire; it is diligently to be inquired what falts, fulphur, vitriol, mercury, or the like fimple bodies are to be found in the feveral metals, and in what quantity.

Dr.

Dr. Mevrel's answers to the foregoing questions, touching the separations of metals and minerals.

1 **F**OR the means of separating. After that the ore is washed, or cleansed from the earth, there is nothing simply necessary, save only a wind-furnace well framed, narrow above and at the hearth, in shape oval, sufficiently fed with charcoal and ore, in convenient proportions.

For additions in this first separation, I have observed none; the dross the mineral brings being sufficient. The refiners of iron observe, that that iron-stone is hardest to melt which is fullest of metal, and that easiest which hath most dross. But in lead and tin the contrary is noted. Yet in melting of metals, when they have been calcined formerly by fire, or strong-waters, there is good use of additions, as of borax, tartar, armoniac, and salt-petre.

2. In extracting of metals. Note, that lead and tin contain silver. Lead and silver contain gold. Iron contains brass. Silver is best separated from lead by the test. So gold from silver. Yet the best way for that is *aqua regia*.

3. For precipitation. I can truly and boldly affirm, that there are no such principles as sal, sulphur, and mercury, which can be separated from any perfect metals. For every part so separated, may easily be reduced into perfect metal without substitution of that, or those principles which chemists imagine to be wanting. As suppose you take the salt of lead; this salt, or as some name it, sulphur, may be turned into perfect lead, by melting it with the like quantity of lead which contains principles only for itself.

I acknowledge that there is quick-silver and brimstone found in the imperfect minerals: but those are nature's remote materials, and not the chemist's principles. As if you dissolve antimony by *aqua regia*, there will be real brimstone swimming upon the water: as appears by the colour of the fire when it is burnt, and by the smell.

The third letter of the cross-row, touching the variation of metals into several shapes, bodies, or natures, the particulars whereof follow:

TINCTURE: turning to rust: calcination: sublimation: precipitation: amalgamatizing, or turning into a soft body: vitrification: opening or dissolving into liquor: sproutings, or branchings, or arborescents: induration and mollification: making tough or brittle: volatility and fixation: transmutation or version.

For tincture; it is to be inquired how metal may be tinged through and through, and with what, and into what colours; as tinging silver yellow, tinging copper white, and tinging red, green, blue; especially with keeping the lustre.

Item, tincture of glasses.

Item, tincture of marble, flint, or other stone.

For turning into rust, two things are chiefly to be inquired; by what corrosives it is done, and into what colours it turns; as lead into white, which they call *cerufs*; iron into yellow, which they call *crocus martis*; quick-silver into vermilion; brass into green, which they call *verdegrise*.

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For calcination; how every metal is calcined, and into what kind of body, and what is the exquisitest way of calcination.

For sublimation; to inquire the manner of subliming, and what metals endure subliming, and what body the sublimate makes.

For precipitation likewise; by what strong water every metal will precipitate, and with what additaments, and in what time, and into what body.

So for amalgama; what metals will endure it, what are the means to do it, and what is the manner of the body.

For vitrification likewise; what metals will endure it, what are the means to do it, into what colour it turns; and farther, where the whole metal is turned into glass, and where the metal doth but hang in the glassy parts; also what weight the vitrified body bears, compared with the crude body; also because vitrification is accounted a kind of death of metals, what vitrification will admit of turning back again, and what not.

For dissolution into liquor, we are to inquire what is the proper *menstruum* to dissolve any metal, and in the negative, what will touch upon the one, and not upon the other, and what several *menstrua* will dissolve any metal, and which most exactly. *Item*, the process or motion of the dissolution, the manner of rising, boiling, vapouring more violent, or more gentle, causing much heat or less. *Item*, the quantity or charge that the strong water will bear, and then give over. *Item*, the colour into which the liquor will turn. Above all it is to be inquired, whether there be any *menstruum* to dissolve any metal that is not fretting, or corroding; and openeth the body by sympathy, and not by mordacity or violent penetration.

For sprouting or branching, though it be a thing but transitory, and a kind of toy or pleasure, yet there is a more serious use of it; for that it discovereth the delicate motions of spirits, when they put forth and cannot get forth, like unto that which is in vegetables.

For induration, or mollification; it is to be inquired what will make metals harder and harder, and what will make them softer and softer. And this inquiry tendeth to two ends: first, for use; as to make iron soft by the fire makes it malleable. Secondly, because induration is a degree towards fixation, and mollification towards volatility; and therefore the inquiry of them will give light towards the other.

For tough and brittle, they are much of the same kind, but yet worthy of an inquiry apart, especially to join hardness with toughness, as making glass malleable, *etc.* and making blades strong to resist and pierce, and yet not easy to break.

For volatility and fixation. It is a principal branch to be inquired: the utmost degree of fixation is that whereon no fire will work, nor strong water joined with fire, if there be any such fixation possible. The next is, when fire simply will not work without strong waters. The next is by the test. The next is when it will endure fire not blown, or such a strength of fire. The next is when it will not endure, but yet is malleable. The next is when it is not malleable, but yet is not fluent, but stupified. So of volatility, the utmost degree is when it will fly away without returning. The next is when it will fly up, but with ease return. The next is when it will fly upwards over the helm by a kind of exsufflation

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tion without vapouring. The next is when it will melt though not rise. The next is when it will soften though not melt. Of all these diligent inquiry is to be made in several metals, especially of the more extreme degrees.

For transmutation or version. If it be real and true, it is the farthest part of art, and should be well distinguished from extraction, from restitution, and from adulteration. I hear much of turning iron into copper; I hear also of the growth of lead in weight, which cannot be without a conversion of some body into lead: but whatsoever is of this kind, and well expressed, is diligently to be inquired and set down.

Dr. Mevrel's answers to the foregoing questions, concerning the variation of metals and minerals.

1. **F**OR tinctures, there are none that I know, but that rich variety which springs from mixture of metals with metals, or imperfect minerals.

2. The imperfect metals are subject to rust, all of them except mercury, which is made into vermilion by solution or calcination. The rest are rusted by any salt, sour, or acid water. Lead into a white body called *cerussia*. Iron into a pale red called *ferrugo*. Copper is turned into green, named *aerugo, aes viride*. Tin into white: but this is not in use, neither hath it obtained a name.

The Scriptures mention the rust of gold, but that is in regard of the alloy.

3. Calcination. All metals may be calcined by strong waters, or by admixtion of salt, sulphur, and mercury. The imperfect metals may be calcined by continuance of simple fire; iron thus calcined is called *crocus martis*.

And this is their best way. Gold and silver are best calcined by mercury. Their colour is gray. Lead calcined is very red. Copper dusky red.

4. Metals are sublimed by joining them with mercury or salts. As silver with mercury, gold with sal armoniac, mercury with vitriol.

5. Precipitation is, when any metal being dissolved into a strong water, is beaten down into a powder by salt water. The chiefest in this kind is oil of tartar.

6. Amalgamation is the joining or mixing of mercury with any other of the metals. The manner is this in gold, the rest are answerable: take six parts of mercury, make them hot in a crucible, and pour them to one part of gold made red hot in another crucible, stir these well together that they may incorporate; which done, cast the mass into cold water and wash it. This is called the amalgama of gold.

7. For vitrification. All the imperfect metals may be turned by strong fire into glass, except mercury; iron into green; lead into yellow; brass into blue; tin into pale yellow. For gold and silver I have not known them vitrified, except joined with antimony. These glassy bodies may be reduced into the form of mineral bodies.

8. Dissolution. All metals without exception may be dissolved.

(1.) Iron may be dissolved by any tart, salt, or vitriolated water; yea by common water, if it be first calcined with sulphur. It dissolves in *aqua fortis*, with great ebullition and heat, into a red liquor so red as blood.

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(2.) Lead

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(2.) Lead is fitteft diffolved in vinegar, into a pale yellow, making the vinegar very fweet.

(3.) Tin is beft diffolved with diftilled falt-water. It retains the colour of the *menftruum*.

(4.) Copper diffolves as iron doth, in the fame liquor, into a blue.

(5.) Silver hath its proper *menftruum*, which is *aqua fortis*. The colour is green, with great heat and ebullition.

(6.) Gold is diffolved with *aqua regia*, into a yellow liquor, with little heat or ebullition.

(7.) Mercury is diffolved with much heat and boiling, into the fame liquors which gold and filver are. It alters not the colour of the *menftruum*.

Note. Strong waters may be charged with half their weight of fixed metals, and equal of mercury; if the workman be fkilful.

(9.) Sprouting. This is an accident of diffolution. For if the *menftruum* be overcharged, then within fhort time the metals will fhoot into certain cryftals.

(10.) For induration or mollification, they depend upon the quantity of fixed mercury and fulphur. I have obferved little of them, neither of toughnefs nor brittlenefs.

(11.) The degrees of fixation and volatility I acknowledge, except the two utmoft, which never were obferved.

(12.) The queftion of tranfmutation is very doubtful. Wherefore I refer your honour to the fourth tome of *Theatrum chymicum*: and there, to that tract which is intituled *Disquifitio Heliana*; where you fhall find full fatisfaction.

The fourth letter of the crofsrow, touching reftitution.

FIRST, therefore, it is to be inquired in the negative, what bodies will never return, either by their extreme fixings, as in fome vitrifications, or by extreme volatility.

It is alfo to be inquired of the two means of reduction; and firft by the fire, which is but by congregation of homogeneal parts.

The fecond is, by drawing them down by fome body that hath confent with them. As iron draweth down copper in water; gold draweth quick-filver in vapour; whatfoever is of this kind, is very diligently to be inquired.

Alfo it is to be inquired what time, or age, will reduce without help of fire or body.

Alfo it is to be inquired what gives impediment to union or reftitution, which is fometimes called mortification; as when quick-filver is mortified with turpentine, fpittle, or butter.

Laftly, it is to be inquired, how the metal reftored, differeth in any thing from the metal rare: as whether it become not more churlifh, altered in colour, or the like.

Dr. Mevrel's answers touching the reftitutions of metals and minerals.

REDUCTION is chiefly effected by fire, wherein if they ftand and nele, the imperfect metals vapour away, and fo do all manner of falts which feperated them *in minimas partes* before.

Reduction

Reduction is singularly holpen, by joining store of metal of the same nature with it in the melting.

Metals reduced are somewhat churlish, but not altered in colour.

The Lord VERULAM's INQUISITION

CONCERNING THE

Versions, transmutations, multiplications, and effections of bodies.

EARTH by fire is turned into brick, which is of the nature of a stone, and serveth for building, as stone doth: and the like of tile. *Query*, the manner.

Naphtha, which was the bituminous mortar used in the walls of Babylon, grows to an intire and very hard matter like a stone.

In clay countries, where there is pebble and gravel, you shall find great stones, where you may see the pebbles or gravel, and between them a substance of stone as hard or harder than the pebble itself.

There are some springs of water, wherein if you put wood, it will turn into the nature of stone: so as that within the water shall be stone, and that above the water continue wood.

The slime about the reins and bladder in a man's body, turns into stone: and stone is likewise found often in the gall; and sometimes, though rarely, *in vena ferrea*.

Query, what time the substance of earth in quarries asketh to be turned into stone?

Water, as it seems, turneth into crystal, as is seen in divers caves, where the crystal hangs *in stillicidiis*.

Try wood, or the stalk of herbs, buried in quick-silver, whether it will not grow hard and stony.

They speak of a stone engendred in a toad's head.

There was a gentleman, digging in his moat, found an egg turned into stone, the white and the yolk keeping their colour, and the shell glistering like a stone cut with corners.

Try some things put into the bottom of a well; as wood, or some soft substance: but let it not touch the water, because it may not putrify.

They speak, that the white of an egg, with lying long in the sun, will turn stone.

Mud in water turns into shells of fishes, as in horse-mussels, in fresh ponds, old and overgrown. And the substance is a wondrous fine substance, light and shining.

A SPEECH touching the recovering of drowned mineral works.

Prepared for the parliament (as Mr. Bushel affirmed) by the Viscount of St. Albans, then lord high chancellor of England.*

To lords and gentlemen,

THE king, my royal master, was lately graciousl: pleas'd to move some discourse to me concerning Mr. Sutton's hospital, and such like worthy foundations of memorable piety: which humbly seconded by myself, drew his

* See Mr. Bee's extract, p. 18, 19.

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majesty into a serious consideration of the mineral treasures of his own territories, and the practical discoveries of them by way of my philosophical theory: which he then so well refented, that afterwards, upon a mature digestion of my whole design, he commanded me to let your lordships understand, how great an inclination he hath to further so hopeful a work, for the honour of his dominions, as the most probable means to relieve all the poor thereof, without any other stock or benevolence, than that which divine bounty should confer on their own industries and honest labours, in recovering all such drowned mineral works, as have been, or shall be therefore deserted.

And, my lords, all that is now desired of his majesty and your lordships, is no more than a gracious act of this present parliament to authorize them herein, adding a mercy to a munificence, which is, the persons of such strong and able petty-felons, who, in true penitence for their crimes, shall implore his majesty's mercy and permission to expiate their offences by their assiduous labours in so innocent and hopeful a work.

For by this unchangeable way, my lords, have I proposed to erect the academical fabric of this island's Solomon's house, modelled in my New Atlantis. And I can hope, my lords, that my midnight studies, to make our countries flourish and outvy European neighbours in mysterious and beneficent arts, have not so ungratefully affected your noble intellects, that you will delay or resist his majesty's desires, and my humble petition in this benevolent, yea, magnificent affair; since your honourable posterities may be enriched thereby, and my ends are only to make the world my heir, and the learned fathers of my Solomon's house, the successive and sworn trustees in the dispensation of this great service, for God's glory, my prince's magnificence, this parliament's honour, our country's general good, and the propagation of my own memory.

And I may assure your lordships, that all my proposals in order to this great architype, seemed so rational and feasible to my royal sovereign our christian Solomon, that I thereby prevailed with his majesty to call this honourable parliament, to confirm and empower me in my own way of mining, by an act of the same, after his majesty's more weighty affairs were considered in your wisdoms; both which he desires your lordships, and you gentlemen that are chosen as the patriots of your respective countries, to take speedy care of: which done, I shall not then doubt the happy issue of my undertakings in this design, whereby concealed treasures, which now seem utterly lost to mankind, shall be confined to so universal a piety, and brought into use by the industry of converted penitents, whose wretched carcases the impartial laws have, or shall dedicate, as untimely feasts, to the worms of the earth, in whose womb those deserted mineral riches must ever lie buried as lost abortments, unless those be made the active midwives to deliver them. For, my lords, I humbly conceive them to be the fittest of all men to effect this great work, for the ends and causes which I have before expressed.

All which, my lords, I humbly refer to your grave and solid judgments to conclude of, together with such other assistances to this frame, as your own oraculous wisdom shall intimate, for the magnifying our Creator in his inscrutable providence, and admirable works of nature.

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Certain experiments made by the Lord BACON about weight in air and water.

A New sovereign of equal weight in the air to the piece in brass, overweigheth in the water nine grains: in three sovereigns the difference in the water is but twenty-four grains.

The same sovereign overweigheth an equal weight of lead, four grains in the water, in brass grains for gold: in three sovereigns about eleven grains.

The same sovereign overweigheth an equal weight of stones in the air, at least sixty-five grains in the water: the grains being for the weight of gold in brass metal.

A glass filled with water weighing, in Troy weights, thirteen ounces and five drams, the glass and the water together weigheth severall: namely, the water nine ounces and a half, and the glass four ounces and a dram.

A bladder weighing two ounces seven drams and a half, a pebble laid upon the top of the bladder makes three ounces six drams and a half, the stone weigheth seven drams.

The bladder as above, blown, and the same fallen, weigheth equal.

A sponge dry weigheth one ounce twenty six grains: the same sponge being wet, weigheth fourteen ounces six drams and three quarters: the water weigheth in severall eleven ounces one dram and a half, and the sponge three ounces and a half, and three quarters of a dram. First time.

The sponge and water together weigh fifteen ounces and seven drams: in severall, the water weigheth eleven ounces and seven drams, and the sponge three ounces seven drams and a half. Second time.

Three sovereigns made equal to a weight in silver in the air, differ in the water.

For false weights, one beam long, the other thick.

The stick and thread weigh half a dram, and twenty grains, being laid in the balance.

The stick tied to reach within half an inch of the end of the beam, and so much from the tongue, weigheth twenty-eight grains; the difference is twenty-two grains.

The same stick being tied to hang over the end of the beam an inch and a half, weigheth half a dram and twenty-four grains, exceeding the weight of the said stick in the balance by four grains.

The same stick being hanged down beneath the thread, as near the tongue as is possible, weigheth only eight grains.

Two weights of gold being made equal in the air, and weighing severally seven drams; the one balance being put into the water, and the other hanging in the air, the balance in the water weigheth only five drams and three grains, and abateth of the weight in the air one dram and a half, and twenty-seven grains.

The same trial being made the second time, and more truly and exactly betwixt gold and gold, weighing severally, as above; and making a just and equal weight in the air, the one balance being put into the water the depth of five inches, and the other hanging in the air, the balance in the water weigheth only four drams, and fifty-five grains, and abateth of the weight in the air two drams and five grains.

The trial being made betwixt lead and lead, weighing severally seven drams in the air, the balance in the water weigheth only four drams and forty-one grains, and abateth

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abateth of the weight in the air two drams and nineteen grains ; the balance kept the same depth in the water as abovesaid.

The trial being made betwixt silver and silver, weighing severally seven drams in the air, the balance in the water weigheth only four drams and twenty-five grains. So it abateth two drams and thirty-five grains ; the same depth in the water observed.

In iron and iron, weighing severally each balance in the air seven drams, the balance in the water weigheth only four drams and eighteen grains ; and abateth of the weight in the air two drams and forty-two grains ; the depth observe as above.

In stone and stone, the same weight of seven drams equally in the air, the balance in the water weigheth only two drams and twenty-two grains ; and abateth of the weight in the air four drams and thirty-eight grains ; the depth as above.

In brass and brass, the same weight of seven drams in each balance, equal in the air, the balance in the water weigheth only four drams and twenty-two grains ; and abateth in the water two drams and thirty-eight grains ; the depth observed.

The two balances being weighed in air and water, the balance in the air overweigheth the other in the water one dram and twenty-eight grains ; the depth in the water as aforesaid.

It is a profitable experiment which sheweth the weights of several bodies in comparison with water. It is of use in lading of ships, and other bottoms, and may help to shew what burden in the several kinds they will bear.

Certain sudden thoughts of the Lord BACON's,

Set down by him under the title of EXPERIMENTS FOR PROFIT.

MUCK of leaves : muck of river, earth, and chalk : muck of earth closed, both for salt-petre and muck : setting of wheat and peas : mending of crops by steeping of seeds : making peas, cherries, and strawberries come early : strengthening of earth for often returns of radishes, parsnips, turnips, *etc.* making great roots of onions, radishes, and other esculent roots : sowing of seeds of trefoil : setting of woad : setting of tobacco, and taking away the rawns : grafting upon boughs of old trees : making of a hasty coppice : planting of osiers in wet grounds : making of candles to last long : building of chimnies, furnaces, and ovens, to give heat with less wood : fixing of logwood : other means to make yellow and green fixed : conserving of oranges, lemons, citrons, pomegranates, *etc.* all summer : recovering of pearl, coral, turcoise colour, by a conservatory of snow : sowing of fenel : brewing with hay, haws, trefoil, broom, hips, bramble-berries, woodbines, wild thyme, instead of hops, thistles : multiplying and dressing artichokes.

Certain experiments of the Lord BACON's, about the commixture of liquors only, not solids, without heat or agitation, but only by simple composition and settling.

SPIRIT of wine mingled with common water, although it be much lighter than oil, yet so as if the first fall be broken, by means of a fop, or otherwise, it stayeth above ; and if it be once mingled, it severeth not again, as oil doth. Tried with water coloured with saffron.

Spirit

Spirit of wine mingled with common water hath a kind of clouding, and motion shewing no ready commixture. Tried with saffron.

A dram of gold dissolved in *aqua regis*, with a dram of copper in *aqua fortis* commixed, gave a green colour, but no visible motion in the parts. Note, that the dissolution of the gold was, twelve parts water to one part body: and of the copper was, six parts water to one part body.

Oil of almonds commixed with spirit of wine, severeth, and the spirit of wine remaineth on the top, and the oil at the bottom.

Gold dissolved commixed with spirit of wine, a dram of each, doth commix, and no other apparent alteration.

Quick-silver dissolved with gold dissolved, a dram of each, doth turn to a mouldy liquor, black, and like smiths water.

Note, the dissolution of the gold was twelve parts water *ut supra*, and one part metal: that of water was two parts, and one part metal.

Spirit of wine and quick-silver commixed, a dram of each, at the first shewed a white milky substance at the top, but soon after mingled.

Oil of vitriol commixed with oil of cloves, a dram of each, turneth into a red dark colour; and a substance thick almost like pitch, and upon the first motion gathereth an extreme heat, not to be endured by touch.

Dissolution of gold, and oil of vitriol commixed, a dram of each, gathereth a great heat at the first, and darkeneth the gold, and maketh a thick yellow.

Spirit of wine and oil of vitriol, a dram of each, hardly mingle; the oil of vitriol going to the bottom, and the spirit of wine lying above in a milky substance. It gathereth also a great heat, and a sweetne's in the taste.

Oil of vitriol, and dissolution of quick silver, a dram of each, maketh an extreme strife, and casteth up a very gro's fume, and after casteth down a white kind of curds, or sands; and on the top a slimish substance, and gathereth a great heat.

Oil of sulphur, and oil of cloves commixed, a dram of each, turn into a thick and red coloured substance; but no such heat as appeared in the commixture with the oil of vitriol.

Oil of *petroleum*, and spirit of wine, a dram of each, intermingle otherwise than by agitation, as wine and water do; and the *petroleum* remaineth on the top.

Oil of vitriol and *petroleum*, a dram of each, turn into a mouldy substance, and gathereth some warmth; there residing a black cloud at the bottom, and a monstrous thick oil on the top.

Spirit of wine, and red wine vinegar, one ounce of each, at the first fall, one of them remaineth above, but by agitation they mingle.

Oil of vitriol, and oil of almonds, one ounce of each, mingle not; but the oil of almonds remaineth above.

Spirit of wine and vinegar, an ounce of each, commixed, do mingle, without any apparent separation, which might be in respect of the colour.

Dissolution of iron, and oil of vitriol, a dram of each, do first put a milky substance into the bottom, and after incorporate into a mouldy substance.

Spirit of wine commixed with milk, a third part spirit of wine, and two parts milk, coagulateth little, but mingleth; and the spirit swims not above.

Milk and oil of almonds mingled, in equal portions, do hardly incorporate, but the oil cometh above, the milk being poured in last; and the milk appeareth in some drops or bubbles.

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Milk one ounce, oil of vitriol a scruple, doth coagulate; the milk at the bottom, where the vitriol goeth.

Dissolution of gum tragacanth, and oil of sweet almonds, do not commingle, the oil remaining on the top till they be stirred, and make the mucilage somewhat more liquid.

Dissolution of gum tragacanth one ounce and a half, with half an ounce of spirit of wine being commixed by agitation, make the mucilage more thick.

The white of an egg with spirit of wine, doth bake the egg into clots as if it began to poch.

One ounce of blood, one ounce of milk, do easily incorporate.

Spirit of wine doth curdle the blood.

One ounce of whey unclarified, one ounce of oil of vitriol, make no apparent alteration.

One ounce of blood, one ounce of oil of almonds, incorporate not, but the oil swims above.

Three quarters of an ounce of wax being dissolved upon the fire, and one ounce of oil of almonds put together and stirred, do not so incorporate, but that when it is cold the wax gathereth and swims upon the top of the oil.

One ounce of oil of almonds cast into an ounce of fugar seething, sever presently, the fugar shooting towards the bottom.

A catalogue of bodies, attractive and not attractive, together with experimental observations about attraction.

THES E following bodies draw : amber, jet, diamond, sapphire, carbuncle, iris, the gem opale, amethyst, *bristolina*, crystal, clear glass, glass of antimony, divers flowers from mines, sulphur, mastic, hard sealing-wax, the harder rosin, arsenic.

These following bodies do not draw : smaragd, *achates*, *corneolus*, pearl *jaspis*, *chalcidinius*, alabaster, porphyry, coral, marble, touchstone, *baematies*, or bloodstone; *smyris*, ivory, bones, ebon-tree, cedar, cypress, pitch, softer rosin, camphire, *galbanum*, ammoniac, storax, benzoin, loadstone, *asphaltum* *.

These bodies, gold, silver, brass, iron, draw not, though never so finely polished.

In winter, if the air be sharp and clear, *sal gemmeum*, roch allum, and *lapis specularis*, will draw.

These following bodies are apt to be drawn, if the mass of them be small : chaff, woods, leaves, stones, all metals leaved, and in the mine; earth, water, oil.

* The drawing of iron excepted.

M E D I C A L R E M A I N S .

Grains of youth.

TAKE of nitre four grains, of ambergrise three grains, of orrice-powder two grains, of white poppy-seed the fourth part of a grain, of saffron half a grain, with water of orange-flowers, and a little tragacanth ; make them into small grains, four in number. To be taken at four a-clock, or going to bed.

Preserving ointments.

TAKE of deers suet one ounce, of myrrh six grains, of saffron five grains, of bay-salt twelve grains, of Canary wine of two years old, a spoonful and a half. Spread it on the inside of your shirt, and let it dry, and then put it on

A purge familiar for opening the liver.

TAKE rhubarb two drams, agaric trochiscat one dram and a half, steep them in claret wine burnt with mace ; take of wormwood one dram, steep it with the rest, and make a mass of pills, with *syrup. acetos. simplex*. But drink an opening broth before it, with succory, fenel, and smallage roots, and a little of an onion.

Wine for the spirits.

TAKE gold perfectly refined three ounces, quench it six or seven times in good claret wine ; add of nitre six grains for two draughts : add of saffron prepared three grains, of ambergrise four grains, pass it through an hippocras bag, wherein there is a dram of cinnamon gross beaten, or, to avoid the dimming of the colour, of ginger. Take two spoonfuls of this to a draught of fresh claret wine.

The preparing of saffron.

TAKE six grains of saffron, steeped in half parts of wine and rose-water, and a quarter part vinegar ; then dry it in the sun.

Wine against adverse melancholy, preserving the senses and the reason.

TAKE the roots of bugloss well scraped and cleansed from their inner pith, and cut them into small slices ; steep them in wine of gold extinguished *ut supra*, and add of nitre three grains, and drink it *ut supra*, mixed with fresh wine : the roots must not continue steeped above a quarter of an hour ; and they must be changed thrice.

Breakfast preservative against the gout and rheums.

To take once in the month at least, and for two days together, one grain of *castorei* in my ordinary broth.

The preparation of garlick.

TAKE garlick four ounces, boil it upon a soft fire in claret wine, for half an hour. Take it out and steep it in vinegar ; whereto add two drams of cloves, then take it forth, and keep it in a glass for use.

M E D I C A L R E M A I N S.

The artificial preparation of damask roses for smell.

TAKE roses, pull their leaves, then dry them in a clear day in the hot sun; then their smell will be as gone. Then cram them into an earthen bottle, very dry and sweet, and stop it very close; they will remain in smell and colour both fresher, than those that are otherwise dried. Note, the first drying, and close keeping upon it, preventeth all putrefaction, and the second spirit cometh forth, made of the remaining moisture not dissipated.

A restorative drink.

TAKE of Indian maiz half a pound, grind it not too small, but to the fineness of ordinary meal, and then bolt and searce it, that all the husky part may be taken away. Take of *eryngium* roots three ounces, of dates as much, of *emula* two drams, of mace three drams, and brew them with ten shilling beer to the quantity of four gallons: and this do, either by decocting them in a pottle of wort, to be after mingled with the beer, being new tapped, or otherwise infuse it in the new beer in a bag. Use this familiarly at meals.

Against the waste of the body by heat.

TAKE sweet pomegranates, and strain them lightly, not pressing the kernel, into a glass; where put some little of the peel of a citron, and two or three cloves, and three grains of ambergrise, and a pretty deal of fine sugar. It is to be drunk every morning whilst pomegranates last.

Methusalem water. Against all asperity and torrefaction of inward parts, and all aduption of the blood, and generally against the driness of age.

TAKE crevices very new, *q. s.* boil them well in claret wine, of them take only the shells, and rub them very clean, especially on the inside, that they may be thoroughly cleaned from the meat. Then wash them three or four times in fresh claret wine, heated: still changing the wine, till all the fish-taste be quite taken away. But in the wine wherein they are washed, steep some tops of green rosemary; then dry the pure shell thoroughly, and bring them to an exquisite powder. Of this powder take three drams. Take also pearl, and steep them in vinegar twelve hours, and dry off the vinegar; of this powder also three drams. Then put the shell powder and pearl powder together, and add to them of ginger one scruple, and of white poppy seed half a scruple, and steep them in spirit of wine, wherein six grains of saffron have been dissolved seven hours. Then upon a gentle heat vapour away all the spirit of wine, and dry the powder against the sun without fire. Add to it of nitre one dram, of ambergrise one scruple and a half; and so keep this powder for use in a clean glass. Then take a pottle of milk, and slice in it of fresh cucumbers, the inner pith only, the rind being pared off, four ounces, and draw forth a water by distillation. Take of claret wine a pint, and quench gold in it four times.

Of the wine, and of the water of milk, take of each three ounces, of the powder one scruple, and drink it in the morning; stir up the powder when you drink, and walk upon it.

A catalogue of astringents, openers and cordials instrumental to health.

A S T R I N G E N T S .

RED rose, black-berry, myrtle, plantane, flower of pomegranate, mint, aloes well washed, myrobalanes, sloes, *agrestia fraga*, mastich, myrrh, saffron, leaves of rosemary, rhubarb received by infusion, cloves, service-berries, *corua*, wormwood, bole armoniac, sealed earth, cinquefoil, tincture of steel, *sanguis draconis*, coral, amber, quinces, spikenard, galls, alum, blood-stone, mummy, *amomum*, galangal, cypress, ivy, *psyllum*, housleek, fallow, mullein, vine, oak-leaves, *lignum alois*, red sanders, mulberry, medlars, flowers of peach-trees, pomegranates, pears, palmule, pith of kernels, purslain, *acacia*, *laudanum*, *tragacanth*, *thus olibani*, comfrey, shepherds-purse, *polygonium*.

Astringents, both hot and cold, which corroborate the parts, and which confirm and refresh such of them as are loose or languishing.

ROSEMARY, mint, especially with vinegar, cloves, cinnamon, cardamum, lign-aloes, rose, myrtle, red sanders, *cotonea*, red wine, chalybeat wine, five-finger grafs, plantane, apples of cypress, berberries, *fraga*, service-berries, cornels, ribes, four pears, rambesia.

Astringents styptic, which by their styptic virtue may stay fluxes.

SLOES, *acacia*, rind of pomegranates infused at least three hours, the styptic virtue not coming forth in lesser time. Alum, galls, juice of fallow, syrup of unripe quinces, *balauftia*, the whites of eggs boiled hard in vinegar.

Astringents, which by their cold and earthy nature may stay the motion of the humours tending to a flux.

SEALED earth, *sanguis draconis*, coral, pearls, the shell of the fish *dactylus*.

Astringents, which by the thickness of their substance stuff as it were the thin humours, and thereby stay fluxes.

RICE, beans, millet, cauls, dry cheese, fresh goats milk.

Astringents, which by virtue of their glutinous substance restrain a flux, and strengthen the looser parts.

KARABET, mastich, *spodium*, hartshorn, frankincense, dried bulls pistle, gum tragacanth.

Astringents purgative, which, having by their purgative or expulsive power thrust out the humours, leave behind them astringitive virtue.

RHUBARB, especially that which is toasted against the fire; myrobalanes, tartar, tamarinds, an Indian fruit like green damascenes.

Astringents which do very much suck and dry up the humours, and thereby stay fluxes.

RUST of iron, *crocus martis*, ashes of spices.

† Perhaps he meant the fruit of Karobe.

M E D I C A L R E M A I N S .

Astringents, which by their nature do dull the spirits, and lay asleep the expulsive virtue, and take away the acrimony of all humours.

LAUDANUM, mithridate, *scordium*, *diacodium*.

Astringents, which by cherishing the strength of the parts, do comfort and confirm their retentive power.

A stomacher of scarlet cloth : whelps, or young healthy boys, applied to the stomach : hippocratic wines, so they be made of austere materials.

O P E N E R S .

SUCCORY, endive, betony, liverwort, *petroselinum*, smallage, *asparagus*, roots of grafs, dodder, tamarisk, *juncus odoratus*, *lacca*, *cupparus*, wormwood, *chamaepitys*, *fumaria*, scurvy-grafs, eringo, nettle, *ireos*, alder, hyssop; *aristolochia*, gentian, *costus*, fenel-root, maiden-hair, harts-tongue, daffodilly, alarum, sarsaparilla, saffaras, acorns, *abretonum*, aloes, agaric, rhubarb infused, onions, garlic, bother, *squilla*, fow-bread, Indian nard, Celtic nard, bark of laurel tree, bitter almonds, holy thistle, camomile, gun-powder, fows (*millepedes*) ammoniac, man's urine, rue, park leaves (*vitex*) centaury, lupines, *chamaedrys*, *costum*, *ammios*, bistort, camphire, *daucus* seed, Indian balsam, *scordium*, sweet cane, galingal, agrimony.

C O R D I A L S .

FLOWERS of basil royal, *flores caryophyllati*, flowers of bugloss and borage, rind of citron, orange flowers, rosemary and its flowers, saffron, musk, amber, *folium*, *i. e. nardi folium*, balm-gentle, pimpernel, gems, gold, generous wines, fragrant apples, rose, *rosa moschata*, cloves, lign-aloes, mace, cinnamon, nutmeg, cardamum, galin-gal, vinegar, kermes berry, *herba moschata*, betony, white sanders, camphire, flowers of heliotrope, penny-royal, *scordium*, opium corrected, white pepper, *nasturtium*, white and red bean, *castum dulce*, *dactylus*, pine, fig, egg-shell, *vinum malvaticum*, ginger, kidneys, oysters, crevices, or river crabs, seed of nettle, oil of sweet almonds, *sesaminum oleum*, *asparagus*, bulbous roots, onions, garlic, *eruca*, *daucus* seed, eringo, *siler montanus*, the smell of musk, *cynethi odor*, caraway-feed, flower of puls, aniseed, pellitory, anointing of the testicles with oil of alder in which pellitory hath been boiled, cloves with goats milk, *olibanum*.

An extract by the Lord BACON, for his own use, out of the book Of the prolongation of life, together with some new advices in order to health.

1. O N C E in the week, or at least in the fortnight, to take the water of mithridate distilled, with three parts to one, or strawberry water to allay it; and some grains of nitre and saffron, in the morning between sleeps.

2. To continue my broth with nitre; but to interchange it every other two days, with the juice of pomegranates expressed, with a little cloves, and rind of citron.

3. To

3. To order the taking of the maceration (*a*) as followeth.
To add to the maceration six grains of *cremor tartari*, and as much *enula*.
To add to the oxymel some infusion of fenel roots in the vinegar, and four grains of angelica seed, and juice of lemons, a third part to the vinegar.
To take it not so immediately before supper, and to have the broth specially made with barley, rosemary, thyme, and cresses.
SOMETIMES to add to the maceration three grains of tartar, and two of *enula*, to cut the more heavy and viscous humours; left rhubarb work only upon the lightest.
To take sometimes the oxymel before it, and sometimes the Spanish honey simple.
4. To take once in the month at least, and for two days together, a grain and a half of castor in my broth, and breakfast.
5. A cooling clyster to be used once a month, after the working of the maceration is settled.
TAKE of barley water, in which the roots of bugloss are boiled, three ounces, with two drams of red sanders, and two ounces of raisins of the sun, and one ounce of dactyles, and an ounce and a half of fat caricks; let it be strained, and add to it an ounce and a half of syrup of violets: let a clyster be made. Let this be taken, with veal, in the aforesaid decoction.
6. To take every morning the fume of lign-aloes, rosemary and bays dried, which I use; but once in a week to add a little tobacco, without otherwise taking it in a pipe.
7. To appoint every day an hour *ad affectus intentionales et sanos*. Query, *de particulari*.
8. To remember masticatories for the mouth.
9. AND orange-flower water to be smelt to or snuffed up.
10. IN the third hour, after the sun is risen, to take in air from some high and open place, with a ventilation of *rosae muscatae*, and fresh violets; and to stir the earth, with infusion of wine and mint.
11. To use ale with a little *enula campana*, *carduus*, germander, sage, angelica seed, cresses of a middle age, to beget a robust heat.
12. MITHRIDATE thrice a year.
13. A BIT of bread dipt *in vino odocrato*, with syrup of dry roses, and a little amber, at going to bed.
14. NEVER to keep the body in the same posture above half an hour at a time.
15. FOUR precepts. To break off custom. To shake off spirits ill disposed. To meditate on youth. To do nothing against a man's genius.
16. SYRUP of quinces for the mouth of the stomach. Inquire concerning other things useful in that kind.
17. To use once during supper time wine in which gold is quenched.
18. To use anointing in the morning lightly with oil of almonds, with salt and saffron, and a gentle rubbing.
19. ALE of the second infusion of the vine of oak.
20. METHUSALEM water, of pearls and shells of crabs, and a little chalk.
21. ALE of raisins, dactyles, potatoes, pistachios, honey, tragacanth, mastic.
22. WINE with swines flesh, or harts flesh.

(a) Viz. Of rhubarb infused into a draught of white wine and beer, mingled together, for the space of half an hour, once in six or seven days. See the lord Bacon's life by Dr. Rawley, towards the end.

MEDICAL REMAINS.

23. To drink the first cup at supper hot, and half an hour before supper something hot and aromatis'd.
24. CHALYBEATS, four times a year.
25. PILULAE *ex tribus*, once in two months, but after the mass has been macerated in oil of almonds.
26. HEROIC desires.
27. BATHING of the feet once in a month, with lye *ex sale nigro*, camomile, sweet marjoram, fenel, sage, and a little *aqua vitae*.
28. To provide always an apt breakfast.
29. To beat the flesh before roasting of it.
30. MACERATIONS in pickles.
31. AGITATION of beer by ropes, or in wheel-barrows.
32. THAT diet is good which makes lean, and then renews. Consider of the ways to effect it.

MEDICAL RECEIPTS of the lord BACON.

His lordship's usual receipt for the Gout.

To which he refers Nat. Hist. Cent. I. N. 60.

1. *The poultis.*

TAKE of manchet about three ounces, the crumb only, thin cut; let it be boiled in milk till it grow to a pulp. Add in the end a dram and a half of the powder of red roses; of saffron ten grains; of oil of roses an ounce; let it be spread upon a linen cloth, and applied lukewarm, and continued for three hours space.

2. *The bath or fomentation.*

TAKE of sage leaves half a handful; of the root of hemlock sliced six drams; of briony roots half an ounce; of the leaves of red roses two pugils; let them be boiled in a pottle of water, wherein steel hath been quenched, till the liquor come to a quart. After the straining, put in half a handful of bay salt. Let it be used with scarlet cloth, or scarlet wool, dipped in the liquor hot, and so renewed seven times; all in the space of a quarter of an hour, or little more.

3. *The plaister.*

TAKE *Emplastrum diachalciteos*, as much as is sufficient for the part you mean to cover. Let it be dissolved with oil of roses, in such a consistence as will stick; and spread upon a piece of holland, and applied.

His lordship's broth and fomentation for the stone.

The broth.

TAKE one dram of *eryngium* roots, cleansed and sliced; and boil them together with a chicken. In the end, add of alder flowers, and marigold flowers together,
one

one pugil ; of angelica seed half a dram, of raisins of the sun stoned fifteen ; of rosemary, thyme, mace, together, a little.

In six ounces of this broth, or thereabouts, let there be dissolved of white *cremor tartari* three grains.

Every third or fourth day, take a small toast of manchet, dipped in oil of sweet almonds new drawn, and sprinkled with a little loaf sugar. You may make the broth for two days, and take the one half every day. If you find the stone to stir, forbear the toast for a course or two. The intention of this broth is, not to void, but to undermine the quarry of the stones in the kidneys.

The fomentation.

TAKE of leaves of violets, mallows, pellitory of the wall, together, one handful ; of flowers of camomile and melilot, together, one pugil ; the root of marsh-mallows, one ounce ; of anis and fenel seeds, together, one ounce and a half ; of flax-seed, two drams. Make a decoction in spring water.

The second receipt, shewing the way of making a certain ointment, which his lordship called Unguentum fragrans, sive Romanum, the fragrant or Roman unguent.

TAKE of the fat of a deer half a pound ; of oil of sweet almonds two ounces : let them be set upon a very gentle fire, and stirred with a stick of juniper till they are melted. Add of root of flower-de-luce powdered, damask roses powdered, together, one dram ; of myrrh dissolved in rose-water half a dram ; of cloves half a scruple ; of civet four grains ; of musk six grains ; of oil of mace expressed one drop ; as much of rose-water as sufficeth to keep the unguent from being too thick. Let all these be put together in a glass, and set upon the embers for the space of an hour, and stirred with a stick of juniper.

Note ; that in the confection of this ointment, there was not used above a quarter of a pound, and a tenth part of a quarter of deer's suet : and that all the ingredients, except the oil of almonds, were doubled when the ointment was half made, because the fat things seemed to be too predominant.

The third receipt. A manus Christi for the stomach.

TAKE of the best pearls very finely pulverized, one dram ; of sal nitre one scruple ; of tartar two scruples ; of ginger and galingal together, one ounce and a half ; of *calamus*, root of *enula campana*, nutmeg, together, one scruple and a half ; of amber sixteen grains ; of the best musk ten grains ; with rose-water and the finest sugar, let there be made a *manus Christi*.

The fourth receipt. A secret for the stomach.

TAKE *lignum aloës* in gross shavings, steep them in sack, or alicant, changed twice, half an hour at a time, till the bitterness be drawn forth. Then take the shavings forth, and dry them in the shade, and beat them to an excellent powder. Of that powder, with the syrup of citrons, make a small pill, to be taken before supper.

WORKS MORAL.

Vol. I.

Kkk

A FRAGMENT of the
C O L O U R S
O F
G O O D and E V I L.
TO THE LORD MOUNTJOYE.

I Send you the last part of the best book of Aristotle of Stagira, who, as your lordship knoweth, goeth for the best author. But saving the civil respect which is due to a received estimation, the man being a Grecian, and of a hasty wit, having hardly a discerning patience, much less a teaching patience, hath so delivered the matter, as I am glad to do the part of a good house-hen, which without any strangeness will sit upon pheasants eggs. And yet perchance, some that shall compare my lines with Aristotle's lines, will muse by what art, or rather by what revelation, I could draw these conceits out of that place. But I, that should know best, do freely acknowledge, that I had my light from him; for where he gave me not matter to perfect, at the least he gave me occasion to invent. Wherein as I do him right, being myself a man that am as free from envying the dead in contemplation, as from envying the living in action or fortune: so yet nevertheless still I say, and I speak it more largely than before, that in perusing the writings of this person so much celebrated, whether it were the impediment of his wit, or that he did it upon glory and affectation to be subtle, as one that if he had seen his own conceits clearly and perspicuously delivered, perhaps would have been out of love with them himself; or else upon policy, to keep himself close, as one that had been a challenger of all the world, and had raised infinite contradiction: to what cause soever it is to be ascribed, I do not find him to deliver and unwrap himself well of that he seemeth to conceive; nor to be a master of his own knowledge. Neither do I for my part also, though I have brought in a new manner of handling this argument, to make it pleasant and lightsome, pretend so to have overcome the nature of the subject; but that the full understanding and use of it will be somewhat dark, and best pleasing the taste of such wits as are patient to stay the digesting and soluting unto themselves of that which is sharp and subtle. Which was the cause, joined with the love and honour which I bear to your lordship, as the person I know to have many virtues, and an excellent order of them, which moved me to dedicate this writing to your lordship after the ancient manner: choosing both a friend, and one to whom I conceived the argument was agreeable.

COLOURS OF GOOD AND EVIL,
OF THE
COLOURS of GOOD and EVIL.

IN deliberatives, the point is, what is good, and what is evil; and of good, what is greater, and of evil, what is less.

So that the persuader's labour is, to make things appear good or evil, and that in higher or lower degree: which as it may be performed by true and solid reasons, so it may be represented also by colours, popularities and circumstances; which are of such force, as they sway the ordinary judgment either of a weak man, or of a wise man, not fully and considerately attending and pondering the matter. Besides their power to alter the nature of the subject in appearance, and so to lead to error, they are of no less use to quicken and strengthen the opinions and persuasions which are true; for reasons plainly delivered, and always after one manner, especially with fine and fastidious minds, enter but heavily and dully: whereas if they be varied, and have more life and vigour put into them by these forms and insinuations, they cause a stronger apprehension, and many times suddenly win the mind to a resolution. Lastly, to make a true and safe judgment, nothing can be of greater use and defence to the mind, than the discovering and reprehension of these colours, shewing in what cases they hold, and in what they deceive: which, as it cannot be done but out of a very universal knowledge of the nature of things, so being performed, it so clearth man's judgment and election, as it is the less apt to slide into any error.

A TABLE of the colours, or appearances of GOOD and EVIL, and their degrees, as places of persuasion and dissuasion, and their several fallacies, and the elenches of them.

I.

Cui caeterae partes vel sectae secundas unanimiter deferunt, cum singulae principatum sibi vindicent, melior reliquis videtur. Nam primas quaeque ex zelo videtur sumere, secundas autem ex vero et merito tribuere.

SO Cicero went about to prove the sect of Academics, which suspended all asseveration, to be the best; For, saith he, ask a Stoic which philosophy is true, he will prefer his own. Then ask him, which approacheth next the truth, he will confess the Academics. So deal with the Epicure, that will scarce endure the Stoic to be in sight of him; so soon as he hath placed himself, he will place the Academics next him. So if a prince took divers competitors to a place, and examined them severally, whom next themselves they would rarest commend, it were like the ablest man should have the most second voices.

The fallax of this colour happeneth oft in respect of envy, for men are accustomed, after themselves and their own faction, to incline unto them which are softest, and are least in their way, in despite and derogation of them that hold them hardest to it. So that this colour of meliority and preeminence is a sign of enervation and weakness.

Cujus

II.

Cujus excellentia vel exuperantia melior, id toto genere melius.

APPERTAINING to this, are the forms: "Let us not wander in generalities: Let us compare particular with particular," *etc.* This appearance, though it seem of strength, and rather logical than rhetorical, yet is very oft a fallax.

Sometime because some things are in kind very casual, which if they escape prove excellent; so that the kind is inferior, because it is so subject to peril, but that which is excellent being proved is superior: as the blossom of March, and the blossom of May, whereof the French verse goeth:

*Burgeon de Mars, enfans de Paris,
Si un eschape, il en vaut dix.*

So that the blossom of May is generally better than the blossom of March; and yet the best blossom of March is better than the best blossom of May. Sometimes because the nature of some kinds is to be more equal, and more indifferent, and not to have very distant degrees: as hath been noted, in the warmer climates the people are generally more wise, but in the northern climates the wits of chief are greater. So in many armies, if the matter should be tried by duel between two champions, the victory should go on the one side; and yet if it be tried by the gross, it would go on the other side: for excellencies go as it were by chance, but kinds go by a more certain nature; as by discipline in war.

Lastly; many kinds have much refuse, which countervail that which they have excellent: and therefore generally metal is more precious than stone; and yet a diamond is more precious than gold.

III.

Quod ad veritatem refertur, majus est, quam quod ad opinionem. Modus autem et probatio ejus, quod ad opinionem pertinet, haec est: quod quis, si clam putaret fore, factururus non esset.

SO the Epicures say of the Stoic felicity placed in virtue, that it is like the felicity of a player, who if he were left of his auditory and their applause, he would straight be out of heart and countenance; and therefore they call virtue *bonum theatrale*: but of riches the poet saith,

Populus me scilicet; at mihi plaudo.

And of pleasure,

Grata sub imo

Gaudia corde promens, vultu simulante pudorem.

The fallax of this colour is somewhat subtle, though the answer to the example be ready, for virtue is not chosen *propter auram popularem*; but contrariwise, *maxime omnium teipsum reverere*: so as a virtuous man will be virtuous *in solitudine*, and not only *in theatro*, though perchance it will be more strong by glory and fame, as an heat which is doubled by reflexion. But that denieth the supposition, it doth not reprehend the fallax; whereof the reprehension is: Allow that virtue, such as is joined with labour and conflict, would not be chosen but for fame and opinion; yet it followeth not that the chief motive of the election should not be real and for itself; for fame may be only *causa impulsiva*, and not *causa constitutiva* or *efficientis*. As if there were two hories, and the one would do better without the spur than the other: but
again

COLOURS OF GOOD AND EVIL:

again, the other with the spur would far exceed the doing of the former, giving him the spur also; yet the latter will be judged to be the better horse. And the form, as to say, "Tush, the life of this horse is but in the spur," will not serve as to a wise judgment: for since the ordinary instrument of horsemanship is the spur, and that it is no matter of impediment or burden, the horse is not to be accounted the less of, which will not do well without the spur; but rather the other is to be reckoned a delicacy than a virtue. So glory and honour are the spurs to virtue: and although virtue would languish without them, yet since they be always at hand to attend virtue, virtue is not to be said the less chosen for itself, because it needeth the spur of fame and reputation: and therefore that position, *nota ejus, quod propter opinionem et non propter veritatem eligitur, haec est; quod quis, si clam putaret fore, facturus non esset*, is reprehended.

IV.

Quod rem integram servat, bonum; quod sine receptu est, malum: nam se recipere non posse, impotentiae genus est; potentia autem bonum.

HEREOF Æsop framed the fable of the two frogs, that consulted together in the time of drought, when many plashes, that they had repaired to, were dry, what was to be done; and the one propounded to go down into a deep well, because it was like the water would not fail there; but the other answered, "Yea, but " if it do fail, how shall we get up again?" And the reason is, that human actions are so uncertain and subject to perils, as that seemeth the best course which hath most passages out of it. Appertaining to this persuasion, the forms are: You shall engage yourself; on the other side, *Non tantum, quantum voles, fumes ex fortuna, etc.* You shall keep the matter in your own hand.

The reprehension of it is, that proceeding and resolving in all actions is necessary. For as he saith well, Not to resolve, is to resolve; and many times it breeds as many necessities, and engageth as far in some other sort, as to resolve. So it is but the covetous man's disease, translated into power; for the covetous man will enjoy nothing, because he will have his full store and possibility to enjoy the more; so by this reason a man should execute nothing, because he should be still indifferent, and at liberty to execute any thing. Besides, necessity and this same *jaceta est alea*, hath many times an advantage, because it awaketh the powers of the mind, and strengtheneth endeavour; *Cacteris pares, necessitate certe superiores estis*.

V.

Quod ex pluribus constat et divisibilibus est majus, quam quod ex paucioribus, et magis unum; nam omnia per partes considerata majora videntur: quare et pluralitas partium magnitudinem prae se fert: fortius autem operatur pluralitas partium si ordo absit; nam inducit similitudinem infiniti, et impedit comprehensionem.

THIS colour seemeth palpable; for it is not plurality of parts without majority of parts, that maketh the total greater; yet nevertheless it often carries the mind away, yea, it deceiveth the sense; as it seemeth to the eye a shorter distance of way, if it be all dead and continued, than if it have trees or buildings, or any other marks whereby the eye may divide it. So when a great moneyed man hath divided his chests, and coins, and bags, he seemeth to himself richer than he was; and therefore a way to amplify any thing is, to break it, and to make anatomy of it in several parts, and to examine it according to several circumstances. And this maketh

maketh the greater shew if it be done without order, for confusion maketh things muster more; and besides, what is set down by order and division, doth demonstrate that nothing is left out or omitted, but all is there; whereas if it be without order, both the mind comprehendeth less that which is set down; and besides, it leaveth a suspicion, as if more might be said than is expressed.

This colour deceiveth, if the mind of him that is to be persuaded, do of itself over-conceive, or prejudge of the greatness of any thing; for then the breaking of it will make it seem less, because it maketh it to appear more according to the truth: and therefore if a man be in sickness or pain, the time will seem longer without a clock or hour-glass, than with it; for the mind doth value every moment, and then the hour doth rather sum up the moments, than divide the day. So in a dead plain the way seemeth the longer, because the eye hath preconceived it shorter than the truth, and the frustrating of that maketh it seem longer than the truth. Therefore if any man have an over-great opinion of any thing, then if another think by breaking it into several considerations he shall make it seem greater to him, he will be deceived; and therefore in such cases it is not safe to divide, but to extol the intire still in general. Another case wherein this colour deceiveth, is when the matter broken or divided is not comprehended by the sense or made at once, in respect of the distracting or scattering of it; and being intire and not divided, is comprehended: as an hundred pounds in heaps of five pounds will shew more than in one gross heap, so as the heaps be all upon one table to be seen at once, otherwise not: as flowers growing scattered in divers beds will shew more than if they did grow in one bed, so as all those beds be within a plot, that they be object to view at once, otherwise not: and therefore men, whose living lieth together in one shire, are commonly counted greater landed than those whose livings are dispersed, though it be more because of the notice and comprehension. A third case wherein this colour deceiveth, and it is not so properly a case of reprehension, as it is a counter colour, being in effect as large as the colour itself; and that is, *omnis compositio indigentiae cujusdam in singulis videtur esse particeps*, because if one thing would serve the turn, it were ever best, but the defect and imperfections of things hath brought in that help to piece them up; as it is said, *Martha, Martha, attendis ad plurima, unum sufficit*. So likewise hereupon Æsop framed the fable of the fox and the cat; whereas the fox bragged what a number of shifts and devices he had to get from the hounds, and the cat said he had but one, which was to climb a tree, which in proof was better worth than all the rest; whereof the proverb grew, *Multa novit vulpes, sed felis unum magnum*. And in the moral of this fable it comes likewise to pass, that a good sure friend is a better help at a pinch, than all the stratagems and policies of a man's own wit. So it falleth out to be a common error in negotiating, whereas men have many reasons to induce or persuade, they strive commonly to utter and use them all at once, which weakeneth them. For it argueth, as was said, a neediness in every of the reasons by itself, as if one did not trust to any of them, but fled from one to another, helping himself only with that: *Et quae non profunt singula, multa juvant*. Indeed in a set speech in an assembly, it is expected a man should use all his reasons in the case he handleth, but in private persuasions it is always a great error. A fourth case wherein this colour may be reprehended, is in respect of that same *vis unita fortior*, according to the tale of the French king, that when the emperor's ambassador had recited his master's stile at large, which consisteth of many countries and dominions; the French king willed his chancellor, or other minister, to repeat

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peat over France as many times as the other had recited the several dominions; intending it was equivalent with them all, and more compacted and united. There is also appertaining to this colour another point, why breaking of a thing doth help it, not by way of adding a shew of magnitude unto it, but a note of excellency and rarity; whereof the forms are, Where shall you find such a concurrence? Great but not complete; for it seems a less work of nature or fortune, to make any thing in his kind greater than ordinary, than to make a strange composition. Yet if it be narrowly considered, this colour will be reprehended or encountered, by imputing to all excellencies in compositions a kind of poverty, or at least a casualty or jeopardy; for from that which is excellent in greatness, somewhat may be taken, or there may be a decay, and yet sufficient left; but from that which hath his price in composition if you take away any thing, or any part do fail, all is disgrace.

VI.

Cujus privatio bona, malum; cujus privatio mala, bonum.

THE forms to make it conceived, that that was evil which is changed for the better, are, He that is in hell thinks there is no other heaven. *Satis quercus*, Acorns were good till bread was found, *etc.* And of the other side, the forms to make it conceived, that that was good which was changed for the worse, are, *Bona magis carendo quam fruendo sentimus: Bona à tergo formosissima*: Good things never appear in their full beauty, till they turn their back and be going away, *etc.*

The reprehension of this colour is, that the good or evil which is removed, may be esteemed good or evil comparatively, and not positively or simply. So that if the privation be good, it follows not the former condition was evil, but less good; for the flower or blossom is a positive good, although the remove of it to give place to the fruit, be a comparative good. So in the tale of Æsop, when the old fainting man in the heat of the day cast down his burden, and called for Death; and when Death came to know his will with him, said, it was for nothing but to help him up with his burden again: it doth not follow, that because death, which was the privation of the burden, was ill, therefore the burden was good. And in this part, the ordinary form of *malum necessarium* aptly reprehendeth this colour; for *privatio mali necessarii est mala*, and yet that doth not convert the nature of the necessary evil, but it is evil.

Again, it cometh sometimes to pass, that there is an equality in the change of privation, and as it were a *dilemma boni*, or a *dilemma mali*: so that the corruption of the one good, is a generation of the other. *Sorti pater æquus utrique est*: and contrary, the remedy of the one evil is the occasion and commencement of another, as in Scylla and Charybdis.

VII.

Quod bono vicinum, bonum; quod à bono remotum, malum.

SUCH is the nature of things, that things contrary, and distant in nature and quality, are also severed and disjoined in place; and things like and consenting in quality, are placed, and as it were quartered together: for, partly in regard of the nature to spread, multiply, and infect in similitude; and partly in regard of the
nature

nature to break, expel, and alter that which is disagreeable and contrary, most things do either associate, and draw near to themselves the like, or at least assimilate to themselves that which approacheth near them, and do also drive away, chase and exterminate their contraries. And that is the reason commonly yielded, why the middle region of the air should be coldest, because the sun and stars are either hot by direct beams, or by reflection. The direct beams heat the upper region, the reflected beams from the earth and seas, heat the lower region. That which is in the midst, being farthest distant in place from these two regions of heat, are most distant in nature, that is, coldest; which is that they term cold or hot *per antiperistasin*, that is, environing by contraries: which was pleasantly taken hold of by him that said, that an honest man, in these days, must needs be more honest than in ages heretofore, *propter antiperistasin*, because the shutting of him in the midst of contraries, must needs make the honesty stronger and more compact in itself.

The reprehension of this colour is: first, many things of amplitude in their kind do as it were ingross to themselves all, and leave that which is next them most destitute: as the shoots or under-wood, that grow near a great and spread tree, is the most pined and shrubby wood of the field, because the great tree doth deprive and deceive them of sap and nourishment; so he saith well, *divitis servi maxime servi*: and the comparison was pleasant of him, that compared courtiers attendant in the courts of princes without great place or office, to fasting-days, which were next the holy-days, but otherwise were the leanest days in all the week.

Another reprehension is, that things of greatness and predominancy, though they do not extenuate the things adjoining in substance, yet they drown them and obscure them in shew and appearance; and therefore the astronomers say, That whereas in all other planets conjunction is the perfectest amity; the sun contrariwise is good by aspect, but evil by conjunction.

A third reprehension is, because evil approacheth to good sometimes for concealment, sometimes for protection; and good to evil for conversion and reformation. So hypocrisy draweth near to religion for covert, and hiding itself; *saepe latet vitium proximitate boni*: and sanctuary men, which were commonly inordinate men and malefactors, were wont to be nearest to priests and prelates, and holy men; for the majesty of good things is such, as the confines of them are revered. On the other side, our Saviour, charged with nearness of publicans and rioters, said, *the physician approacheth the sick, rather than the whole*.

VIII.

Quod quis culpa sua contraxit, majus malum; quod ab externis imponitur, minus malum.

THE reason is, because the sting and remorse of the mind accusing itself doubleth all adversity: contrariwise, the considering and recording inwardly, that a man is clear and free from fault and just imputation, doth attemper outward calamities. For if the evil be in the sense, and in the conscience both, there is a gemination of it; but if evil be in the one, and comfort in the other, it is a kind of compensation: so the poets in tragedies do make the most passionate lamentation, and thole that forerun final despair, to be accusing, questioning, and torturing of a man's life.

Seque unum clamat causamque caputque malorum.

And contrariwise, the extremities of worthy persons have been annihilated in the consideration of their own good deservings. Besides, when the evil cometh from without,

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there is left a kind of evaporation of grief, if it come by human injury, either by indignation, and meditating of revenge from ourselves, or by expecting or fore-conceiving that Nemesis and retribution will take hold of the authors of our hurt : or if it be by fortune or accident, yet there is left a kind of expostulation against the divine powers ;

Atque deos atque astra vocat crudelia mater.

But where the evil is derived from a man's own fault, there all strikes deadly inwards, and suffocates.

The reprehension of this colour is, first in respect of hope, for reformation of our faults is *in nostra potestate* ; but amendment of our fortune simply is not. Therefore Demosthenes, in many of his orations, saith thus to the people of Athens : “ That having regard to the time past, is the worst point and circumstance of all the rest ; that as to the time to come is the best : what is that ? Even this, that by your sloth, irresolution and misgovernment, your affairs are grown to this declination and decay. For had you used and ordered your means and forces to the best, and done your parts every way to the full, and, notwithstanding, your matters should have gone backward in this manner as they do, there had been no hope left of recovery or reparation ; but since it hath been only by our own errors,” *etc.* So Epictetus in his degrees saith, The worst state of man is to accuse external things, better that to accuse a man's self, and best of all to accuse neither.

Another reprehension of this colour, is in respect of the well bearing of evils where-with a man can charge no body but himself, which maketh them the less.

Leve fit quod bene fertur onus.

And therefore many natures that are either extremely proud, and will take no fault to themselves, or else very true and cleaving to themselves, when they see the blame of any thing that falls out ill must light upon themselves, have no other shift but to bear it out well, and to make the least of it ; for as we see when sometimes a fault is committed, and before it be known who is to blame, much ado is made of it ; but after, if it appear to be done by a son, or by a wife, or by a near friend, then it is light made of : so much more when a man must take it upon himself. And therefore it is commonly seen, that women that marry husbands of their own choosing against their friends consents, if they be never so ill used, yet you shall seldom see them complain, but set a good face on it.

IX.

Quod opera et virtute nostra partum est, majus bonum ; quod ab alieno beneficio vel ab indulgentia fortunæ delatum est, minus bonum.

THE reasons are, first, the future hope, because in the favours of others, or the good winds of fortune, we have no state or certainty ; in our endeavours or abilities we have. So as when they have purchased one good fortune, we have them as ready, and better edged, and inured to procure another.

The forms be : You have won this by play, You have not only the water, but you have the receipt, you can make it again if it be lost, *etc.*

Next, because these properties which we enjoy by the benefit of others, carry with them an obligation, which seemeth a kind of burden ; whereas the other, which derive from ourselves, are like the freest patents, *absque aliquo inde reddendo* ; and if they proceed from fortune or providence, yet they seem to touch us secretly with the reverence of the divine powers, whose favours we taste, and therefore work a kind of religious

religious fear and restraint : whereas in the other kind, that comes to pass which the prophet speaketh, *laetantur et exultant, immolant plagis suis, et sacrificant re iusto.*

Thirdly, Because that which cometh unto us without our own virtue, yielded not that commendation and reputation ; for actions of great felicity may draw wonder, but praise less ; as Cicero said to Cæsar, *Quæ miremur, habemus ; quæ laudemus, expectamus.*

Fourthly, Because the purchases of our own industry are joined commonly with labour and strife, which gives an edge and appetite, and makes the fruition of our desires more pleasant. *Suavis cibis à venatu.*

On the other side, there be four counter colours to this colour, rather than reprehensions, because they be as large as the colour itself. First, because felicity seemeth to be a character of the favour and love of the divine powers, and accordingly worketh both confidence in ourselves, and respect and authority from others. And this felicity extendeth to many casual things, whereunto the care or virtue of man cannot extend, and therefore seemeth to be a larger good ; as when Cæsar said to the sailor, *Caesarem portas et fortunam ejus ;* if he had said *et virtutem ejus,* it had been small comfort against a tempest, otherwise than if it might seem upon merit to induce fortune.

Next, whatsoever is done by virtue and industry, seems to be done by a kind of habit and art, and therefore open to be imitated and followed ; whereas felicity is inimitable : so we generally see, that things of nature seem more excellent than things of art, because they be inimitable : for, *quod imitabile est, potentia quadam vulgatum est.*

Thirdly, Felicity commendeth those things which come without our own labour ; for they seem gifts, and the other seem pennyworths : whereupon Plutarch saith elegantly of the act of Timoleon, who was so fortunate, compared with the acts of Agesilaus and Epaminondas ; that they were like Homer's verses, they ran so easily and so well. And therefore it is the word we give unto poesy, terming it a happy vein, because facility seemeth ever to come from happiness.

Fourthly, This same *praeter spem, vel praeter expectatum,* doth increase the price and pleasure of many things ; and this cannot be incident to those things that proceed from our own care and compass.

X.

Gradus privationis major videtur, quam gradus diminutionis ; et rursus gradus inceptionis major videtur, quam gradus incrementi.

IT is a position in the mathematics, that there is no proportion between somewhat and nothing, therefore the degree of nullity and quiddity or act, seemeth larger than the degrees of increase and decrease ; as to a *monoculus* it is more to lose one eye than to a man that hath two eyes. So if one have lost divers children, it is more grief to him to lose the last, than all the rest ; because he is *spes gregis.* And therefore Sibylla when she brought her three books, and had burned two, did double the whole price of both the other, because the burning of that had been *gradus privationis,* and not *diminutionis.*

This colour is reprehended first in those things, the use and service whereof resteth in sufficiency, competency, or determinate quantity : as if a man be to pay one hundred pounds upon a penalty, it is more to him to want twelve pence, than after that twelve pence supposed to be wanting, to want ten shillings more ; so the decay of a

man's estate seems to be most touched in the degree, when he first grows behind, more than afterwards, when he proves nothing worth. And hereof the common forms are *Sera in fundo parsimonia*, and As good never a whit, as never the better, *etc.* It is reprehended also in respect of that notion, *Corruptio unius, generatio alterius*: so that *gradus privationis* is many times less matter, because it gives the cause and motive to some new course. As when Demosthenes reprehended the people for hearkening to the conditions offered by king Philip, being not honourable nor equal, he saith they were but aliments of their sloth and weakness, which if they were taken away, necessity would teach them stronger resolutions. So doctor Hector was wont to say to the dames of London, when they complained they were they could not tell how, but yet they could not endure to take any medicine; he would tell them, their way was only to be sick, for then they would be glad to take any medicine.

Thirdly, This colour may be reprehended, in respect that the degree of decrease is more sensitive than the degree of privation; for in the mind of man *gradus diminutionis* may work a wavering between hope and fear, and so keep the mind in suspense, from settling and accommodating in patience and resolution. Hereof the common forms are, *Better eye out, than always ache; Make or mar, etc.*

For the second branch of this colour, it depends upon the same general reason: hence grew the common place of extolling the beginning of every thing: *dimidium facti qui bene coepit habet*. This made the astrologers so idle as to judge of a man's nature and destiny, by the constellation of the moment of his nativity or conception. This colour is reprehended, because many inceptions are but, as Epicurus termeth them, *tentamenta*, that is, imperfect offers and essays, which vanish and come to no substance without an iteration; so as in such cases the second degree seems the worthiest, as the body-horse in the cart, that draweth more than the fore-horse. Hereof the common forms are, *The second blow makes the fray, the second word makes the bargain; Alter malo principium dedit, alter modum abstulit, etc.* Another reprehension of this colour is in respect of defatigation, which makes perseverance of greater dignity than inception: for chance or instinct of nature may cause inception; but settled affection, or judgment, maketh the continuance.

Thirdly, This colour is reprehended in such things, which have a natural course and inclination contrary to an inception. So that the inception is continually evacuated and gets no start; as in the common form, *Non progredi est regredi, Qui non proficit deficit*: running against the hill; rowing against the stream, *etc.* For if it be with the stream or with the hill, then the degree of inception is more than all the rest.

Fourthly, This colour is to be understood of *gradus inceptions à potentia ad actum, comparatus cum gradu ab actu ad incrementum*. For otherwise *major videtur gradus ab impotentia ad potentiam, quàm à potentia ad actum*.

E S S A Y S

O R

C O U N S E L S

C I V I L and M O R A L.

To Mr. ANTHONY BACON his dear Brother.

Loving and beloved brother,

I Do now, like some that have an orchard ill neighboured, that gather their fruit before it is ripe, to prevent stealing. These fragments of my conceits were going to print; to labour the stay of them had been troublesome, and subject to interpretation; to let them pass had been to adventure the wrong they might receive by untrue copies, or by some garnishment which it might please any that should set them forth to bestow upon them. Therefore I held it best discretion to publish them myself, as they passed long ago from my pen, without any further disgrace than the weakness of the author. And as I did ever hold, there might be as great a vanity in retiring and withdrawing mens conceits, except they be of some nature, from the world, as in obtruding them; so in these particulars I have played myself the inquisitor, and find nothing to my understanding in them contrary or infectious to the state of religion, or manners, but rather, as I suppose, medicinable. Only I disliked now to put them out, because they will be like the late new half-pence, which though the silver were good, yet the pieces were small. But since they would not stay with their master, but would needs travel abroad, I have preferred them to you that are next myself; dedicating them, such as they are, to our love, in the depth whereof, I assure you, I sometimes wish your infirmities translated upon myself, that her majesty might have the service of so active and able a mind; and I might be with excuse confined to these contemplations and studies, for which I am fittest: so commend I you to the preservation of the divine Majesty.

From my chamber at Grays-Inn,
this 30th of January 1597.

Your intire loving brother, FRAN. BACON.

To my loving Brother Sir JOHN CONSTABLE, *Kt.*

MY last essays I dedicated to my dear brother, Mr. Anthony Bacon, who is with God. Looking amongst my papers this vacation, I found others of the same nature: which if I myself shall not suffer to be lost, it seemeth the world will not, by the often printing of the former. Missing my brother, I found you next; in respect of bond both of near alliance, and of strait friendship and society, and particularly of communication in studies: wherein I must acknowledge myself beholden to you. For as my business found rest in my contemplations, so my contemplations ever found rest in your loving conference and judgment. So wishing you all good, I remain,

1612.

Your loving brother and friend, FRAN. BACON.

To the right honourable my very good lord the duke of BUCKINGHAM, his grace, lord high admiral of England.

Excellent Lord,

SOLOMON says, *A good name is as a precious ointment*; and I assure myself such will your grace's name be with posterity. For your fortune and merit both have been eminent: and you have planted things that are like to last. I do now publish my *Essays*; which of all my other works have been most current: for that, as it seems, they come home to mens business and bosoms. I have enlarged them both in number and weight; so that they are indeed a new work. I thought it therefore agreeable to my affection and obligation to your grace, to prefix your name before them both in English and in Latin: For I do conceive, that the Latin volume of them, being in the universal language, may last as long as books last. My *Instauration* I dedicated to the king: my *History of Henry the seventh*, which I have now also translated into Latin, and my portions of *Natural History*, to the prince: and these I dedicate to your grace; being of the best fruits, that by the good increase which God gives to my pen and labours I could yield. God lead your grace by the hand.

1625.

Your grace's most obliged and faithful servant, FRAN. SP. ALBAN.

Essays Civil and Moral.

I. Of TRUTH.

WHAT is truth? said jesting Pilate; and would not stay for an answer. Certainly there be that delight in giddiness; and count it a bondage to fix a belief; affecting free-will in thinking, as well as in acting. And though the sects of philosophers of that kind be gone, yet there remain certain discoursing wits, which are of the same veins; though there be not so much blood in them as was in those of the ancients. But it is not only the difficulty and labour which men take in finding out of truth; nor again, that when it is found, it imposeth upon mens thoughts; that doth bring lyes in favour: but a natural though corrupt love of the lye itself. One of the later school of the Grecians examineth the matter, and is at a stand to think what should be in it, that men should love lyes; where neither they make for pleasure, as with poets; nor for advantage, as with the merchant; but for the lye's sake. But I cannot tell: this same truth is a naked and open day-light, that doth not shew the masks, and mummeries, and triumphs of the world, half so stately and daintily as candle-lights. Truth may perhaps come to the price of a pearl, that sheweth best by day: but it will not rise to the price of a diamond or carbuncle, that sheweth best in varied lights. A mixture of a lye doth ever add pleasure. Doth any man doubt, that if there were taken out of mens minds, vain opinions, flattering hopes, false valuations, imaginations as one would, and the like; but it would leave the minds of a number of men, poor shrunken things; full of melancholy and indisposition, and unpleasing to themselves? One of the fathers, in great severity, called poesy, *vinum daemonum*; because it filleth the imagination, and yet it is but with the shadow of a lye. But it is not the lye that passeth through the mind, but the lye that sinketh in, and settleth in it, that doth the hurt, such as we spake of before. But howsoever these things are thus in mens depraved judgments and affections, yet truth, which only doth judge itself, teacheth, that the inquiry of truth, which is the love-making, or wooing of it; the knowledge of truth, which is the presence of it; and the belief of truth, which is the enjoying of it; is the sovereign good of human nature. The first creature of God, in the works of the days, was the light of the sense; the last was the light of reason; and his sabbath work ever since is the illumination of his Spirit. First he breathed light upon the face of the matter, or chaos; then he breathed light into the face of man; and still he breatheth and inspireth light into the face of his chosen. The poet that beautified the sect, that was otherwise inferior to the rest, saith yet excellently well: "It is a pleasure to stand upon the shore and to see ships tost upon the sea: a pleasure to stand in the window of a castle, and to see a battle, and the adventures thereof below: but no pleasure is comparable to the standing upon the vantage ground of truth, a hill not to be commanded, and where the air is always clear and serene: and to see the errors, and wandrings, and mists, and tempests, in the vale below:" so always, that this prospect be with pity, and not with swelling

or pride. Certainly, it is heaven upon earth, to have a man's mind move in charity, rest in providence, and turn upon the poles of truth.

To pass from theological and philosophical truth, to the truth of civil business; it will be acknowledged, even by those that practise it not, that clear and round dealing is the honour of man's nature; and that mixture of falshood is like alloy in coin of gold and silver; which may make the metal work the better, but it embaseth it. For these winding and crooked courses are the goings of the serpent; which goeth basely upon the belly, and not upon the feet. There is no vice that doth so cover a man with shame, as to be found false and perfidious. And therefore Montagne saith prettily, when he inquired the reason, why the word of the lye should be such a disgrace, and such an odious charge? Saith he, "If it be well weighed, to say a man lyeth, is as much as to say, that he is brave towards God, and a coward towards men. For a lye faces God, and shrinks from man." Surely the wickedness of falshood, and breach of faith, cannot possibly be so highly expressed, as in that it shall be the last peal to call the judgments of God upon the generations of men: it being foretold, that when Christ cometh *he shall not find faith upon the earth.*

II. Of DEATH.

MEN fear death, as children fear to go in the dark: and as that natural fear in children is increased with tales, so is the other. Certainly, the contemplation of death, as the wages of sin, and passage to another world, is holy and religious; but the fear of it, as a tribute due unto nature, is weak. Yet in religious meditations, there is sometimes mixture of vanity and of superstition. You shall read in some of the friars books of mortification, that a man should think with himself, what the pain is, if he have but his finger's end pressed or tortured; and thereby imagine what the pains of death are, when the whole body is corrupted and dissolved; when many times death passeth with less pain than the torture of a limb: for the most vital parts are not the quickest of sense. And by him that spake only as a philosopher, and natural man, it was well said; *Pompa mortis magis terret, quam mors ipsa.* Groans, and convulsions, and a discoloured face, and friends weeping, and blacks, and obsequies, and the like, shew death terrible. It is worthy the observing, that there is no passion in the mind of man so weak, but it mates and masters the fear of death: and therefore death is no such terrible enemy, when a man hath so many attendants about him, that can win the combat of him. Revenge triumphs over death; love slights it; honour aspireth to it; grief flieth to it; fear pre-occupateth it: nay, we read, after Otho the emperor had slain himself, pity, which is the tenderest of affections, provoked many to die, out of mere compassion to their sovereign, and as the truest sort of followers. Nay, Seneca adds, niceness and satiety; *cogita quomodo eadem feceris; mori velle, non tantum fortis, aut miser sed etiam fastidiosus potest.* A man would die, though he were neither valiant nor miserable, only upon a weariness to do the same thing so oft over and over. It is no less worthy to observe, how little alteration in good spirits the approaches of death make; for they appear to be the same men till the last instant. Augustus Cæsar died in a compliment; *Livia, conjugii nostri memor vive, et vale.* Tiberius in dissimulation; as Tacitus saith of him; *Jam Tiberium vires et corpus, non dissimulatio, deserebant.* Vespasian in a jest; sitting upon the stool; *Ut puto Deus fio.* Galba with a sentence; *Feri, si ex re sit populi Romani;* holding forth his neck. Septimius Severus in dispatch; *Adeste, si quid mihi restat agendum:* and the like.

like. Certainly the Stoics bestowed too much cost upon death, and by their great preparations made it appear more fearful. Better saith he, *qui finem vitae extremum inter munera ponit naturae*. It is as natural to die, as to be born; and to a little infant, perhaps, the one is as painful as the other. He that dies in an earnest pursuit, is like one that is wounded in hot blood; who, for the time, scarce feels the hurt; and therefore a mind fixt and bent upon somewhat that is good, doth avert the dolors of death: but above all, believe it, the sweetest canticle is, *Nunc dimittis*; when a man hath obtained worthy ends and expectations. Death hath this alio; that it openeth the gate to good fame, and extinguisheth envy ----- *Extinctus amulitur idem*.

III. *Of UNITY IN RELIGION.*

RELIGION being the chief band of human society, it is a happy thing, when itself is well contained within the true band of unity. The quarrels and divisions about religion were evils unknown to the heathen. The reason was, because the religion of the heathen consisted rather in rites and ceremonies, than in any constant belief. For you may imagine what kind of faith theirs was, when the chief doctors and fathers of their church were the poets. But the true God hath this attribute, that he is a jealous God; and therefore his worship and religion will endure no mixture nor partner. We shall therefore speak a few words concerning the unity of the church; what are the fruits thereof; what the bounds; and what the means.

The fruits of unity, next unto the well-pleasing of God, which is all in all, are two; the one towards those that are without the church; the other towards those that are within. For the former; it is certain, that heresies and schisms are of all others the greatest scandals; yea more than corruption of manners. For as in the natural body, a wound or solution of continuity, is worse than a corrupt humour; so in the spiritual. So that nothing doth so much keep men out of the church, and drive men out of the church, as breach of unity: and therefore, whensoever it cometh to that pass, that one saith, *ecce in deserto*; another saith, *ecce in penetralibus*; that is, when some men seek Christ in the conventicles of heretics, and others in an outward face of a church, that voice had need continually to sound in mens ears, *nolite exire, go not out*. The doctor of the Gentiles, the propriety of whose vocation drew him to have a special care of those without, saith; *If an beaten come in, and hear you speak with several tongues, will he not say that you are mad?* And certainly it is little better, when atheists, and profane persons, do hear of so many discordant and contrary opinions in religion; it doth avert them from the church, and maketh them *to sit down in the chair of the scornors*. It is but a light thing to be vouched in so serious a manner, but yet it expresseth well the deformity: There is a master of scoffing; that in his catalogue of books of a feigned library sets down this title of a book; "The Morris-dance of Heritiques." For indeed every sect of them hath a diverse posture or cringe by themselves, which cannot but move derision in worldlings and depraved politics, who are apt to contemn holy things.

As for the fruit towards those that are within, it is peace; which containeth infinite blessings: it establisheth faith; it kindleth charity; the outward peace of the church distilleth into peace of conscience; and it turneth the labours of writing and reading of controversies into treatises of mortification and devotion.

Concerning the bonds of unity; the true placing of them importeth exceedingly. There appear to be two extremes. For to certain zealots all speech of pacification is odious. *Is it peace, Jeshu? What hast thou to do with peace? turn thee behind me.* Peace is not the matter, but following and party. Contrariwise, certain Laodiceans, and lukewarm persons think they may accommodate points of religion by middleways, and taking part of both, and witty reconcilements; as if they would make an arbitrement between God and man. Both these extremes are to be avoided; which will be done, if the league of Christians, penned by our Saviour himself, were in the two cross clauses thereof, soundly and plainly expounded: *he that is not with us is against us*: and again, *he that is not against us is with us*: that is, if the points fundamental, and of substance in religion, were truly discerned and distinguished from points not merely of faith, but of opinion, order or good intention. This is a thing may seem to many a matter trivial, and done already; but if it were done less partially, it would be embraced more generally.

Of this I may give only this advice, according to my small model. Men ought to take heed of rending God's church by two kinds of controversies. The one is, when the matter of the point controverted is too small and light, not worth the heat and strife about it, kindled only by contradiction. For, as it is noted by one of the fathers, Christ's coat indeed had no seam; but the church's vesture was of divers colours: whereupon he saith, *in veste varietas fit, scissura non fit*; they be two things, unity, and uniformity. The other is, when the matter of the point controverted is great; but it is driven to an over-great subtilty and obscurity; so that it becometh a thing rather ingenious than substantial. A man that is of judgment and understanding, shall sometimes hear ignorant men differ, and know well within himself, that those who so differ mean one thing, and yet they themselves would never agree. And if it come so to pass in that distance of judgment which is between man and man; shall we not think that God above, that knows the heart, doth not discern that frail men, in some of their contradictions, intend the same thing, and accepteth of both? The nature of such controversies is excellently expressed by St. Paul, in the warning and precept that he giveth concerning the same, *devita profanas vocum novitates, et oppositiones falsi nominis scientiae*. Men create oppositions which are not; and put them into new terms so fixed, as, whereas the meaning ought to govern the term, the term in effect governeth the meaning. There be also two false peaces or unities; the one when the peace is grounded but upon an implicit ignorance; for all colours will agree in the dark: the other, when it is pieced up upon a direct admission of contraries in fundamental points. For truth and falshood, in such things, are like the iron and clay in the toes of Nebuchadnezzar's image; they may cleave, but they will not incorporate.

Concerning the means of procuring unity; men must beware, that in the procuring or muniting of religious unity, they do not dissolve and deface the laws of charity, and of human society. There be two swords amongst Christians, the spiritual and temporal; and both have their due office and place in the maintenance of religion. But we may not take up the third sword, which is Mahomet's sword, or like unto it; that is, to propagate religion by wars, or by sanguinary persecutions to force consciences; except it be in cases of overt scandal, blasphemy, or intermixture of practice against the state; much less to nourish seditions; to authorise conspiracies and rebellions; to put the sword into the peoples hands, and the like, tending to the subversion of all government, which is the ordinance of God. For this is but to dash the first table against.

against the second ; and so to consider men as Christians, as we forget that they are men. Lucretius the poet, when he beheld the act of Agamemnon, that could endure the sacrificing of his own daughter, exclaimed ;

Tantum religio potuit suadere malorum.

What would he have said, if he had known of the massacre in France, or the powder-treason of England ? He would have been seven times more epicure and atheist than he was : for as the temporal sword is to be drawn with great circumspection, in cases of religion ; so it is a thing monstrous to put it into the hands of the common people. Let that be left unto the anabaptists, and other furies. It was great blasphemy, when the devil said, *I will descend and be like the Highest* ; but it is greater blasphemy to personate God, and bring him in saying, “ I will descend, and be like the prince of “ darkness.” And what is it better to make the cause of religion to descend to the cruel and execrable actions of murdering princes, butchery of people, and subversion of states and governments ? Surely, this is to bring down the Holy Ghost, instead of the likeness of a dove, in the shape of a vulture or raven : and to set, out of the bark of a christian church, a flag of a bark of pirates and assassins. Therefore it is most necessary, that the church by doctrine and decree ; princes by their sword ; and all learnings both christian and moral, as by their mercury rod ; do damn and send to hell for ever those facts and opinions, tending to the support of the same ; as hath been already in good part done. Surely in counsels concerning religion, that counsel of the apostle should be prefixed ; *Ira hominis non implet justitiam Dei.* And it was a notable observation of a wise father, and no less ingenuously confessed ; That those which held and persuaded pressure of consciences, were commonly interested therein themselves for their own ends.

IV. *Of* REVENGE.

REVENGE is a kind of wild justice, which the more man's nature runs to, the more ought law to weed it out. For as for the first wrong, it doth but offend the law ; but the revenge of that wrong putteth the law out of office. Certainly in taking revenge, a man is but even with his enemy ; but in passing it over, he is superior : for it is a prince's part to pardon. And Solomon, I am sure, saith, *It is the glory of a man to pass by an offence.* That which is past is gone and irrevocable, and wise men have enough to do with things present and to come : therefore they do but trifle with themselves that labour in past matters. There is no man doth a wrong for the wrong's sake ; but thereby to purchase himself profit, or pleasure, or honour, or the like. Therefore why should I be angry with a man for loving himself better than me ? And if any man should do wrong, merely out of ill nature, why ? yet it is but like the thorn or brier, which prick and scratch, because they can do no other. The most tolerable sort of revenge is for those wrongs which there is no law to remedy : but then let a man take heed the revenge be such as there is no law to punish ; else a man's enemy is still beforehand, and it is two for one. Some, when they take revenge, are desirous the party should know whence it cometh : this is the more generous. For the delight seemeth to be not so much in doing the hurt, as in making the party repent : but base and crafty cowards are like the arrow that flieth in the dark. Coimus, duke of Florence, had a desperate saying against perfidious or neglecting friends, as if those wrongs were unpardonable. “ You shall read, saith he, that we “ are commanded to forgive our enemies ; but you never read, that we are command-

“ ed to forgive our friends.” But yet the spirit of Job was in a better tune; *Shall we, saith he, take good at God's hands, and not be content to take evil also?* And so friends in a proportion. This is certain, that a man that studieth revenge, keeps his own wounds green, which otherwise would heal, and do well. Public revenges are for the most part fortunate; as that for the death of Cæsar; for the death of Pertinax; for the death of Henry the third of France; and many more; but in private revenges it is not so; nay rather, vindictive persons live the life of witches; who as they are mischievous, so end they unfortunate.

V. Of ADVERSITY.

IT was an high speech of Seneca, after the manner of the Stoics, that the good things which belong to prosperity are to be wished, but the good things that belong to adversity are to be admired: *Bona rerum secundarum optabilia, adversarum mirabilia.* Certainly if miracles be the command over nature, they appear most in adversity. It is yet a higher speech of his than the other much too high for a heathen. It is true greatness to have in one the frailty of a man, and the security of a God: *Vere magnum, habere fragilitatem hominis, securitatem Dei.* This would have done better in poesy, where transcendencies are more allowed. And the poets indeed have been busy with it; for it is in effect the thing which is figured in that strange fiction of the ancient poets, which seemeth not to be without myltery; nay, and to have some approach to the state of a Christian: that Hercules, when he went to unbind Prometheus, by whom human nature is represented, sailed the length of the great ocean in an earthen pot or pitcher; lively describing christian resolution, that saileth in the frail bark of the flesh through the waves of the world. But to speak in a mean: the virtue of prosperity, is temperance; the virtue of adversity, is fortitude; which in morals is the more heroicall virtue. Prosperity is the blessing of the Old Testament; adversity is the blessing of the New, which carrieth the greater benediction, and the clearer revelation of God's favour. Yet, even in the Old Testament, if you listen to David's harp, you shall hear as many herse-like airs as carols: and the pencil of the Holy Ghost hath laboured more in describing the afflictions of Job than the felicities of Solomon. Prosperity is not without many fears and distastes; and adversity is not without comforts and hopes. We see in needle-works and embroideries, it is more pleasing to have a lively work upon a sad and solemn ground, than to have a dark and melancholy work upon a lightfome ground: judge therefore of the pleasure of the heart by the pleasure of the eye. Certainly virtue is like precious odours, most fragrant when they are incensed, or crushed; for prosperity doth best discover vice, but adversity doth best discover virtue.

VI. Of SIMULATION and DISSIMULATION.

DISSIMULATION is but a faint kind of policy, or wisdom; for it asketh a strong wit, and a strong heart, to know when to tell truth, and to do it. Therefore it is the weaker sort of politicians that are the great dissemblers.

Tacitus saith, Livia sorted well with the arts of her husband, and dissimulation of her son; attributing arts or policy to Augustus, and dissimulation to Tiberius. And again, when Mucianus encourageth Vespasian to take arms against Vitellius, he saith; We rise not against the piercing judgment of Augustus, nor the extreme caution or closeness of Tiberius. Their properties of arts or policy, and dissimulation or closeness,
are

are indeed habits and faculties several, and to be distinguished. For if a man have that penetration of judgment as he can discern what things are to be laid open, and what to be secreted, and what to be shewed at half lights, and to whom and when, which indeed are arts of state, and arts of life, as Tacitus well calleth them, to him a habit of dissimulation is a hindrance and a poorness. But if a man cannot obtain to that judgment, then it is left to him, generally to be close and a dissembler. For where a man cannot choose, or vary in particulars, there it is good to take the safest and warriest way in general; like the going softly by one that cannot well see. Certainly the ablest men that ever were, have had all an openness and frankness of dealing, and a name of certainty and veracity; but then they were like horses well managed; for they could tell passing well when to stop or turn: and at such times, when they thought the case indeed required dissimulation, if then they used it, it came to pass, that the former opinion spread abroad of their good faith and clearness of dealing made them almost invisible.

There be three degrees of this hiding and veiling of a man's self. The first, closeness, reservation, and secrecy, when a man leaveth himself without observation, or without hold to be taken, what he is. The second, dissimulation in the negative, when a man lets fall signs and arguments, that he is not that he is. And the third, simulation in the affirmative, when a man industriously and expressly feigns and pretends to be that he is not.

For the first of these, secrecy; it is indeed the virtue of a confessor; and assuredly the secret man heareth many confessions; for who will open himself to a blab or a babler? but if a man be thought secret, it inviteth discovery; as the more close air sucketh in the more open: and as in confession the revealing is not for worldly use, but for the ease of a man's heart; so secret men come to knowledge of many things in that kind; while men rather discharge their minds, than impart their minds. In few words, mysteries are due to secrecy. Besides, to say truth, nakedness is uncomely as well in mind as body; and it addeth no small reverence to mens manners and actions if they be not altogether open. As for talkers and futile persons, they are commonly vain and credulous withal. For he that talketh what he knoweth, will also talk what he knoweth not. Therefore set it down, that an habit of secrecy is both politic and moral. And in this part it is good that a man's face give his tongue leave to speak. For the discovery of a man's self by the tracts of his countenance is a great weakness and betraying; by how much it is many times more marked and believed than a man's words.

For the second, which is dissimulation; it followeth many times upon secrecy, by a necessity: so that he that will be secret must be a dissembler in some degree. For men are too cunning to suffer a man to keep an indifferent carriage between both, and to be secret, without swaying the balance on either side. They will so beset a man with questions, and draw him on, and pick it out of him, that, without an absurd silence, he must shew an inclination one way; or if he do not, they will gather as much by his silence as by his speech. As for equivocations or oraculous speeches, they cannot hold out long. So that no man can be secret, except he give himself a little scope of dissimulation; which is as it were but the skirts or train of secrecy.

But for the third degree, which is simulation and false profession; that I hold more culpable and less politic, except it be in great and rare matters. And therefore a general custom of simulation, which is this last degree, is a vice rising either of a natural falseness or fearfulness; or of a mind that hath some main faults; which because a

man must needs disguise, it maketh them practise simulation in other things; lest his hand should be out of use.

The great advantages of simulation and dissimulation are three. First, to lay asleep opposition, and to surprize. For where a man's intentions are published, it is an alarm to call up all that are against them. The second is, to reserve to a man's self a fair retreat: for if a man engage himself by a manifest declaration, he must go through or take a fall. The third is, the better to discover the mind of another. For to him that opens himself, men will hardly shew themselves adverse; but will fairly let him go on, and turn their freedom of speech to freedom of thought. And therefore it is a good shrewd proverb of the Spaniard, Tell a lye, and find a truth. As if there were no way of discovery but by simulation. There be also three disadvantages to set it even. The first, that simulation and dissimulation commonly carry with them a shew of fearfulness, which in any business doth spoil the feathers of round flying up to the mark. The second, that it puzzleth and perplexeth the conceits of many, that perhaps would otherwise co-operate with him; and makes a man walk, almost alone, to his own ends. The third and greatest is, that it depriveth a man of one of the most principal instruments for action; which is trust and belief. The best composition and temperature is, to have openness in fame and opinion; secrecy in habit; dissimulation in seasonable use; and a power to feign, if there be no remedy.

VII. *Of PARENTS and CHILDREN.*

THE joys of parents are secret; and so are their griefs and fears: they cannot utter the one, nor they will not utter the other. Children sweeten labours; but they make misfortunes more bitter: they increase the cares of life, but they mitigate the remembrance of death. The perpetuity by generation is common to beasts; but memory, merit, and noble works, are proper to men: and surely a man shall see the noblest works and foundations have proceeded from childless men; which have sought to express the images of their minds, where those of their bodies have failed: so the care of posterity is most in them that have no posterity. They that are the first raisers of their houses, are most indulgent towards their children; beholding them as the continuance, not only of their kind, but of their work; and so both children and creatures.

The difference in affection of parents towards their several children is many times unequal; and sometimes unworthy; especially in the mother; as Solomon saith, *A wise son rejoiceth the father; but an ungracious son shames the mother.* A man shall see, where there is a house full of children, one or two of the eldest respected, and the youngest made wantons; but in the midst, some that are as it were forgotten, who many times nevertheless prove the best. The illiberality of parents in allowance towards their children, is an harmful error; makes them base; acquaints them with shifts; makes them sort with mean company; and makes them surfeit more when they come to plenty: and therefore the proof is best when men keep their authority towards their children, but not their purse. Men have a foolish manner, both parents, and schoolmasters, and servants, in creating and breeding an emulation between brothers during childhood, which many times sorteth to discord when they are men, and disturbeth families. The Italians make little difference between children and nephews, or near kinsfolks; but so they be of the lump they care not, though they pass not through

through their own body. And, to say truth, in nature it is much a like matter; in-
 somuch that we see a nephew sometimes resembleth an uncle, or a kinsman, more
 than his own parent; as the blood happens. Let parents choose betimes the vocations
 and courtes they mean their children should take; for then they are most flexible; and
 let them not too much apply themselves to the disposition of their children, as think-
 ing they will take best to that which they have most mind to. It is true, that if the
 affection or aptness of the children be extraordinary, then it is good not to cross it;
 but generally the precept is good, *Optimum elige, suave et facile illud faciet consue-
 tudo*. Younger brothers are commonly fortunate, but seldom or never where the
 elder are disinherited.

VIII. *Of MARRIAGE and SINGLE LIFE.*

HE that hath wife and children, hath given hostages to fortune; for they are impedi-
 ments to great enterprizes, either of virtue or mischief. Certainly the best works and
 of greatest merit for the public, have proceeded from the unmarried or childless
 men; which both in affection and means have married and endowed the public. Yet
 it were great reason, that those that have children should have greatest care of future
 times; unto which they know they must transmit their dearest pledges. Some there
 are, who though they lead a single life, yet their thoughts do end with themselves,
 and account future times impertinences. Nay, there are some other, that account wife
 and children but as bills of charges. Nay more, there are some foolish rich covetous
 men, that take a pride in having no children, because they may be thought so much
 the richer. For perhaps they have heard some talk, Such a one is a great rich man;
 and another except to it, Yea, but he hath a great charge of children: as if it were
 an abatement to his riches. But the most ordinary cause of a single life is liberty;
 especially in certain self-pleasing and humourous minds, which are so sensible of every
 restraint, as they will go near to think their girdles and garters to be bonds and shackles.
 Unmarried men are best friends, best masters, best servants, but not always best sub-
 jects; for they are light to run away; and almost all fugitives are of that condition.
 A single life doth well with churchmen: for charity will hardly water the ground,
 where it must first fill a pool. It is indifferent for judges and magistrates: for if
 they be facile and corrupt, you shall have a servant five times worse than a wife. For
 soldiers, I find the generals commonly, in their hortatives, put men in mind of their
 wives and children. And I think the despising of marriage amongst the Turks, mak-
 eth the vulgar soldiers more base. Certainly, wife and children are a kind of discipline
 of humanity: and single men, though they be many times more charitable, because
 their means are less exhausted; yet on the other side, they are more cruel and hard-
 hearted, good to make severe inquisitors, because their tendernefs is not so oft called upon.
 Grave natures, led by custom, and therefore constant, are commonly loving husbands;
 as was said of Ulysses, *vetulam suam praetulit immortalitati*. Chaste women are often
 proud and froward, as presuming upon the merit of their chastity. It is one of the
 best bonds, both of chastity and obedience, in the wife, if she think her husband wife;
 which she will never do if she find him jealous. Wives are young mens mistresses;
 companions for middle age; and old mens nurses. So as a man may have a quarrel
 to marry when he will. But yet he was reputed one of the wise men, that made an-
 swer to the question, when a man should marry? "A young man not yet, an elder
 "man not at all." It is often seen, that bad husbands have very good wives; whe-
 ther

ther it be, that it raiseth the price of their husbands kindness when it comes; or that the wives take a pride in their patience. But this never fails if the bad husbands were of their own choosing, against their friends consent; for then they will be sure to make good their own folly.

IX. Of ENVY.

THERE be none of the affections which have been noted to fascinate or bewitch, but love and envy. They both have vehement wishes; they frame themselves readily into imaginations and suggestions: and they come easily into the eye; especially upon the presence of the objects; which are the points that conduce to fascination, if any such thing there be. We see likewise, the Scripture calleth envy an *evil eye*: and the astrologers call the evil influences of the stars, evil aspects; so that still there seemeth to be acknowledged in the act of envy, an ejaculation, or irradiation of the eye. Nay, some have been so curious, as to note, that the times when the stroke or percussive of an envious eye doth most hurt, are, when the party envied is beheld in glory or triumph; for that sets an edge upon envy: and besides, at such times, the spirits of the person envied do come forth most into the outward parts, and so meet the blow.

But leaving these curiosities, though not unworthy to be thought on in fit place, we will handle, what persons are apt to envy others; what persons are most subject to be envied themselves; and what is the difference between public and private envy.

A man that hath no virtue in himself, ever envieth virtue in others. For mens minds will either feed upon their own good, or upon others evil; and who wanteth the one, will prey upon the other: and whoso is out of hope to attain another's virtue, will seek to come at even hand by depressing another's fortune.

A man that is busy and inquisitive, is commonly envious: for to know much of other mens matters cannot be, because all that ado may concern his own estate: therefore it must needs be, that he taketh a kind of play-pleasure in looking upon the fortunes of others; neither can he that mindeth but his own business find much matter for envy. For envy is a gadding passion, and walketh the streets, and doth not keep at home: *Non est curiosus, quin idem sit malevolus.*

Men of noble birth are noted to be envious towards new men when they rise: for the distance is altered; and it is like a deceit of the eye, that when others come on, they think themselves go back.

Deformed persons and eunuchs, and old men and bastards, are envious: for he that cannot possibly mend his own case, will do what he can to impair another's; except these defects light upon a very brave and heroical nature, which thinketh to make his natural wants part of his honour; in that it should be said, that an eunuch or a lame man did such great matters; affecting the honour of a miracle; as it was in Narses the eunuch, and Agefilaus and Tamerlane, that were lame men.

The same is the case of men that rise after calamities and misfortunes; for they are as men fallen out with the times; and think other mens harms a redemption of their own sufferings.

They that desire to excel in too many matters, out of levity and vainglory, are ever envious, for they cannot want work; it being impossible but many, in some one

one of those things, should surpass them. Which was the character of Adrian the emperor, that mortally envied poets, and painters, and artificers, in works wherein he had a vein to excel.

Lastly, near kinsfolks, and fellows in office, and those that have been bred together, are more apt to envy their equals when they are raised. For it doth upbraid unto them their own fortunes and pointeth at them, and cometh oftener into their remembrance, and incurreth likewise more into the note of others; and envy ever redoubleth from speech and fame. Cain's envy was the more vile and malignant towards his brother Abel, because, when his sacrifice was better accepted, there was no body to look on. Thus much for those that are apt to envy.

Concerning those that are more or less subject to envy: First, persons of eminent virtue, when they are advanced, are less envied. For their fortune seemeth but due unto them; and no man envieth the payment of a debt, but rewards, and liberality rather. Again, envy is ever joined with the comparing of a man's self; and where there is no comparison, no envy; and therefore kings are not envied but by kings. Nevertheless it is to be noted, that unworthy persons are most envied at their first coming in, and afterwards overcome it better; whereas contrariwise, persons of worth and merit are most envied when their fortune continueth long. For by that time, though their virtue be the same, yet it hath not the same lustre; for fresh men grow up that darken it.

Persons of noble blood are less envied in their rising; for it seemeth but right done to their birth: besides, there seemeth not much added to their fortune; and envy is as the sun-beams, that beat hotter upon a bank or steep rising ground than upon a flat. And for the same reason, those that are advanced by degrees, are less envied than those that are advanced suddenly, and *per saltum*.

Those that have joined with their honour, great travels, cares, or perils, are less subject to envy: for men think that they earn their honours hardly, and pity them sometimes; and pity ever healeth envy: wherefore you shall observe that the more deep and sober sort of politic persons, in their greatness, are ever bemoaning themselves what a life they lead, chanting a *Quanta patimur*: not that they feel it so, but only to abate the edge of envy. But this is to be understood of business that is laid upon men, and not such as they call unto themselves: for nothing increaseth envy more, than an unnecessary and ambitious ingrossing of business: and nothing doth extinguish envy more, than for a great person to preserve all other inferior officers in their full rights and preeminences of their places: for by that means there be so many screens between him and envy.

Above all, those are most subject to envy, which carry the greatness of their fortunes in an insolent and proud manner; being never well but while they are shewing how great they are, either by outward pomp, or by triumphing over all opposition or competition: whereas wise men will rather do sacrifice to envy, in suffering themselves sometimes of purpose to be crossed and overborn in things that do not much concern them. Notwithstanding, so much is true; that the carriage of greatness in a plain and open manner, so it be without arrogancy and vainglory, doth draw less envy, than if it be in a more crafty and cunning fashion. For in that course a man doth but disavow fortune, and seemeth to be conscious of his own want in worth, and doth but teach others to envy him.

Lastly, to conclude this part; as we said in the beginning, that the act of envy had somewhat in it of witchcraft, so there is no other cure of envy, but the cure

of witchcraft : and that is, to remove the lot, as they call it, and to lay it upon another. For which purpose, the wiser sort of great persons bring in ever upon the stage somebody upon whom to derive the envy that would come upon themselves ; sometimes upon ministers and servants ; sometimes upon colleagues and associates, and the like : and for that turn, there are never wanting some persons of violent and undertaking natures, who, so they may have power and business, will take it at any cost.

Now to speak of public envy. There is yet some good in public envy, whereas in private there is none. For public envy is as an ostracism, that eclipseth men when they grow too great : and therefore it is a bridle also to great ones, to keep them within bounds.

This envy, being in the Latin word *invidia*, goeth in the modern languages by the name of discontentment ; of which we shall speak in handling sedition. It is a disease in a state like to infection : for as infection spreadeth upon that which is found, and tainteth it ; so when envy is gotten once into a state, it traduceth even the best actions thereof, and turneth them into an ill odour ; and therefore there is little won by intermingling of plausible actions : for that doth argue but a weakness and fear of envy, which hurteth so much the more ; as it is likewise usual in infections, which if you fear them, you call them upon you.

This public envy seemeth to beat chiefly upon principal officers or ministers, rather than upon kings and estates themselves. But this is a sure rule, that if the envy upon the minister be great, when the cause of it in him is small ; or if the envy be general in a manner upon all the ministers of an estate, then the envy, though hidden, is truly upon the state itself. And so much of public envy or discontentment, and the difference thereof from private envy, which was handled in the first place.

We will add this in general touching the affection of envy ; that of all other affections, it is the most importunate and continual : for of other affections there is occasion given but now and then ; and therefore it is well said, *Invidia festos dies non agit* : for it is ever working upon some or other. And it is also noted, that love and envy do make a man pine, which other affections do not, because they are not so continual. It is also the vilest affection, and the most depraved ; for which cause it is the proper attribute of the devil, who is called, *the envious man, that soweth tares amongst the wheat by night* : as it always cometh to pass, that envy worketh subtilly and in the dark ; and to the prejudice of good things, such as is the wheat.

X. Of LOVE.

THE stage is more beholden to love, than the life of man. For as to the stage, love is ever matter of comedies, and now and then of tragedies ; but in life it doth much mischief, sometimes like a fire, sometimes like a fury. You may observe, that amongst all the great and worthy persons, whereof the memory remaineth, either ancient or recent, there is not one that hath been transported to the mad degree of love ; which shews, that great spirits and great business do keep out this weak passion. You must except nevertheless Marcus Antonius the partner of the empire of Rome, and Appius Claudius the decemvir and lawgiver ; whereof the former was indeed a voluptuous man and inordinate ; but the latter

was an austere and wise man : and therefore it seems, though rarely, that love can find entrance, not only into an open heart, but also into a heart well fortified, if watch be not well kept. It is a poor saying of Epicurus ; *Satis magnum alter alteri theatrum sumus* : as if man, made for the contemplation of heaven, and all noble objects, should do nothing but kneel before a little idol, and make himself the subject though not of the mouth, as beasts are, yet of the eye, which was given him for higher purposes. It is a strange thing to note the excess of this passion ; and how it braves the nature and value of things by this, that the speaking in a perpetual hyperbole is comely in nothing but in love. Neither is it merely in the phrase ; for whereas it hath been well said, that the arch flatterer, with whom all the petty flatterers have intelligence, is a man's self ; certainly the lover is more. For there was never proud man thought so absurdly well of himself, as the lover doth of the person loved ; and therefore it was well said, that it is impossible to love, and to be wise. Neither doth this weakness appear to others only, and not to the party loved, but to the loved most of all ; except the love be reciprocal. For it is a true rule, that love is ever rewarded either with the reciprocal, or with an inward and secret contempt : by how much the more men ought to beware of this passion, which loseth not only other things, but itself. As for the other losses, the poet's relation doth well figure them ; that he that preferred Helena, quitted the gifts of Juno and Pallas : for whosoever esteemeth too much of amorous affection, quitted both riches and wisdom. This passion hath its floods in the very times of weakness, which are great prosperity, and great adversity ; though this latter hath been less observed : both which times kindle love, and make it more fervent, and therefore shew it to be the child of folly. They do best, who, if they cannot but admit love, yet make it keep quarter ; and sever it wholly from their serious affairs and actions of life : for if it check once with business, it troubleth mens fortunes, and maketh men that they can no ways be true to their own ends. I know not how, but martial men are given to love : I think it is, but as they are given to wine ; for perils commonly ask to be paid in pleasures. There is in man's nature a secret inclination and motion towards love of others, which, if it be not spent upon some one or a few, doth naturally spread itself towards many, and maketh men become humane and charitable ; as it is seen sometimes in friers. Nuptial love maketh mankind ; friendly love perfecteth it ; but wanton love corrupteth and embaseth it.

XI. Of GREAT PLACE.

MEN in great place are thrice servants ; servants of the sovereign or state ; servants of fame ; and servants of business : so as they have no freedom, neither in their persons, nor in their actions, nor in their times. It is a strange desire, to seek power, and to lose liberty ; or to seek power over others, and to lose power over a man's self. The rising unto place is laborious ; and by pains men come to greater pains ; and it is sometimes base and by indignities men come to dignities. The standing is slippery, and the regress is either a downfall, or at least an eclipse, which is a melancholy thing. *Cum non sis qui fueris, non esse cur velis vivere ?* Nay, men cannot retire when they would ; neither will they when it were reason : but are impatient of privateness, even in age and sickness, which require the shadow : like old townsmen, that will be still sitting at their street door, though thereby they offer age to scorn. Certainly great persons had need to borrow other mens opinions to

think themselves happy; for if they judge by their own feeling, they cannot find it; but if they think with themselves what other men think of them, and that other men would fain be as they are, then they are happy as it were by report, when perhaps they find the contrary within. For they are the first that find their own griefs; though they be the last that find their own faults. Certainly men in great fortunes are strangers to themselves, and while they are in the puzzle of business, they have no time to tend their health either of body or mind. *Illi mors gravis incubat, qui notus nimis omnibus, ignotus moritur sibi.* In place there is licence to do good and evil; whereof the latter is a curse; for in evil the best condition is not to will; the second not to can. But power to do good is the true and lawful end of aspiring. For good thoughts, though God accept them, yet towards men are little better than good dreams, except they be put in act; and that cannot be without power and place; as the vantage and commanding ground. Merit and good works is the end of man's motion; and conscience of the same is the accomplishment of man's rest. For if a man can be partaker of God's theatre, he shall likewise be partaker of God's rest. *Et conversus Deus, ut aspiceret opera, quae fecerunt manus suae, vidit quod omnia essent bona nimis;* and then the sabbath. In the discharge of thy place, set before thee the best examples; for imitation is a globe of precepts. And after a time set before thee thine own example; and examine thyself strictly, whether thou didst not best at first. Neglect not also the examples of those, that have carried themselves ill in the same place: not to set off thyself by taxing their memory; but to direct thyself what to avoid. Reform therefore, without bravery or scandal of former times and persons; but yet set it down to thyself, as well to create good precedents, as to follow them. Reduce things to the first institution, and observe wherein and how they have degenerated; but yet ask counsel of both times: of the ancient time what is best; and of the latter time what is fittest. Seek to make thy course regular; that men may know beforehand what they may expect: but be not too positive and peremptory; and express thyself well when thou digressest from thy rule. Preserve the right of thy place, but stir not questions of jurisdiction: and rather assume thy right in silence, and *de facto*, than voice it with claims and challenges. Preserve likewise the rights of inferior places; and think it more honour to direct in chief, than to be busy in all. Embrace and invite helps and advices touching the execution of thy place; and do not drive away such as bring thee information, as needless, but accept of them in good part. The vices of authority are chiefly four; delays, corruption, roughness, and facility. For delays; give easy access; keep times appointed; go through with that which is in hand; and interlace not business but of necessity. For corruption; do not only bind thine own hands, or thy servants hands, from taking, but bind the hands of suitors also from offering. For integrity used, doth the one; but integrity professed, and with a manifest detestation of bribery, doth the other: and avoid not only the fault, but the suspicion. Whosoever is found variable, and changeth manifestly without manifest cause, giveth suspicion of corruption. Therefore always when thou changeest thine opinion or course, profess it plainly, and declare it, together with the reasons that move thee to change: and do not think to steal it. A servant, or a favourite, if he be inward, and no other apparent cause of esteem, is commonly thought but a by-way to close corruption. For roughness; it is a needless cause of discontent; severity breedeth fear, but roughness breedeth hate. Even reproofs from authority ought to be grave, and not taunting. As for facility, it is worse than bribery. For bribes come but now and then; but if impu-

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tunity or idle respects lead a man, he shall never be without. As Solomon saith; *to respect persons is not good; for such a man will transgress for a piece of bread.* It is most true what was anciently spoken, A place sheweth the man: and it sheweth some to the better, and some to the worse; *omnium consensus, copax imperii, nisi imperasset,* saith Tacitus of Galba: but of Vespasian he saith; *Julius imperanti in Vespasiano mutatus in melius.* Though the one was meant of sufficiency, the other of manners and affection. It is an assured sign of a worthy and generous spirit, whom honour amends. For honour is or should be the place of virtue: and as in nature things move violently to their place, and calmly in their place; so virtue in ambition is violent, in authority settled and calm. All rising to great place is by a winding stair; and if there be factions, it is good to side a man's self whilst he is in the rising; and to balance himself when he is placed. Use the memory of thy predecessor fairly and tenderly; for if thou dost not, it is a debt will surely be paid when thou art gone. If thou have colleagues, respect them, and rather call them when they look not for it, than exclude them when they have reason to look to be called. Be not too sensible, or too remembring of thy place in conversation, and private answers to suitors; but let it rather be said, When he sits in place he is another man.

XII. Of BOLDNESS.

IT is a trivial grammar-school text, but yet worthy a wise man's consideration. Question was asked of Demosthenes, what was the chief part of an orator? He answered, Action. What next? Action. What next again? Action. He said it that knew it best; and had by nature himself no advantage in that he commended. A strange thing, that that part of an orator, which is but superficial, and rather the virtue of a player, should be placed so high above those other noble parts of invention, elocution, and the rest: nay almost alone, as if it were all in all. But the reason is plain. There is in human nature generally, more of the fool than of the wise; and therefore those faculties by which the foolish part of mens minds is taken, are most potent. Wonderful like is the case of boldness in civil business; what first? Boldness. What second and third? Boldness. And yet boldness is a child of ignorance and baseness, far inferior to other parts. But nevertheless it doth fascinate, and bind hand and foot those that are either shallow in judgment or weak in courage, which are the greatest part; yea, and prevaieth with wise men at weak times: therefore we see it hath done wonders in popular states, but with senates and princes less; and more ever upon the first entrance of bold persons into action, than soon after; for boldness is an ill keeper of promise. Surely, as there are mountebanks for the natural body, so there are mountebanks for the politic body: men that undertake great cures, and perhaps have been lucky in two or three experiments, but want the grounds of science, and therefore cannot hold out: nay, you shall see a bold fellow many times do Mahomet's miracle. Mahomet made the people believe that he would call an hill to him, and from the top of it offer up his prayers for the observers of his law. The people assembled: Mahomet called the hill to come to him again and again; and when the hill stood still he was never a whit abashed, but said, "If the hill will not come to Mahomet, Mahomet will go to the hill." So these men, when they have promised great matters, and failed most shamefully, yet, if they have the perfection of boldness, they will but slight it over, and make a turn, and no more ado. Certainly to men of great judgment bold persons are a sport to behold,

behold; nay, and to the vulgar also boldness hath somewhat of the ridiculous: for if absurdity be the subject of laughter, doubt you not but great boldness is seldom without some absurdity: especially it is a sport to see when a bold fellow is out of countenance, for that puts his face into a most shrunken and wooden posture, as needs it must; for in bashfulness the spirits do a little go and come; but with bold men, upon like occasion, they stand at a stay; like a stale at chess, where it is no mate, but yet the game cannot stir: but this last were fitter for a satire, than for a serious observation. This is well to be weighed, that boldness is ever blind; for it seeth not dangers and inconveniencies: therefore it is ill in counsel, good in execution: so that the right use of bold persons is, that they never command in chief, but be seconds, and under the direction of others. For in counsel, it is good to see dangers; and in execution not to see them, except they be very great.

XIII. Of GOODNESS, and GOODNESS OF NATURE.

I Take goodness in this sense, the affecting of the weal of men, which is what the Grecians called *philantropia*; and the word humanity, as it is used, is a little too light to express it. Goodness I call the habit, and goodness of nature the inclination. This of all virtues and dignities of the mind is the greatest, being the character of the Deity; and without it man is a busy, mischievous, wretched thing, no better than a kind of vermin. Goodness answers to the theological virtue charity, and admits no excess but error. The desire of power in excess caused the angels to fall; the desire of knowledge in excess caused man to fall: but in charity there is no excess; neither can angel or man come in danger by it. The inclination to goodness is imprinted deeply in the nature of man; inso-much, that if it issue not towards men, it will take unto other living creatures; as it is seen in the Turks, a cruel people, who nevertheless are kind to beasts, and give alms to dogs and birds: inso-much, as Busbechius reporteth, a christian boy in Constantinople had like to have been stoned for gagging, in a waggishness, a long-billed fowl. Errors indeed in this virtue of goodness or charity may be committed. The Italians have an ungracious proverb; *Tanto buon che val niente*; So good, that he is good for nothing. And one of the doctors of Italy, Nicholas Machiavel, had the confidence to put in writing, almost in plain terms, that the christian faith had given up good men in prey to those that are tyrannical and unjust: which he spake, because indeed there was never law, or sect, or opinion, did so much magnify goodness, as the christian religion doth: therefore to avoid the scandal, and the danger both, it is good to take knowledge of the errors of an habit so excellent. Seek the good of other men, but be not in bondage to their faces or fancies; for that is but facility or softness, which taketh an honest mind prisoner. Neither give thou Æsop's cock a gem, who would be better pleased, and happier if he had a barley-corn. The example of God teacheth the lesson truly; *he sendeth his rain, and maketh his sun to shine upon the just and the unjust*; but he doth not rain wealth, nor shine honour and virtues upon men equally: common benefits are to be communicated with all, but peculiar benefits with choice. And beware, how in making the portraiture thou breakest the pattern; for divinity maketh the love of ourselves the pattern, the love of our neighbours but the portraiture: *Sell all thou hast, and give it to the poor, and follow me*. But sell not all thou hast, except thou come and follow me; that is, except thou have a vocation, wherein thou mayest do as much good with little means as with great: for otherwise,

otherwise, in feeding the streams thou dryest the fountain. Neither is there only a habit of goodness directed by right reason ; but there is in some men, even in nature, a disposition towards it ; as on the other side there is a natural malignity. For there be, that in their nature do not affect the good of others. The lighter sort of malignity turneth but to a crossness, or frowardness, or aptness to oppose, or difficultness, or the like ; but the deeper sort to envy, and mere mischief. Such men, in other mens calamities, are as it were in season, and are ever on the loading part ; not so good as the dogs that licked Lazarus' sores, but like flies that are still buzzing upon any thing that is raw ; *Misanthropi*, that make it their practice to bring men to the bough, and yet have never a tree for the purpose in their gardens, as Timon had. Such dispositions are the very errors of human nature, and yet they are the fittest timber to make great politics of ; like to knee timber, that is good for ships that are ordained to be tossed, but not for building houses that shall stand firm. The parts and signs of goodness are many. If a man be gracious and courteous to strangers, it shews he is a citizen of the world, and that his heart is no island cut off from other lands, but a continent that joins to them. If he be compassionate towards the afflictions of others, it shews that his heart is like the noble tree that is wounded itself when it gives the balm. If he easily pardons and remits offences, it shews that his mind is planted above injuries, so that he cannot be shot. If he be thankful for small benefits, it shews that he weighs mens minds, and not their trash. But above all, if he have St. Paul's perfection, that he would wish to be an *anathema* from Christ for the salvation of his brethren, it shews much of a divine nature, and a kind of conformity with Christ himself.

XIV. Of NOBILITY.

WE will speak of nobility first as a portion of an estate, then as a condition of particular person. A monarchy, where there is no nobility at all, is ever a pure and absolute tyranny ; as that of the Turks : for nobility attempters sovereignty, and draws the eyes of the people somewhat aside from the line royal. But for democracies, they need not ; and they are commonly more quiet, and less subject to sedition, than where there are stirps of nobles ; for mens eyes are upon the business, and not upon the persons : or if upon the persons, it is for the business sake, as fittest, and not for flags and pedigree. We see the Switzers last well, notwithstanding their diversity of religion, and of cantons : for utility is their bond, and not respects. The United Provinces of the Low Countries, in their government, excel : for where there is an equality, the consultations are more indifferent, and the payments and tributes more chearful. A great and potent nobility addeth majesty to a monarch, but diminisheth power ; and putteth life and spirit into the people, but presseth their fortune. It is well when nobles are not too great for sovereignty, nor for justice ; and yet maintained in that height, as the insolency of inferiors may be broken upon them, before it come on too fast upon the majesty of kings. A numerous nobility causeth poverty and inconvenience in a state, for it is a surcharge of expence ; and besides, it being of necessity that many of the nobility fall in time to be weak in fortune, it maketh a kind of disproportion between honour and means.

As for nobility in particular persons : it is a reverend thing to see an ancient castle or building not in decay ; or to see a fair timber tree sound and perfect ; how much more to behold an ancient noble family, which hath stood against the waves and
weathers

weathers of time? for new nobility is but the act of power, but ancient nobility is the act of time. Those that are first raised to nobility, are commonly more virtuous, but less innocent, than their descendents; for there is rarely any rising, but by a commixture of good and evil arts: but it is reason the memory of their virtues remain to their posterity, and their faults die with themselves. Nobility of birth commonly abateth industry; and he that is not industrious, envieth him that is. Besides, noble persons cannot go much higher; and he that standeth at a stay, when others rise, can hardly avoid motions of envy. On the other side, nobility extinguisheth the passive envy from others towards them, because they are in possession of honour. Certainly kings that have able men of their nobility, shall find ease in employing them, and a better slide into their business: for people naturally bend to them, as born in some sort to command.

XV. Of SEDITIONS and TROUBLES.

SHEPHERDS of people had need know the kalendars of tempests in state; which are commonly greatest when things grow to equality; as natural tempests are greatest about the *aequinoctia*. And as there are certain hollow blasts of wind, and secret swellings of seas, before a tempest, so are there in states:

Ille etiam caecos instare tumultus

Saepe monet, fraudesque et operta tumescere bella.

Libels and licentious discourses against the state, when they are frequent and open, and in like sort false news often running up and down to the disadvantage of the state, and hastily embraced, are amongst the signs of troubles. Virgil giving the pedigree of Fame, saith, she was sister to the giants.

Illam Terra perens, ira irritata decorum,

Extremam, ut perhibent, Coeo Enceladoque sororem

Progenit.

As if fames were the relicks of seditions past: but they are no less indeed the preludes of seditions to come. Howsoever he noteth it right, that seditious tumults and seditious fames, differ no more, but as brother and sister, masculine and feminine; especially if it come to that, that the best actions of a state, and the most plausible, and which ought to give greatest contentment, are taken in ill sense and traduced: for that shews the envy great, as Tacitus saith; *constata magna invidia, seu bene, seu male, gesta premunt*. Neither doth it follow, that because these fames are a sign of troubles, that the suppressing of them with too much severity should be a remedy of troubles. For the despising of them many times checks them best; and the going about to stop them, doth but make a wonder long-lived. Also that kind of obedience which Tacitus speaketh of, is to be held suspected; *Erant in officio, sed tamen qui nullent mandata imperantium interpretari, quam esse equi*; disputing, excusing, cavilling upon mandates and directions, is a kind of shaking off the yoke, and assay of disobedience: especially if in those disputings they which are for the correction, speak fearfully and tenderly; and those that are against it, audaciously.

Also, as Machiavel noteth well, when princes, that ought to be common parents, make themselves as a party, and lean to a side, it is as a boat that is overthrown by uneven weight on the one side: as was well seen in the time of Henry the third of France; for first, himself entered league for the extirpation of the protestants; and presently after the same league was turned upon himself. For when the autho-

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rity of princes is made but an accessory to a cause, and that there be other bands that tie faster than the band of sovereignty, kings begin to be put almost out of possession.

Also, when discords, and quarrels, and factions, are carried openly and audaciously, it is a sign the reverence of government is lost. For the motions of the greatest persons in a government ought to be as the motions of the planets under *primum mobile*, according to the old opinion; which is, that every one of them is carried swiftly by the highest motion, and softly in their own motion. And therefore when great ones in their own particular motion move violently, and, as Tacitus expresseth it well, *liberius, quam ut imperantium meminissent*; it is a sign the orbs are out of frame. For reverence is that wherewith princes are girt from God, who threatneth the dissolving thereof; *solvam cingula regum*.

So when any of the four pillars of government are mainly shaken or weakened, which are religion, justice, counsel, and treasure, men had need to pray for fair weather. But let us pass from this part of predictions, concerning which, nevertheless, more light may be taken from that which followeth, and let us speak first of the materials of seditions; then of the motives of them; and thirdly of the remedies.

Concerning the materials of seditions. It is a thing well to be considered; for the surest way to prevent seditions, if the times do bear it, is to take away the matter of them. For if there be fuel prepared, it is hard to tell whence the spark shall come that shall set it on fire. The matter of seditions is of two kinds: much poverty, and much discontentment. It is certain, so many overthrown estates, so many votes for troubles. Lucan noteth well the state of Rome before the civil war;

*Hinc usura vorax, rapidumque in tempore foenus,
Hinc concussa fides, et multis utile bellum.*

This same *multis utile bellum* is an assured and infallible sign of a state disposed to seditions and troubles. And if this poverty and broken estate in the better sort be joined with a want and necessity in the mean people, the danger is imminent and great. For the rebellions of the belly are the worst. As for discontentments, they are in the politic body like to humours in the natural, which are apt to gather a preternatural heat, and to inflame. And let no prince measure the danger of them by this; whether they be just, or unjust; for that were to imagine people to be too reasonable; who do often spurn at their own good: nor yet by this; whether the griefs whereupon they rise be in fact great or small. For they are the most dangerous discontentments, where the fear is greater than the feeling. *Dolendi modus, timendi non item*. Besides, in great oppressions, the same things that provoke the patience, do withal mate the courage; but in fears it is not so. Neither let any prince or state be secure concerning discontentments, because they have been often, or have been long, and yet no peril hath ensued; for as it is true that every vapour or fume, doth not turn into a storm; so it is nevertheless true, that storms, though they blow over divers times, yet may fall at last; and as the Spanish proverb noteth well, the cord breaketh at the last by the weakest pull.

The causes and motives of seditions are, innovation in religion, taxes, alteration of laws and customs, breaking of privileges, general oppression, advancement of unworthy persons, strangers, dearths, disbanded foldiers, factions grown desperate; and whatsoever in offending people joineth and knitteth them in a common cause.

For the remedies, there may be some general preservatives, whereof we will speak ; as for the just cure, it must answer to the particular disease : and so be left to counsel, rather than rule.

The first remedy or prevention, is to remove by all means possible that material cause of sedition, whereof we spake ; which is want and poverty in the estate. To which purpose serveth the opening and well balancing of trade ; the cherishing of manufactures ; the banishing of idleness ; the repressing of waste and excess by sumptuary laws ; the improvement and husbanding of the soil ; the regulating of prices of things vendible ; the moderating of taxes and tributes, and the like. Generally it is to be foreseen, that the population of a kingdom, especially if it be not mown down by wars, do not exceed the stock of the kingdom, which should maintain them. Neither is the population to be reckoned only by number : for a smaller number, that spend more, and earn less, do wear out an estate sooner than a greater number that live lower and gather more. Therefore the multiplying of nobility, and other degrees of quality, in an over proportion to the common people, doth speedily bring a state to necessity : and so doth likewise an overgrown clergy ; for they bring nothing to the stock ; and in like manner, when more are bred scholars, than preferments can take off.

It is likewise to be remembered, that forasmuch as the increase of any estate must be upon the foreigner, for whatsoever is somewhere gotten is somewhere lost, there be but three things which one nation selleth unto another ; the commodity as nature yieldeth it ; the manufacture ; and the vesture or carriage. So that if these three wheels go, wealth will flow as in a spring tide. And it cometh many times to pass, that *matcriam superabit opus*, that the work and carriage is more worth than the material, and enricheth a state more ; as is notably seen in the Low-Country men, who have the best mines above ground in the world.

Above all things good policy is to be used, that the treasure and moneys in a state be not gathered into few hands. For otherwise a state may have a great stock, and yet starve. And money is like muck, not good except it be spread. This is done chiefly by suppressing, or at the least keeping a strait hand upon the devouring trades of usury, ingrossing, great pasturages, and the like.

For removing discontentments, or at least the danger of them : there is in every state, as we know, two portions of subjects, the noblesse, and the commonalty. When one of these is discontent, the danger is not great ; for common people are of slow motion, if they be not excited by the greater sort ; and the greater sort are of small strength, except the multitude be apt and ready to move of themselves. Then is the danger, when the greater sort do but wait for the troubling of the waters amongst the meaner, that then they may declare themselves. The poets feign, that the rest of the Gods would have bound Jupiter ; which he hearing of, by the counsel of Pallas, sent for Briareus with his hundred hands to come in to his aid. An emblem, no doubt, to shew, how safe it is for monarchs to make sure of the good will of common people.

To give moderate liberty for griefs and discontentments to evaporate, so it be without too great insolency or bravery, is a safe way. For he that turneth the humours back, and maketh the wound bleed inwards, endangereth malign ulcers and pernicious impostumations.

The part of Epimetheus might well become Prometheus, in the case of discontentments, for there is not a better provision against them. Epimetheus, when
griefs

griefs and evils flew abroad, at last shut the lid and kept hope in the bottom of the vessel. Certainly the politic and artificial nourishing and entertaining of hopes, and carrying men from hopes to hopes, is one of the best antidotes against the poison of discontentments. And it is a certain sign of a wise government and proceeding, when it can hold mens hearts by hopes, when it cannot by satisfaction: and when it can handle things in such manner, as no evil shall appear so peremptory, but that it hath some outlet of hope; which is the less hard to do, because both particular persons and factions are apt enough to flatter themselves, or at least to brave that which they believe not.

Also, the foresight and prevention that there be no likely or fit head, whereunto discontented persons may resort, and under whom they may join, is a known but an excellent point of caution. I understand a fit head to be one that hath greatness and reputation; that hath confidence with the discontented party, and upon whom they turn their eyes; and that is thought discontented in his own particular: which kind of persons are either to be won and reconciled to the state, and that in a fast and true manner; or to be confronted with some other of the same party that may oppose them, and so divide the reputation. Generally, the dividing and breaking of all factions and combinations that are adverse to the state, and setting them at distance, or at least distrust amongst themselves, is not one of the worst remedies. For it is a desperate case, if those that hold with the proceeding of the state, be full of discord and faction; and those that are against it be entire and united.

I have noted, that some witty and sharp speeches which have fallen from princes, have given fire to seditions. Cæsar did himself infinite hurt in that speech; *Sylla nescivit literas, non potuit discedere*: for it did utterly cut off that hope which men had entertained, that he would at one time or other give over his dictatorship. Galba undid himself by that speech; *Legi à se militem, non emi*: for it put the soldiers out of hope of the donative. Probus likewise by that speech, *Si vixero, non opus erit amplius Romano imperio militibus*; a speech of great despair for the soldiers: and many the like. Surely princes had need, in tender matters and ticklish times, to beware what they say; especially in these short speeches, which fly abroad like darts, and are thought to be shot out of their secret intentions. For, as for large discourses, they are flat things, and not so much noted.

Lastly, let princes, against all events, not be without some great person, one, or rather more, of military valour near unto them, for the repressing of seditions in their beginnings. For without that, there useth to be more trepidation in court upon the first breaking out of troubles, than were fit. And the state runneth the danger of that which Tacitus saith, *atque is habitus animorum fuit, ut pessimum facinus auderent pauci, plures vellent, omnes paterentur*. But let such military persons be assured and well reputed of, rather than factious and popular; holding also good correspondence with the other great men in the state; or else the remedy is worse than the disease.

XVI. Of ATHEISM.

I Had rather believe all the fables in the Legend, and the Talmud, and the Alcoran, than that this universal frame is without a mind. And therefore God never wrought miracle to convince atheism, because his ordinary works convince it. It is true, that a little philosophy inclineth man's mind to atheism; but depth in

philosophy bringeth mens minds about to religion : for while the mind of man looketh upon second causes scattered, it may sometimes rest in them and go no farther ; but when it beholdeth the chain of them confederate and linked together, it must needs fly to Providence and Deity. Nay even that school which is most accused of atheism, doth most demonstrate religion : that is the school of Leucippus, and Democritus, and Epicurus. For it is a thousand times more credible, that four mutable elements, and one immutable fifth essence duly and eternally placed, need no God ; than that an army of infinite small portions, or seeds unplaced, should have produced this order and beauty without a divine marshal. The Scripture saith, *The fool hath said in his heart, There is no God* : it is not said, *the fool hath thought in his heart*. So as he rather saith it by rote to himself, as that he would have, than that he can thoroughly believe it, or be persuaded of it. For none deny there is a God, but those for whom it maketh that there were no God. It appeareth in nothing more, that atheism is rather in the lip than in the heart of man, than by this ; that atheists will ever be talking of that their opinion, as if they fainted in it within themselves, and would be glad to be strengthened by the consent of others : nay more, you shall have atheists strive to get disciples, as it fareth with other sects : and, which is most of all, you shall have of them that will suffer for atheism, and not recant ; whereas if they did truly think that there were no such thing as God, why should they trouble themselves ? Epicurus is charged, that he did but dissemble, for his credit's sake, when he affirmed there were blessed natures, but such as enjoyed themselves without having respect to the government of the world. Wherein they say he did temporize, though in secret he thought there was no God. But certainly he is traduced ; for his words are noble and divine : *Non deos vulgi negare profanum ; sed vulgi opiniones diis applicare profanum*. Plato could have said no more. And although he had the confidence to deny the administration, he had not the power to deny the nature. The Indians of the west have names for their particular gods, though they have no name for God : as if the heathens should have had the names Jupiter, Apollo, Mars, *etc.* but not the word *Deus* : which shews, that even those barbarous people have the notion, though they have not the latitude and extent of it. So that against atheists the very savages take part with the very subtlest philosophers. The contemplative atheist is rare ; a Diagoras, a Bion, a Lucian perhaps, and some others : and yet they seem to be more than they are ; for that all that impugn a received religion or superstition, are by the adverse part branded with the name of atheists. But the great atheists indeed are hypocrites ; which are ever handling holy things, but without feeling ; so as they must needs be cauterized in the end. The causes of atheism are ; divisions in religion, if they be many ; for any one main division addeth zeal to both sides ; but many divisions introduce atheism. Another is, scandal of priests ; when it is come to that which S. Bernard saith, *non est jam dicere, ut populus, sic sacerdos : quia nec sic populus, ut sacerdos*. A third is, custom of profane scoffing in holy matters ; which doth by little and little deface the reverence of religion. And lastly, learned times, especially with peace and prosperity : for troubles and adversities do more bow mens minds to religion. They that deny a God, destroy man's nobility : for certainly man is of kin to the beasts by his body ; and if he be not of kin to God by his spirit, he is a base and ignoble creature. It destroys likewise magnanimity, and the raising of human nature : for take an example of a dog, and mark what a generosity and courage he will put on, when he finds himself maintained by a man ; who to
him

him is instead of a God, or *melior natura*: which courage is manifestly such, as that creature, without that confidence of a better nature than his own, could never attain. So man, when he resteth and assureth himself upon divine protection and favour, gathereth a force and faith, which human nature in itself could not obtain: therefore as atheism is in all respects hateful, so in this, that it depriveth human nature of the means to exalt itself above human frailty. As it is in particular persons, so it is in nations: never was there such a state for magnanimity as Rome; of this state hear what Cicero saith: *Quam volumus, licet, patres conscripti, nos amemus, tamen nec numero Hispanos, nec robore Gallos, nec calliditate Poenos, nec artibus Graecos, nec denique hoc ipso hujus gentis et terrae domestico nativoque sensu Italos ipsos et Latinos; sed pietate, ac religione, atque hac una sapientia, quod deorum immortalium numine omnia regi gubernarique perspeximus, omnes gentes nationesque superavimus.*

XVII. Of SUPERSTITION.

IT were better to have no opinion of God at all, than such an opinion as is unworthy of him: for the one is unbelief, the other is contumely: and certainly superstition is the reproach of the Deity. Plutarch saith well to that purpose: "Surely," saith he, I had rather a great deal men should say, there was no such man at all as Plutarch, than that they should say, that there was one Plutarch, that would eat his children as soon as they were born; as the poets speak of Saturn." And as the contumely is greater towards God, so the danger is greater towards men. Atheism leaves a man to sense, to philosophy, to natural piety, to laws, to reputation; all which may be guides to an outward moral virtue, though religion were not: but superstition dismounts all these, and erecteth an absolute monarchy in the minds of men. Therefore atheism did never perturb states; for it makes men wary of themselves, as looking no farther: and we see the times inclined to atheism, as the time of Augustus Cæsar, were civil times. But superstition hath been the confusion of many states; and bringeth in a new *primum mobile*, that ravisheth all the spheres of government. The master of superstition is the people; and in all superstition wise men follow fools; and arguments are fitted to practice, in a reversed order. It was gravely said by some of the prelates in the council of Trent, where the doctrine of the schoolmen bare great sway; that the schoolmen were like astronomers, which did feign eccentrics and epicycles, and such engines of orbs, to save the phænomena, though they knew there were no such things; and in like manner, that the schoolmen had framed a number of subtle and intricate axioms and theorems, to save the practice of the church. The causes of superstition are: pleasing and sensual rites and ceremonies: excess of outward and pharisaical holiness: over-great reverence of traditions, which cannot but load the church: the stratagems of prelates for their own ambition and lucre: the favouring too much of good intentions, which openeth the gate to conceits and novelties: the taking an aim at divine matters by human, which cannot but breed mixture of imaginations: and lastly, barbarous times, especially joined with calamities and disasters. Superstition without a veil is a deformed thing: for as it addeth deformity to an ape to be so like a man; so the similitude of superstition to religion makes it the more deformed. And as wholesome meat corrupteth to little worms; so good forms and orders corrupt into a number of petty observances. There is a superstition in avoiding superstition; when men think to do best, if they go farthest from the superstition formerly received.

ceived : therefore care should be had, that, as it fareth in ill purgings, the good be not taken away with the bad, which commonly is done when the people is the reformer.

XVIII. *Of TRAVEL.*

TRAVEL in the younger sort is a part of education ; in the elder a part of experience. He that travelleth into a country before he hath some entrance into the language, goeth to school, and not to travel. That young men travel under some tutor, or grave servant, I allow well ; so that he be such a one that hath the language, and hath been in the country before ; whereby he may be able to tell them what things are worthy to be seen in the country where they go, what acquaintances they are to seek, what exercises or discipline the place yieldeth. For else young men shall go hooded, and look abroad little. It is a strange thing, that in sea-voyages, where there is nothing to be seen but sky and sea, men should make diaries ; but in land travel, wherein so much is to be observed, for the most part they omit it ; as if chance were fitter to be registered than observation. Let diaries therefore be brought in use. The things to be seen and observed are : the courts of princes, especially when they give audience to ambassadors : the courts of justice while they sit and hear causes : and so of consistories ecclesiastic : the churches and monasteries, with the monuments which are therein extant : the walls and fortifications of cities and towns, and so the havens and harbours : antiquities and ruins ; libraries, colleges, disputations, and lectures, where any are ; shipping and navies ; houses, and gardens of state and pleasure near great cities ; armories, arsenals, magazines, exchanges, burres, warehouses ; exercises of horsemanship, fencing, training of soldiers, and the like ; comedies, such whereunto the better sort of persons do resort ; treasuries of jewels and robes, cabinets and rarities : and to conclude, whatsoever is memorable in the places where they go. After all which the tutors or servants ought to make diligent inquiry. As for triumphs, masks, feasts, weddings, funerals, capital executions, and such shews, men need not to be put in mind of them ; yet they are not to be neglected. If you will have a young man to put his travel into a little room, and in short time to gather much, this you must do : first, as was said, he must have some entrance into the language before he goeth. Then he must have such a servant, or tutor, as knoweth the country, as was likewise said. Let him carry with him also some card or book describing the country where he travelleth, which will be a good key to his inquiry. Let him keep also a diary. Let him not stay long in one city or town ; more or less as the place deserveth, but not long : nay, when he stayeth in one city or town, let him change his lodging from one end and part of the town to another, which is a great adamant of acquaintance. Let him sequester himself from the company of his countrymen, and diet in such places where there is good company of the nation where he travelleth. Let him, upon his removes from one place to another, procure recommendation to some person of quality residing in the place whither he removeth ; that he may use his favour in those things he desireth to see or know. Thus he may abridge his travel with much profit. As for the acquaintance which is to be sought in travel, that which is most of all profitable, is acquaintance with the secretaries and employed men of ambassadors ; for so in travelling in one country he shall suck the experience of many. Let him also see and visit eminent persons in all kinds, which are of great name
abroad ;

abroad; that he may be able to tell how the life agreeth with the fame. For quarrels, they are with care and discretion to be avoided: they are commonly for mistresses, healths, place, and words. And let a man beware how he keepeth company with choleric and quarrelsome persons; for they will engage him into their own quarrels. When a traveller returneth home, let him not leave the countries where he hath travelled altogether behind him; but maintain a correspondence by letters with those of his acquaintance which are of most worth. And let his travel appear rather in his discourse than in his apparel or gesture; and in his discourse let him be rather advised in his answers than forward to tell stories: and let it appear that he doth not change his country manners for those of foreign parts; but only prick in some flowers of that he hath learned abroad, into the customs of his own country.

XIX. *Of* EMPIRE.

IT is a miserable state of mind to have few things to desire, and many things to fear: and yet that commonly is the case of kings, who being at the highest, want matter of desire, which makes their minds more languishing: and have many representations of perils and shadows, which makes their minds the less clear. And this is one reason also of that effect which the Scripture speaketh of, *that the king's heart is inscrutable*. For multitude of jealousies, and lack of some predominant desire, that should marshal and put in order all the rest, maketh any man's heart hard to find or sound. Hence it comes likewise, that princes many times make themselves desires, and set their hearts upon toys; sometimes upon a building; sometimes upon erecting of an order; sometimes upon the advancing of a person; sometimes upon obtaining excellency in some art or feat of the hand; as Nero for playing on the harp; Domitian for certainty of the hand with the arrow; Commodus for playing at fence; Caracalla for driving chariots; and the like. This seemeth incredible unto those that know not the principle, That the mind of man is more cheered and refreshed by profiting in small things, than by standing at a stay in great. We see also that kings that have been fortunate conquerors in their first years, it being not possible for them to go forward infinitely, but that they must have some check or arrest in their fortunes, turn in their latter years to be superstitious and melancholy: as did Alexander the Great, Dioclesian, and in our memory Charles the fifth, and others; for he that is used to go forward and findeth a stop, falleth out of his own favour, and is not the thing he was.

To speak now of the true temper of empire: it is a thing rare and hard to keep; for both temper and distemper consist of contraries. But it is one thing to mingle contraries, another to interchange them. The answer of Apollonius to Vespasian is full of excellent instruction: Vespasian asked him, what was Nero's overthrow? He answered, Nero could touch and tune the harp well, but in government sometimes he used to wind the pins too high, sometimes to let them down too low. And certain it is that nothing destroyeth authority so much, as the unequal and untimely interchange of power pressed too far, and relaxed too much.

This is true, that the wisdom of all these latter times, in princes affairs, is rather fine deliveries, and shiftings of dangers and mischiefs, when they are near; than solid and grounded courses to keep them aloof. But this is but to try masteries with fortune: and let men beware, how they neglect, and suffer matter of trouble to be prepared;

pared; for no man can forbid the spark, nor tell whence it may come. The difficulties in princes business are many and great; but the greatest difficulty is often in their own mind. For it is common with princes, saith Tacitus, to will contradictories. *Sunt plerumque regum voluntates vehementes, et inter se contrariae.* For it is the sollicitism of power, to think to command the end, and yet not to endure the mean.

Kings have to deal with their neighbours; their wives; their children; their prelates or clergy; their nobles; their second nobles or gentlemen; their merchants; their commons; and their men of war; and from all these arise dangers, if care and circumspection be not used.

First for their neighbours, there can no general rule be given, the occasions are so variable, save one, which ever holdeth; which is, that princes do keep due sentinel that none of their neighbours do overgrow so, by increase of territory, by embracing of trade, by approaches, or the like, as they become more able to annoy them, than they were. And this is generally the work of standing counsels, to foresee, and to hinder it. During that triumvirate of kings, king Henry the eighth of England, Francis the first, king of France, and Charles the fifth, emperor, there was such a watch kept, that none of the three could win a palm of ground, but the other two would straightways balance it, either by confederation, or if need were by a war: and would not, in any wise, take up peace at interest. And the like was done by that league, which Guicciardine saith, was the security of Italy, made between Ferdinando king of Naples; Lorenzius Medices and Ludovicus Sforza, potentates, the one of Florence, the other of Milan. Neither is the opinion of some of the schoolmen to be received, that a war cannot justly be made but upon a precedent injury, or provocation. For there is no question, but a just fear of an imminent danger, though there be no blow given, is a lawful cause of a war.

For their wives, there are cruel examples of them. Livia is infamed for the poisoning of her husband: Roxolana, Solyman's wife, was the destruction of that renowned prince, Sultan Mustapha; and otherwise troubled his house and succession: Edward the second of England his queen had the principal hand in the deposing and murder of her husband. This kind of danger is then to be feared, chiefly, when the wives have plots for the raising of their own children, or else that they be advowtresses.

For their children: the tragedies likewise of the dangers from them have been many: and generally, the entering of fathers into suspicion of their children hath been ever unfortunate. The destruction of Mustapha, that we named before, was so fatal to Solyman's line, as the succession of the Turks, from Solyman until this day, is suspected to be untrue, and of strange blood; for that Selymus the second was thought to be supposititious. The destruction of Crispus, a young prince of rare towardness, by Constantinus the Great, his father, was in like manner fatal to his house, for both Constantinus and Constance, his sons, died violent deaths; and Constantius his other son did little better; who died indeed of sickness, but after that Julianus had taken arms against him. The destruction of Demetrius, son to Philip the second of Macedon, turned upon the father, who died of repentance. And many like examples there are; but few or none where the fathers had good by such distrust, except it were where the sons were up in open arms against them; as was Selymus the first against Bajazet: and the three sons of Henry the second, king of England.

For

For their prelates, when they are proud and great, there is also danger from them : as it was in the times of Anselmus and Thomas Becket, archbishops of Canterbury, who with their crofiers did almost try it with the king's sword ; and yet they had to deal with stout and haughty kings, William Rufus, Henry the first, and Henry the second. The danger is not from that state, but where it hath a dependence of foreign authority ; or where the churchmen come in, and are elected, not by the collation of the king or particular patrons, but by the people.

For their nobles ; to keep them at a distance it is not amiss ; but to depress them, may make a king more absolute, but less safe ; and less able to perform any thing that he desires : I have noted it in my *History of king Henry the seventh of England*, who depressed his nobility ; whereupon it came to pass that his times were full of difficulties and troubles : for the nobility, though they continued loyal unto him, yet did they not co-operate with him in his business. So that in effect he was fain to do all things himself.

For their second nobles ; there is not much danger from them, being a body dispersed. They may sometimes discourse high, but that doth little hurt : besides, they are a counterpoise to the higher nobility, that they grow not too potent : and lastly, being the most immediate in authority with the common people, they do best temper popular commotions.

For their merchants, they are *vena porta* ; and if they flourish not, a kingdom may have good limbs, but will have empty veins, and nourish little. Taxes and imposts upon them do seldom good to the king's revenue, for that that he wins in the hundred, he loseth in the thire ; the particular rates being increased, but the total bulk of trading rather decreased.

For their commons, there is little danger from them, except it be where they have great and potent heads ; or where you meddle with the point of religion, or their customs or means of life.

For their men of war, it is a dangerous state where they live and remain in a body, and are used to donatives, whereof we see examples in the janizaries and pretorian bands of Rome ; but trainings of men, and arming them in several places, and under several commanders, and without donatives, are things of defence and no danger.

Princes are like to heavenly bodies, which cause good or evil times ; and which have much veneration, but no rest. All precepts concerning kings are in effect comprehended in those two remembrances : *Memento quod es homo* ; and *Memento quod es Deus*, or *vice Dei* : the one bridleth their power, and the other their will.

XX. Of COUNSEL.

THE greatest trust between man and man is the trust of giving counsel. For in other confidences, men commit the parts of life ; their lands, their goods, their children, their credit, some particular affair ; but to such as they make their counsellors they commit the whole : by how much the more they are obliged to all faith and integrity. The wisest princes need not think it any diminution to their greatness, or derogation to their sufficiency, to rely upon counsel. God himself is not without : but hath made it one of the great names of his blessed Son, *the counsellor*. Solomon hath pronounced, that *in counsel is stability*. Things will have their first or second agitation ; if they be not tossed upon the arguments of

counsel, they will be tossed upon the waves of fortune ; and be full of inconstancy, doing and undoing, like the reeling of a drunken man. Solomon's son found the force of counsel, as his father saw the necessity of it. For the beloved kingdom of God was first rent and broken by ill counsel ; upon which counsel there are set, for our instruction, the two marks whereby bad counsel is for ever best discerned : that it was young counsel, for the persons ; and violent counsel, for the matter.

The ancient times do set forth in figure both the incorporation and inseparable conjunction of counsel with kings, and the wise and politic use of counsel by kings : the one, in that they say Jupiter did marry Metis, which signifieth counsel ; whereby they intend, that sovereignty is married to counsel : the other in that which followeth, which was thus : they say, after Jupiter was married to Metis, she conceived by him, and was with child, but Jupiter suffered her not to stay till she brought forth, but eat her up ; whereby he became himself with child, and was delivered of Pallas armed out of his head. Which monstrous fable containeth a secret of empire ; how kings are to make use of their council of state : that, first, they ought to refer matters unto them, which is the first begetting or impregnation ; but when they are elaborate, moulded and shaped in the womb of their council, and grow ripe and ready to be brought forth, that then they suffer not their council to go through with the resolution and direction, as if it depended on them ; but take the matter back into their own hands, and make it appear to the world, that the decrees and final directions, which, because they come forth with prudence and power, are resembled to Pallas armed, proceeded from themselves, and not only from their authority, but, the more to add reputation to themselves, from their head and device.

Let us now speak of the inconveniencies of counsel, and of the remedies. The inconveniencies that have been noted in calling and using counsel are three. First, the revealing of affairs, whereby they become less secret. Secondly, the weakening of the authority of princes, as if they were less of themselves. Thirdly, the danger of being unfaithfully counselled, and more for the good of them that counsel, than of him that is counselled. For which inconveniencies the doctrine of Italy, and practice of France, in some kings times, hath introduced cabinet counsels ; a remedy worse than the disease.

As to secrecy, princes are not bound to communicate all matters with all counsellors, but may extract and select. Neither is it necessary, that he that consulteth what he should do, should declare what he will do. But let princes beware, that the unsecreting of their affairs comes not from themselves. And as for cabinet counsels, it may be their motto ; *Plenus rimarum sum* : one futile person, that maketh it his glory to tell, will do more hurt than many that know it their duty to conceal. It is true, there be some affairs which require extreme secrecy, which will hardly go beyond one or two persons besides the king : neither are those counsels unprosperous ; for besides the secrecy they commonly go on constantly in one spirit of direction without distraction. But then it must be a prudent king, such as is able to grind with a hand-mill ; and those inward counsellors had need also be wise men, and especially true and trusty to the king's ends ; as it was with king Henry the seventh of England, who in his greatest business imparted himself to none, except it were to Morton and Fox.

For weakening of authority; the fable sheweth the remedy. Nay, the majesty of kings is rather exalted than diminished, when they are in the chair of counsel; neither was there ever prince bereaved of his dependences by his council, except where there hath been either an over-greatness in one counsellor, or an over-strict combination in divers; which are things soon found and holpen.

For the last inconvenience, that men will counsel with an eye to themselves, certainly *Non inveniet fidem super terram*, is meant of the nature of times, and not of all particular persons. There be that are in nature faithful and sincere, and plain and direct; not crafty and involved: let princes above all draw to themselves such natures. Besides, counsellors are not commonly so united, but that one counsellor keepeth centinel over another; so that if any do counsel out of faction or private ends, it commonly comes to the king's ear. But the best remedy is, if princes know their counsellors, as well as their counsellors know them:

Principis est virtus maxima nosse suos

And on the other side, counsellors should not be too speculative into their sovereign's person. The true composition of a counsellor is rather to be skilful in their master's business, than in his nature; for then he is like to advise him, and not to feed his humour. It is of singular use to princes, if they take the opinions of their council both separately and together: for private opinion is more free, but opinion before others is more reverend. In private, men are more bold in their own humours; and in consort, men are more obnoxious to others humours; therefore it is good to take both: and of the inferior sort, rather in private, to preserve freedom; of the greater rather in consort, to preserve respect. It is in vain for princes to take counsel concerning matters, if they take no counsel likewise concerning persons: for all matters are as dead images; and the life of the execution of affairs resteth in the good choice of persons. Neither is it enough to consult concerning persons *secundum genera*, as in an idea or mathematical description, what the kind and character of the person should be; for the greatest errors are committed, and the most judgment is shewn in the choice of individuals. It was truly said, *optimi consilarii mortui*; books will speak plain, when counsellors blanch. Therefore it is good to be conversant in them, specially the books of such as themselves have been actors upon the stage.

The councils at this day, in most places, are but familiar meetings; where matters are rather talked on, than debated: and they run too swift to the order or act of council. It were better, that in causes of weight the matter were propounded one day, and not spoken to till the next day; in *nocte consilium*. So was it done in the commission of union between England and Scotland; which was a grave and orderly assembly. I commend set days for petitions: for both it gives the suitors more certainty for their attendance; and it frees the meetings for matters of estate, that they may *hoc agere*. In choice of committees, for ripening business for the council, it is better to choose indifferent persons, than to make an indifferency by putting in those that are strong on both sides. I commend also standing commissions; as for trade, for treasure, for war, for suits, for some provinces: for where there be divers particular councils, and but one council of estate, as it is in Spain, they are, in effect, no more than standing commissions; save that they have greater authority. Let such as are to inform councils out of their particular professions, as lawyers, seamen, mint-men, and the like, be first

heard before committees ; and then, as occasion serves, before the council. And let them not come in multitudes, or in a tribunitious manner ; for that is to clamour councils, not to inform them. A long table, and a square table, or seats about the walls, seem things of form, but are things of substance ; for at a long table, a few at the upper end, in effect, sway all the business ; but in the other form, there is more use of the counsellors opinions that sit lower. A king when he presides in council, let him beware how he opens his own inclination too much in that which he propoundeth : for else counsellors will but take the wind of him, and instead of giving free counsel sing him a song of *Placebo*.

XXI. Of DELAYS.

FORTUNE is like the market, where many times if you can stay a little, the price will fall. And again, it is sometimes like Sibylla's offer, which at first offereth the commodity at full, then consumeth part and part, and still holdeth up the price. For occasion, as it is in the common verse, turneth a bald noddle, after she hath presented her locks in front, and no hold taken : or at least turneth the handle of the bottle first to be received, and after the belly, which is hard to clasp. There is surely no greater wisdom, than well to time the beginnings and onsets of things. Dangers are no more light, if they once seem light : and more dangers have deceived men, than forced them. Nay, it were better to meet some dangers half way, though they come nothing near, than to keep too long a watch upon their approaches ; for if a man watch too long, it is odds he will fall asleep. On the other side, to be deceived with too long shadows, as some have been when the moon was low, and shone on their enemies back, and so to shoot off before the time ; or to teach dangers to come on, by over-early buckling towards them, is another extreme. The ripeness or unripeness of the occasion, as we said, must ever be well weighed ; and generally it is good to commit the beginnings of all great actions to Argos with his hundred eyes, and the ends to Briareus with his hundred hands : first to watch, and then to speed. For the helmet of Pluto, which maketh the politic man go invisible, is secrecy in the counsel, and celerity in the execution. For when things are once come to the execution, there is no secrecy comparable to celerity ; like the motion of a bullet in the air, which flieth so swift as it outruns the eye.

XXII. Of CUNNING.

WE take cunning for a sinister or crooked wisdom. And certainly there is great difference between a cunning man and a wise man ; not only in point of honesty, but in point of ability. There be that can pack the cards, and yet cannot play well ; so there are some that are good in canvasses and factions, that are otherwise weak men. Again it is one thing to understand persons, and another thing to understand matters ; for many are perfect in mens humours, that are not greatly capable of the real part of business ; which is the constitution of one that hath studied men more than books. Such men are fitter for practice than for counsel ; and they are good but in their own alley : turn them to new men, and they have lost their aim ; so as the old rule to know a fool from a wise man, *Mitte ambos nudos ad ignotos, et videbis*, doth scarce hold for them. And because these cunning men are like haberdashers of small wares, it is not amiss to set forth their shop.

It is a point of cunning, to wait upon him with whom you speak with your eye; as the Jesuits give it in precept: for there be many wise men that have secret hearts and transparent countenances. Yet this should be done with a demure abasing of your eye sometimes, as the Jesuits also do use.

Another is, that when you have any thing to obtain of present dispatch, you entertain and amuse the party with whom you deal with some other discourse; that he be not too much awake to make objections. I knew a counsellor and secretary, that never came to queen Elizabeth of England with bills to sign, but he would always first put her into some discourse of estate, that she might the less mind the bills.

The like surprize may be made by moving things when the party is in haste, and cannot stay to consider advisedly of what is moved.

If a man would cross a business, that he doubts some other would handsomely and effectually move, let him pretend to wish it well, and move it himself in such sort as may foil it.

The breaking off in the midst of what one was about to say, as if he took himself up, breeds a greater appetite in him with whom you confer, to know more.

And because it works better when any thing seemeth to be gotten from you by question, than if you offer it of yourself, you may lay a bait for a question, by shewing another visage and countenance than you are wont; to the end to give occasion for the party to ask what the matter is of the change; as Nehemiah did, *And I had not before that time been sad before the king.*

In things that are tender and unpleasing, it is good to break the ice by some whose words are of less weight, and to reserve the more weighty voice to come in as by chance, so that he may be asked the question upon the other's speech: as Narcissus did, in relating to Claudius the marriage of Messalina and Silius.

In things that a man would not be seen in himself, it is a point of cunning to borrow the name of the world; as to say, The world says, or There is a speech abroad.

I knew one, that when he wrote a letter, he would put that which was most material in the postscript, as if it had been a bye-matter.

I know another that, when he came to have speech, he would pass over that that he intended most; and go forth, and come back again, and speak of it as of a thing that he had almost forgot.

Some procure themselves to be surprized at such times, as it is like the party that they work upon will suddenly come upon them; and to be found with a letter in their hand, or doing somewhat which they are not accustomed to; to the end they may be apposed of those things, which of themselves they are desirous to utter.

It is a point of cunning to let fall those words in a man's own name, which he would have another man learn and use, and thereupon take advantage. I knew two that were competitors for the secretary's place in queen Elizabeth's time, and yet kept good quarter between themselves, and would confer one with another upon the business; and the one of them said, that to be a secretary in the declination of a monarchy was a ticklish thing, and that he did not affect it: the other straight caught up those words; and discoursed with divers of his friends, that he had no reason to desire to be secretary in the declination of a monarchy. The first man took hold of it, and found means it was told the queen; who hearing of

a declination of a monarchy, took it so ill, as she would never after hear of the other's suit.

There is a cunning which we in England call, the turning of the cat in the pan; which is, when that which a man says to another, he lays it as if another had said it to him; and to say truth, it is not easy, when such a matter passed between two, to make it appear from which of them it first moved and began.

It is a way that some men have, to glance and dart at others, by justifying themselves by negatives; as to say, This I do not: as Tigellinus did towards Burrhus, *se non diversas spes, sed incolumitatem imperatoris simpliciter spectare.*

Some have in readiness so many tales and stories, as there is nothing they would insinuate, but they can wrap it into a tale; which serveth both to keep themselves more in guard, and to make others carry it with more pleasure.

It is a good point of cunning, for a man to shape the answer he would have in his own words and propositions; for it makes the other party stick the less.

It is strange how long some men will lie in wait to speak somewhat they desire to say; and how far about they will fetch, and how many other matters they will bear over to come near it; it is a thing of great patience, but yet of much use.

A sudden, bold, and unexpected question, doth many times surprize a man, and lay him open. Like to him, that having changed his name, and walking in Paul's, another suddenly came behind him and called him by his true name, whereat straightways he looked back.

But these small wares and petty points of cunning are infinite, and it were a good deed to make a list of them; for that nothing doth more hurt in a state, than that cunning men pass for wise.

But certainly some there are that know the resorts and falls of business, that cannot sink into the main of it; like a house that hath convenient stairs and entries, but never a fair room. Therefore you shall see them find out pretty looses in the conclusion, but are no ways able to examine or debate matters. And yet commonly they take advantage of their inability, and would be thought wits of direction. Some build rather upon the abusing of others, and, as we now say, putting tricks upon them, than upon soundness of their own proceedings. But Solomon saith, *Prudens advertit ad gressus suos: stultus divertit ad dolos.*

XXIII. Of WISDOM FOR A MAN'S SELF.

AN ant is a wise creature for itself: but it is a shrewd thing in an orchard or garden. And certainly men that are great lovers of themselves waste the public. Divide with reason between self-love and society; and be so true to thyself, as thou be not false to others; especially to thy king and country. It is a poor center of a man's actions, Himself. It is right earth. For that only stands fast upon its own center: whereas all things that have affinity with the heavens, move upon the center of another which they benefit. The referring of all to a man's self is more tolerable in a sovereign prince, because themselves are not only themselves but their good and evil is at the peril of the public fortune. But it is a desperate evil in a servant to a prince, or a citizen in a republic. For whatsoever affairs pass such a man's hands, he crooketh them to his own ends: which must needs be often eccentric to the ends of his master or state. Therefore let princes or states choose such servants as have not this mark; except they mean their service should be made but
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the necessary. That which maketh the effect more pernicious is, that all proportion is lost: it were disproportion enough for the servant's good to be preferred before the master's; but yet it is a greater extreme, when a little good of the servant shall carry things against a great good of the master's. And yet that is the case of bad officers, treasurers, ambassadors, generals, and other false and corrupt servants; which set a bias upon their bowl of their own petty ends and envies, to the overthrow of their masters great and important affairs. And for the most part, the good such servants receive, is after the model of their own fortune; but the hurt they sell for that good, is after the model of their masters fortune. And certainly it is the nature of extreme self-lovers, as they will set an house on fire, and it were but to roast their eggs: and yet these men many times hold credit with their masters, because their study is but to please them, and profit themselves: and for either respect they will abandon the good of their affairs.

Wisdom for a man's self is in many branches thereof a depraved thing. It is the wisdom of rats, that will be sure to leave a house somewhat before it fall. It is the wisdom of the fox, that thrusts out the badger, who digged and made room for him. It is the wisdom of crocodiles, that shed tears when they would devour. But that which is specially to be noted is, that those which, as Cicero says of Pompey, are *sui amantes sine rivali*, are many times unfortunate. And whereas they have all their time sacrificed to themselves, they become in the end themselves sacrifices to the inconstancy of fortune, whose wings they thought by their self-wisdom to have pinioned.

XXIV. Of INNOVATIONS.

AS the births of living creatures at first are ill shapen; so are all innovations, which are the births of time. Yet notwithstanding as those that first bring honour into their family, are commonly more worthy than most that succeed: so the first precedent, if it be good, is seldom attained by imitation. For ill, to man's nature, as it stands perverted, hath a natural motion strongest in continuance: but good, as a forced motion, strongest at first. Surely every medicine is an innovation, and he that will not apply new remedies, must expect new evils; for time is the greatest innovator: and if time of course alter things to the worse, and wisdom and counsel shall not alter them to the better, what shall be the end? It is true, that what is settled by custom, though it be not good, yet at least it is fit. And those things which have long gone together, are, as it were, confederate within themselves: whereas new things piece not so well; but though they help by their utility, yet they trouble by their unconformity. Besides, they are like strangers, more admired, and less favoured. All this is true if time stood still; which contrariwise moveth so round, that a froward retention of custom is as turbulent a thing, as an innovation; and they that reverence too much old times are but a scorn to the new. It were good therefore, that men in their innovations would follow the example of time itself, which indeed innovateth greatly, but quietly and by degrees scarce to be perceived: for otherwise whatsoever is new is unlooked for; and ever it mends some, and impairs others: and he that is holpen takes it for a fortune, and thanks the time; and he that is hurt, for a wrong, and imputeth it to the author. It is good also not to try experiments in states, except the necessity be urgent, or the utility evident; and well to beware that it be the reformation that draweth on the change; and not
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the desire of change that pretendeth the reformation. And lastly, that the novelty, though it be not rejected, yet be held for a suspect: and, as the Scripture saith, *that we make a stand upon the ancient way, and then look about us, and discover what is the straight and right way, and so to walk in it.*

XXV. Of DISPATCH.

AFFECTED dispatch is one of the most dangerous things to business that can be. It is like that which the physicians call predigestion or hasty digestion; which is sure to fill the body full of crudities and secret seeds of diseases. Therefore measure not dispatch by the times of sitting, but by the advancement of the business. And as in races, it is not the large stride, or high lift, that makes the speed; so in business, the keeping close to the matter, and not taking of it too much at once, procureth dispatch. It is the care of some, only to come off speedily for the time; or to contrive some false periods of business, because they may seem men of dispatch. But it is one thing to abbreviate by contracting, another by cutting off; and business so handled at several sittings or meetings, goeth commonly backward and forward in an unsteady manner. I knew a wise man that had it for a by-word, when he saw men hasten to a conclusion, "Stay a little, that we may make an end the sooner."

On the other side, true dispatch is a rich thing. For time is the measure of business, as money is of wares: and business is bought at a dear hand, where there is small dispatch. The Spartans and Spaniards have been noted to be of small dispatch: *Mi venga la muerte de Spagna*; Let my death come from Spain; for then it will be sure to be long in coming.

Give good hearing to those that give the first information in business; and rather direct them in the beginning, than interrupt them in the continuance of their speeches: for he that is put out of his own order, will go forward and backward, and be more tedious while he waits upon his memory, than he could have been if he had gone on in his own course. But sometimes it is seen, that the moderator is more troublesome than the actor.

Iterations are commonly loss of time: but there is no such gain of time, as to iterate often the state of the question; for it chaseth away many a frivolous speech as it is coming forth. Long and curious speeches are as fit for dispatch, as a robe or mantle with a long train is for a race. Prefaces, and passages, and excusations, and other speeches of reference to the person, are great wastes of time; and though they seem to proceed of modesty, they are bravery. Yet beware of being too material, when there is any impediment or obstruction in mens wills; for pre-occupation of mind ever requireth preface of speech; like a fomentation to make the unguent enter.

Above all things, order, and distribution, and singling out of parts, is the life of dispatch; so as the distribution be not too subtle: for he that doth not divide, will never enter well into business; and he that divideth too much, will never come out of it clearly. To choose time, is to save time; and an unseasonable motion is but beating the air. There be three parts of business; the preparation, the debate or examination, and the perfection. Whereof, if you look for dispatch, let the middle only be the work of many, and the first and last the work of few. The proceeding

proceeding upon somewhat conceived in writing, doth for the most part facilitate dispatch: for though it should be wholly rejected, yet that negative is more pregnant of direction than an indefinite; as ashes are more generative than dull.

XXVI. *Of SEEMING WISE.*

IT hath been an opinion, that the French are wiser than they seem, and the Spaniards seem wiser than they are. But howsoever it be between nations, certainly it is so between man and man. For as the apostle saith of godliness, *having a shew of godliness, but denying the power thereof*; so certainly there are in point of wisdom and sufficiency that do nothing or little very solemnly; *magno conatu nugas*. It is a ridiculous thing, and fit for a satire to persons of judgment, to see what shifts these formalists have, and what prospectives to make superficies to seem body that hath depth and bulk. Some are so close and reserved, as they will not shew their wares but by a dark light; and seem always to keep back somewhat; and when they know within themselves, they speak of that they do not well know, would nevertheless seem to others to know of that which they may not well speak. Some help themselves with countenance and gesture, and are wise by signs; as Cicero saith of Piso, that when he answered him, he fetched one of his brows up to his forehead, and bent the other down to his chin: *respondes, altero ad frontem sublato, altero ad mentum depresso supercilio, crudelitatem tibi non placere*. Some think to bear it by speaking a great word, and being peremptory; and go on, and take by admittance that which they cannot make good. Some, whatsoever is beyond their reach, will seem to despise or make light of it as impertinent or curious; and so would have their ignorance seem judgment. Some are never without a difference, and commonly by amusing men with a subtilty blanch the matter; of whom A. Gellius saith, *hominem delirum, qui verborum minutiis rerum frangit pondera*. Of which kind also, Plato in his *Protagoras* bringeth in Prodicus in scorn, and maketh him make a speech that consisteth of distinctions from the beginning to the end. Generally such men in all deliberations find ease to be of the negative side, and affect a credit to object and foretel difficulties: for when propositions are denied, there is an end of them; but if they be allowed, it requireth a new work: which false point of wisdom is the bane of business. To conclude, there is no decaying merchant, or inward beggar, hath so many tricks to uphold the credit of their wealth, as these empty persons have to maintain the credit of their sufficiency. Seeming wise men may make shift to get opinion; but let no man choose them for employment, for certainly you were better take for business a man somewhat absurd, than over formal.

XXVII. *Of FRIENDSHIP.*

IT had been hard for him that spake it to have put more truth and untruth together, in few words, than in that speech; "Whosoever is delighted in solitude, is either a wild beast, or a God." For it is most true, that a natural and secret hatred, and averfation towards society, in any man, hath somewhat of the savage beast: but it is most untrue, that it should have any character at all of the divine nature, except it proceed, not out of a pleasure in solitude, but out of a love and desire to sequester a man's self for a higher conversation: such

as is found to have been falsely and feignedly in some of the heathen; as Epimenides the Candian, Numa the Roman, Empedocles the Sicilian, and Apollonius of Tyana; and truly and really in divers of the ancient hermits, and holy fathers of the church. But little do men perceive what solitude is, and how far it extendeth. For a crowd is not company, and faces are but a gallery of pictures; and talk but a tinkling cymbal, where there is no love. The Latin adage meeteth with it a little; *Magna civitas, magna solitudo*; because in a great town friends are scattered, so that there is not that fellowship, for the most part, which is in less neighbourhoods. But we may go farther, and affirm most truly, that it is a mere and miserable solitude, to want true friends, without which the world is but a wilderness. And even in this sense also of solitude, whosoever in the frame of his nature and affections is unfit for friendship, he taketh it of the beast, and not from humanity.

A principal fruit of friendship is the ease and discharge of the fulness and swellings of the heart, which passions of all kinds do cause and induce. We know diseases of stoppings and suffocations are the most dangerous in the body; and it is not much otherwise in the mind; you may take sarza to open the liver; steel to open the spleen; flour of sulphur for the lungs; *castoreum* for the brain; but no receipt openeth the heart but a true friend, to whom you may impart griefs, joys, fears, hopes, suspicions, counsels, and whatsoever lieth upon the heart, to oppress it, in a kind of civil shrift or confession.

It is a strange thing to observe, how high a rate great kings and monarchs do set upon this fruit of friendship, whereof we speak; so great, as they purchase it many times at the hazard of their own safety and greatness. For princes, in regard of the distance of their fortune from that of their subjects and servants, cannot gather this fruit, except, to make themselves capable thereof, they raise some persons to be as it were companions, and almost equals to themselves; which many times forteth to inconvenience. The modern languages give unto such persons the name of favourites or privadoes; as if it were matter of grace or conversation: but the Roman name attaineth the true use and cause thereof; naming them *participes curarum*; for it is that which tieth the knot. And we see plainly, that this hath been done, not by weak and passionate princes only, but by the wisest and most politic that ever reigned, who have oftentimes joined to themselves some of their servants, whom both themselves have called friends, and allowed others likewise to call them in the same manner, using the word which is received between private men.

L. Sylla, when he commanded Rome, raised Pompey, after surnamed the Great, to that height, that Pompey vaunted himself for Sylla's over-match. For when he had carried the consulship for a friend of his against the pursuit of Sylla, and that Sylla did a little resent thereat, and began to speak great, Pompey turned upon him again, and in effect bad him be quiet; for that more men adore the sun rising, than the sun setting. With Julius Cæsar Decimus Brutus had obtained that interest, as he set him down in his testament for heir in remainder after his nephew. And this was the man that had power with him to draw him forth to his death. For when Cæsar would have discharged the senate, in regard of some ill presages, and specially a dream of Calpurnia; this man lifted him gently by the arm out of his chair, telling him, He hoped he would not dismiss the senate, till his wife had dreamed a better dream. And it seemeth, his favour was so great, as Antonius, in a letter which is recited *verbatim* in one of Cicero's Philippics, calleth him *venefica*, witch; as if he had enchanted Cæsar. Augustus raised Agrippa, though of mean birth, to that height,

height, as when he consulted with Mæcenas about the marriage of his daughter Julia, Mæcenas took the liberty to tell him, That he must either marry his daughter to Agrippa, or take away his life; there was no third way, he had made him so great. With Tiberius Cæsar Sejanus had ascended to that height, as they two were termed and reckoned as a pair of friends. Tiberius in a letter to him saith; *Hæc pro amicitia nostra non occultavi*: and the whole senate dedicated an altar to Friendship as to a goddess, in respect of the great dearnets of friendship between them two. The like or more was between Septimius Severus and Plantianus. For he forced his eldest son to marry the daughter of Plantianus; and would often maintain Plantianus in doing affronts to his son; and did write also in a letter to the senate, by these words: "I love the man so well, as I wish he may over-live me." Now if these princes had been as a Trajan, or a Marcus Aurelius, a man might have thought that this had proceeded of an abundant goodness of nature; but being men so wise, of such strength and severity of mind, and so extreme lovers of themselves, as all these were; it proveth most plainly, that they found their own felicity, though as great as ever happened to mortal men, but as an half piece, except they might have a friend to make it entire; and yet, which is more, they were princes that had wives, sons, nephews; and yet all these could not supply the comfort of friendship.

It is not to be forgotten what Commineus observeth of his first master duke Charles the Hardy, namely, That he would communicate his secrets with none; and least of all those secrets which troubled him most. Whereupon he goeth on, and saith, That towards his latter time, that closeness did impair, and a little perish his understanding. Surely Commineus might have made the same judgment also, if it had pleased him, of his second master Lewis the eleventh, whose closeness was indeed his tormentor. The parable of Pythagoras is dark, but true; *Cor ne edito*, eat not the heart. Certainly, if a man would give it a hard phrase, those that want friends to open themselves unto, are cannibals of their own hearts. But one thing is most admirable, wherewith I will conclude this first fruit of friendship, which is, that this communicating of a man's self to his friend works two contrary effects; for it redoubleth joys, and cutteth griefs in halves. For there is no man that imparteth his joys to his friend, but he joyeth the more; and no man that imparteth his griefs to his friend, but he grieveth the less. So that it is in truth of operation upon a man's mind of like virtue, as the alchemists use to attribute to their stone, for man's body; that it worketh all contrary effects, but still to the good and benefit of nature. But yet, without praying in aid of alchemists, there is a manifest image of this in the ordinary course of nature. For in bodies, union strengtheneth and cherisheth any natural action; and, on the other side, weakeneth and duileth any violent impression; and even so is it of minds.

The second fruit of friendship is healthful and sovereign for the understanding, as the first is for the affections. For friendship maketh indeed a fair day in the affections, from storm and tempests; but it maketh day-light in the understanding, out of darkness and confusion of thoughts: neither is this to be understood only of faithful counsel, which a man receiveth from his friend; but before you come to that, certain it is, that whosoever hath his mind fraught with many thoughts, his wits and understanding do clarify and break up in the communicating and discoursing with another: he tosseth his thoughts more easily: he marshalleth them more orderly; he seeth how they look when they are turned into words; finally, he waxeth wiser than himself; and that more by an hour's discourse, than by a day's meditation. It was

well said by Themistocles to the king of Persia, That speech was like cloth of Arras, opened and put abroad, whereby the imagery doth appear in figure; whereas in thoughts they lie but as in packs. Neither is this second fruit of friendship, in opening the understanding, restrained only to such friends, as are able to give a man counsel, they indeed are best, but even, without that, a man learneth of himself, and bringeth his own thoughts to light, and whetteth his wits as against a stone, which itself cuts not. In a word; a man were better relate himself to a statue or picture, than to suffer his thoughts to pass in smother.

Add now, to make this second fruit of friendship complete, that other point which lieth more open, and falleth within vulgar observation; which is faithful counsel from a friend. Heraclitus saith well in one of his aenigmas, Dry light is ever the best. And certain it is, that the light that a man receiveth by counsel from another, is drier and purer, than that which cometh from his own understanding and judgment; which is ever infused and drenched in his affections and customs. So as there is as much difference between the counsel that a friend giveth, and that a man giveth himself, as there is between the counsel of a friend and of a flatterer. For there is no such flatterer as is a man's self; and there is no such remedy against flattery of a man's self, as the liberty of a friend. Counsel is of two sorts; the one concerning manners, the other concerning business. For the first, the best preservative to keep the mind in health, is the faithful admonition of a friend. The calling of a man's self to a strict account, is a medicine sometimes too piercing and corrosive. Reading good books of morality, is a little flat and dead. Observing our faults in others, is sometimes improper for our case: but the best receipt, best, I say, to work, and best to take, is the admonition of a friend. It is a strange thing to behold what gross errors and extreme absurdities many, especially of the greater sort, do commit, for want of a friend to tell them of them; to the great damage both of their fame and fortune. For, as St. James saith, they are as men *that look sometimes into a glass, and presently forget their own shape and favour*: as for business, a man may think if he will, that two eyes see no more than one; or that a gamester seeth always more than a looker-on; or that a man in anger is as wise as he that hath said over the four and twenty letters; or that a musket may be shot off, as well upon the arm, as upon a rest; and such other fond and high imaginations, to think himself all in all. But when all is done, the help of good counsel is that which setteth business straight. And if any man think, that he will take counsel, but it shall be by pieces; asking counsel in one business of one man, and in another business of another man; it is well, that is to say, better perhaps than if he asked none at all, but he runneth two dangers: one, that he shall not be faithfully counseled; for it is a rare thing, except it be from a perfect and entire friend, to have counsel given, but such as shall be bowed and crooked to some ends which he hath that giveth it. The other, that he shall have counsel given, hurtful and unsafe, though with good meaning, and mixed partly of mischief, and partly of remedy: even as if you would call a physician that is thought good for the cure of the decease you complain of, but is unacquainted with your body; and therefore may put you in way for a present cure, but overthroweth your health in some other kind, and so cure the disease and kill the patient. But a friend that is wholly acquainted with a man's estate, will beware by furthering any present business how he dasheth upon other inconvenience. And therefore rest not upon scattered counsels; they will rather distract and mislead, than settle and direct.

After these two noble fruits of friendship, peace in the affections, and support of the

The judgment, followeth the last fruit, which is like the pomegranate, full of many kernels; I mean aid, and bearing a part in all actions and occasions. Here the best way to represent to life the manifold use of friendship, is to call and see how many things there are which a man cannot do himself; and then it will appear that it was a sparing speech of the ancients to say, That a friend is another himself; for that a friend is far more than himself. Men have their time, and die many times in desire of some things which they principally take to heart; the bestowing of a child, the finishing of a work, or the like. If a man have a true friend, he may rest almost secure, that the care of those things will continue after him. So that a man hath as it were two lives in his desires. A man hath a body, and that body is confined to a place; but where friendship is, all offices of life are as it were granted to him and his deputy: for he may exercise them by his friend. How many things are there, which a man cannot, with any face or comeliness, say or do himself? A man can scarce alledge his own merits with modesty, much less extol them: a man cannot sometimes brook to supplicate or beg; and a number of the like. But all these things are graceful in a friend's mouth, which are blushing in a man's own. So again, a man's person hath many proper relations, which he cannot put off. A man cannot speak to his son but as a father; to his wife, but as a husband; to his enemy, but upon terms: whereas a friend may speak as the case requires, and not as it forteth with the person. But to enumerate these things were endless; I have given the rule, where a man cannot fitly play his own part; if he have not a friend, he may quit the stage.

XXVIII. *Of* EXPENCE.

RICHES are for spending; and spending for honour and good actions. Therefore extraordinary expence must be limited by the worth of the occasion; for voluntary undoing may be as well for a man's country, as for the kingdom of heaven. But ordinary expence ought to be limited by a man's estate, and governed with such regard as it be within his compass; and not subject to deceit and abuse of servants; and ordered to the best shew, that the bills may be less than the estimation abroad. Certainly if a man will keep but of even hand, his ordinary expences ought to be but to the half of his receipts; and if he think to wax rich, but to the third part. It is no baseness for the greatest, to descend and look into their own estate. Some forbear it, not upon negligence alone, but doubting to bring themselves into melancholy, in respect they shall find it broken. But wounds cannot be cured without searching. He that cannot look into his own estate at all, had need both choose well those whom he employeth, and change them often: for new are more timorous and less subtle. He that can look into his estate but seldom, it behoveth him to turn all to certainties. A man had need, if he be plentiful in some kind of expence, to be as saving again in some other. As if he be plentiful in diet, to be saving in apparel: if he be plentiful in the hall, to be saving in the stable: and the like. For he that is plentiful in expences of all kinds, will hardly be preserved from decay. In clearing of a man's estate, he may as well hurt himself in being too sudden, as in letting it run on too long: for hasty selling is commonly as disadvantageable as interest. Besides, he that clears at once will relapse; for finding himself out of straits, he will revert to his customs; but he that cleareth by degrees induceth a habit of frugality, and gaineth as well upon his mind as upon his estate. Certainly, who hath a state to repair, may not despise small things: and commonly it is less dishonourable to abridge petty charges,

charges, than to stoop to petty gettings. A man ought warily to begin charges, which once begun will continue; but in matters that return not, he may be more magnificent.

XXIX. *Of the TRUE GREATNESS of KINGDOMS and ESTATES.*

THE speech of Themistocles the Athenian, which was haughty and arrogant in taking so much to himself, had been a grave and wise observation and censure, applied at large to others. Desired at a feast to touch a lute, he said, He could not fiddle, but yet he could make a small town a great city. These words, holpen a little with a metaphor, may express two differing abilities in those that deal in business of estate. For if a true survey be taken of counsellors and statesmen, there may be found, though rarely, those who can make a small state great, and yet cannot fiddle; as on the other side, there will be found a great many that can fiddle very cunningly, but yet are so far from being able to make a small state great, as their gift lieth the other way; to bring a great and flourishing estate to ruin and decay. And certainly those degenerate arts and shifts, whereby many counsellors and governors gain both favour with their masters, and estimation with the vulgar, deserve no better name than fiddling; being things rather pleasing for the time, and graceful to themselves only, than tending to the weal and advancement of the state which they serve. There are also, no doubt, counsellors and governors which may be held sufficient, *negotiiis pares*, able to manage affairs, and to keep them from precipices and manifest inconveniencies, which nevertheless are far from the ability to raise and amplify an estate, in power, means, and fortune. But be the workmen what they may be, let us speak of the work; that is, the true greatness of kingdoms and estates, and the means thereof. An argument fit for great and mighty princes to have in their hand; to the end, that neither by over-measuring their forces they lose themselves in vain enterprizes; nor on the other side, by undervaluing them, they descend to fearful and pusillanimous counsels.

The greatness of an estate in bulk and territory doth fall under measure and the greatness of finances and revenue doth fall under computation. The population may appear by musters, and the number and greatness of cities and towns by cards and maps. But yet there is not any thing amongst civil affairs more subject to error, than the right valuation and true judgment concerning the power and forces of an estate. The kingdom of heaven is compared, not to any great kernel or nut, but to a grain of mustard-seed; which is one of the least grains, but hath in it a property and spirit hastily to get up and spread. So are there states, great in territory, and yet not apt to enlarge or command; and some that have but a small dimension of stem, and yet apt to be the foundations of great monarchies.

Walled towns, stored arsenals and armouries, goodly races of horse, chariots of war, elephants, ordnance, artillery, and the like: all this is but a sheep in a lion's skin, except the breed and disposition of the people be stout and warlike. Nay number itself, in armies, importeth not much, where the people is of weak courage; for, as Virgil saith, it never troubles a wolf how many the sheep be. The army of the Persians, in the plains of Arbela, was such a vast sea of people, as it did somewhat astonish the commanders in Alexander's army; who came to him therefore, and wished him to set upon them by night; but he answered, he would not pilfer the victory: and the defeat was easy. When Tigranes the Armenian, being encamped upon a
hill

hill with four hundred thousand men, discovered the army of the Romans, being not above fourteen thousand, marching towards him; he made himself merry with it, and said, "Yonder men are too many for an embassage, and too few for a fight." But before the sun set, he found them enow to give him the chase, with infinite slaughter. Many are the examples of the great odds between number and courage: so that a man may truly make a judgment, that the principal point of greatness in any state is to have a race of military men. Neither is money the sinews of war, as it is trivially said, where the sinews of mens arms, in base and effeminate people, are failing. For Solon said well to Cræsus, when in ostentation he shewed him his gold, "Sir, if any other come that hath better iron than you, he will be master of all this gold." Therefore let any prince or state think soberly of his forces, except his militia of natives be of good and valiant soldiers. And let princes, on the other side, that have subjects of martial disposition, know their own strength, unless they be otherwise wanting unto themselves. As for mercenary forces, which is the help in this case, all examples shew, that whatsoever estate or prince doth rest upon them, he may spread his feathers for a time, but he will mew them soon after.

The blessing of Judah and Issachar will never meet; that the same people or nation should be both the lion's whelp, and the ass between burdens. Neither will it be, that a people over-laid with taxes should ever become valiant and martial. It is true, that taxes levied by consent of the estate, do abate mens courage less; as it hath been seen notably in the excises of the Low Countries; and, in some degree, in the subsidies of England. For you must note, that we speak now of the heart, and not of the purse. So that although the same tribute and tax, laid by consent, or by imposing, be all one to the purse, yet it works diversly upon the courage. So that you may conclude, that no people over-charged with tribute is fit for empire.

Let states that aim at greatness, take heed how their nobility and gentlemen do multiply too fast; for that maketh the common subject grow to be a peasant and base swain, driven out of heart, and in effect but the gentleman's labourer. Even as you may see in coppice woods; if you leave your staddles too thick, you shall never have clean underwood, but shrubs and bushes. So in countries, if the gentlemen be too many, the commons will be base; and you will bring it to that, that not the hundred poll will be fit for an helmet; especially as to the infantry, which is the nerve of an army: and so there will be great population, and little strength. This which I speak of, hath been no where better seen, than by comparing of England and France; whereof England, though far less in territory and population, hath been, nevertheless, an overmatch; in regard the middle people of England make good soldiers, which the peasants of France do not. And herein the device of king Henry the seventh, whereof I have spoken largely in the history of his life, was profound and admirable; in making farms, and houses of husbandry, of a standard; that is, maintained with such a proportion of land unto them, as may breed a subject to live in convenient plenty, and no servile condition; and to keep the plough in the hands of the owners, and not mere hirelings. And thus indeed you shall attain to Virgil's character, which he gives to ancient Italy:

Terra parvis armis auge ut regibae.

Neither is that state, which, for any thing I know, is almost peculiar to England, and hardly to be found any where else, except it be perhaps in Poland, to be passed over; I mean the state of free servants, and attendants upon noblemen and gentlemen, which are no ways inferior unto the yeomanry for arms: and therefore out of all question,

question, the splendor and magnificence, and great retinues, and hospitality of noble-men and gentlemen, received into custom, doth much conduce unto martial greatness: whereas, contrariwise, the close and reserved living of noblemen and gentlemen causeth a penury of military forces.

By all means it is to be procured, that the trunk of Nebuchadnezzar's tree of monarchy be great enough to bear the branches and the boughs; that is, that the natural subjects of the crown or state bear a sufficient proportion to the stranger subjects that they govern. Therefore all states, that are liberal of naturalization towards strangers, are fit for empire. For to think that an handful of people can, with the greatest courage and policy in the world, embrace too large extent of dominion, it may hold for a time, but it will fail suddenly. The Spartans were a nice people in point of naturalization; whereby, while they kept their compass, they stood firm; but when they did spread, and their boughs were become too great for their stem, they became a windfall upon the sudden. Never any state was, in this point, so open to receive strangers into their body, as were the Romans; therefore it sorted with them accordingly, for they grew to the greatest monarchy. Their manner was to grant naturalization, which they called *jus civitatis*, and to grant it in the highest degree, that is, not only *jus commercii*, *jus connubii*, *jus hereditatis*; but also, *jus suffragii*, and *jus honorum*: and this not to singular persons alone, but likewise to whole families; yea, to cities, and sometimes to nations. Add to this, their custom of plantation of colonies, whereby the Roman plant was removed into the soil of other nations: and putting both constitutions together, you will say, that it was not the Romans that spread upon the world, but it was the world that spread upon the Romans: and that was the sure way of greatness. I have marvelled sometimes at Spain, how they clasp and contain so large dominions, with so few natural Spaniards: but sure the whole compass of Spain is a very great body of a tree, far above Rome and Sparta at the first. And besides, though they have not had that usage, to naturalize liberally, yet they have that which is next to it; that is, to employ, almost indifferently, all nations, in their militia of ordinary soldiers; yea, and sometimes in their highest commands. Nay, it seemeth at this instant, they are sensible of this want of natives; as by the pragmatical sanction, now published, appeareth.

It is certain, that sedentary and within-door arts, and delicate manufactures, that require rather the finger than the arm, have in their nature a contrariety to a military disposition. And generally all warlike people are a little idle, and love danger better than travail: neither must they be too much broken of it, if they shall be preserved in vigour. Therefore it was great advantage in the ancient states of Sparta, Athens, Rome, and others, that they had the use of slaves, which commonly did rid those manufactures. But that is abolished, in greatest part, by the christian law. That which cometh nearest to it is, to leave those arts chiefly to strangers, which for that purpose are the more easily to be received, and to contain the principal bulk of the vulgar natives within those three kinds; tillers of the ground, free-servants, and handicraftsmen of strong and manly arts, as smiths, masons, carpenters, *etc.* not reckoning professed soldiers.

But above all, for empire and greatness, it importeth most, that a nation do profess arms as their principal honour, study, and occupation. For the things which we formerly have spoken of, are but habilitations towards arms: and what is habilitation without intention and act? Romulus after his death, as they report or feign, sent a present to the Romans, that above all they should intend arms, and then they should prove

prove the greatest empire of the world. The fabric of the state of Sparta was wholly, though not wisely, framed and composed to that scope and end. The Persians and Macedonians had it for a flash. The Gauls, Germans, Goths, Saxons, Normans, and others, had it for a time. The Turks have it at this day, though in great declination. Of Christian Europe they that have it, are in effect only the Spaniards. But it is so plain, that every man profiteth in that he most intendeth, that it needeth not to be stood upon. It is enough to point at it; that no nation, which doth not directly profess arms, may look to have greatness fall into their mouths. And on the other side, it is a most certain oracle of time, that those states that continue long in that profession, as the Romans and Turks principally have done, do wonders: and those that have professed arms but for an age, have notwithstanding commonly attained that greatness in that age, which maintained them long after, when their profession and exercise of arms hath grown to decay.

Incident to this point is, for a state to have those laws or customs, which may reach forth unto them just occasions, as may be pretended, of war. For there is that Justice imprinted in the nature of men, that they enter not upon wars, whereof so many calamities do ensue, but upon some, at the least specious, grounds and quarrels. The Turk hath at hand, for cause of war, the propagation of his law or sect; a quarrel that he may always command. The Romans though they esteemed the extending the limits of their empire to be great honour to their generals, when it was done; yet they never rested upon that alone to begin a war. First therefore, let nations that pretend to greatness have this, that they be sensible of wrongs, either upon borderers, merchants, or politic ministers; and that they sit not too long upon a provocation. Secondly, let them be prest, and ready to give aids and succours to their confederates; as it ever was with the Romans: insomuch, as if the confederate had leagues defensive with divers other states, and upon invasion offered, did implore their aids severally, yet the Romans would ever be the foremost, and leave it to none other to have the honour. As for the wars, which were anciently made on the behalf of a kind of party, or tacit conformity of estate, I do not see how they may be well justified; as when the Romans made a war for the liberty of Græcia; or when the Lacedæmonians and Athenians made wars, to set up or pull down democracies and oligarchies: or when wars were made by foreigners, under the pretence of justice or protection, to deliver the subjects of others from tyranny and oppression; and the like. Let it suffice, that no estate expect to be great, that is not awake upon any just occasion of arming.

No body can be healthful without exercise, neither natural body nor politic: and certainly, to a kingdom or estate, a just and honourable war is the true exercise. A civil war, indeed, is like the heat of a fever; but a foreign war is like the heat of exercise, and serveth to keep the body in health. For in a slothful peace, both courages will effeminate, and manners corrupt. But howsoever it be for happiness, without all question, for greatness it maketh, to be still, for the most part, in arms: and the strength of a veteran army, though it be a chargeable business, always on foot, is that which commonly giveth the law, or at least the reputation amongst all neighbour states, as may well be seen in Spain; which hath had, in one part or other, a veteran army, almost continually, now by the space of six-score years.

To be master of the sea, is an abridgment of a monarchy. Cicero writing to Atticus, of Pompey his preparation against Cæsar, saith, *Consilium Pompeii plane Themistocleum est; putat enim, qui mari potitur, eum r. rem petiri.* And without doubt Pompey had tired out Cæsar, if upon vain confidence he had not left that

way. We see the great effects of battles by sea. The battle of Actium decided the empire of the world. The battle of Lepanto arrested the greatness of the Turk. There be many examples, where sea-fights have been final to the war; but this is, when princes or states have set up their rest upon the battles. But thus much is certain; that he that commands the sea is at great liberty, and may take as much and as little of the war as he will. Whereas those that be strongest by land are many times, nevertheless, in great straits. Surely, at this day, with us of Europe, the vantage of strength at sea, which is one of the principal dowries of this kingdom of Great Britain, is great: both because most of the kingdoms of Europe are not merely inland, but girt with the sea, most part of their compass; and because the wealth of both Indies seems in great part but an accessory to the command of the seas.

The wars of latter ages seem to be made in the dark, in respect of the glory and honour which reflected upon men from the wars in ancient time. There be now, for martial encouragement, some degrees and orders of chivalry, which nevertheless are conferred promiscuously upon soldiers, and no soldiers; and some remembrance perhaps upon the escutcheon, and some hospitals for maimed soldiers, and such like things. But in ancient times, the trophies erected upon the place of the victory; the funeral laudatives and monuments for those that died in the wars; the crowns and garlands personal; the stile of emperor, which the great kings of the world after borrowed; the triumphs of the generals upon their return; the great donatives and largesses upon the disbanding of the armies, were things able to inflame all mens courages, but above all, that of the triumph, among the Romans, was not pageants or gaudery, but one of the wisest and noblest institutions that ever was. For it contained three things; honour to the general; riches to the treasury out of the spoils; and donatives to the army. But that honour, perhaps, were not fit for monarchies; except it be in the person of the monarch himself, or his sons; as it came to pass in the times of the Roman emperors, who did appropriate the actual triumphs to themselves and their sons, for such wars as they did achieve in person; and left only, for wars achieved by subjects, some triumphal garments and ensigns to the general.

To conclude: no man can, by *care taking*, as the Scripture saith, *add a cubit to his stature*, in this little model of a man's body: but in the great frame of kingdoms and commonwealths, it is in the power of princes or estates, to add amplitude and greatness to their kingdoms. For by introducing such ordinances, constitutions, and customs, as we have now touched, they may sow greatness to their posterity and succession. But these things are commonly not observed, but left to take their chance.

XXX. Of REGIMEN OF HEALTH.

THERE is a wisdom in this beyond the rules of physic: a man's own observation, what he finds good of, and what he finds hurt of, is the best physic to preserve health. But it is a safer conclusion to say this, "This agreeth not well with me, therefore I will not continue it;" than this, "I find no offence of this, therefore I may use it." For strength of nature in youth passeth over many excesses, which are owing a man till his age. Discern of the coming on of years, and think not to do the same things still; for age will not be defied. Beware of sudden change in any great point of diet, and if necessity enforce it, fit the rest to it. For it is a secret both in nature and state, that it is safer to change many things than one. Examine thy customs of diet, sleep, exercise, apparel, and the like; and try in any thing thou shalt
judge

judge hurtful, to discontinue it by little and little ; but so, as if thou dost find any inconvenience by the change, thou come back to it again ; for it is hard to distinguish that which is generally held good and wholesome, from that which is good particularly, and fit for thine own body. To be free-minded and cheerfully disposed, at hours of meat, and of sleep, and of exercise, is one of the best precepts of long lasting. As for the passions and studies of the mind, avoid envy, anxious fears, anger, fretting inwards, subtle and knotty inquisitions, joys and exhilarations in excess, sadness not communicated. Entertain hopes, mirth rather than joy, variety of delights, rather than surfeit of them ; wonder and admiration, and therefore novelties ; studies that fill the mind with splendid and illustrious objects, as histories, fables, and contemplations of nature. If you fly physic in health, altogether, it will be too strange for your body when you shall need it. If you make it too familiar, it will work no extraordinary effect when sickness cometh. I commend rather some diet for certain seasons, than frequent use of physic, except it be grown into a custom. For those diets alter the body more, and trouble it less. Despise no new accident in your body, but ask opinion of it. In sickness, respect health principally ; and in health, action. For those that put their bodies to endure in health, may in most sicknesses, which are not very sharp, be cured only with diet and tendering. Celsus could never have spoken it as a physician, had he not been a wise man withal ; when he giveth it for one of the great precepts of health and lasting, that a man do vary and interchange contraries ; but with an inclination to the more benign extreme. Use fasting and full eating, but rather full eating ; watching and sleep, but rather sleep ; sitting and exercise, but rather exercise ; and the like. So shall nature be cherished and yet taught masteries. Physicians are some of them so pleasing and conformable to the humour of the patient, as they press not the true cure of the disease ; and some other are so regular in proceeding according to art for the disease, as they respect not sufficiently the condition of the patient. Take one of a middle temper ; or if it may not be found in one man, combine two of either sort ; and forget not to call as well the best acquainted with your body, as the best reputed of for his faculty.

XXXI. *Of* SUSPICION.

SUSPICIONS amongst thoughts, are like bats amongst birds, they ever fly by twilight. Certainly they are to be repressed, or at the least well guarded : for they cloud the mind, they lose friends, and they check with business, whereby business cannot go on currently and constantly. They dispose kings to tyranny, husbands to jealousy, wise men to irresolution and melancholy. They are defects not in the heart, but in the brain ; for they take place in the stoutest natures ; as in the example of Henry the seventh of England ; there was not a more suspicious man, nor a more stout. And in such a composition they do small hurt. For commonly they are not admitted but with examination, whether they be likely or no ? But in fearful natures they gain ground too fast. There is nothing makes a man suspect much, more than to know little : and therefore men should remedy suspicion, by procuring to know more, and not to keep their suspicions in smother. What would men have ? Do they think those they employ and deal with are faints ? Do they not think they will have their own ends, and be truer to themselves than to them ? Therefore there is no better way to moderate suspicions, than to account upon such suspicions as true, and yet to bridle them as false : for so far a man ought to make use of suspicions, as to provide, as if

that should be true that he suspects, yet it may do him no hurt. Suspicions that the mind of itself gathers are but buzzes; but suspicions that are artificially-nourished, and put into mens heads by the tales and whisperings of others, have stings. Certainly the best mean to clear the way in this same wood of suspicions, is frankly to communicate them with the party that he suspects; for thereby he shall be sure to know more of the truth of them than he did before; and withal shall make that party more circumspect not to give farther cause of suspicion. But this should not be done to men of base natures: for they, if they find themselves once suspected, will never be true. The Italian says, *Sospetto licentia fede*; as if suspicion did give a passport to faith; but it ought rather to kindle it to discharge itself.

XXXII. *Of* DISCOURSE.

SOME in their discourse desire rather commendation of wit, in being able to hold all arguments, than of judgment in discerning what is true; as if it were a praise to know what might be said, and not what should be thought. Some have certain common-places and themes, wherein they are good, and want variety: which kind of poverty is for the most part tedious, and when it is once perceived, ridiculous. The honourablest part of talk is to give the occasion; and again to moderate and pass to somewhat else; for then a man leads the dance. It is good in discourse and speech of conversation to vary, and intermingle speech of the present occasion with arguments; tales with reasons; asking of questions, with telling of opinions; and jest with earnest: for it is a dull thing to tire, and, as we say now, to jade any thing too far. As for jest, there be certain things which ought to be privileged from it; namely, religion, matters of state, great persons, any man's present business of importance, and any case that deserveth pity. Yet there be some that think their wits have been asleep, except they dart out somewhat that is piquant, and to the quick: that is a vein which should be bridled;

Parce puer stimulis, et fortius utere loris.

And generally men ought to find the difference between saltness and bitterness. Certainly he that hath a satirical vein, as he maketh others afraid of his wit, so he had need be afraid of others memory. He that questioneth much shall learn much, and content much; but especially if he apply his questions to the skill of the persons whom he asketh: for he shall give them occasion to please themselves in speaking, and himself shall continually gather knowledge. But let his questions not be troublesome, for that is fit for a poser. And let him be sure to leave other men their turns to speak. Nay, if there be any that would reign, and take up all the time, let him find means to take them off, and to bring others on; as musicians use to do with those that dance too long galliards. If you dissemble sometimes your knowledge of that you are thought to know, you shall be thought another time to know what you know not. Speech of a man's self ought to be seldom, and well chosen. I knew one was wont to say in scorn, "He must needs be a wise man, he speaks so much of himself:" and there is but one case wherein a man may commend himself with good grace, and that is in commending virtue in another; especially if it be such a virtue whereunto himself pretendeth. Speech of touch towards others, should be sparingly used: for discourse ought to be as a field, without coming home to any man. I knew two noblemen of the west part of England, whereof the one was given to scoff, but kept ever royal cheer in his house; the other

other would ask of those that had been at the other's table, "Tell truly, was there never a flout or dry blow given?" To which the guest would answer; Such and such a thing passed. The lord would say, "I thought he would mar a good dinner." Discretion of speech is more than eloquence; and to speak agreeably to him with whom we deal, is more than to speak in good words, or in good order. A good continued speech, without a good speech of interlocution, shews slowness: and a good reply, or second speech, without a good settled speech, sheweth shallowness and weakness. As we see in beasts, that those that are weakest in the course, are yet nimblest in the turn: as it is betwixt the gray-hound and the hare. To use too many circumstances ere one come to the matter, is wearisome; to use none at all, is blunt.

XXXIII. *O*f PLANTATIONS.

PLANTATIONS are amongst ancient, primitive, and heroical works. When the world was young, it begat more children; but now it is old, it begets fewer: for I may justly account new plantations to be the children of former kingdoms. I like a plantation in a pure foil; that is, where people are not displanted to the end to plant in others. For else it is rather an extirpation, than a plantation. Planting of countries is like planting of woods; for you must make account to lose almost twenty years profit, and expect your recompence in the end. For the principal thing that hath been the destruction of most plantations, hath been the base and hasty drawing of profit in the first years. It is true, speedy profit is not to be neglected, as far as may stand with the good of the plantation, but no farther. It is a shameful and unblest thing, to take the scum of people, and wicked condemned men, to be the people with whom you plant; and not only so, but it spoileth the plantation; for they will ever live like rogues, and not fall to work, but be lazy, and do mischief, and spend victuals, and be quickly weary, and then certify over to their country to the discredit of the plantation. The people wherewith you plant, ought to be gardeners, ploughmen, labourers, smiths, carpenters, joiners, fishermen, fowlers, with some few apothecaries, surgeons, cooks, and bakers. In a country of plantation, first look about what kind of victual the country yields of itself to hand; as chestnuts, walnuts, pine-apples, olives, dates, plums, cherries, wild honey, and the like, and make use of them. Then consider what victual or esculent things there are, which grow speedily, and within the year; as parsnips, carrets, turnips, onions, radishes, artichokes of Jerusalem, maiz, and the like. For wheat, barley, and oats, they ask too much labour: but with peas and beans you may begin; both because they ask less labour, and because they serve for meat, as well as for bread. And of rice likewise cometh a great increase, and it is a kind of meat. Above all, there ought to be brought store of bisket, oatmeal, flour, meal, and the like, in the beginning, till bread may be had. For beasts or birds, take chiefly such as are least subject to diseases, and multiply fastest: as swine, goats, cocks, hens, turkeys, geese, house-doves, and the like. The victual in plantations ought to be expended almost as in a besieged town; that is with certain allowance. And let the main part of the ground employed to gardens or corn, be to a common stock; and to be laid in, and stored up, and then delivered out in proportion; besides some spots of ground that any particular person will manure for his own private. Consider likewise what commodities the

soil where the plantation is doth naturally yield, that they may some way help to defray the charge of the plantation : so it be not, as was said, to the untimely prejudice of the main business ; as it hath fared with tobacco in Virginia. Wood commonly aboundeth but too much ; and therefore timber is fit to be one. If there be iron ore, and streams whereupon to set the mills ; iron is a brave commodity where wood aboundeth. Making of bay-salt, if the climate be proper for it should be put in experience. Growing-filk likewise, if any be, is a likely commodity. Pitch and tar, where store of firs and pines are, will not fail. So drugs and sweet woods, where they are, cannot but yield great profit. Soap ashes likewise, and other things that may be thought of. But moil not too much under ground ; for the hope of mines is very uncertain, and useth to make the planters lazy in other things. For government, let it be in the hands of one assisted with some counsel ; and let them have commission to exercise martial laws with some limitation. And above all, let men make that profit of being in the wilderness, as they have God always and his service, before eyes. Let not the government of the plantation depend upon too many counsellors and undertakers in the country that planteth, but upon a temperate number ; and let those be rather noblemen and gentlemen, than merchants ; for they look ever to the present gain. Let there be freedoms from custom, till the plantation be of strength : and not only freedom from custom, but freedom to carry their commodities where they may make their best of them, except there be some special cause of caution. Cram not in people, by sending too fast, company after company ; but rather hearken how they waste, and send supplies proportionably ; but so as the number may live well in the plantation, and not by surcharge be in penury. It hath been a great endangering to the health of some plantations, that they have built along the sea and rivers, in marsh and unwholesome grounds. Therefore though you begin there to avoid carriage, and other like discommodities, yet build still rather upwards from the streams, than along. It concerneth likewise the health of the plantation, that they have good store of salt with them, that they may use it in their victuals when it shall be necessary. If you plant where savages are, do not only entertain them with trifles and gingles ; but use them justly and graciously, with sufficient guard nevertheless : and do not win their favour by helping them to invade their enemies, but for their defence it is not amiss. And send oft of them over to the country that plants, that they may see a better condition than their own, and commend it when they return. When the plantation grows to strength, then it is time to plant with women, as well as with men ; that the plantation may spread into generations ; and not be ever pieced from without. It is the sinfulness thing in the world, to forsake or destitute a plantation once in forwardness : for besides the dishonour, it is the guiltiness of blood of many commiserable persons.

XXXIV. Of RICHES.

I Cannot call riches better than the baggage of virtue. The Roman word is better, *impedimenta*. For as the baggage is to an army, so are riches to virtue. It cannot be spared, nor left behind, but it hindreth the march ; yea, and the care of it, sometimes, loseth or disturbeth the victory : of great riches there is no real use, except it be in the distribution ; the rest is but conceit. So saith Solomon ; *Where much is, there are many to consume it ; and what bath the owner, but the sight of it with his*

his eyes? The personal fruition in any man, cannot reach to feel great riches: there is a custody of them; or a power of dole and donative of them; or a fame of them; but no solid use to the owner. Do you not see what feigned prices are set upon little stones and rarities? And what works of ostentation are undertaken, because there might seem to be some use of great riches? But then you will say they may be of use, to buy men out of dangers or troubles. As Solomon saith, *Riches are as a stronghold in the imagination of the rich man.* But this is excellently expressed, that it is in imagination, and not always in fact. For certainly great riches have sold more men than they have bought out. Seek not proud riches, but such as thou mayst get justly, use soberly, distribute cheerfully, and leave contentedly. Yet have no abstract nor friarly contempt of them: but distinguish, as Cicero saith well of Rabirius Posthumus; *in studio rei amplificandae apparatus, non avaritiae praedam, sed instrumentum bonitati quaeri.* Harken also to Solomon, and beware of hasty gathering of riches: *Qui festinat ad divitias, non erit infons.* The poets feign, that when Plutus, which is riches, is sent from Jupiter, he limps, and goes slowly; but when he is sent from Pluto, he runs, and is swift of foot: meaning that riches gotten by good means and just labour pace slowly; but when they come by the death of others, as by the course of inheritance, testaments, and the like, they come tumbling upon a man. But it might be applied likewise to Pluto, taking him for the devil. For when riches come from the devil, as by fraud, and oppression, and unjust means, they come upon speed. The ways to enrich are many, and most of them foul. Parsimony is one of the best, and yet is not innocent: for it withholdeth men from works of liberality and charity. The improvement of the ground is the most natural obtaining of riches; for it is our great mother's blessing, the earth's; but it is slow. And yet, where men of great wealth do stoop to husbandry, it multiplieth riches exceedingly. I knew a nobleman in England that had the greatest audits of any man in my time; a great grasper, a great sheep-master, a great timber-man, a great collier, a great corn-master, a great lead-man; and so of iron, and a number of the like points of husbandry: so as the earth seemed a sea to him, in respect of the perpetual importation. It was truly observed by one, that himself came very hardly to a little riches, and very easily to great riches. For when a man's stock is come to that, that he can expect the prime of markets, and overcome those bargains, which for their greatness are few mens money, and be partner in the industries of younger men, he cannot but increase mainly. The gains of ordinary trades and vocations are honest, and furthered by two things, chiefly, by diligence, and by a good name for good and fair dealing. But the gains of bargains are of a more doubtful nature, when men should wait upon others necessity; broke by servants and instruments to draw them on; put off others cunningly that would be better chapmen, and the like practices, which are crafty and naught. As for the chopping of bargains, when a man buys, not to hold, but to sell over again, that commonly grindeth double, both upon the feller, and upon the buyer. Sharings do greatly enrich, if the hands be well chosen that are trusted. Usury is the certainest means of gain, though one of the worst, as that whereby a man doth eat his bread *in sudore vultus alieni*; and besides, doth plough upon Sundays. But yet certain though it be, it hath flaws; for that the scriveners and brokers do value unfound men, to serve their own turn. The fortune in being the first in an invention, or in a privilege, doth cause sometimes a wonderful overgrowth in riches; as it was with the first sugar-man in the Canaries. Therefore, if a man can play the true logician, to have as

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well judgment as invention, he may do great matters, especially if the times be fit. He that resteth upon gains certain, shall hardly grow to great riches. And he that puts all upon adventures, doth oftentimes break, and come to poverty: it is good therefore to guard adventures with certainties that may uphold losses. Monopolies and co-emption of wares or resale, where they are not restrained, are great means to enrich; especially if the party have intelligence what things are like to come in to request, and so store himself beforehand. Riches gotten by service, though it be of the best rise, yet when they are gotten by flattery, feeding humours, and other servile conditions, they may be placed amongst the worst. As for fishing for testaments and executorships, as Tacitus saith of Seneca, *Testamenta et orbos tanquam indagine capi*, it is yet worse; by how much men submit themselves to meaner persons, than in service. Believe not much them that seem to despise riches; for they despise them that despair of them; and none worse when they come to them. Be not penny-wise; riches have wings, and sometimes they fly away of themselves, sometimes they must be set flying to bring in more. Men leave their riches either to their kindred, or to the public: and moderate portions prosper best in both. A great estate left to an heir, is as a lure to all the birds of prey round about, to seize on him, if he be not the better established in years and judgment. Likewise glorious gifts and foundations, are like sacrifices without salt; and but the painted sepulchres of alms, which soon will putrify and corrupt inwardly. Therefore measure not thine advancements by quantity, but frame them by measure; and defer not charities till death: for certainly, if a man weigh it rightly, he that doth so, is rather liberal of another man's than of his own.

XXXV. Of PROPHECIES.

I Mean not to speak of divine prophecies, nor of heathen oracles, nor of natural predictions; but only of prophecies that have been of certain memory, and from hidden causes. Saith the Pythonissa to Saul; *To-morrow thou and thy son shall be with me*. Virgil hath these Verses from Homer:

*At domus Aeneae cunctis dominabitur oris,
 Et nati natorum, et qui nascentur ab illis.* Æneid. iii. 97.

A prophecy, as it seems, of the Roman empire. Seneca the Tragedian hath these verses:

*Venient annis
 Secula feris, quibus oceanus
 Vincula rerum laxet, et ingens
 Patcat tellus, Tiphysque novos
 Detegat orbes; nec sit terris
 Ultima Thule:*

A prophecy of the discovery of America. The daughter of Polycrates dreamed, that Jupiter bathed her father, and Apollo anointed him: and it came to pass, that he was crucified in an open place, where the sun made his body run with sweat, and the rain washed it. Philip of Macedon dreamed, he sealed up his wife's belly; whereby he did expound it, that his wife should be barren; but Aristander the soothsayer told him, his wife was with child: because men do not use to seal vessels that are empty. A phantasm that appeared to M. Brutus in his tent, said to him; *Philippis iterum me videbis*. Tiberius said to Galba, *Tu quoque, Galba, degustabis imperium*. In Vespasian's time there went a prophecy in the east, that those that should

should come forth of Judæa, should reign over the world; which though it may be was meant of our Saviour, yet Tacitus expounds it of Vespasian. Domitian dreamed the night before he was slain, that a golden head was growing out of the nape of his neck: and indeed the succession that followed him, for many years, made golden times. Henry the sixth of England said of Henry the seventh, when he was a lad, and gave him water; "This is the lad that shall enjoy the crown for which we strive." When I was in France, I heard from one Dr. Pena, that the queen-mother, who was given to curious arts, caused the king her husband's nativity to be calculated under a false name; and the astrologer gave a judgment, that he should be killed in a duel; at which the queen laughed, thinking her husband to be above challenges and duels: but he was slain, upon a course at tilt, the splinters of the staff of Montgomery going in at his beaver. The trivial prophecy which I heard when I was a child, and queen Elizabeth was in the flower of her years, was;

*When Hempe is sponne,
England's donne.*

Whereby it was generally conceived, that after the princes had reigned, which had the principal letters of that word Hempe, which were Henry, Edward, Mary, Philip, and Elisabeth, England should come to utter confusion: which, thanks be to God, is verified only in the change of the name, for that the king's stile is now no more of England, but of Britain. There was also another prophecy before the year of eighty eight, which I do not well understand:

*There shall be seen upon a day,
Between the haugh and the May,
The black fleet of Norway.
When that is come and gone,
England build houses of lime and stone,
For after wars shall you have none.*

It was generally conceived to be meant of the Spanish fleet that came in eighty eight. For that the King of Spain's surname, as they say, is Norway. The prediction of Regiomontanus,

Octogesimo octavo mirabilis annus:

was thought likewise accomplished, in the sending of that great fleet, being the greatest in strength, though not in number, of all that ever swam upon the sea. As for Cleon's dream, I think it was a jest: it was, that he was devoured of a long dragon; and it was expounded of a maker of sausages that troubled him exceedingly. There are numbers of the like kind; especially if you include dreams, and predictions of astrology. But I have set down these few only of certain credit, for example. My judgment is, that they ought all to be despised, and ought to serve but for winter talk by the fire-side. Though when I say despised, I mean it as for belief: for otherwise, the spreading or publishing of them, is in no sort to be despised; for they have done much mischief. And I see many severe laws made to suppress them. What hath given them grace, and some credit, consisteth in three things: first, that men mark when they hit, and never mark when they miss; as they do, generally, also of dreams. The second is, that probable conjectures, or obscure traditions, many times, turn themselves into prophecies: while the nature of man, which coveteth divination, thinks it no peril to foretel that, which indeed they do but collect; as that of Seneca's verse. For so much was then subject demon-

demonstration, that the globe of the earth had great parts beyond the Atlantic, which might be probably conceived not to be all sea: and adding thereto, the tradition in Plato's *Timaeus*, and his *Atlanticus*, it might encourage one to turn it to a prediction. The third and last, which is the great one, is, that almost all of them, being infinite in number, have been impostures, and by idle and crafty brains, merely contrived and feigned after the event past.

XXXVI. Of AMBITION.

AMBITION is like choler, which is an humour that maketh men active, earnest, full of alacrity, and stirring, if it be not stopped. But if it be stopped, and cannot have its way, it becometh adust, and thereby malign and venomous. So ambitious men, if they find the way open for their rising, and still get forward, they are rather busy than dangerous; but if they be checked in their desires, they become secretly discontent, and look upon men and matters with an evil eye, and are best pleased when things go backward; which is the worst property in a servant of a prince or state. Therefore it is good for princes, if they use ambitious men, to handle it so, as they be still progressive, and not retrograde; which, because it cannot be without inconvenience, it is good not to use such natures at all. For if they rise not with their service, they will take order to make their service fall with them. But since we have said it were good not to use men of ambitious natures, except it be upon necessity, it is fit we speak, in what cases they are of necessity. Good commanders in the wars must be taken, be they never so ambitious: for the use of their service dispenseth with the rest; and to take a soldier without ambition, is to pull off his spurs. There is also great use of ambitious men in being screens to princes, in matters of danger and envy: for no man will take that part, except he be like a feeced dove, that mounts and mounts, because he cannot see about him. There is use also of ambitious men in pulling down the greatness of any subject that over-tops; as Tiberius used Macro in the pulling down of Sejanus. Since therefore they must be used in such cases, there resteth to speak how they are to be bridled, that they may be less dangerous. There is less danger of them, if they be of mean birth, than if they be noble; and if they be rather harsh of nature, than gracious and popular; and if they be rather new raised, than grown cunning and fortified in their greatness. It is counted by some a weakness in princes to have favourites; but it is, of all others, the best remedy against ambitious great ones. For when the way of pleasuring and displeasuring lieth by the favourite, it is impossible any other should be over-great. Another means to curb them, is to balance them by others as proud as they. But then there must be some middle counsellors to keep things steady; for without that ballast the ship will roll too much. At the least a prince may animate and inure some meaner persons, to be as it were scourges to ambitious men. As for the having of them obnoxious to ruin, if they be of fearful natures, it may do well: but if they be stout and daring, it may precipitate their designs, and prove dangerous. As for the pulling of them down, if the affairs require it, and that it may not be done with safety suddenly, the only way is, the interchange continually of favours and disgraces, whereby they may not know what to expect, and be as it were in a wood. Of ambitions, it is less harmful the ambition to prevail in great things, than that other to appear in every thing; for that breeds confusion, and mars business: but yet it is less danger to have an ambitious man stirring

stirring in business, than great in dependences. He that seeketh to be eminent amongst able men, hath a great task; but that is ever good for the public. But he that plots to be the only figure amongst ciphers, is the decay of a whole age. Honour hath three things in it: the vantage ground to do good; the approach to kings and principal persons; and the raising of a man's own fortunes. He that hath the best of these intentions, when he aspireth, is an honest man: and that prince that can discern of these intentions in another that aspireth, is a wise prince. Generally let princes and states choose such ministers as are more sensible of duty than of rising; and such as love business rather upon conscience, than upon bravery: and let them discern a busy nature from a willing mind.

XXXVII. *Of MASKS AND TRIUMPHS.*

THESE things are but toys to come amongst such serious observations. But yet since princes will have such things, it is better they should be graced with elegance, than daubed with cost. Dancing to song, is a thing of great state and pleasure. I understand it, that the song be in quire, placed aloft, and accompanied with some broken music: and the ditty fitted to the device. Acting in song, especially in dialogues, hath an extreme good grace; I say acting, not dancing, for that is a mean and vulgar thing, and the voices of the dialogue should be strong and manly, a base, and a tenor; no treble, and the ditty high and tragical; not nice or dainty. Several quires placed one over-against another, and taking the voice by catches, anthem-wise, give great pleasure. Turning dances into figure, is a childish curiosity. And generally let it be noted, that those things which I here set down, are such as do naturally take the sense, and not respect petty wonderments. It is true, the alterations of scenes, so it be quietly and without noise, are things of great beauty and pleasure; for they feed and relieve the eye before it be full of the same object. Let the scenes abound with light, specially coloured and varied: and let the maskers, or any other that are to come down from the scene, have some motions upon the scene itself before their coming down: for it draws the eye strangely, and makes it with great pleasure to desire to see that it cannot perfectly discern. Let the songs be loud and cheerful, and not chirpings or pulings. Let the music likewise be sharp and loud, and well placed. The colours that shew best by candle-light, are white, carnation, and a kind of sea-water green; and ouches, or spangs, as they are of no great cost, so they are of most glory. As for rich embroidery, it is lost and not discerned. Let the suits of the maskers be graceful, and such as become the person when the vizards are off: not after examples of known attires; turks, soldiers, mariners, and the like. Let anti-masks not be long; they have been commonly of fools, satyrs, baboons, wild men, antics, beatts, spirits, witches, ethiopes, pigmies, turquets, nymphs, rustics, cupids, statues moving, and the like. As for angels, it is not comical enough to put them in anti-masks; and any thing that is hideous, as devils, giants, is on the other side as unfit: but chiefly, let the music of them be recreative, and with some strange changes. Some sweet odours suddenly coming forth without any drops falling, are in such a company, as there is steam and heat, things of great pleasure and refreshment. Double masks, one of men, another of ladies, addeth state and variety. But all is nothing except the room be kept clear and neat.

For jousts, and tourneys, and barriers, the glories of them are chiefly in the chariots, wherein the challengers make their entry; especially if they be drawn with

strange beasts ; as lions, bears, camels, and the like : or in the devices of their entrance, or in the bravery of their liveries ; or in the goodly furniture of their horses and armour. But enough of these toys.

XXXVIII. *Of NATURE in MEN.*

NATURE is often hidden, sometimes overcome, seldom extinguished. Force maketh nature more violent in the return ; doctrine and discourse maketh nature less importune : but custom only doth alter and subdue nature. He that seeketh victory over his nature, let him not set himself too great, nor too small tasks ; for the first will make him dejected by often failings ; and the second will make him a small proceeder, though by often prevailings. And at the first, let him practise with helps, as swimmers do with bladders or rushes : but after a time let him practise with disadvantages, as dancers do with thick shoes. For it breeds great perfection if the practice be harder than the use. Where nature is mighty, and therefore the victory hard, the degrees had need be, first to stay and arrest nature in time ; like to him that would say over the four and twenty letters when he was angry : then to go less in quantity ; as if one should, in forbearing wine, come from drinking healths, to a draught at a meal ; and lastly, to discontinue altogether. But if a man have the fortitude and resolution to enfranchise himself at once, that is the best :

*Optimus ille animi vindex, laudentia pectus
Vincula qui rupit, dedoluitque semel.*

Neither is the ancient rule amiss, to bend nature as a wand to a contrary extreme, whereby to set it right : understanding it where the contrary extreme is no vice. Let not a man force a habit upon himself with a perpetual continuance, but with some intermission. For both the pause reinforceth the new onset ; and if a man that is not perfect be ever in practice, he shall as well practise his errors as his abilities, and induce one habit of both : and there is no means to help this but by seasonable intermissions. But let not a man trust his victory over his nature too far ; for nature will lie buried a great time, and yet revive upon the occasion or temptation. Like as it was with Æsop's damsel, turned from a cat to a woman, who sat very demurely at the board's end, till a mouse ran before her. Therefore let a man either avoid the occasion altogether, or put himself often to it, that he may be little moved with it. A man's nature is best perceived in privateness, for there is no affectation ; in passion, for that putteth a man out of his precepts ; and in a new case or experiment, for there custom leaveth him. They are happy men, whose natures sort with their vocations ; otherwise they may say, *Multum incolæ fuit anima mea* : when they converse in those things they do not affect. In studies, whatsoever a man commandeth upon himself, let him set hours for it ; but whatsoever is agreeable to his nature, let him take no care for any set times : for his thoughts will fly to it of themselves ; so as the spaces of other business or studies will suffice. A man's nature runs either to herbs or weeds : Therefore let him seasonably water the one, and destroy the other.

XXXIX. *Of CUSTOM and EDUCATION.*

MENS thoughts are much according to their inclination ; their discourse and speeches according to their learning and infused opinions ; but their deeds are after as they have been accustomed. And therefore, as Machiavel well noteth, though
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in an evil-favoured instance, there is no trusting to the force of nature, nor to the bravery of words, except it be corroborated by custom. His instance is, that for the achieving of a desperate conspiracy, a man should not rest upon the intricacies of any man's nature, or his resolute undertakings; but take such an one as hath had his hands formerly in blood. But Machiavel knew not of a frier Clement, nor a Ravillac, nor a Jauregny, nor a Baltazar Gerard: yet his rule holdeth still, that nature nor the engagement of words, are not so forcible as custom. Only superstition is now so well advanced, that men of the first blood are as firm as butchers by occupation: and votary resolution is made equipollent to custom, even in matter of blood. In other things, the predominancy of custom is every where visible; in so much as a man would wonder to hear men profess, protest, engage, give great words, and then do just as they have done before: as if they were dead images, and engines moved only by the wheels of custom. We see also the reign or tyranny of custom what it is. The Indians, I mean the sect of their wise men, lay themselves quietly upon a stack of wood, and so sacrifice themselves by fire. Nay, the wives strive to be burned with the corps of their husbands. The lads of Sparta, of ancient time, were wont to be scourged upon the altar of Diana, without so much as wincing. I remember in the beginning of queen Elizabeth's time of England, an Irish rebel condemned put up a petition to the deputy, that he might be hanged in a with, and not in an halter, because it had been so used with former rebels. There be monks in Russia, for penance, that will sit a whole night in a vessel of water, till they be engaged with hard ice. Many examples may be put of the force of custom, both upon mind and body. Therefore since custom is the principal magistrate of man's life, let men by all means endeavour to obtain good customs. Certainly custom is most perfect, when it beginneth in young years: this we call education, which is, in effect, but an early custom. So we see in languages, the tongue is more pliant to all expressions and sounds, the joints are more supple to all feats of activity and motions, in youth than afterwards. For it is true, that late learners cannot so well take the ply, except it be in some minds that have not suffered themselves to fix, but have kept themselves open and prepared to receive continual amendment, which is exceeding rare. But if the force of custom simple and separate be great; the force of custom copulate and conjoined, and collegiate, is far greater. For there example teacheth, company comforteth, emulation quickeneth, glory raiseth: so as in such places the force of custom is in its exaltation. Certainly the great multiplication of virtues upon human nature, resteth upon societies well ordained and disciplined. For commonwealths and good governments do nourish virtue grown, but do not much mend the seeds. But the misery is, that the most effectual means are now applied to the ends least to be desired.

XL. *Of FORTUNE.*

IT cannot be denied but outward accidents conduce much to fortune: favour, opportunity, death of others, occasion fitting virtue. But chiefly, the mold of a man's fortune is in his own hands. *Faber quisque fortunæ suæ*; saith the poet. And the most frequent of external causes is, that the folly of one man is the fortune of another. For no man prospers so suddenly as by others errors. *Serpens nisi serpentem comederit non fit draco.* Overt and apparent virtues bring forth praise; but there be secret and hidden virtues that bring forth fortune: certain deliveries of a man's self, which have no name. The Spanish name, *cajemechara*, partly expresseth them: when there be

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not floods, nor resistencies in a man's nature; but that the wheels of his mind keep way with the wheels of his fortune. For so Livy, after he had described Cato Major in these words; *in illis rebus, tantum rebus corporis et animi fuit, ut quocunque loco natus esset, fortunam sibi futuram videretur*; falleth upon that, that he had *versatile ingenium*. I therefore if a man look sharply and attentively, he shall see fortune: for though she be blind, yet she is not invisible. The way of fortune is like the milky way in the sky; which is a meeting or knot of a number of small stars, not seen asunder, but giving light together. So are there a number of little and scarce discerned virtues, or rather faculties and customs, that make men fortunate. The Italians note some of them, such as a man would little think. When they speak of one that cannot do amiss, they will throw in into his other conditions, that he hath *Poco di matto*. And certainly there be not two more fortunate properties, than to have a little of the fool, and not too much of the honest. Therefore extreme lovers of their country, or masters, were never fortunate, neither can they be. For when a man placeth his thoughts without himself, he goeth not his own way. An hasty fortune maketh an enterprizer and remover; the French hath it better, *entreprenant*, or *remuant*, but the exercised fortune maketh the able man. Fortune is to be honoured and respected, and it be but for her daughters, Confidence and Reputation. For those two felicity breedeth: the first within a man's self; the latter, in others towards him. All wise men, to decline the envy of their own virtues, use to ascribe them to providence and fortune; for so they may the better assume them: and besides, it is greatness in a man to be the care of the higher powers. So Cæsar said to the pilot in the tempest, *Cæsarem portas, et fortunam ejus*. So Sylla chose the name of *felix*, and not of *magnus*: and it hath been noted, that those that ascribe openly too much to their own wisdom and policy, end unfortunate. It is written, that Timotheus the Athenian, after he had, in the account he gave to the state of his government, often interlaced this speech, "And in this fortune had no part; never prospered in any thing he undertook afterwards. Certainly there be, whose fortunes are like Homer's verses, that have a slide and easiness more than the verses of other poets: as Plutarch saith of Timoleon's fortune, in respect of that of Agesilaus or Epaminondas. And that this should be, no doubt it is much in a man's self.

XLI. Of USURY.

MANY have made witty invectives against usury. They say, That it is pity the devil should have God's part, which is the tithe. That the usurer is the greatest sabbath-breaker, because his plough goeth every Sunday. That the usurer is the drone that Virgil speaketh of:

Ignis cum fucos pecus à præcipibus arcent.

That the usurer breaketh the first law that was made for mankind after the fall; which was, *In sudore vultus tui comedes panem tuum*; not, *In sudore vultus alieni*. That usurers should have orange-tawney bonnets, because they do judaize. That it is against nature, for money to beget money: and the like. I say this only, that usury is a *concessum propter duritiem cordis*: for since there must be borrowing and lending, and men are so hard of heart as they will not lend freely, usury must be permitted. Some others have made suspicious and cunning propositions of banks, discovery of mens estates, and other inventions. But few have spoken of usury usefully. It is good to set before us the incommodities and commodities of usury; that the good

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may be either weighed out, or culled out; and warily to provide, that while we make forth to that which is better, we meet not with that which is worse.

The discommodities of usury are: first, that it makes fewer merchants. For were it not for this lazy trade of usury, money would not lie still but would in great part be employed upon merchandizing; which is the *vena porta* of wealth in a state. The second, that it makes poor merchants. For as a farmer cannot husband his ground so well, if he sit at a great rent; so the merchant cannot drive his trade so well, if he sit at great usury. The third is incident to the other two; and that is, the decay of customs of kings or states, which ebb or flow with merchandizing. The fourth, that it bringeth the treasure of a realm or state into a few hands. For the usurer being at certainties, and others at uncertainties, at the end of the game most of the money will be in the box; and ever a state flourisheth when wealth is more equally spread. The fifth, that it beats down the price of land: for the employment of money is chiefly either merchandizing or purchasing; and usury way-lays both. The sixth, that it doth dull and damp all industries, improvements, and new inventions, wherein money should be stirring, if it were not for this slug. The last, that it is the canker and ruin of many mens estates, which in process of time breeds a public poverty.

On the other side, the commodities of usury are: first, that howsoever usury in some respect hindereth merchandizing, yet in some other it advanceth it; for it is certain that the greatest part of trade is driven by young merchants, upon borrowing at interest; so as if the usurer either call in or keep back his money, there will ensue presently a great stand of trade. The second is, that were it not for this easy borrowing upon interest, mens necessities would draw upon them a most sudden undoing; in that they would be forced to sell their means, be it lands or goods, far under foot; and so whereas usury doth but gnaw upon them, bad markets would swallow them quite up. As for mortgaging or pawning, it will little mend the matter; for either men will not take pawns without use; or if they do, they will look precisely for the forfeiture. I remember a cruel moneyed man in the country, that would say; "The devil take this usury, it keeps us from forfeitures of mortgages and bonds." The third and last is, that it is a vanity to conceive, that there would be ordinary borrowing without profit; and it is impossible to conceive the number of inconveniencies that will ensue, if borrowing be cramped. Therefore to speak of the abolishing of usury is idle. All states have ever had it in one kind or rate or other. So as that opinion must be sent to Utopia.

To speak now of the reformation and reglement of usury: how the discommodities of it may be best avoided, and the commodities retained: it appears by the balance of commodities and discommodities of usury, two things are to be reconciled. The one, that the tooth of usury be grinded that it bite not too much: the other, that there be left open a means to invite monied men to lend to the merchants, for the continuing and quickning of trade. This cannot be done, except you introduce two several sorts of usury, a less and a greater. For if you reduce usury to one low rate, it will ease the common borrower, but the merchant will be to seek for money. And it is to be noted, that the trade of merchandize being the most lucrative, may bear usury at a good rate; other contracts not so.

To serve both intentions, the way should be briefly thus. That there be two rates of usury; the one free and general for all; the other under licence only to certain persons, and in certain places of merchandizing. First therefore let usury in general be

be reduced to five in the hundred; and let that rate be proclaimed to be free and current; and let the state shut itself out to take any penalty for the same. This will preserve borrowing from any general stop or dryness. This will ease infinite borrowers in the country. This will in good part raise the price of land, because land purchased at sixteen years purchase, will yield six in the hundred and somewhat more, whereas this rate of interest yields but five. This by like reason will encourage and edge industrious and profitable improvements; because many will rather venture in that kind, than take five in the hundred, especially having been used to greater profit. Secondly, let there be certain persons licensed to lend to known merchants, upon usury at a higher rate: and let it be with the cautions following. Let the rate be, even with the merchant himself, somewhat more easy than that he used formerly to pay: for by that means all borrowers shall have some ease by this reformation, be he merchant or whosoever. Let it be no bank or common stock, but every man be master of his own money. Not that I altogether dislike banks, but they will hardly be brooked in regard of certain suspicions. Let the state be answered some small matter for the licence, and the rest left to the lender: for if the abatement be but small, it will no whit discourage the lender. For he, for example, that took before ten or nine in the hundred, will sooner descend to eight in the hundred, than give over his trade of usury; and go from certain gains, to gains of hazard. Let these licensed lenders be in number indefinite, but restrained to certain principal cities and towns of merchandizing: for then they will be hardly able to colour other mens moneys in the country; so as the licence of nine will not suck away the current rate of five: for no man will send his moneys far off, nor put them into unknown hands.

If it be objected, that this doth in a sort authorise usury, which before was in some places but permissive: the answer is, that it is better to mitigate usury by declaration, than to suffer it to rage by connivance.

XLII. Of YOUTH and AGE.

A Man that is young in years, may be old in hours, if he have lost no time. But that happeneth rarely. Generally youth is like the first cogitations, not so wise as the second. For there is a youth in thoughts, as well as in ages. And yet the invention of young men is more lively than that of old; and imaginations stream into their minds better, and as it were more divinely. Natures that have much heat, and great and violent desires and perturbations, are not ripe for action, till they have passed the meridian of their years: as it was with Julius Cæsar, and Septimius Severus. Of the latter of whom it is said, *Juventutem egit erroribus, imo furoribus, plenam*. And yet he was the ablest emperor almost of all the list. But reposed natures may do well in youth: as it is seen in Augustus Cæsar, Cosmus duke of Florence, Galton de Fois, and others. On the other side, heat and vivacity in age is an excellent composition for business. Young men are fitter to invent than to judge; fitter for execution than for counsel; and fitter for new projects, than for settled business. For the experience of age, in things that fall within the compass of it, directeth them; but in new things abuseth them. The errors of young men are the ruin of business; but the errors of aged men amount but to this; that more might have been done, or sooner. Young men, in the conduct and management of actions embrace more than they can hold; stir more than they can quiet; fly to the end, without consideration of the means and degrees; pursue some few principles, which they have chanced upon, absurdly; care
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not to innovate, which draws unknown inconveniences; use extreme remedies at first; and, that which doubleth all errors, will not acknowledge or retract them; like an unready horse, that will neither stop nor turn. Men of age object too much, consult too long, adventure too little, repent too soon, and seldom drive business home to the full period; but content themselves with a mediocrity of success. Certainly it is good to compound employments of both; for that will be good for the present, because the virtues of either age may correct the defects of both: and good for succession, that young men may be learners, while men in age are actors: and lastly, good for external accidents, because authority followeth old men, and favour and popularity youth. But for the moral part, perhaps youth will have the preeminence, as age hath for the politic. A certain Rabbin upon the text, *Your young men shall see visions, and your old men shall dream dreams*; inferreth, that young men are admitted nearer to God than old; because vision is a clearer revelation than a dream. And certainly, the more a man drinketh of the world, the more it intoxicateth; and age doth profit rather in the powers of understanding, than in the virtues of the will and affections. There be some have an over-early ripeness in their years, which fadeth betimes: these are first, such as have brittle wits, the edge whereof is soon turned; such as was Hermogenes the rhetorician, whose books are exceeding subtile; who afterwards waxed stupid. A second sort, is of those that have some natural dispositions which have better grace in youth than in age: such as is a fluent and luxuriant speech; which becomes youth well, but not age. So Tully saith of Hortensius; *idem manebat, neque idem decebat*. The third is, of such as take too high a strain at the first; and are magnanimous, more than tract of years can uphold. As was Scipio Africanus, of whom Livy saith in effect; *ultima primis cedebant*.

XLIII. Of BEAUTY.

VIRTUE is like a rich stone, best plain set: and surely virtue is best in a body that is comely, though not of delicate features; and that hath rather dignity of presence, than beauty of aspect. Neither is it almost seen, that very beautiful persons are otherwise of great virtue. As if nature were rather busy not to err, than in labour to produce excellency. And therefore they prove accomplished, but not of great spirit; and study rather behaviour than virtue. But this holds not always; for Augustus Cæsar, Titus Vespasianus, Philip le Belle of France, Edward the fourth of England, Alcibiades of Athens, Ismael the sophi of Persia, were all high and great spirits; and yet the most beautiful men of their times. In beauty, that of favour is more than that of colour; and that of decent and gracious motion more than that of favour. That is the best part of beauty, which a picture cannot express; no nor the first sight of the life. There is no excellent beauty, that hath not some strangeness in the proportion. A man cannot tell, whether Apelles or Albert Durer were the more trisler; whereof the one would make a personage by geometrical proportions: the other, by taking the best parts out of divers faces, to make one excellent. Such personages, I think, would please no body but the painter that made them. Not but I think a painter may make a better face than ever was; but he must do it by a kind of felicity, as a musician that maketh an excellent air in music, and not by rule. A man shall see faces, that if you examine them part by part, you shall never find a good; and yet altogether do well. If it be true, that the principal part of beauty is in decent motion, certainly,

it is no marvel, though persons in years seem many times more amiable; *pulchro-ram autumnus pulcher*: for no youth can be comely but by pardon, and considering the youth, as to make up the comeliness. Beauty is as summer-fruits, which are easy to corrupt, and cannot last: and for the most part it makes a dissolute youth, and an age a little out of countenance: but yet certainly again, if it light well, it maketh virtues shine, and vices blush.

XLIV. Of DEFORMITY.

DEFORMED persons are commonly even with nature; for as nature hath done ill by them, so do they by nature; being for the most part, as the Scripture saith, *void of natural affection*: and so they have their revenge of nature. Certainly there is a consent between the body and the mind, and where nature erreth in the one, she ventureth in the other. *Ubi peccat in uno, periclitatur in altero*. But because there is in man an election touching the frame of his mind, and a necessity in the frame of his body, the stars of natural inclination are sometimes obscured by the sun of discipline and virtue: therefore it is good to consider of deformity, not as a sign which is more deceivable, but as a cause which seldom faileth of the effect. Whosoever hath any thing fixed in his person that doth induce contempt, hath also a perpetual spur in himself, to rescue and deliver himself from scorn; therefore all deformed persons are extreme bold. First, as in their own defence, as being exposed to scorn; but in process of time by a general habit. Also it stirreth in them industry, and especially of this kind, to watch and observe the weakness of others, that they may have somewhat to repay. Again, in their superiors it quenqueth jealousy towards them, as persons that they think they may at pleasure despise: and it layeth their competitors and emulators asleep; as never believing they should be in possibility of advancement, till they see them in possession. So that, upon the matter, in a great wit deformity is an advantage to rising. Kings in ancient times, and at this present, in some countries, were wont to put great trust in eunuchs, because they that are envious towards all, are more obnoxious and officious towards one. But yet their trust towards them hath rather been as to good spies, and good whisperers, than good magistrates and officers. And much like is the reason of deformed persons. Still the ground is, they will, if they be of spirit, seek to free themselves from scorn; which must be either by virtue or malice. And therefore let it not be marvelled, if sometimes they prove excellent persons; as was Agesilaus, Zanger the son of Solyman, Æsop, Gasca president of Peru; and Scævras may go likewise amongst them, with others.

XLV. Of BUILDING.

HOUSES are built to live in, and not to look on; therefore let use be preferred before uniformity, except where both may be had. Leave the goodly fabrics of houses for beauty only, to the enchanted palaces of the poets: who build them with small cost. He that builds a fair house upon an ill seat, committeth himself to prison. Neither do I reckon it an ill seat only, where the air is unwholesome, but likewise where the air is unequal; as you shall see many fine seats, set upon a knap of ground, environed with higher hills round about it, whereby the heat of the sun is pent in, and the wind gathereth as in troughs; so as you shall have, and that

that suddenly, as great diversity of heat and cold, as if you dwelt in several places. Neither is it ill air only that maketh an ill seat; but ill ways, ill markets; and, if you will consult with Momus, ill neighbours. I speak not of many more; want of water, want of wood, shade, and shelter; want of fruitfulness, and mixture of grounds of several natures; want of prospect; want of level grounds; want of places at some near distance for sports of hunting, hawking, and races; too near the sea, too remote; having the commodity of navigable rivers, or the inconvenience of their overflowing; too far off from great cities, which may hinder business; or too near them, which lurcheth all provisions, and maketh every thing dear; where a man hath a great living laid together, and where he is scant: all which, as it is impossible perhaps to find together, so it is good to know them, and think of them, that a man may take as many as he can: and if he have several dwellings, that he sort them so, that what he wanteth in the one, he may find in the other. Lucullus answered Pompey well, who, when he saw his stately galleries and rooms, so large and lightsome in one of his houses, said, "Surely an excellent place for summer, but how do you do in winter?" Lucullus answered, "Why, do you not think me as wise as some fowls are, that ever change their abode towards the winter?"

To pass from the seat to the house itself, we will do as Cicero doth in the orator's art, who writes books *de oratore*, and a book he intitles *Orator*: whereof the former delivers the precepts of the art, and the latter the perfection. We will therefore describe a princely palace, making a brief model thereof. For it is strange to see, now in Europe, such huge buildings as the Vatican, and Escorial, and some others be, and yet scarce a very fair room in them.

First therefore, I say, you cannot have a perfect palace, except you have two several sides; a side for the banquet, as is spoken of in the book of Esther; and a side for the household: the one for feast and triumphs, the other for dwelling. I understand both these sides to be not only returns, but parts of the front; and to be uniform without, though severally partitioned within; and to be on both sides of a great and stately tower, in the midst of the front; that as it were joineth them together on either hand. I would have on the side of the banquet, in front, one only goodly room above stairs, of some forty foot high; and under it a room for a dressing or preparing place, at times of triumphs. On the other side, which is the household side, I wish it divided at the first into a hall and a chapel, with a partition between, both of good state and bigness; and those not to go all the length, but to have at the farther end a winter and a summer parlour, both fair: and under these rooms a fair and large cellar sunk under ground; and likewise some privy kitchens, with butteries and pantries, and the like. As for the tower, I would have it two stories, of eighteen foot high apiece, above the two wings; and a goodly leads upon the top, railed, with statues interposed; and the same tower to be divided into rooms, as shall be thought fit. The stairs likewise to the upper rooms, let them be upon a fair open newel, and finely railed in, with images of wood, cast into a brass colour; and a very fair landing-place at the top. But this to be, if you do not appoint any of the lower rooms, for a dining-place of servants; for otherwise you shall have the servants dinner after your own: for the steam of it will come up as in a tunnel. And so much for the front. Only I understand the height of the first stairs to be sixteen foot, which is the height of the lower room.

Beyond this front is there to be a fair court, but three sides of it of a far lower building than the front. And in all the four corners of that court fair stair-cases cast into turrets on the outside, and not within the row of buildings themselves: but those towers are not to be of the height of the front, but rather proportionable to the lower building. Let the court not be paved, for that striketh up a great heat in summer, and much cold in winter: but only some side alleys, with a cross, and the quarters to graze, being kept shorn, but not too near shorn. The row of return on the banquet side, let it be all stately galleries; in which galleries let there be three, or five, fine cupolas, in the length of it, placed at equal distance; and fine coloured windows of several works. On the household side, chambers of presence, and ordinary entertainments, with some bed-chambers; and let all three sides be a double house, without thorough lights on the sides, that you may have rooms from the sun, both for forenoon and afternoon. Cast it also, that you may have rooms both for summer and winter; shady for summer, and warm for winter. You shall have sometimes fair houses so full of glass, that one cannot tell where to become to be out of the sun or cold. For imbowed windows, I hold them of good use; in cities indeed, upright do better, in respect of the uniformity towards the street, for they be pretty retiring places for conference; and besides, they keep both the wind and sun off; for that which would strike almost through the room, doth scarce pass the window. But let them be but few, four in the court, on the sides only.

Beyond this court, let there be an inward court of the same square and height, which is to be environed with the garden on all sides: and in the inside, cloistered on all sides, upon decent and beautiful arches, as high as the first story: on the under story, towards the garden, let it be turned to a grotto, or place of shade or estivation: and only have opening and windows towards the garden, and be level upon the floor, no whit sunk under ground, to avoid all dampishness. And let there be a fountain, or some fair work of statues, in the midst of this court; and to be paved as the other court was. These buildings to be for privy lodgings on both sides, and the end for privy galleries: whereof you must foresee, that one of them be for an infirmary, if the prince or any special person should be sick, with chambers, bed-chamber, *antecamera* and *recamera*, joining to it. This upon the second story. Upon the ground-story, a fair gallery, open, upon pillars; and upon the third story likewise, an open gallery upon pillars, to take the prospect and freshness of the garden. At both corners of the farther side, by way of return, let there be two delicate or rich cabinets, daintily paved, richly hanged, glazed with crystalline glass, and a rich cupola in the midst; and all other elegancy that may be thought upon. In the upper gallery too, I wish that there may be, if the place will yield it, some fountains running in divers places from the wall, with some fine avoidances. And thus much for the model of the palace; save that you must have, before you come to the front, three courts: a green court plain, with a wall about it: a second court of the same, but more garnished, with little turrets, or rather embellishments upon the wall; and a third court, to make a square with the front, but not to be built, nor yet inclosed with a naked wall, but inclosed with terrasses leaded aloft, and fairly garnished on the three sides; and cloistered on the inside with pillars, and not with arches below. As for offices, let them stand at distance, with some low galleries to pass from them to the palace itself.

XLVI. *Of* GARDENS.

GOD almighty first planted a garden : and indeed it is the purest of human pleasures. It is the greatest refreshment to the spirits of man ; without which, buildings and palaces are but gross handy-works : and a man shall ever see, that when ages grow to civility and elegancy, men come to build stately, sooner than to garden finely ; as if gardening were the greater perfection. I do hold it in the royal ordering of gardens, there ought to be gardens for all the months in the year : in which severally, things of beauty may be then in season. For December and January, and the latter part of November, you must take such things as are green all winter ; holly ; ivy ; bays ; juniper ; cypress-trees ; yew ; pine-apple trees ; fir-trees ; rosemary ; lavender ; periwinkle, the white, the purple, and the blue ; germander ; flags ; orange-trees ; lemon-trees, and myrtles, if they be stoved ; and sweet marjoram warm set. There followeth, for the latter part of January and February, the *mezereon* tree, which then blossoms ; *crocus vernus*, both the yellow and the gray ; primroses ; anemonies ; the early tulip ; *hyacinthus orientalis* ; *chamaïris* ; *fritellaria*. For March there come violets, especially the single blue, which are the earliest ; the yellow daffadil ; the daisy ; the almond-tree in blossom ; the peach-tree in blossom ; the cornelian tree in blossom ; sweet briar. In April follow the double white violet ; the wall-flower ; the stock-gilliflower ; the cowslip, flower-de-luces, and lilies of all natures ; rosemary-flowers ; the tulip ; the double piony ; the pale daffadil ; the French honeysuckle ; the cherry-tree in blossom ; the damascene and plum-trees in blossom ; the white thorn in leaf ; the lilach-tree. In May and June come pinks of all sorts ; especially the blush-pink, roses of all kinds, except the musk, which comes later : honeysuckles ; strawberries ; bugloss ; columbine ; the French marygold ; *flos Africanus* ; cherry-tree in fruit ; ribes ; figs in fruit ; raspberries ; vine flowers ; lavender in flowers ; the sweet satyrian, with the white flower ; *herba muscaria* ; *lilium convallium* ; the apple-tree in blossom. In July come gilliflowers of all varieties ; musk-roses ; the lime-tree in blossom ; early pears, and plums in fruit, gennittings, codlins. In August come plums of all sorts in fruit ; pears ; apricots ; barberries ; filberds ; muskmelons ; monks-hoods, of all colours. In September come grapes ; apples ; poppies of all colours ; peaches ; *melo cotones* ; nectarines ; cornelians ; wardens ; quinces. In October, and the beginning of November, come services ; medlars ; bullaces ; roses cut or removed to come late ; hollyoaks, and such like. These particulars are for the climate of London : but my meaning is perceived, that you may have *ver perpetuum*, as the place affords.

And because the breath of flowers is far sweeter in the air, where it comes and goes, like the warbling of music, than in the hand, therefore nothing is more fit for that delight than to know what be the flowers and plants that do best perfume the air. Roses damask and red, are fast flowers of their smells ; so that you may walk by a whole row of them, and find nothing of their sweetness : yea, though it be in a morning's dew. Bays likewise yield no smell, as they grow ; rosemary little ; nor sweet marjoram. That which above all others yields the sweetest smell in the air, is the violet ; especially the white double violet, which comes twice a year ; about the middle of April, and about Bartholomew-tide. Next to that is the musk-rose : then the strawberry-leaves dying, with a most excellent cordial smell : then the flower of the vines ; it is a little dust, like the dust of a bent, which grows upon

upon the cluster, in the first coming forth: then sweet-brier: then wall-flowers, which are very delightful; to be set under a parlour, or lower chamber window: then pinks and gilliflowers, especially the matted pink, and clove gilliflower: then the flowers of the lime-tree: then the honey-suckles, so they be somewhat afar off. Of bean-flowers I speak not, because they are field flowers: but those which perfume the air most delightfully, not pass'd by as the rest, but being troden upon and crushed, are three: that is, burnet, wild thyme, and water mints. Therefore you are to set whole alleys of them, to have the pleasure when you walk or tread.

For gardens, speaking of those which are indeed prince-like, as we have done of buildings, the contents ought not well to be under thirty acres of ground, and to be divided into three parts: a green in the entrance; a heath or desert in the going forth; and the main garden in the midst; besides alleys on both sides. And I like well, that four acres of ground be assigned to the green, six to the heath, four and four to either side, and twelve to the main garden. The green hath two pleasures; the one, because nothing is more pleasant to the eye, than green grass kept finely shorn; the other, because it will give you a fair alley in the midst; by which you may go in front upon a stately hedge, which is to inclose the garden. But because the alley will be long, and in great heat of the year or day, you ought not to buy the shade in the garden by going in the sun through the green; therefore you are, of either side the green, to plant a covert alley, upon carpenters work, about twelve foot in height, by which you may go in shade into the garden. As for the making of knots or figures, with divers coloured earths, that they may lie under the windows of the house, on that side which the garden stands, they be but toys; you may see as good fights, many times, in tarts. The garden is best to be square, encompassed on all the four sides with a stately arched hedge: the arches to be upon pillars of carpenters work, of some ten foot high, and six foot broad; and the spaces between, of the same dimension with the breadth of the arch. Over the arches let there be an entire hedge, of some four foot high, framed also upon carpenters work; and upon the upper hedge, over every arch, a little turret, with a belly enough to receive a cage of birds: and over every space, between the arches, some other little figure, with broad plates of round coloured glass, gilt, for the sun to play upon. But this hedge I intend to be raised upon a bank, not steep, but gently slope, of some six foot, set all with flowers. Also I understand, that this square of the garden should not be the whole breadth of the ground, but to leave on either side ground enough for diversity of side alleys; unto which the two covert alleys of the green may deliver you: but there must be no alleys with hedges at either end of this great inclosure; not at the hither end, for letting your prospect upon the fair hedge from the green; nor at the farther end, for letting your prospect from the hedge, through the arches, upon the heath.

For the ordering of the ground within the great hedge. I leave it to variety of device; advising nevertheless, that whatsoever form you cast it into, first it be not too busy, or full of work: wherein I, for my part, do not like images cut out in juniper or other garden stuff; they be for children. Little low hedges round, like welts, with some pretty pyramids, I like well; and in some places, fair columns upon frames of carpenter's work. I would also have the alleys spacious and fair. You may have cloier alleys upon the side grounds, but none in the main garden. I wish also, in the very middle, a fair mount, with three ascents and alleys, enough for four to walk a-breast; which I would have to be perfect circles, without any bulwarks or embossments; and the whole mount to be thirty foot high; and some fine banqueting house, with some chimneys neatly cast, and without too much glass.

For

For fountains, they are a great beauty and refreshment; but pools marr all, and make the garden unwholesome, and full of flies and frogs. Fountains I intend to be of two natures: the one that sprinkleth or spouteth water; the other a fair receipt of water, of some thirty or forty foot square, but without fish, or slime, or mud. For the first, the ornaments of images gilt, or of marble, which are in use, do well: but the main matter is so to convey the water, as it never stay either in the bowls, or in the cistern; that the water be never by rest discoloured, green or red, or the like; or gather any mossiness or putrefaction. Besides that, it is to be cleansed every day by the hand. Also some steps up to it, and some fine pavement about it doth well. As for the other kind of fountain, which we may call a bathing pool, it may admit much curiosity and beauty, wherewith we will not trouble ourselves; as that the bottom be finely paved, and with images; the sides likewise; and withal embellished with coloured glass, and such things of lustre; encompassed also with fine rails of low statues. But the main point is the same which we mentioned in the former kind of fountain; which is, that the water be in perpetual motion, fed by a water higher than the pool, and delivered into it by fair spouts, and then discharged away under ground by some equality of bores, that it stay little. And for fine devices of arching water without spilling, and making it rise in several forms, of feathers, drinking-glasses, canopies, and the like, they be pretty things to look on, but nothing to health and sweetness.

For the heath, which was the third part of our plot, I wish it to be framed as much as may be to a natural wildness. Trees I would have none in it, but some thickets made only of sweet-brier and honey-suckle, and some wild vine amongst; and the ground set with violets, straw-berries, and primroses. For these are sweet and proper in the shade. And these to be in the heath here and there, not in any order. I like also little heaps, in the nature of mole-hills, such as are in wild heaths, to be set, some with wild thyme, some with pinks, some with germander, that gives a good flower to the eye, some with periwinkle, some with violets, some with straw-berries, some with cowslips, some with daisies, some with red roses, some with *lilium convallium*, some with sweet-williams red, some with bears foot, and the like low flowers, being withal sweet and fightly. Part of which heaps to be with standards of little bushes, prickt upon their top, and part without. The standards to be roses, juniper, holly, berberries, but here and there, because of the smell of their blossom, red currans, goose-berries, rosemary, bays, sweet-briar, and such like. But these standards to be kept with cutting, that they grow not out of course.

For the side grounds, you are to fill them with variety of alleys, private, to give a full shade, some of them, wheresoever the sun be. You are to frame some of them likewise for shelter, that when the wind blows sharp, you may walk as in a gallery. And those alleys must be likewise hedged at both ends, to keep out the wind; and these closer alleys must be ever finely gravelled, and no grass, because of growing wet. In many of these alleys likewise, you are to set fruit-trees of all sorts; as well upon the walls as in ranges. And this should be generally observed, that the borders wherein you plant your fruit-trees, be fair and large, and low, and not steep; and set with fine flowers, but thin and sparingly, lest they deceive the trees. At the end of both the side grounds, I would have a mount of some pretty height, leaving the wall of the inclosure breast high, to look abroad into the fields.

For the main garden, I do not deny but there should be some fair alleys, ranged on both sides, with fruit trees, and some pretty tufts of fruit-trees, and arbours with seats,

set in some decent order ; but these to be by no means set too thick, but to leave the main garden so as it be not close, but the air open and free. For as for shade, I would have you rest upon the alleys of the side grounds, there to walk, if you be disposed, in the heat of the year or day ; but to make account, that the main garden is for the more temperate parts of the year ; and in the heat of summer, for the morning and the evening, or overcast days.

For aviaries, I like them not, except they be of that largeness, as they may be turfed, and have living plants and bushes set in them ; that the birds may have more scope, and natural nestling, and that no foulness appear in the floor of the aviary.

So I have made a platform of a princely garden, partly by precept, partly by drawing ; not a model, but some general lines of it ; and in this I have spared for no cost. But it is nothing for great princes, that for the most part, taking advice with workmen, with no less cost set their things together ; and sometimes add statues, and such things, for state and magnificence, but nothing to the true pleasure of a garden.

XLVII. *Of NEGOTIATING.*

IT is generally better to deal by speech, than by letter ; and by the mediation of a third, than by a man's self. Letters are good, when a man would draw an answer by letter back again ; or when it may serve for a man's justification, afterwards to produce his own letter ; or where it may be danger to be interrupted, or heard by pieces. To deal in person is good, when a man's face breedeth regard, as commonly with inferiors ; or in tender cases, where a man's eye upon the countenance of him with whom he speaketh, may give him a direction how far to go : and generally where a man will reserve to himself liberty, either to disavow or to expound. In choice of instruments, it is better to choose men of a plainer sort, that are like to do that that is committed to them, and to report back again faithfully the success ; than those that are cunning to contrive out of other mens business somewhat to grace themselves, and will help the matter in report, for satisfaction sake. Use also such persons as affect the business wherein they are employed, for that quickeneth much ; and such as are fit for the matter ; as bold men for expostulation, fair-spoken men for persuasion, crafty men for inquiry and observation, froward and absurd men for business that doth not well bear out itself. Use also such as have been lucky, and prevailed before in things wherein you have employed them ; for that breeds confidence, and they will strive to maintain their prescription. It is better to sound a person with whom one deals, afar off, than to fall upon the point at first ; except you mean to surprise him by some short question. It is better dealing with men in appetite, than with those that are where they would be. If a man deal with another upon conditions, the start or first performance is all ; which a man cannot reasonably demand, except either the nature of the thing be such which must go before ; or else a man can persuade the other party, that he shall still need him in some other thing ; or else that he be counted the honestest man. All practice is to discover, or to work. Men discover themselves in trust, in passion, at unawares, and of necessity, when they would have somewhat done, and cannot find an apt pretext. If you would work any man, you must either know his nature and fashions, and so lead him ; or his ends, and so persuade him ; or his weakness and disadvantages, and so awe him ; or those that have interest in him, and so govern him. In dealing with cunning persons, we must ever consider their ends to interpret their speeches ; and it is good to say little

to them, and that which they least look for. In all negotiations of difficulty, a man may not look to sow and reap at once; but must prepare business, and so ripen it by degrees.

XLVIII. *Of FOLLOWERS and FRIENDS.*

COSTLY followers are not to be liked; lest while a man maketh his train longer, he make his wings shorter. I reckon to be costly, not them alone which charge the purse, but which are wearisome and importune in suits. Ordinary followers ought to challenge no higher conditions than countenance, commendation, and protection from wrongs. Factious followers are worse to be liked, which follow not upon affection to him with whom they range themselves, but upon discontentment conceived against some other: whereupon commonly ensueth that ill intelligence that we many times see between great personages. Likewise glorious followers, who make themselves as trumpets of the commendation of those they follow, are full of inconvenience; for they taint business through want of secrecy; and they export honour from a man, and make him a return in envy. There is a kind of followers likewise, which are dangerous, being indeed espials; which inquire the secrets of the house, and bear tales of them to others. Yet such men many times are in great favour; for they are officious, and commonly exchange tales. The following by certain estates of men answerable to that which a great person himself professeth, as of soldiers to him that hath been employed in the wars, and the like, hath ever been a thing civil, and well taken even in monarchies; so it be without too much pomp or popularity. But the most honourable kind of following, is to be followed as one that apprehendeth to advance virtue and desert in all sorts of persons. And yet where there is no eminent odds in sufficiency, it is better to take with the more passable than with the more able. And besides, to speak truth, in base times active men are of more use than virtuous. It is true, that in government, it is good to use men of one rank equally: for to countenance some extraordinarily, is to make them insolent, and the rest discontent; because they may claim a due. But contrariwise in favour, to use men with much difference and election is good; for it maketh the persons preferred more thankful, and the rest more officious; because all is of favour. It is good discretion not to make too much of any man at the first; because one cannot hold out that proportion. To be governed, as we call it, by one, is not safe; for it shews softness, and gives a freedom to scandal and disreputation; for those that would not censure, or speak ill of a man immediately, will talk more boldly of those that are so great with them, and thereby wound their honour. Yet to be distracted with many, is worse; for it makes men to be of the last impression, and full of change. To take advice of some few friends is ever honourable; for lookers-on many times see more than gamesters; and the vulture best discovereth the hill. There is little friendship in the world, and least of all between equals, which was wont to be magnified. That that is, is between superior and inferior, whose fortunes may comprehend the one the other.

XLIX. *Of SUITORS.*

MANY ill matters and projects are undertaken; and private suits do putrify the public good. Many good matters are undertaken with bad minds; I

mean not only corrupt minds, but crafty minds, that intend not performance. Some embrace suits, which never mean to deal effectually in them; but if they see there may be life in the matter by some other mean, they will be content to win a thank, or take a second reward, or at least to make use in the mean time of the suitor's hopes. Some take hold of suits, only for an occasion to cross some other, or to make an information, whereof they could not otherwise have apt pretext; without care what become of the suit when that turn is served: or generally, to make other mens business a kind of entertainment to bring in their own. Nay, some undertake suits, with a full purpose to let them fall; to the end to gratify the adverse party or competitor. Surely there is in some sort a right in every suit; either a right of equity, if it be a suit of controversy; or a right of desert, if it be a suit of petition. If affection lead a man to favour the wrong side in justice, let him rather use his countenance to compound the matter than to carry it. If affection lead a man to favour the less worthy in desert, let him do it without depraving or disabling the better deserver. In suits which a man doth not well understand, it is good to refer them to some friend of trust and judgment, that may report whether he may deal in them with honour; but let him choose well his referendaries, for else he may be led by the nose. Suitors are so distasted with delays and abuses, that plain dealing in denying to deal in suits at first, and reporting the success barely, and in challenging no more thanks than one hath deserved, is grown not only honourable, but also gracious. In suits of favour, the first coming ought to take little place; so far forth consideration may be had of his trust, that, if intelligence of the matter could not otherwise have been had but by him, advantage be not taken of the note, but the party left to his other means, and in some sort recompensed for his discovery. To be ignorant of the value of a suit, is simplicity; as well as to be ignorant of the right thereof, is want of conscience. Secrecy in suits is a great mean of obtaining; for voicing them to be in forwardness, may discourage some kind of suitors; but doth quicken and awake others. But timing of the suit is the principal: timing, I say, not only in respect of the person that should grant it, but in respect of those which are like to cross it. Let a man, in the choice of his mean, rather choose the fittest mean than the greatest mean: and rather them that deal in certain things than those that are general. The reparation of a denial is sometimes equal to the first grant; if a man shew himself neither dejected nor discontented. *Iniquum petas, ut æquum feras*; is a good rule, where a man hath strength of favour: but otherwise a man were better rise in his suit; for he that would have ventured at first to have lost the suitor, will not in the conclusion lose both the suitor and his own former favour. Nothing is thought so easy a request to a great person, as his letter; and yet, if it be not in a good cause, it is so much out of his reputation. There are no worse instruments than these general contrivers of suits; for they are but a kind of poison and infection to public proceedings.

L. Of STUDIES.

STUDIES serve for delight, for ornament, and for ability. Their chief use for delight, is in privateness and retiring; for ornament, is in discourse; and for ability, is in the judgment and disposition of business. For expert men can execute, and perhaps judge of particulars, one by one; but the general counsels, and

and the plots and marshalling of affairs, come best from those that are learned. To spend too much time in studies, is sloth; to use them too much for ornament, is affectation; to make judgment wholly by their rules, is the humour of a scholar. They perfect nature, and are perfected by experience: for natural abilities are like natural plants, that need pruning by study; and studies themselves do give forth directions too much at large, except they be bounded in by experience. Crafty men contemn studies; simple men admire them; and wise men use them: for they teach not their own use; but that is a wisdom without them, and above them, won by observation. Read not to contradict and confute; nor to believe and take for granted; nor to find talk and discourse; but to weigh and consider. Some books are to be tasted, others to be swallowed, and some few to be chewed and digested: that is, some books are to be read only in parts; others to be read, but not curiously; and some few to be read wholly, and with diligence and attention. Some books also may be read by deputy, and extracts made of them by others; but that would be only in the less important arguments, and the meaner sort of books: else distilled books are like common distilled waters, flashy things. Reading maketh a full man; conference a ready man; and writing an exact man. And therefore if a man write little, he had need have a great memory; if he confer little, he had need have a present wit; and if he read little, he had need have much cunning, to seem to know that he doth not. Histories make men wise; poets, witty; the mathematics, subtle; natural philosophy, deep; moral, grave; logic and rhetoric, able to contend: *Abeunt studia in mores*. Nay, there is no stound or impediment in the wit, but may be wrought out by fit studies; like as diseases of the body may have appropriated exercises: bowling is good for the stone and reins; shooting for the lungs and breast; gentle walking for the stomach; riding for the head; and the like. So if a man's wit be wandering, let him study the mathematics; for in demonstrations, if his wit be called away never so little, he must begin again: if his wit be not apt to distinguish or find differences, let him study the schoolmen; for they are *cymini sectores*: if he be not apt to beat over matters, and to call up one thing to prove and illustrate another, let him study the lawyers cases: so every defect of the mind may have a special receipt.

LI. Of FACTION.

MANY have an opinion not wise; that for a prince to govern his estate, or for a great person to govern his proceedings, according to the respect of factions, is a principal part of policy; whereas, contrariwise, the chiefest wisdom is, either in ordering those things which are general, and wherein men of several factions do nevertheless agree, or in dealing with correspondence to particular persons, one by one. But I say not, that the consideration of factions is to be neglected. Mean men, in their rising, must adhere; but great men, that have strength in themselves, were better to maintain themselves indifferent and neutral. Yet even in beginners, to adhere so moderately, as he be a man of the one faction, which is most passable with the other, commonly giveth best way. The lower and weaker faction is the firmer in conjunction: and it is often seen, that a few that are stiff do tire out a greater number that are more moderate. When one of the factions is extinguished, the remaining subdivideth: as the faction between Lucullus and the rest of the nobles of the senate, which they called *optimates*,

held out a while against the faction of Pompey and Cæsar : but when the senate's authority was pulled down, Cæsar and Pompey soon after brake. The faction or party of Antonius and Octavianus Cæsar, against Brutus and Cassius, held out likewise for a time : but when Brutus and Cassius were overthrown, then soon after Antonius and Octavianus brake and subdivided. These examples are of wars, but the same holdeth in private factions. And therefore those that are seconds in factions, do many times, when the faction subdivideth, prove principals : but many times also they prove cyphers and casheered ; for many a man's strength is in opposition ; and when that faileth he groweth out of use. It is commonly seen, that men once placed, take in with the contrary faction to that by which they enter ; thinking belike that they have the first sure, and now are ready for a new purchase. The traitor in faction lightly goeth away with it ; for when matters have stuck long in balancing, the winning of some one man casteth them, and he getteth all the thanks. The even carriage between two factions, proceedeth not always of moderation, but of a trueness to a man's self, with end to make use of both. Certainly in Italy they hold it a little suspect in popes, when they have often in their mouth *Padre commune* : and take it to be a sign of one that meaneth to refer all to the greatness of his own house. Kings had need beware how they side themselves, and make themselves as of a faction or party ; for leagues within the state are ever pernicious to monarchies ; for they raise an obligation paramount to obligation of sovereignty, and make the king *tanquam unus ex nobis* ; as was to be seen in the league of France. When factions are carried too high, and too violently, it is a sign of weakness in princes, and much to the prejudice both of their authority and business. The motions of factions under kings ought to be like the motions, as the astronomers speak, of the inferior orbs ; which may have their proper motions, but yet still are quietly carried by the higher motion of *primum mobile*.

LII. Of CEREMONIES and RESPECTS.

HE that is only real, had need have exceeding great parts of virtue : as the stone had need to be rich, that is set without foil : but if a man mark it well, it is in praise and commendation of men, as it is in gettings and gains. For the proverb is true, that light gains make heavy purses ; for light gains come thick, whereas great come but now and then. So it is true, that small matters win great commendation, because they are continually in use, and in note ; whereas the occasion of any great virtue cometh but on festivals : therefore it doth much add to a man's reputation, and is, as queen Isabella said, like perpetual letters commendatory, to have good forms. To attain them, it almost sufficeth not to despise them : for so shall a man observe them in others ; and let him trust himself with the rest. For if he labour too much to express them, he shall lose their grace ; which is to be natural and unaffected. Some mens behaviour is like a verse, wherein every syllable is measured : how can a man comprehend great matters, that breaketh his mind too much to small observations ? Not to use ceremonies at all, is to teach others not to use them again, and so diminisheth respect to himself ; especially they be not to be omitted to strangers and formal natures : but the dwelling upon them and exalting them above the moon, is not only tedious, but doth diminish the faith and credit of him that speaks. And certainly there

is a kind of conveying of effectual and imprinting passages, amongst compliments, which is of singular use, if a man can hit upon it. Amongst a man's peers, a man shall be sure of familiarity; and therefore it is good a little to keep state. Amongst a man's inferiors, one shall be sure of reverence; and therefore it is good a little to be familiar. He that is too much in any thing, so that he giveth another occasion of satiety, maketh himself cheap. To apply one's self to others is good; so it be with demonstration that a man doth it upon regard, and not upon facility. It is a good precept, generally in seconding another, yet to add somewhat of one's own; as if you will grant his opinion, let it be with some distinction; if you will follow his motion, let it be with condition; if you allow his counsel, let it be with alledging farther reason. Men had need beware how they be too perfect in compliments; for be they never so sufficient otherwise, their enviers will be sure to give them that attribute, to the disadvantage of their greater virtues. It is loss also in business, to be too full of respects, or to be too curious in observing times and opportunities: Solomon saith, *He that considereth the wind, shall not sow; and he that looketh to the clouds, shall not reap.* A wise man will make more opportunities than he finds. Mens behaviour should be like their apparel; not too strait or point device, but free for exercise or motion.

LIII. Of PRAISE.

PRAISE is the reflexion of virtue: but it is as the glass or body which giveth the reflexion. If it be from the common people, it is commonly false and nought; and rather followeth vain persons than virtuous; for the common people understand not many excellent virtues: the lowest virtues draw praise from them; the middle virtues work in them astonishment or admiration; but of the highest virtues they have no sense or perceiving at all: but shews, and *species virtutibus similes*, serve best with them. Certainly fame is like a river, that beareth up things light and swoln, and drowns things weighty and solid: but if persons of quality and judgment concur, then it is, as the Scripture saith, *Nomen bonum instar arguenti fragrantis.* It filleth all round about, and will not easily away: for the odours of ointments are more durable than those of flowers. There be so many false points of praise, that a man may justly hold it a suspect. Some praises proceed merely of flattery; and if he be an ordinary flatterer, he will have certain common attributes, which may serve every man; if he be a cunning flatterer, he will follow the arch-flatterer, which is a man's self; and wherein a man thinketh best of himself, therein the flatterer will uphold him most: but if he be an impudent flatterer, look, wherein a man is conscious to himself that he is most defective, and is most out of countenance in himself, that will the flatterer intitle him to perforce, *spreti conscientia.* Some praises come of good wishes and respects, which is a form due in civility to kings and great persons; *laudando praecipere*; when by telling men what they are, they represent to them what they should be. Some men are praised maliciously to their hurt, thereby to stir envy and jealousy towards them; *pessimum genus inimicorum laudantium*; insomuch as it was a proverb amongst the Grecians, that he that was praised to his hurt, should have a push rise upon his nose: as we say, that a blister will rise upon one's tongue that tells a lie. Certainly moderate praise, used with opportunity and not vulgar, is that which doth the good. Solomon saith, *He that praiseth his friend aloud, rising early, it shall be to him no better than a curse.* Too much

much magnifying of man or matter, doth irritate contradiction, and procure envy and scorn. To praise a man's self cannot be decent, except it be in rare cases: but to praise a man's office or profession, he may do it with good grace, and with a kind of magnanimity. The cardinals of Rome, which are theologues, and friers, and schoolmen, have a phrase of notable contempt and scorn, towards civil business; for they call all temporal business, of wars, embassages, judicature and other employments, *shirrerie*, which is under-sheriffries, as if they were but matters for under-sheriffs and catchpoles; though many times those under-sheriffries do more good than their high speculations. St. Paul, when he boasts of himself, he doth oft interlace, *I speak like a fool*; but speaking of his calling, he saith, *magnificabo apostolatatum meum*.

LIV. Of VAIN-GLORY.

IT was prettily devised of Æsop: The fly sat upon the axle-tree of the chariot-wheel, and said, What a dust do I raise? So are there some vain persons, that whatsoever goeth alone, or moveth upon greater means, if they have never so little hand in it, they think it is they that carry it. They that are glorious, must needs be factious; for all bravery stands upon comparisons. They must needs be violent, to make good their own vaunts: neither can they be secret, and therefore not effectual; but according to the French proverb, *Beaucoup de bruit, peu de fruit*: Much bruit, little fruit. Yet certainly there is use of this quality in civil affairs: where there is an opinion, and frame to be created, either of virtue or greatness, these men are good trumpeters. Again, as Titus Livius noteth, in the case of Antiochus and the Ætolians, there are sometimes great effects of crois lies; as if a man that negotiates between two princes, to draw them to join in a war against the third, doth extol the forces of either of them, above measure, the one to the other: and sometimes, he that deals between man and man, raiseth his own credit with both, by pretending greater interest than he hath in either. And in these and the like kinds, it often falls out, that somewhat is produced of nothing; for lies are sufficient to breed opinion, and opinion brings on substance. In military commanders and soldiers vain-glory is an essential point; for as iron sharpens iron, so by glory one courage sharpeneth another: in cases of great enterprise, upon charge and adventure, a composition of glorious natures doth put life into business; and those that are of solid and sober natures, have more of the ballast than of the sail. In fame of learning, the flight will be slow, without some feathers of ostentation: *Qui de contemenda gloria libros scribunt, nomen suum inscribunt*. Socrates, Aristotle, Galen, were men full of ostentation. Certainly vain-glory helpeth to perpetuate a man's memory; and virtue was never so beholden to human nature, as it received its due at the second hand. Neither had the fame of Cicero, Seneca, Plinius Secundus, born her age so well, if it had not been joined with some vanity in themselves: like unto varnish, that makes cielings not only shine but last. But all this while, when I speak of vain-glory, I mean not of that property that Tacitus doth attribute to Mucianus; *omnium, quae dixerat, feceratque, arte quadam ostentator*: for that proceeds not of vanity, but of natural magnanimity and discretion: and in some persons, is not only comely but gracious. For excusations, cessions, modesty itself well governed, are but arts of ostentation. And amongst those arts there is none better, than that which Plinius Secundus speaketh of; which is to be liberal of praise and commendation to others, in that wherein a man's self hath any perfection. For saith Pliny
very

very wittily: "in commending another, you do yourself right; for he that you commend is either superior to you, in that you commend, or inferior. If he be inferior, if he be to be commended, you much more. If he be superior, if he be not to be commended, you much less." Glorious men are the scorn of wise men; the admiration of fools; the idols of parasites; and the slaves of their own vaunts.

LV. *Of Honour and Reputation.*

THE winning of honour is but the revealing of a man's virtue and worth without disadvantage. For some in their actions do woo and affect honour and reputation; which sort of men are commonly much talked of, but inwardly little admired. And some, contrariwise, darken their virtue in the shew of it; so as they be undervalued in opinion. If a man perform that which hath not been attempted before, or attempted and given over; or hath been achieved, but not with so good circumstance; he shall purchase more honour than by effecting a matter of greater difficulty or virtue, wherein he is but a follower. If a man so temper his actions, as in some one of them he doth content every faction or combination of people, the music will be the fuller. A man is an ill husband of his honour that entereth into any action, the failing wherein may disgrace him more than the carrying of it through can honour him. Honour that is gained and broken upon another, hath the quickest reflexion, like diamonds cut with facets. And therefore let a man contend to excel any competitors of his in honour, in out-shooting them, if he can, in their own bow. Discreet followers and servants help much to reputation: *omnis fama à domesticis emanat.* Envy, which is the canker of honour, is best extinguished by declaring a man's self, in his ends rather to seek merit, than fame; and by attributing a man's successes rather to divine providence and felicity, than to his own virtue or policy. The true marshalling of the degrees of sovereign honour, are these. In the first place are *conditores imperiorum*; founders of states and commonwealths; such as were Romulus, Cyrus, Cæsar, Ottoman, Ismael. In the second place are *legislatores*, lawgivers, which are also called second founders, or *perpetui principes*, because they govern by their ordinances, after they are gone: such were Lycurgus, Solon, Justinian, Edgar, Alphonus of Castile the wise, that made the *Siete partidas*. In the third place are *liberatores*, or *salvatores*; such as compound the long miseries of civil wars, or deliver their countries from servitude of strangers or tyrants; as Augustus Cæsar, Vespasianus, Aurelianus, Theodoricus, king Henry the seventh of England, king Henry the fourth of France. In the fourth place are *propagatores*, or *propugnatores imperii*, such as in honourable wars enlarge their territories, or make noble defence against invaders. And in the last place, are *patres patriæ*, which reign justly, and make the times good wherein they live. Both which last kinds need no examples, they are in such number. Degrees of honour in subjects are; first, *participes curarum*, those upon whom princes do discharge the greatest weight of their affairs; their right hands, as we call them. The next are *duces belli*, great leaders; such as are princes lieutenants, and do them notable services in the wars. The third are *gratiosi*, favourites; such as exceed not this scantling, to be solace to the sovereign, and harmless to the people: and the fourth, *negotii pares*; such as have great places under princes, and execute their places with sufficiency. There is an honour likewise, which may be ranked amongst the greatest, which hap-

peneth

peneth rarely : that is, of such as sacrifice themselves to death or danger for the good of their country ; as was M. Regulus, and the two Decii.

LVI. Of JUDICATURE.

JUDGES ought to remember, that their office is *jus dicere*, and not *jus dare* ; to interpret law, and not to make law, or give law. Else will it be like the authority claimed by the church of Rome ; which, under pretext of exposition of Scripture, doth not stick to add and alter ; and to pronounce that which they do not find ; and by shew of antiquity to introduce novelty. Judges ought to be more learned than witty ; more reverend than plausible ; and more advised than confident. Above all things, integrity is their portion and proper virtue. *Cursed*, saith the law, *is he that removeth the land-mark*. The mislayer of a mere-stone is to blame : but it is the unjust judge that is the capital remover of land-marks, when he defineth amiss of lands and property. One foul sentence doth more hurt than many foul examples. For these do but corrupt the stream : the other corrupteth the fountain. So saith Solomon ; *Fons turbatus, et vena corrupta, est justus cadens in causa sua coram adversario*. The office of judges may have reference unto the parties that sue ; unto the advocates that plead ; unto the clerks and ministers of justice underneath them ; and to the sovereign or state above them.

First, for the causes or parties that sue. *There be*, saith the Scripture, *that turn judgment into wormwood* ; and surely there be also that turn it into vinegar : for injustice maketh it bitter, and delays make it sour. The principal duty of a judge is to suppress force and fraud ; whereof force is the more pernicious when it is open ; and fraud when it is close and disguised. Add thereto contentious suits, which ought to be spewed out as the surfeit of courts. A judge ought to prepare his way to a just sentence, as God useth to prepare his way, by raising valleys and taking down hills : so when there appeareth on either side an high hand, violent prosecution, cunning advantages taken, combination, power, great counsel, then is the virtue of a judge seen, to make inequality equal ; that he may plant his judgment as upon an even ground. *Qui fortiter emungit, elicit sanguinem* ; and where the wine-press is hard wrought, it yields a harsh wine that tastes of the grape-stone. Judges must beware of hard constructions and strained inferences ; for there is no worse torture than the torture of laws : especially in case of laws penal they ought to have care, that that which was meant for terror be not turned into rigour ; and that they bring not upon the people that shower whereof the Scripture speaketh, *pluet super eos laqueos* : for penal laws pressed, are a shower of snares upon the people. Therefore let penal laws, if they have been sleepers of long, or if they be grown unfit for the present time, be by wise judges confined in the execution ; *Judicis officium est, ut res, ita tempora rerum, etc.* In causes of life and death, judges ought, as far as the law permiteth, in justice to remember mercy ; and to cast a severe eye upon the example, but a merciful eye upon the person.

Secondly, for the advocates and counsel that plead : patience and gravity of hearing is an essential part of justice ; and an over-speaking judge is no well-tuned cymbal. It is no grace to a judge, first to find that which he might have heard in due time from the bar ; or to shew quickness of conceit in cutting off evidence or counsel too short ; or to prevent information by questions, though pertinent. The parts of a judge in hearing

hearing are four : to direct the evidence ; to moderate length, repetition, or impertinency of speech ; to recapitulate, select, and collate, the material points of that which hath been said ; and to give the rule or sentence. Whatsoever is above these, is too much ; and proceedeth either of glory and willingness to speak, or of impatience to hear, or of shortness of memory, or of want of a stayed and equal attention. It is a strange thing to see, that the boldness of advocates should prevail with judges ; whereas they should imitate God, in whose seat they sit : who *represseth the presumptuous*, and *giveth grace to the modest*. But it is more strange, that judges should have noted favourites ; which cannot but cause multiplication of fees and suspicion of by-ways. There is due from the judge to the advocate some commendation and gracing where causes are well handled, and fairly pleaded ; especially towards the side which obtaineth not ; for that upholds in the client the reputation of his counsel, and beats down in him the conceit of his cause. There is likewise due to the public a civil reprehension of advocates, where there appeareth cunning counsel, gross neglect, slight information, indiscreet pressing, or an over-bold defence. And let not the counsel at the bar chop with the judge, nor wind himself into the handling of the cause anew, after the judge hath declared his sentence : but on the other side, let not the judge meet the cause half way ; nor give occasion to the party to say, his counsel or proofs were not heard.

Thirdly, for that that concerns clerks and ministers. The place of justice is an hallowed place ; and therefore not only the bench, but the footpace, and precincts, and purprise thereof, ought to be preserved without scandal and corruption. For certainly *grapes*, as the Scripture saith, *will not be gathered of thorns or thistles* : neither can justice yield her fruit with sweetness, amongst the briers and brambles of catching and polling clerks and ministers. The attendance of courts is subject to four bad instruments. First, certain persons that are sowers of suits ; which make the court swell, and the country pine. The second sort is of those that engage courts in quarrels of jurisdiction, and are not truly *amici curiae*, but *parasiti curiae*, in puffing a court up beyond her bounds, for their own scraps and advantage. The third sort is of those that may be accounted the left hands of courts ; persons that are full of nimble and sinister tricks and shifts, whereby they pervert the plain and direct courses of courts, and bring justice into oblique lines and labyrinths. And the fourth is, the poller and exacter of fees ; which justifies the common resemblance of the courts of justice to the bush, whereunto while the sheep flies for defence in weather, he is sure to lose part of his fleece. On the other side, an ancient clerk, skilful in precedents, wary in proceeding, and understanding in the business of the court, is an excellent finger of a court, and doth many times point the way to the judge himself.

Fourthly, for that which may concern the sovereign and estate. Judges ought above all to remember the conclusion of the Roman twelve tables ; *salus populi suprema lex* ; and to know that laws, except they be in order to that end, are but things captious, and oracles not well inspired. Therefore it is an happy thing in a state, when kings and states do often consult with judges ; and again, when judges do often consult with the king and state ; the one, when there is matter of law intervenient in business of state ; the other, when there is some consideration of state intervenient in matter of law. For many times the things deduced to judgment may be *meum* and *tuum*, when the reason and consequence thereof may trench to point of estate. I call matter of estate, not only the parts of sovereignty, but whatsoever introduceth any great alteration, or dangerous precedent ; or concerneth manifestly any great portion of people. And let no man weakly conceive, that just laws and true policy have any

ESSAYS CIVIL AND MORAL.

antipathy, for they are like the spirits and sinews, that one moves with the other. Let judges also remember, that Solomon's throne was supported by lions on both sides; let them be lions, but yet lions under the throne; being circumspect that they do not check or oppose any points of sovereignty. Let not judges also be so ignorant of their own right, as to think there is not left to them, as a principal part of their office, a wise use and application of laws. For they may remember what the apostle saith of a greater law than theirs; *Nos scimus quia lex bona est, modo quis ea utatur legitime.*

LVII. Of ANGER.

TO seek to extinguish anger utterly, is but a bravery of the Stoics. We have better oracles: *Be angry, but sin not. Let not the sun go down upon your anger.* Anger must be limited and confined, both in race and in time. We will first speak, how the natural inclination and habit, *to be angry*, may be attempered and calmed. Secondly, how the particular motions of anger may be repressed, or at least refrained from doing mischief. Thirdly, how to raise anger, or appease anger, in another.

For the first, there is no other way but to meditate and ruminate well upon the effects of anger, how it troubles man's life. And the best time to do this, is to look back upon anger when the fit is thoroughly over. Seneca saith well; That anger is like ruin, which breaks itself upon that it falls. The Scripture exhorteth us, *to possess our souls in patience.* Whosoever is out of patience, is out of possession of his soul. Men must not turn bees;

animasque in vulnere ponunt.

Anger is certainly a kind of baseness; as it appears well in the weakness of those subjects in whom it reigns; children, women, old folks, sick folks. Only men must beware, that they carry their anger rather with scorn, than with fear; so that they may seem rather to be above the injury, than below it. Which is a thing easily done, if a man will give law to himself in it.

For the second point, the causes and motives of anger are chiefly three. First, to be too sensible of hurt; for no man is angry that feels not himself hurt: and therefore tender and delicate persons must needs be oft angry; they have so many things to trouble them, which more robust natures have little sense of. The next is the apprehension and construction of the injury offered to be, in the circumstances thereof, full of contempt. For contempt is that which putteth an edge upon anger, as much or more than the hurt itself. And therefore when men are ingenious in picking out circumstances of contempt, they do kindle their anger much. Lastly, opinion of the touch of a man's reputation doth multiply and sharpen anger. Wherein the remedy is, that a man should have, as Consalvo was wont to say, *telam honoris crassiozem.* But in all refrainings of anger, it is the best remedy to win time; and to make a man's self believe, that the opportunity of his revenge is not yet come: but that he foresees a time for it, and so to still himself in the mean time, and reserve it.

To contain anger from mischief, though it take hold of a man, there be two things whereof you must have special caution. The one of extreme bitterness of words, especially if they be aculeate and proper: for *communia maledicta* are nothing so much: and again, that in anger a man reveal no secrets; for that makes them not fit for society. The other, that you do not peremptorily break off, in any business, in a fit of anger: but howsoever you shew bitterness, do not act any thing that is not revocable.

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For raising and appeasing anger in another; it is done chiefly by choosing of times. When men are frowardeſt and worſt diſpoſed, to incenſe them. Again, by gathering, as was touched before, all that you can find out to aggravate the contempt: and the two remedies are by the contraries. The former, to take good times, when firſt to relate to a man an angry buſineſs: for the firſt impreſſion is much. And the other is, to ſever, as much as may be, the conſtruction of the injury, from the point of contempt: imputing it to miſunderſtanding, fear, paſſion, or what you will.

LVIII. *Of VICISSITUDE OF THINGS.*

SOLOMON faith, *There is no new thing upon the earth*: ſo that as Plato had an imagination, that all knowledge was but remembrance; ſo Solomon giveth his ſentence, *that all novelty is but oblivion*. Whereby you may ſee, that the river of Lethe runneth as well above ground as below. There is an abſtruſe aſtrologer, that faith, if it were not for two things that are conſtant, the one is, that the fixed ſtars ever ſtand at like diſtance one from another, and never come nearer together, nor go farther aſunder: the other, that the diurnal motion perpetually keepeth time, no individual would laſt one moment. Certain it is, that the matter is in a perpetual flux, and never at a ſtay. The great winding ſheets that bury all things in oblivion, are two: deluges, and earthquakes. As for conflagrations, and great droughts, they do not merely diſpeople and deſtroy. Phaeton's car went but a day. And the three years drought, in the time of Elias, was but particular, and left people alive. As for the great burnings by lightnings, which are often in the Weſt-Indies, they are but narrow. But in the other two deſtructions, by deluge and earthquake, it is farther to be noted, that the remnant of people which hap to be reſerved, are commonly ignorant and mountainous people, that can give no account of the time paſt: ſo that the oblivion is all one, as if none had been left. If you conſider well of the people of the Weſt-Indies, it is very probable that they are a newer or a younger people than the people of the old world: and it is much more likely, that the deſtruction that hath heretofore been there, was not by earthquakes, as the Egyptian prieſt told Solon, concerning the iſland of Atlantis, that it was ſwallowed by an earthquake, but rather, that it was deſolated by a particular deluge; for earthquakes are ſeldom in thoſe parts: but, on the other ſide, they have ſuch pouring rivers, as the rivers of Aſia, and Africa, and Europe, are but brooks to them. Their Andes likewiſe, or mountains, are far higher than thoſe with us; whereby it ſeems, that the remnants of generation of men were in ſuch a particular deluge ſaved. As for the obſervation that Machiavel hath, that the jealouſy of ſects doth much extinguiſh the memory of things; traducing Gregory the Great, that he did what in him lay to extinguiſh all heathen antiquities; I do not find that thoſe zeals do any great effects, nor laſt long; as it appeared in the ſucceſſion of Sabinian, who did revive the former antiquities.

The viciffitude or mutations in the ſuperior globe are no fit matter for this preſent argument. It may be, Plato's great year, if the world ſhould laſt ſo long, would have ſome effect, not in renewing the ſtate of like individuals, for that is the fume of thoſe, that conceive the celeftial bodies have more accurate influences upon theſe things below than indeed they have, but in groſs. Comets, out of queſtion, have likewiſe power and effect over the groiſs and maſs of things: but they are rather gazed upon, and waited upon in their journey, than wiſely obſerved in their effects; eſpecially in their reſpective effects: that is, what kind of comet, for magnitude, colour, verſion of the beams, placing in the region of heaven, or laſting, produceth what kind of effects.

There is a toy, which I have heard, and I would not have it given over, but waited upon a little. They say it is observed in the Low Countries, I know not in what part, that every five and thirty years, the same kind and fate of years and weathers comes about again : as great frost, great wet, great droughts, warm winters, summers with little heat, and the like ; and they call it the prime. It is a thing I do the rather mention, because, computing backwards, I have found some concurrence.

But to leave these points of nature, and to come to men. The greatest vicissitude of things amongst men is the vicissitude of sects and religions : for those orbs rule in mens minds most. The true religion is built upon the rock : the rest are tossed upon the waves of time. To speak therefore of the causes of new sects, and to give some counsel concerning them, as far as the weakness of human judgment can give stay to so great revolutions.

When the religion formerly received is rent by discords ; and when the holiness of the professors of religion is decayed and full of scandal ; and withal the times be stupid, ignorant, and barbarous, you may doubt the springing up of a new sect ; if then also there should arise any extravagant and strange spirit to make himself author thereof : all which points held when Mahomet published his law. If a new sect have not two properties, fear it not ; for it will not spread. The one is the supplanting, or the opposing of authority established : for nothing is more popular than that. The other is the giving licence to pleasures and a voluptuous life. For as for speculative heresies, such as were in ancient times the Arians, and now the Arminians, though they work mightily upon mens wits, yet they do not produce any great alterations in states ; except it be by the help of civil occasions. There be three manner of plantations of new sects : by the power of signs and miracles ; by the eloquence and wisdom of speech and persuasion ; and by the sword. For martyrdoms, I reckon them amongst miracles ; because they seem to exceed the strength of human nature : and I may do the like of superlative and admirable holiness of life. Surely there is no better way to stop the rising of new sects and schisms, than to reform abuses ; to compound the smaller differences ; to proceed mildly, and not with sanguinary persecutions ; and rather to take off the principal authors, by winning and advancing them, than to enrage them by violence and bitterness.

The changes and vicissitudes in wars are many : but chiefly in three things ; in the seats or stages of the war ; in the weapons ; and in the manner of the conduct. Wars, in ancient time, seemed more to move from east to west : for the Persians, Assyrians, Arabians, Tartars, which were the invaders, were all eastern people. It is true, the Gauls were western ; but we read but of two incursions of theirs ; the one to Gallo-Græcia, the other to Rome. But east and west have no certain points of heaven ; and no more have the wars, either from the east or west, any certainty of observation. But north and south are fixed : and it hath seldom or never been seen, that the far southern people have invaded the northern, but contrariwise ; whereby it is manifest, that the northern tract of the world is in nature the more martial region : be it in respect of the stars of that hemisphere, or of the great continents that are upon the north ; whereas the south part, for ought that is known, is almost all sea ; or which is most apparent, of the cold of the northern parts ; which is that which, without aid of discipline, doth make the bodies hardest, and the courages warmest.

Upon the breaking and shivering of a great state and empire, you may be sure to have wars. For great empires, while they stand, do enervate and destroy the forces of the natives which they have subdued, resting upon their own protecting forces :
and

and then when they fail also, all goes to ruin, and they become a prey. So was it in the decay of the Roman empire, and likewise in the empire of Almaine, after Charles the Great, every bird taking a feather; and were not unlike to befall to Spain, if it should break. The great accessions and unions of kingdoms do likewise stir up wars. For when a state grows to an over-power, it is like a great flood, that will be sure to overflow. As it hath been seen in the states of Rome, Turkey, Spain, and others. Look, when the world hath fewest barbarous people, but such as commonly will not marry or generate, except they know means to live, as it is almost every where at this day, except Tartary, there is no danger of inundations of people: but when there be great shoals of people, which go on to populate, without foreseeing means of life and sustentation, it is of necessity that once in an age or two they discharge a portion of their people upon other nations; which the ancient northern people were wont to do by lot; casting lots what part should stay at home, and what should seek their fortunes. When a warlike state grows soft and effeminate, they may be sure of a war. For commonly such states are grown rich in the time of their degenerating; and so the prey inviteth, and their decay in valour encourageth a war.

As for the weapons, it hardly falleth under rule and observation: yet we see, even they have returns and vicissitudes. For certain it is, that ordnance was known in the city of the Oxidracas in India; and was that which the Macedonians called thunder and lightening, and magic. And it is well known, that the use of ordnance hath been in China above two thousand years. The conditions of weapons, and their improvement are, first, the fetching afar off; for that outruns the danger; as it is seen in ordnance and muskets. Secondly, the strength of the percussion; wherein likewise ordnance do exceed all variations and ancient inventions. The third is, the commodious use of them; as that they may serve in all weathers; that the carriage may be light and manageable; and the like.

For the conduct of the war: at the first, men rested extremely upon number: they did put the wars likewise upon main force and valour, pointing days for pitched fields, and so trying it out, upon an even match: and they were more ignorant in ranging and arraying their battles. After, they grew to rest upon number rather competent than vast; they grew to advantages of place, cunning diversions, and the like: and they grew more skilful in the ordering of their battles.

In the youth of a state, arms do flourish; in the middle age of a state, learning; and then both of them together for a time: in the declining age of a state, mechanical arts and merchandize. Learning hath its infancy, when it is but beginning and almost childish: then its youth, when it is luxuriant and juvenile: then its strength of years, when it is solid and reduced: and lastly, its old age, when it waxeth dry and exhausted. But it is not good to look too long upon these turning wheels of vicissitude, lest we become giddy. As for the philology of them, that is but a circle of tales, and therefore not fit for this writing.

Of a KING.

1. **A** King is a mortal god on earth, unto whom the living God hath lent his own name as a great honour; but withal told him, he should die like a man, lest he should be proud and flatter himself, that God hath with his name imparted unto him his nature also.

2. Of all kind of men, God is the least beholden unto them; for he doth most for them, and they do ordinarily least for him.

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3. A king that would not feel his crown too heavy for him, must wear it every day; but if he think it too light, he knoweth not of what metal it is made.

4. He must make religion the rule of government, and not to balance the scale; for he that casteth in religion only to make the scales even, his own weight is contained in those characters, *Mene, mene, tekel, upharfin*, *He is found too light, his kingdom shall be taken from him.*

5. And that king that holds not religion the best reason of state, is void of all piety and justice, the supporters of a king.

6. He must be able to give counsel himself, but not rely thereupon; for though happy events justify their counsels, yet it is better that the evil event of good advice be rather imputed to a subject than a sovereign.

7. He is the fountain of honour, which should not run with a waste pipe, lest the courtiers sell the water, and then, as papists say of their holy wells, it loses the virtue.

8. He is the life of the law, not only as he is *lex loquens* himself, but because he animateth the dead letter, making it active towards all his subjects *praemio et poena.*

9. A wise king must do less in altering his laws than he may; for new government is ever dangerous. It being true in the body politic, as in the corporal, that *omnis subita immutatio est periculosa*; and though it be for the better, yet it is not without a fearful apprehension; for he that changeth the fundamental laws of a kingdom, thinketh there is no good title to a crown, but by conquest.

10. A king that setteth to sale seats of justice, oppresseth the people; for he teacheth his judges to sell justice; and *pretio parata pretio venditur justitia.*

11. Bounty and magnificence are virtues very regal, but a prodigal king is nearer a tyrant than a parsimonious; for store at home draweth not his contemplations abroad; but want supplieth itself of what is next, and many times the next way: a king herein must be wise, and know what he may justly do.

12. That king which is not feared, is not loved; and he that is well seen in his craft, must as well study to be feared as loved; yet not loved for fear, but feared for love.

13. Therefore, as he must always resemble him whose great name he beareth, and that as in manifesting the sweet influence of his mercy on the severe stroke of his justice sometimes, so in this not to suffer a man of death to live; for besides that the land doth mourn, the restraint of justice towards sin doth more retard the affection of love, than the extent of mercy doth inflame it; and sure where love is [ill] bestowed, fear is quite lost.

14. His greatest enemies are his flatterers; for though they ever speak on his side, yet their words still make against him.

15. The love which a king oweth to a weal public, should not be restrained to any one particular; yet that his more special favour do reflect upon some worthy ones, is somewhat necessary, because there are few of that capacity.

16. He must have a special care of five things, if he would not have his crown to be but to him *infelix felicitas.*

First, that *simulata sanctitas* be not in the church; for that is *duplex iniquitas.*

Secondly, that *inutilis aequitas* sit not in the chancery; for that is *inepta misericordia.*

Thirdly, that *utilis iniquitas* keep not the exchequer; for that is *crudelo latrocinium.*

Fourthly, that *fidelis temeritas* be not his general; for that will bring but *seram poenitentiam.*

Fifthly,

Fifthly, that *infidelis prudentia* be not his secretary; for that is *anguis sub viridi herba*.

To conclude; as he is of the greatest power, so he is subject to the greatest cares, made the servant of his people, or else he were without a calling at all.

He then that honoureth him not is next an atheist, wanting the fear of God in his heart.

A fragment of an Essay on FAME.

THE poets make Fame a monster. They describe her in part finely and elegantly; and in part gravely and sententiously. They say: Look, how many feathers she hath, so many eyes she hath underneath; so many tongues; so many voices; she pricks up so many ears.

This is a flourish, there follow excellent parables; as, that she gathereth strength in going; that she goeth upon the ground, and yet hideth her head in the clouds: that in the day-time she sitteth in a watch-tower, and flieth most by night: that she mingleth things done, with things not done: and that she is a terror to great cities. But that which passeth all the rest is, they do recount that the Earth, mother of the giants, that made war against Jupiter, and were by him destroyed, thereupon in an anger brought forth Fame; for certain it is, that rebels, figured by the giants, and seditious fames and libels, are but brothers and sisters; masculine and feminine. But now if a man can tame this monster, and bring her to feed at the hand, and govern her, and with her fly other ravening fowl, and kill them, it is somewhat worth. But we are infected with the stile of the poets. To speak now in a sad and a serious manner; there is not in all the politics a place less handled, and more worthy to be handled, than this of fame. We will therefore speak of these points: what are false fames; and what are true fames; and how they may be best discerned; how fames may be sown and raised; how they may be spread and multiplied; and how they may be checked and laid dead. And other things concerning the nature of fame. Fame is of that force, as there is scarcely any great action wherein it hath not a great part, especially in the war. Mucianus undid Vitellius by a fame that he scattered, that Vitellius had in purpose to remove the legions of Syria into Germany, and the legions of Germany into Syria; whereupon the legions of Syria were infinitely inflamed. Julius Cæsar took Pompey unprovided, and laid asleep his industry and preparations, by a fame that he cunningly gave out, how Cæsar's own soldiers loved him not; and being wearied with the wars, and laden with the spoils of Gaul, would forsake him as soon as he came into Italy. Livia settled all things for the succession of her son Tiberius, by continual giving out that her husband Augustus was upon recovery and amendment. And it is an usual thing with the bashaws, to conceal the death of the Great Turk from the janizaries and men of war, to save the sacking of Constantinople and other towns, as their manner is. Themistocles made Xerxes, king of Persia, post apace out of Grecia, by giving out that the Grecians had a purpose to break his bridge of ships which he had made athwart the Hellespont. There be a thousand such like examples, and the more they are, the less they need to be repeated, because a man meeteth with them every where: therefore let all wise governors have as great a watch and care over fames, as they have of the actions and designs themselves.

The rest was not finished.

A
C O L L E C T I O N
O F
A P O P H T H E G M S
N E W and O L D.

HIS LORDSHIP'S PREFACE.

JULIUS Cæsar did write a collection of apophthegms as appears in an epistle of Cicero; so did Macrobius, a consular man. I need say no more for the worth of a writing of that nature. It is pity Cæsar's book is lost: for I imagine they were collected with judgment and choice; whereas that of Plutarch and Stobæus, and much more the modern ones, draw much of the dregs. Certainly they are of excellent use. They are mucrones verborum, pointed speeches. The words of the wise are as goads, saith Solomon. Cicero prettily calleth them salinas, salt-pits, that you may extract salt out of, and sprinkle it where you will. They serve to be interlaced in continued speech. They serve to be recited upon occasion of themselves. They serve if you take out the kernel of them, and make them your own. I have, for my recreation amongst more serious studies, collected some few of them (a): therein fanning the old; not omitting any, because they are vulgar, for many vulgar ones are excellent good, nor for the meanness of the person, but because they are dull and flat; and adding many new, that otherwise would have died.

(a) This collection his lordship made out of his memory, without turning any book. *Ravins.*

A

C O L L E C T I O N

O F

A P O P H T H E G M S New and Old.

1. **Q**UEEN Elizabeth, the morrow of her coronation, it being the custom to release prisoners at the inauguration of a prince, went to the chapel ; and in the great chamber, one of her courtiers, who was well known to her, either out of his own motion, or by the instigation of a wiser man, presented her with a petition ; and before a number of courtiers, besought her with a loud voice, “ That now this good time, there might be four or five principal prisoners more released : those were the four evangelists and the apostle St. Paul, who had been long shut up in an unknown tongue, as it were in prison ; so as they could not converse with the common people.” The Queen answered very gravely, “ That it was best first to inquire of them, Whether they would be released or no.”

2. Queen Ann Bullen, at the time when she was led to be beheaded in the Tower, called one of the king’s privy-chamber to her, and said unto him, “ Com- mend me to the king, and tell him, that he hath been ever constant in his course of advancing me ; from a private gentlewoman he made me a marchioness ; and from a marchioness a queen ; and now, that he hath left no higher degree of earthly honour, he intends to crown my innocency with the glory of martyrdom.”

3. His majesty James the first, king of Great Britain, having made unto his parliament an excellent and large declaration, concluded thus ; “ I have now given you a clear mirrour of my mind ; use it therefore like a mirrour, and take heed how you let it fall, or how you foil it with your breath.”

4. A great officer in France was in danger to have lost his place ; but his wife, by her suit and means making, made his peace ; whereupon a pleasant fellow said, “ That he had been crushed, but that he saved himself upon his horns.”

5. His majesty said to his parliament at another time, finding there were some causeless jealousies sown amongst them ; “ That the king and his people, whereof the parliament is the representative body, were as husband and wife ; and therefore that of all other things jealousy was between them most pernicious.”

6. His majesty, when he thought his council might note in him some variety in businesses, though indeed he remained constant, would say, “ That the sun many times shineth watery ; but it is not the sun which causeth it, but some cloud rising betwixt us and the sun : and when that is scattered, the sun is as it was, and comes to his former brightness.”

7. His

7. His majesty, in his answer to the book of the cardinal of Evereux, who had in a grave argument of divinity sprinkled many witty ornaments of poetry and humanity, saith; "That these flowers were like blue, and yellow, and red flowers in the corn, which make a pleasant shew to those that look on, but they hurt the corn."

8. Sir Edward Coke being vehement against the two provincial councils of Wales, and the north, said to the king; "There was nothing there but a kind of confusion and hotch-potch of justice: one while they were a star-chamber; another while a kings-bench; another, a common pleas; another, a commission of oyer and terminer." His majesty answered; "Why, Sir Edward Coke, they be like houses in progress, where I have not, nor can have, such distinct rooms of state, as I have here at Whitehall, or at Hampton-court."

9. The commissioners of the treasury moved the king for the relief of his estate, to disafforest some forests of his, explaining themselves of such forests as lay out of the way, not near any of the king's houses, nor in the court of his progress; whereof he should never have use nor pleasure. "Why, saith the king, do you think that Solomon had use and pleasure of all his three hundred concubines!"

10. His majesty, when the committees of both houses of parliament presented unto him the instrument of union of England and Scotland, was merry with them; and amongst other pleasant speeches, shewed unto them the laird of Lawreston a Scotchman, who was the tallest and greatest man that was to be seen, and said; "Well, now we are all one, yet none of you will say, but here is one Scotchman greater than any Englishman;" which was an ambiguous speech; but it was thought he meant it of himself.

11. His majesty would say to the lords of his council when they sat upon any great matter, and came from council in to him, "Well, you have sat, but what have you hatched?"

12. When the arch-duke did raise his siege from the Grave, the then secretary came to queen Elizabeth. The queen, having first intelligence thereof, said to the secretary, "Wote you what? The arch-duke is risen from the Grave." He answered; "What, without the trumpet of the arch-angel?" The queen replied, "Yes; without the sound of trumpet."

13. Queen Elizabeth was importuned much by my lord of Essex, to supply divers great offices that had been long void; the queen answered nothing to the matter; but rose up on the sudden, and said; "I am sure my office will not be long void." And yet at that time there was much speech of troubles, and divisions about the crown, to be after her decease; but they all vanished; and king James came in, in a profound peace.

14. The council did make remonstrance unto queen Elizabeth of the continual conspiracies against her life; and namely, that a man was lately taken, who stood ready in a very dangerous and suspicious manner to do the deed: and they shewed her the weapon, wherewith he thought to have acted it. And therefore they advised her, that she should go less abroad to take the air, weakly attended, as she used. But the queen answered, "That she had rather be dead, than put in custody."

15. The lady Paget, that was very private with queen Elizabeth, declared herself much against the match with Monsieur. After monsieur's death, the queen

took extreme grief, at least as she made shew, and kept in within her bed-chamber and one ante-chamber for three weeks space, in token of mourning: at last she came forth into the privy-chamber, and admitted her ladies to have access unto her; and amongst the rest, my lady Paget presented herself, and came to her with a smiling countenance. The queen bent her brows, and seemed to be highly displeas'd, and said to her; "Madam, you are not ignorant of my extreme grief, and do you come to me with a countenance of joy?" My lady Paget answered; "Alas, if it please your majesty, it is impossible for me to be absent from you three weeks, but that when I see you, I must look chearfully." "No, no, said the queen, not forgetting her former averfeness to the match, you have some other conceit in it, tell me plainly." My lady answered, "I must obey you; it is this. I was thinking how happy your majesty was, you married not Monsieur; for seeing you take such thought for his death, being but your friend; if he had been your husband, sure it would have cost you your life."

16. Henry the fourth of France his queen was young with child; count Soissons, that had his expectation upon the crown, when it was twice or thrice thought that the queen was with child before, said to some of his friends, "That it was but with a pillow." This had some ways come to the king's ear; who kept it till such time as the queen waxed great: then he called the count of Soissons to him, and said, laying his hand upon the queen's belly; "Come cousin, is this a pillow?" The count of Soissons answered; "Yes, sir, it is a pillow for all France to sleep upon."

17. King Henry the fourth of France was so punctual of his word, after it was once pass'd, that they called him "The king of the faith."

18. The said king Henry the fourth was moved by his parliament to a war against the protestants: he answered, "Yes, I mean it; I will make every one of you captains; you shall have companies assigned you." The parliament observing whereunto his speech tended, gave over, and deserted his motion.

19. Queen Elizabeth was wont to say, upon the commission of sales, "That the commissioners used her like strawberry-wives, that laid two or three great strawberries at the mouth of their pot, and all the rest were little ones; so they made her two or three good prizes of the first particulars, but fell straight-ways."

20. Queen Elizabeth used to say of her instructions to great officers, "That they were like to garments, strait at the first putting on, but did by and by wear loose enough."

21. A great officer at court, when my lord of Essex was first in trouble; and that he, and those that dealt for him, would talk much of my lord's friends, and of his enemies, answered to one of them; "I will tell you, I know but one friend and one enemy my lord hath, and that one friend is the queen, and that one enemy is himself."

22. The book for deposing king Richard the second, and the coming in of Henry the fourth, supposed to be written by doctor Hayward, who was committed to the Tower for it, had much incens'd queen Elizabeth; and she asked Mr. Bacon, being then of her counsel learned; "Whether there were any treason contained in it?" Who intending to do him a pleasure, and to take off the queen's bitterness with a merry conceit, answered; "No, madam, for treason I cannot deliver opinion that there is any, but very much felony." The queen apprehending it gladly, asked,
"How?"

“ How ? and wherein ? ” Mr. Bacon answered, “ Because he had stolen many of his sentences and conceits out of Cornelius Tacitus.”

23. Queen Elizabeth being to resolve upon a great officer, and being by some, that canvassed for others, put in some doubt of that person whom she meant to advance, called for Mr. Bacon ; and told him, “ She was like one with a lanthorn seeking a man ; ” and seemed unsatisfied in the choice she had of a man for that place. Mr. Bacon answered her, “ That he had heard that in old time there was usually painted on the church walls the day of doom, and God sitting in judgment, and Saint Michael by him, with a pair of balances ; and the soul, and the good deeds in the one balance ; and the faults and the evil deeds in the other : and the soul’s balance went up far too light. Then was our lady painted with a great pair of beads, who cast them into the light balance, and brought down the scale : so, he said, place and authority, which were in her majesty’s hands to give, were like our lady’s beads, which though men, through any imperfections, were too light before, yet when they were cast in, made weight competent.”

24. Queen Elizabeth was dilatory enough in suits, of her own nature ; and the lord treasurer Burleigh being a wise man, and willing therein to feed her humour, would say to her ; “ Madam, you do well to let suitors stay ; for I shall tell you, *bis dat, qui cito dat* ; if you grant them speedily, they will come again the sooner.”

25. Sir Nicholas Bacon, who was keeper of the great seal of England, when queen Elizabeth in her progress came to his house at Gorhambury, and said to him ; “ My lord, what a little house have you gotten ? ” answered her ; “ Madam, my house is well, but it is you that have made me too great for my house.”

26. There was a conference in parliament, between the lords house and the house of commons, about a bill of accountants, which came down from the lords to the commons ; which bill prayed, That the lands of accountants, whereof they were seized when they entered upon their office, might be liable to their arrears to the queen. But the commons desired, That the bill might not look back to accountants that were already, but extend only to accountants hereafter. But the lord treasurer said ; “ Why, I pray you, if you had lost your purse by the way, would you look forwards, or would you look back ? The queen hath lost her purse.”

27. The lord keeper, Sir Nicholas Bacon, was asked his opinion by my lord of Leicester, concerning two persons whom the queen seemed to think well of : “ By my troth, my lord, said he, the one is a grave counsellor ; the other is a proper young man ; and so he will be as long as he lives.”

28. My lord of Leicester, favourite to queen Elizabeth, was making a large chace about Cornbury park ; meaning to inclose it with posts and rails ; and one day was casting up his charge what it would come to. Mr. Goldingham, a free spoken man, stood by, and said to my lord ; “ Methinks your lordship goeth not the cheapest way to work.” “ Why, Goldingham,” said my lord. “ Marry, my lord, said Goldingham, count you but upon the posts, for the country will find you railing.”

29. The lord keeper, Sir Nicholas Bacon, was asked his opinion by queen Elizabeth of one of these monopoly licences ? And he answered ; “ Madam, will you have me speak the truth ? *Licentia omnes deterioribus sumus* : We are all the worse for licences.”

30. My

30. My lord of Essex, at the succour of Roan, made twenty four knights, which at that time was a great number. Divers of those gentlemen were of weak and small means ; which when queen Elizabeth heard, she said ; “ My lord might have done well to have built his alms-house, before he made his knights.”

31. The deputies of the reformed religion, after the massacre which was at Paris upon St. Bartholomew’s day, treated with the king and queen-mother, and some other of the council, for a peace. Both sides were agreed upon the articles. The question was, upon the security for the performance. After some particulars propounded and rejected, the queen-mother said, “ Why, is not the word of a king sufficient security ?” One of the deputies answered ; “ No, by St. Bartholomew, madam.”

32. There was a French gentleman speaking with an English of the law Salique ; That women were excluded from inheriting the crown of France. The English said ; “ Yes, but that was meant of the women themselves, not of such males as claimed by women.” The French gentleman said, “ Where did you find that gloss ?” The English answered, “ I’ll tell you, Sir ; look on the back-side of the record of the law Salique, and there you shall find it indorsed :” implying, there was no such thing as the law Salique, but that it is a mere fiction.

33. A frier of France, being in an earnest dispute about the law Salique, would needs prove it by Scripture ; citing that verse of the gospel ; *Lilia agri non laborant, neque nent* ; the lilies of the field do neither labour nor spin ; applying it thus ; That the flower-de-luces of France cannot descend, neither to the distaff, nor to the spade ; that is, not to a woman, nor to a peasant.

34. When peace was renewed with the French in England, divers of the great counsellors were presented from the French with jewels : the lord Henry Howard, being then earl of Northampton and a counsellor, was omitted. Whereupon the king said to him, “ My lord, how happens it that you have not a jewel as well as the rest ?” My lord answered, according to the fable in Æsop ; *Non sum Gallus, itaque non reperi gemmam.*

35. The same earl of Northampton, then lord privy seal, was asked by king James openly at the table, where commonly he entertained the king with discourse ; the king asked him upon the sudden ; “ My lord, have you not a desire to see Rome ?” My lord privy seal answered ; “ Yes indeed, Sir.” The king said, “ And why ?” My lord answered ; “ Because, if it please your majesty, it was the seat of the greatest monarchy, and the seminary of the bravest men in the world, whilst it was heathen : and then, secondly, because afterwards it was the see of so many holy bishops in the primitive church, most of them martyrs.” The king would not give it over, but said ; “ And for nothing else ?” My lord answered ; “ Yes, if it please your Majesty, for two things more : the one, to see him, who, they say, hath so great a power to forgive other men their sins, to confess his own sins upon his knees before a chaplain or priest : and the other to hear Antichrist say his creed.”

36. Sir Nicholas Bacon being appointed a judge for the northern circuit, and having brought his trials that came before him to such a pass, as the passing of sentence on malefactors, he was by one of the malefactors mightily importuned for to save his life ; which, when nothing that he had said did avail, he at length desired his mercy on account of kindred. “ Prithee,” said my lord judge, “ how came that in ?” “ Why, if it please you, my lord, your name is Bacon, and mine is Hog, and in all ages Hog and Bacon have been so near kindred, that they are not to
“ be

“ be separated.” “ Ay, but,” replied judge Bacon, “ you and I cannot be kindred, except you be hanged; for Hog is not Bacon until it be well hanged.”

37. Two scholars and a countryman travelling upon the road, one night lodged all in one inn, and supped together, where the scholars thought to have put a trick upon the countryman, which was thus: the scholars appointed for supper two pigeons, and a fat capon, which being ready was brought up, and they having fat down, the one scholar took up one pigeon, the other scholar took the other pigeon, thinking thereby that the countryman should have fat still, until that they were ready for the carving of the capon; which he perceiving, took the capon and laid it on his trencher, and thus said, “ Daintily contrived, every man a bird.”

38. Jack Roberts was defired by his taylor, when the reckoning grew somewhat high, to have a bill of his hand. Roberts said, “ I am content, but you must let no man know it.” When the taylor brought him the bill, he tore it as in choler, and said to him, “ You use me not well; you promised me that no man should know it, and here you have put in, *Be it known to all men by these presents.*”

39. Sir Walter Raleigh was wont to say of the ladies of queen Elizabeth’s privy-chamber and bed-chamber, “ that they were like witches, they could do hurt, but they could do no good.”

40. There was a minister deprived for inconformity, who said to some of his friends, “ that if they deprived him, it should cost an hundred mens lives.” The party understood it, as if being a turbulent fellow, he would have moved sedition, and complained of him; whereupon being convented and apposed upon that speech, he said his meaning was, “ that if he lost his benefice, he would practise physic, and then he thought he should kill an hundred men in time.”

41. Secretary Bourn’s son kept a gentleman’s wife in Shropshire, who lived from her husband with him: when he was weary of her, he caused her husband to be dealt with to take her home, and offered him five hundred pounds for reparation; the gentleman went to Sir H. Sidney, to take his advice upon this offer, telling him, “ that his wife promised now a new life; and, to tell him truth, five hundred pounds would come well with him; and besides, that sometimes he wanted a woman in his bed.” “ By my troth,” said Sir Henry Sidney, “ take her home, and take the money; then whereas other cuckolds wear their horns plain, you may wear yours gilt.”

42. When Rabelais, the great jester of France, lay on his death-bed, and they gave him the extreme unction, a familiar friend came to him afterwards, and asked him how he did? Rabelais answered, “ Even going my journey, they have greased my boots already.”

43. Mr. Bromley solicitor, giving in evidence for a deed, which was impeached to be fraudulent, was urged by the counsel on the other side with this presumption, That in two former suits when title was made, that deed was passed over in silence, and some other conveyance stood upon. Mr. justice Catiline taking in with that side, asked the solicitor, “ I pray thee, Mr. Solicitor, let me ask you a familiar question; I have two geldings in my stable; I have divers times business of importance, and still I send forth one of my geldings, and not the other; would you not think I set him aside for a jade?” “ No, my lord,” said Bromley, “ I would think you spared him for your own saddle.”

44. Thales, as he looked upon the stars, fell towards water; whereupon it was after said, "that if he had looked into the water he might have seen the stars, but looking up to the stars he could not see the water."

45. A man and his wife in bed together, she towards morning pretended herself to be ill at ease, desiring to lie on her husband's side; so the good man, to please her, came over her, making some short stay in his passage over; where she had not long lain, but desired to lie in her old place again: quoth he, "How can it be effected?" She answered, "Come over me again." "I had rather," said he, "go a mile and a half about."

46. A thief being arraigned at the bar for stealing a mare, in his pleading urged many things in his own behalf, and at last nothing availing, he told the bench, the mare rather stole him, than he the mare; which in brief he thus related: That passing over several grounds about his lawful occasions, he was pursued close by a fierce mastiff dog, and so was forced to save himself by leaping over a hedge, which being of an agile body he effected; and in leaping, a mare standing on the other side of the hedge, leaped upon her back, who running furiously away with him, he could not by any means stop her, until he came to the next town, in which town the owner of the mare lived, and there was he taken, and here arraigned.

47. Master Mason of Trinity college, sent his pupil to another of the fellows, to borrow a book of him, who told him, "I am loth to lend my books out of my chamber, but if it please thy tutor to come and read upon it in my chamber, he shall as long as he will." It was winter, and some days after the same fellow sent to Mr. Mason to borrow his bellows; but Mr. Mason said to his pupil, "I am loth to lend my bellows out of my chamber, but if thy tutor would come and blow the fire in my chamber, he shall as long as he will."

48. A notorious rogue being brought to the bar, and knowing his case to be desperate, instead of pleading, he took to himself the liberty of jesting, and thus said, "I charge you in the king's name, to seize and take away that man, meaning the judge in the red gown, for I go in danger of my life because of him."

49. In Flanders, by accident a Flemish tiler fell from the top of a house upon a Spaniard, and killed him, though he escaped himself; the next of the blood prosecuted his death with great violence, and when he was offered pecuniary recompence, nothing would serve him but *lex talionis*: whereupon the judge said to him, "that if he did urge that sentence, it must be, that he should go up to the top of the house, and then fall down upon the tiler."

50. A rough-hewn seaman, being brought before a wise just-ifs for some misdemeanour, was by him sent away to prison, and being somewhat refractory after he heard his doom, insomuch as he would not stir a foot from the place where he stood, saying, "it were better to stand where he was, than go to a worse place:" the justice thereupon, to shew the strength of his learning, took him by the shoulder, and said, "Thou shalt go *vogus vogus*," instead of *volens volens*.

51. Francis the first of France, used for his pleasure sometimes to go disguised: so walking one day in the company of the cardinal of Bourbon near Paris, he met with a peasant with a new pair of shoes upon his arm: so he called unto him, and said; "By our lady, these be good shoes, what did they cost thee?" The peasant said, "Guess." The king said, "I think some five sols." Saith the peasant, "You have lyed; but a *carlois*." "What, villain," said the cardinal of Bourbon,

Bourbon, "thou art dead, it is the king." The peasant replied; "The devil take him of you and me, that knew so much."

52. There was a young man in Rome, that was very like Augustus Cæsar; Augustus took knowledge of him, and sent for the man, and asked him, "Was your mother ever at Rome?" He answered; "No, sir, but my father was."

53. A physician advised his patient that had sore eyes, that he should abstain from wine; but the patient said, "I think rather, Sir, from wine and water; for I have often marked it in blue eyes, and I have seen water come forth, but never wine."

54. A debauched seaman being brought before a justice of the peace upon the account of swearing, was by the justice commanded to deposite his fine in that behalf provided, which was two shillings; he thereupon plucking out of his pocket a half crown, asked the justice what was the rate he was to pay for cursing; the justice told him, six-pence: quoth he, "Then a pox take you all for a company of knaves and fools, and there's half a crown for you, I will never stand changing of money."

55. Augustus Cæsar was invited to supper by one of his old friends, that had conversed with him in his less fortunes, and had but ordinary entertainment; whereupon at his going away, he said, "I did not know that you and I were so familiar."

56. Agathocles, after he had taken Syracuse, the men whereof, during the siege, had in a bravery spoken of him all the villany that might be, sold the Syracusans for slaves, and said; "Now if you use such words of me, I will tell your masters of you."

57. Dionysius the elder, when he saw his son in many things very inordinate, said to him, "Did you ever know me do such things?" His son answered, "No, but you had not a tyrant to your father." The father replied, "No, nor you, if you take these courses, will have a tyrant to your son."

58. Callisthenes the philosopher, that followed Alexander's court, and hated the king, being asked by one, how one should become the famousst man in the world, answered, "By taking away him that is."

59. Agesilaus, when one told him there was one did excellently counterfeit a nightingale, and would have had him hear him, said; "Why I have heard the nightingale herself."

60. A great nobleman, upon the complaint of a servant of his, laid a citizen by the heels, thinking to bend him to his servant's desire; but the fellow being stubborn, the servant came to his lord, and told him, "Your lordship, I know, hath gone as far as well you may, but it works not; for yonder fellow is more perverse than before." Said my lord, "Let's forget him a while, and then he will remember himself."

61. One came to a cardinal in Rome, and told him, that he had brought his lordship a dainty white palfrey, but he fell lame by the way. Saith the cardinal to him, "I'll tell thee what thou shalt do; go to such a cardinal, and such a cardinal," naming him half a dozen cardinals, "and tell them as much; and so whereas by thy horse, if he had been sound, thou couldest have pleased but one, with thy lame horse thou mayest please half a dozen."

62. A witty rogue coming into a lace-shop, said, he had occasion for some lace; choice whereof being shewed him, he at last pitched upon one pattern, and asked them, how much they would have for so much as would reach from ear to ear,

for so much he had occasion for. They told him, for so much : so some few words passing between them, he at last agreed, and told down his money for it, and began to measure on his own head, thus saying ; “ One ear is here, and the other
“ is nailed to the pillory in Bristol, and I fear you have not so much of this lace
“ by you at present as will perfect my bargain : therefore this piece of lace shall
“ suffice at present in part of payment, and provide the rest with all expedition.”

63. Iphicrates the Athenian, in a treaty that he had with the Lacedæmonians for peace, in which question was about security for observing the same, said ;
“ The Athenians would not accept of any security, except the Lacedæmonians
“ did yield up unto them those things, whereby it might be manifest, that they
“ could not hurt them if they would.”

64. Euripides would say of persons that were beautiful, and yet in some years,
“ In fairest bodies not only the spring is pleasant, but also the autumn.”

65. There was a captain sent to an exploit by his general with forces that were not likely to atchieve the enterprize ; the captain said to him, “ Sir, appoint
“ but half so many. Why, “ saith the general ? The captain answered ; Because
“ it is better fewer die than more.”

66. There was a harbinger who had lodged a gentleman in a very ill room, who expostulated with him somewhat rudely ; but the harbinger carelessly said ;
“ you will take pleasure in it when you are out of it.”

67. There is a Spanish adage, “ Love without end hath no end ;” meaning,
that if it were begun not upon particular ends it would last.

68. A woman being suspected by her husband for dishonesty, and being by him at last pressed very hard about it, made him quick answer with many protestations,
“ that she knew no more of what he said than the man in the moon.” Now the
captain of the ship called the Moon, was the very man she so much loved.

69. Demosthenes when he fled from the battle, and that it was reproached to him, said, “ that he that flies might fight again.”

70. Gonzalvo would say, “ The honour of a soldier ought to be of a strong
“ web ;” meaning, that it should not be so fine and curious, that every little disgrace should catch and stick in it.

71. An apprentice of London being brought before the chamberlain by his master for the sin of incontinency, even with his own mistress, the chamberlain thereupon gave him many christian exhortations ; and at last he mentioned and pressed the chastity of Joseph, when his mistress tempted him with the like crime of incontinency. “ Ay, Sir,” said the apprentice ; “ but if Joseph’s mistress had been
“ as handsome as mine is, he could not have forborn.”

72. Bias gave in precept, “ Love as if you should hereafter hate ; and hate as
“ if you should hereafter love.”

73. Cineas was an excellent orator and statesman, and principal friend and counsellor to Pyrrhus ; and falling in inward talk with him, and discerning the king’s endless ambition ; Pyrrhus opened himself unto him, that he intended first a war upon Italy, and hoped to atchieve it : Cineas asked him, “ Sir, what will you do
“ then ? Then, saith he, we will attempt Sicily.” Cineas said, “ Well, Sir, what
“ then ?” Said Pyrrhus, “ If the Gods favour us, we may conquer Africa and
“ Carthage.” “ What then, Sir,” saith Cineas ? “ Nay then,” saith Pyrrhus, “ we
“ may take our rest, and sacrifice and feast every day, and make merry with our
“ friends.” “ Alas, Sir,” said Cineas, “ may we not do so now without all this ado ?”

74. Lamia

74. Lamia the courtezán had all power with Demetrius king of Macedon, and by her infligations he did many unjust and cruel acts; whereupon Lyfimachus said, "that it was the first time that ever he knew a whore play in a tragedy."

75. One of the Romans said to his friend, "What think you of one who was taken in the act and manner of adultery?" The other answered, "Marry, I think he was slow at dispatch."

76. Epaminondas, when his great friend and colleague in war was suitor to him to pardon an offender, denied him; afterwards, when a concubine of his made the same suit, he granted it to her; which when Pelopidas seemed to take unkindly, he said; "Such suits are to be granted to whores, but not to personages of worth."

77. Thales being asked when a man should marry, said; "Young men not yet, old men not at all."

78. A company of scholars going together to catch conies, carried one scholar with them, which had not much more wit than he was born with; and to him they gave in charge, that if he saw any, he should be silent, for fear of scaring of them. But he no sooner espied a company of rabbits, before the rest, but he cried aloud, *Ecce multi cuniculi*, which in English signifies, "Behold many conies;" which he had no sooner said, but the conies ran to their burrows: and he being checked by them for it, answered, "Who the devil would have thought that the rabbits understood Latin?"

79. A Welchman being at a sessions-house, and seeing the prisoners hold up hands at the bar, related to some of his acquaintance there, "that the judges were good fortune-tellers; for if they did but look upon their hands, they could certainly tell whether they should live or die."

80. Solon compared the people unto the sea, and orators and counsellors to the winds; for that the sea would be calm and quiet, if the winds did not trouble it.

81. Socrates was pronounced by the oracle of Delphos to be the wisest man of Greece, which he would put from himself ironically, saying, "there would be nothing in him to verify the oracle, except this; that he was not wise, and knew it; and others were not wise, and knew it not."

82. Socrates, when there was shewed him the book of Heraclitus the obscure, and was asked his opinion of it, answered; "Those things which I understood were excellent, I imagine so were those I understood not; but they require a diver of Delos."

83. Bion asked an envious man that was very sad, "what harm had befallen unto him, or what good had befallen unto another man."

84. Stilpo the philosopher, when the people flocked about him, and that one said to him, "The people come wondering about you as if it were to see some strange beast?" "No, saith he, it is to see a man which Diogenes fought with his lantern at noon-day."

85. A man being very jealous of his wife, insomuch that which way soever she went, he would be prying at her heels; and she being so grieved thereat, in plain terms told him, "that if he did not for the future leave off his proceedings in that nature, she would graft such a pair of horns upon his head, that should hinder him from coming out of any door in the house."

86. A citizen of London passing the streets very hastily, came at last where some stop was made by carts; and some gentlemen talking together, who knew him, where being in some passion that he could not suddenly pass, one of them in this

wife spoke unto him; "that others had passed by, and there was room enough, "only they could not tell whether their horns were so wide as his."

87. A tinker passing Cheapside with his usual tone, "Have you any work for "a tinker?" an apprentice standing at a door opposite to a pillory there set up, called the tinker, with an intent to put a jest upon him, and told him, "that he should "do very well if he would stop those two holes in the pillory;" to which the tinker answered, "that if he would but put in his head and ears a while in that "pillory, he would bestow both brags and nails upon him to hold him in, and "give him his labour into the bargain."

88. A young maid having married an old man, was observed on the day of marriage to be somewhat moody, as if she had eaten a dish of chums, which one of her bridemen observing, bid her be cheary; and told her moreover, "that an old "horse would hold out as long, and as well as a young one, in travel." To which she answered, stroking down her belly with her hand, "But not in this road, Sir."

89. There was in Oxford a cowardly fellow that was a very good archer; he was abused grossly by another, and moaned himself to Sir Walter Raleigh, then a scholar, and asked his advice, what he should do to repair the wrong had been offered him; Raleigh answered, "Why, challenge him at a match of shooting."

90. Whitehead a grave divine, was much esteemed by queen Elizabeth, but not preferred, because he was against the government of bishops; he was of a blunt stoical nature: he came one day to the queen, and the queen happened to say to him, "I like thee the better, Whitehead, because thou livest unmarried." He answered, "In troth, madam, I like you the worse for the same cause."

91. Doctor Laud said, "that some hypocrites, and seeming mortified men, "that held down their heads like bulrushes, were like the little images that they "place in the very bowing of the vaults of churches, that look as if they held "up the church, but are but puppets."

92. A nobleman of this nation, famously known for his mad tricks, on a time having taken physic, which he perceiving that it began well to work, called up his man to go for a chirurgeon presently, and to bring his instruments with him. The chirurgeon comes in all speed; to whom my lord related, that he found himself much addicted to women, and therefore it was his will, that the cause of it might be taken away, and therefore commanded him forthwith to prepare his instruments ready for to geld him: so the chirurgeon forthwith prepares accordingly, and my lord told him that he would not see it done, and therefore that he should do his work the back way: so, both parties being contented, my lord makes ready, and holds up his a---; and when he perceives the chirurgeon very near him, he lets fly full in his face; which made the chirurgeon step back, but coming presently on again; "Hold, hold, faith my lord, I will better "consider of it, for I see the retentive faculty is very weak at the approach of "such keen instruments."

93. There was a cursed page that his master whipt naked, and when he had been whipt, would not put on his cloaths: and when his master bad him, said, "Take them you, for they are the hangman's fees."

94. There was a lady of the west country, that gave great entertainment at her house to most of the gallant gentlemen thereabouts, and amongst others Sir Walter Raleigh was one. This lady, though otherwise a stately dame, was a notable good housewife; and in the morning betimes she called to one of her maids that
looked

looked to the swine, and asked, "Are the pigs served?" Sir Walter Raleigh's chamber was fast by the lady's, so as he heard her: a little before dinner, the lady came down in great state into the great chamber, which was full of gentlemen; and as soon as Sir Walter Raleigh set eye upon her, "Madam," saith he, "are the pigs served?" The lady answered, "You know best whether you have had your breakfast."

95. There were fishermen drawing the river at Chelsea; Mr. Bacon came thither by chance in the afternoon, and offered to buy their draught: they were willing. He asked them what they would take? They asked Thirty shillings. Mr. Bacon offered them ten. They refused it. Why then, saith Mr. Bacon, I will be only a looker on. They drew, and caught nothing. Saith Mr. Bacon, Are not you mad fellows now, that might have had an angel in your purse, to have made merry withal, and to have warmed you thoroughly, and now you must go home with nothing. Ay but, saith the fishermen, we had hope then to make a better gain of it. Saith Mr. Bacon, "Well, my master, then I will tell you, hope is a good breakfast, but it is " a bad supper."

96. A lady walking with Mr. Bacon in Gray's Inn walks, asked him, Whose that piece of ground lying next under the walls was? He answered, "Theirs." Then she asked him, If those fields beyond the walks were theirs too? He answered, "Yes, " Madam, those are ours, as you are ours, to look on, and no more."

97. His lordship, when he was newly made lord Keeper, was in Gray's Inn walks with Sir Walter Raleigh; one came and told him, that the earl of Exeter was above. He continued upon occasion still walking a good while. At last when he came up, my lord of Exeter met him, and said; "My lord, I have made a great venture, to come up so high stairs, being a gouty man." His lordship answered; "Pardon me, " my lord, I have made the greatest venture of all; for I have ventured upon " your patience."

98. When Sir Francis Bacon was made the king's attorney, Sir Edward Coke was put up from being lord Chief Justice of the common pleas, to be lord Chief Justice of the king's bench; which is a place of greater honour, but of less profit; and withal was made privy counsellor. After a few days, the lord Coke meeting with the king's attorney, said unto him; Mr. Attorney, this is all your doing: It is you that have made this stir. Mr. Attorney answered; "Ah! my lord, your lordship all this " while hath grown in breadth; you must needs now grow in height, or else you " would be a monster."

99. One day queen Elizabeth told Mr. Bacon, that my lord of Essex, after great protestation of penitence and affection, fell in the end but upon the suit of renewing of his farm of sweet wines. He answered; "I read that in nature, there be two kinds " of motions or appetites in sympathy; the one as of iron to the adamant, for per- " fection; the other as of the vine to the stake, for sustentation; that her majesty " was the one, and his suit the other."

100. Mr. Bacon, after he had been vehement in parliament against depopulation and inclosures; and that soon after the queen told in that she had referred the hearing of Mr. Mill's cause to certain counsellors and judges; and asked him how he liked of it? answered; "Oh, madam! my mind is known; I am against all in- " closures, and especially against inclosed justice."

101. When Sir Nicholas Bacon the lord Keeper lived, every room in Gorhambury was served with a pipe of water from the ponds, distant about a mile off. In the lifetime of Mr. Anthony Bacon, the water ceased. After whose death, his lordship coming to the inheritance, could not recover the water without infinite charge: when he

was lord chancellor, he built verulam house, close by the pond-yard, for a place of privacy when he was called upon to dispatch any urgent business. And being asked, why he built that house there; his lordship answered, "that since he could not carry the water to his house, he would carry his house to the water."

102. When my lord president of the council came first to be lord treasurer, he complained to my lord chancellor of the troublesome of the place, for that the exchequer was so empty; the lord chancellor answered; "My lord, be of good cheer, for now you shall see the bottom of your business at the first."

103. When his lordship was newly advanced to the great seal, Gondomar came to visit him. My lord said; that he was to thank God and the king for that honour; but yet, so he might be rid of the burden, he could very willingly forbear the honour: and that he formerly had a desire, and the same continued with him still, to lead a private life. Gondomar answered, that he would tell him a tale of an old rat, that would needs leave the world, and acquainted the young rats that he would retire into his hole, and spend his days solitarily; and would enjoy no more comfort: and commanded them upon his high displeasure, not to offer to come in unto him. They forbore two or three days; at last, one that was more hardy than the rest, incited some of his fellows to go in with him, and he would venture to see how his father did: for he might be dead. They went in, and found the old rat sitting in the midst of a rich Parmesan cheese. So he applied the fable after his witty manner.

104. Rabelais tells a tale of one that was very fortunate in compounding differences. His son undertook the said course, but could never compound any. Whereupon he came to his father, and asked him; what art he had to reconcile differences? He answered; "he had no other but this; to watch when the two parties were much wearied, and their hearts were too great to seek reconciliation at one another's hands; then to be a means betwixt them, and upon no other terms." After which the son went home, and prospered in the same undertakings.

105. Alonso Cartilio was informed by his steward of the greatness of his expence, being such as he could not hold out therewith. The bishop asked him, wherein it chiefly arose? His steward told him, in the multitude of his servants. The bishop bad him to make him a note of those that were necessary, and those that might be spared. Which he did. And the bishop taking occasion to read it before most of his servants, said to his steward; "Well, let these remain because I have need of them; and these other also because they have need of me."

106. Mr. Marbury the preacher would say, "that God was fain to do with wicked men, as men do with frisking jades in a pasture, that cannot take them up, till they get them at a gate. So wicked men will not be taken up till the hour of death."

107. Pope Sixtus the fifth, who was a very poor man's son, and his father's house ill thatched, so that the sun came in, in many places, would sport with his ignobility, and say; "that he was *nato di casa illustre*, son of an illustrious house."

108. When the king of Spain conquered Portugal, he gave special charge to his lieutenant, that the soldiers should not spoil, lest he should alienate the hearts of the people: the army also suffered much scarcity of victual. Whereupon the Spanish soldiers would afterwards say; "that they had won the king a kingdom on earth, as the kingdom of heaven used to be won; by fasting and abstaining from that which is another man's."

109. They feigned a tale of Sixtus Quintus, whom they called Size-ace, that after his death he went to hell, and the porter of hell said to him; "You have some
" reason

“ reason to offer yourself to this place, because you were a wicked man ; but yet, because you were a pope, I have order not to receive you : you have a place of your own, purgatory, you may go thither.” So he went away, and sought about a great while for purgatory, and could find no such place. Upon that he took heart, and went to heaven and knocked ; and St. Peter asked, “ Who was there ?” He said, “ Sixtus pope.” Whereunto St. Peter said, “ Why do you knock ? you have the keys.” Sixtus answered, “ It is true, but it is so long since they were given, as I doubt the wards of the lock be altered.”

110. Charles king of Sweden, a great enemy of the Jesuits, when he took any of their colleges, he would hang the old Jesuits, and put the young to his mines, saying ; “ that since they wrought so hard above ground, he would try how they could work under ground.”

111. In chancery, at one time when the counsel of the parties set forth the boundaries of the land in question, by the plot ; and the counsel of one part said, “ We lie on this side, my lord ;” and the counsel of the other part said, “ And we lie on this side :” the lord chancellor Hatton stood up and said ; “ If you lie on both sides, whom will you have me to believe ?”

112. Sir Edward Coke was wont to say, when a great man came to dinner to him, and gave him no knowledge of his coming ; “ Sir, since you sent me no word of your coming, you must dine with me ; but if I had known of it in due time, I would have dined with you.”

113. Pope Julius the third, when he was made pope, gave his hat unto a youth, a favourite of his, with great scandal. Whereupon, at one time, a cardinal that might be free with him, said modestly to him ; “ What did your holiness see in that young man, to make him cardinal ?” Julius answered, “ What did you see in me to make me pope.”

114. The same Julius, upon like occasion of speech, Why he should bear so great affection to the same young man ? would say ; “ that he found by astrology, that it was the youth’s destiny to be a great prelate ; which was impossible except himself were pope. And therefore that he did raise him, as the driver on of his own fortune.”

115. Sir Thomas More had only daughters at the first, and his wife did ever pray for a boy. At last she had a boy ; which being come to man’s estate, proved but simple. Sir Thomas said to his wife, “ Thou prayedst so long for a boy, that he will be a boy as long as he lives.”

116. Sir Fulk Grevil, afterwards lord Brook, in parliament, when the house of commons, in a great business, stood much upon precedents, said unto them ; “ Why do you stand so much upon precedents ? The times hereafter will be good or bad. If good, precedents will do no harm ; if bad, power will make a way where it finds none.”

117. Sir Thomas More, on the day that he was beheaded, had a barber sent to him, because his hair was long ; which was thought would make him more commiserated with the people. The barber came to him, and asked him, “ Whether he would be pleased to be trimmed ?” “ In good faith, honest fellow, faith Sir Thomas, the king and I have a suit for my head ; and till the title be cleared, I will do no cost upon it.”

118. Stephen

A P O P H T H E G M S.

118. Stephen Gardiner bishop of Winchester, a great champion of the popish religion, was wont to say of the protestants who ground upon the Scripture; "that they were like posts, that bring truth in their letters, and lies in their mouths."

119. The former Sir Thomas More had sent him by a sutor in chancery two silver flagons. When they were presented by the gentleman's servant, he said to one of his men, "Have him to the cellar, and let him have of my best wine:" and, turning to the servant, said; "Tell thy master, if he like it, let him not spare it."

120. Michael Angelo the famous painter, painting in the pope's chapel the portraiture of hell and damned souls, made one of the damned souls so like a cardinal that was his enemy, as every body at first sight knew it. Whereupon the cardinal complained to pope Clement, humbly praying it might be defaced. The pope said to him; "Why, you know very well, I have power to deliver a soul out of purgatory, but not out of hell."

121. There was an agent here for the Dutch, called Carroon; and when he used to move the queen for farther succours and more men, my lord Henry Howard would say; "that he agreed well with the name of Charon, ferryman of hell; for he came still for more men, to increase *regnum umbrarum*."

122. They were wont to call referring to the masters in chancery, committing. My lord keeper Egerton, when he was master of the rolls, was wont to ask, "what the cause had done that it should be committed."

123. They feigned a tale, principally against doctors reports in the chancery, that Sir Nicolas Bacon, when he came to heaven gate, was opposed, touching an unjust decree which had been made in the chancery. Sir Nicolas desired to see the order, whereupon the decree was drawn up; and finding it to begin *Veneris, etc.* "Why, saith he, I was then sitting in the star-chamber; this concerns the master of the rolls, let him answer it." Soon after came the master of the rolls, Cordal, who died indeed a small time after Sir Nicolas Bacon; and he was likewise stayed upon it: and looking into the order, he found, that upon the reading of a certificate of Doctor Gibson, it was ordered that his report should be decreed. And so he put it upon Dr. Gibson, and there it stuck.

124. Sir Nicolas Bacon, when a certain nimble-witted counsellor at the bar, who was forward to speak, did interrupt him often, said unto him; "There is a great difference betwixt you and me: a pain to me to speak, and a pain to you to hold your peace."

125. The same Sir Nicolas Bacon, upon bills exhibited to discover where lands lay, upon proof that they had a certain quantity of land, but could not set it forth, was wont to say; "And if you cannot find your land in the country, how will you have me find it in the chancery?"

126. Mr. Howland, in conference with a young student, arguing a case, happened to say, "I would ask you but this question." The student presently interrupted him, to give him an answer. Whereunto Mr. Howland gravely said; "Nay, though I ask you a question, yet I did not mean you should answer me, I mean to answer myself."

127. Pope Adrian the sixth was talking with the duke of Sesa, "that Pasquil gave great scandal, and that he would have him thrown into the river:" but Sesa answered; "Do it not, holy father, for then he will turn frog; and whereas now he chants but by day, he will then chant both by day and night."

128. There

128. There was a gentleman in Italy that wrote to a great friend of his, whom the pope had newly advanced to be cardinal; that he was very glad of his advancement for the cardinal's own sake; but he was sorry that he himself had lost a good friend.

129. There was a king of Hungary took a bishop in battle, and kept him prisoner: whereupon the pope writ a monitory to him, for that he had broken the privilege of holy church, and taken his son. The king sent an embassy to him, and sent withal the armour wherein the bishop was taken, and this only in writing; *Vide num haec sit vestis filii tui*: "Know now whether this be thy son's coat."

130. Sir Amyas Pawlet, when he saw too much haste made in any matter, was wont to say; "Stay a while, that we may make an end the sooner."

131. A master of the requests to queen Elizabeth had divers times moved for audience, and been put off. At last he came to the queen in a progress, and had on a new pair of boots. The queen, who loved not the smell of new leather, said to him; "Fy, sfoven, thy new boots stink." "Madam," said he, "it is not my new boots that stink; but it is the stale bills that I have kept so long."

132. At an act of the commencement, the answerer gave for this question, that an aristocracy was better than a monarchy. The replier, who was a dissolute man, did tax him that being a private bred man, he would give a question of state. The answerer said, that the replier did much wrong the privilege of scholars, who would be much straitned if they should give questions of nothing but such things wherein they are practised: and added, "We have heard yourself dispute of virtue, which no man will say you put much in practice."

133. Queen Isabella of Spain used to say, "Whosoever hath a good presence, and a good fashion, carries continual letters of recommendation."

134. Alonso of Arragon was wont to say in commendation of age, "that age appeared to be best in four things: old wood best to burn; old wine to drink; old friends to trust; and old authors to read."

135. It was said of Augustus, and afterward the like was said of Septimius Severus; both which did infinite mischief in their beginnings, and infinite good toward their ends; "that they should either have never been born or never died."

136. Constantine the Great, in a kind of envy, himself being a great builder, as Trajan likewise was, would call Trajan *Parietaria*, wall-flower, because his name was upon so many walls.

137. Alonso of Arragon was wont to say of himself, "that he was a great necromancer, for that he used to ask counsel of the dead;" meaning of books.

138. Ethelwold, bishop of Winchester, in a famine, sold all the rich vessels and ornaments of the church, to relieve the poor with bread; and said, "there was no reason that the dead temples of God should be sumptuously furnished, and the living temples suffer penury."

139. Many men, especially such as affect gravity, have a manner after other mens speech to shake their heads. A great officer of this land would say, "it was as men shake a bottle, to see if there were any wit in their heads or no?"

140. After a great fight, there came to the camp of Consalvo the great captain, a gentleman, proudly horsted and armed. Diego de Mendoza asked the great captain, who is this? Who answered; "It is saint Ermin, who never appears but after the storm."

141. There was one that died greatly in debt: when it was reported in some company, where divers of his creditors casually were, that he was dead, one began to say; "Well, if he be gone, then he hath carried five hundred ducats of mine with him into the other world:" and another said, "And two hundred of mine: and a third spake of great fums of his." Whereupon one that was amongst them said; "I perceive now, that though a man cannot carry any of his own with him into the next world, yet he may carry away that which is another man's."

142. Francis Carvajal, that was the great captain of the rebels of Peru, had often given the chafe to Diego Centeno, a principal commander of the emperor's party: he was afterwards taken by the emperor's lieutenant Gasca, and committed to the custody of Diego Centeno, who used him with all possible courtesy; infomuch as Carvajal asked him; "I pray, sir, who are you that use me with this courtesy?" Centeno said, "Do not you know Diego Centeno?" Carvajal answered, "Truly, sir, I have been so used to see your back, as I knew not your face."

143. There was a merchant died that was very far in debt, his goods and household-stuff were set forth to sale. A stranger would needs buy a pillow there, saying; "This pillow sure is good to sleep upon, since he could sleep that owed so many debts."

144. A lover met his lady in a close chair, she thinking to have gone unknown, he came and spake to her: she asked him, "How did you know me?" He said, "Because my wounds bleed afresh;" alluding to the common tradition, that the wounds of a body slain will bleed afresh upon the approach of the murderer.

145. A gentleman brought music to his lady's window. She hated him, and had warned him often away: and when he would not desist, she threw stones at him: whereupon a gentleman said unto him that was in his company; "What greater honour can you have to your music, than that stones come about you, as they did to Orpheus?"

146. Coranus the Spaniard, at a table at dinner, fell into an extolling his own father, saying; "if he could have wished of God, he could not have chosen amongst men a better father." Sir Henry Savil said, "What not Abraham?" Now Coranus was doubted to descend of a race of Jews.

147. Bresquet, jester to Francis the first of France, did keep a calendar of fools, wherewith he did use to make the king sport; telling him ever the reason, why he put any one into his calendar. When Charles the fifth, emperor, upon confidence of the noble nature of Francis, passed through France, for the appeasing of the rebellion of Gaunt, Bresquet put him into his calendar. The king asked him the cause. He answered; "Because you having suffered at the hands of Charles the greatest bitterness that ever prince did from another, nevertheless he would trust his person into your hands." "Why, Bresquet," said the king, "what wilt thou say, if thou seest him pass back in as great safety, as if he marched through the midst of Spain?" Saith Bresquet; "Why then I will put him out, and put in you."

148. Archbishop Grindall was wont to say; "that the physicians here in England were not good at the cure of particular diseases; but had only the power of the church, to bind and loose."

149. Cosinus duke of Florence was wont to say of perfidious friends, "that we read, that we ought to forgive our enemies; but we do not read that we ought our friends."

150. A papist being opposed by a protestant, "that they had no Scripture for images," answered, "Yes; for you read that the people laid their sick in the streets, that the shadow of saint Peter might come upon them; and that a shadow was an image, and the obscurest of all images."

151. Sir Edward Dyer, a grave and wise gentleman, did much believe in Kelley the alchemist, that he did indeed the work, and did make gold; inasmuch that he went into Germany, where Kelley then was, to inform himself fully thereof. After his return, he dined with my lord of Canterbury; where at that time was at the table Dr. Brown the physician. They fell in talk of Kelley. Sir Edward Dyer, turning to the archbishop, said; I do assure your grace, that what I shall tell you is truth; I am an eye-witness thereof; and if I had not seen it, I should not have believed it. I saw Mr. Kelley put of the base metal into the crucible; and after it was set a little upon the fire, and a very small quantity of the medicine put in, and stirred with a stick of wood, it came forth in great proportion, perfect gold; to the touch, to the hammer, and to the test. My lord archbishop said; "You had need take heed what you say, Sir Edward Dyer, for here is an infidel at the board." Sir Edward Dyer said again pleasantly; "I should have looked for an infidel sooner in any place than at your grace's table." "What say you, Dr. Brown," said the archbishop? Dr. Brown answered, after his blunt and huddling manner; "The gentleman hath spoken enough for me." "Why," said the archbishop, "what hath he said?" "Marry," saith Dr. Brown, "he said, he would not have believed it, except he had seen it; and no more will I."

152. Doctor Johnson said, that in sickness there were three things that were material; the physician, the disease, and the patient: and if any two of these joined, then they get the victory; for, *Ne Hercules quidem contra duos*. If the physician and the patient join, then down goes the disease; for then the patient recovers: if the physician and the disease join, that is a strong disease; and the physician mistaking the cure, then down goes the patient: if the patient and the disease join, then down goes the physician; for he is discredited.

153. Mr. Bettenham said; that virtuous men were like some herbs and spices, that give not out their sweet smell, till they be broken or crushed.

154. There was a painter became a physician; whereupon one said to him; "You have done well; for before the faults of your work were seen; but now they are unseen."

155. There was a gentleman that came to the Tilt all in orange-tawny, and ran very ill. The next day he came again all in green, and ran worse. There was one of the lookers on asked another; "What is the reason that this gentleman changeth his colours?" The other answered, "Sure, because it may be reported, that the gentleman in the green ran worse than the gentleman in the orange-tawny."

156. Zelim was the first of the Ottomans that did shave his beard, whereas his predecessors wore it long. One of his bashaws asked him, Why he altered the custom of his predecessors? He answered, "Because you bashaws may not lead me by the beard, as you did them."

157. Æneas Sylvius, that was pope Pius Secundus, was wont to say; That the former popes did wisely to set the lawyers a work to debate, whether the donation of Constantine the Great to Sylvester, of St. Peter's patrimony, were good or valid in

law or no? the better to skip over the matter in fact, whether there was ever any such thing at all or no.

158. The lord bishop Andrews was asked at the first coming over of the archbishop of Spalato, whether he were a protestant or no? He answered; "Truly " I know not; but I think he is a detestant;" that was, of most of the opinions of Rome.

159. It was said amongst some of the grave prelates of the council of Trent, in which the school-divines bare the sway; that the school-men were like the astronomers, who to save the phænomena framed to their conceit eccentrics and epicycles, and a wonderful engine of orbs; though no such things were: so they, to save the practice of the church, had devised a great number of strange positions.

160. Æneas Sylvius would say, that the Christian faith and law, though it had not been confirmed by miracles, yet was worthy to be received for the honesty thereof.

161. Mr. Bacon would say, that it was in his business, as it is frequently in the ways: that the next way is commonly the foulest; and that if a man will go the fairest way, he must go somewhat about.

162. Mr. Bettenham, reader of Gray's Inn, used to say, that riches were like muck; when it lay in a heap it gave but a stench and ill odour; but when it was spread upon the ground, then it was cause of much fruit.

163. Cicero married his daughter to Dolabella, that held Cæsar's party: Pompey had married Julia, that was Cæsar's daughter. After, when Cæsar and Pompey took arms one against the other, and Pompey had passed the seas, and Cæsar possessed Italy, Cicero stayed somewhat long in Italy, but at last sailed over to join with Pompey; who when he came to him, Pompey said, "You are welcome, but where " left you your son-in-law?" Cicero answered, "With your father-in-law."

164. Vespasian and Titus his eldest son were both absent from Rome when the empire was cast upon Vespasian; Domitian his younger son was at Rome, who took upon him the affairs; and being of a turbulent spirit, made many changes; and displaced divers officers and governors of provinces, sending them successors. So when Vespasian returned to Rome, and Domitian came into his presence, Vespasian said to him; "Son, I looked when you would have sent me a successor."

165. Nero loved a beautiful youth, whom he used viciously, and called him wife: there was a senator of Rome that said secretly to his friend, "It was pity Nero's " father had not such a wife."

166. Galba succeeded Nero, and his age being despised, there was much licence and confusion in Rome during his empire; whereupon a senator said in full senate; "It were better to live where nothing is lawful, than where all things are " lawful."

167. Augustus Cæsar did write to Livia, who was over-sensible of some ill words that had been spoken of them both: "Let it not trouble thee, my Livia, if any " man speak ill of us; for we have enough that no man can do ill unto us."

168. Chilon said, that kings, friends, and favourites, were like casting counters; that sometimes stood for one, sometimes for ten, sometimes for an hundred.

169. Theodosius, when he was pressed by a suitor, and denied him; the suitor said, "Why, Sir, you promised it." He answered; "I said it, but I did not promise " it, if it be unjust."

170. The

170. The Romans, when they spake to the people, were wont to stile them, Ye Romans; when commanders in war spake to their army, they stiled them, My soldiers. There was a mutiny in Cæsar's army, and somewhat the soldiers would have had, yet they would not declare themselves in it, but only demanded a mission or discharge; though with no intention it should be granted: but, knowing that Cæsar had at that time great need of their service, thought by that means to wrench him to their other desires: whereupon with one cry they asked mission. Cæsar, after silence made, said; "I for my part, ye Romans." This title did actually speak them to be dismissed: which voice they had no sooner heard, but they mutinied again; and would not suffer him to go on with his speech, until he had called them by the name of his Soldiers: and so with that one word he appeased the sedition.

171. Cæsar would say of Sylla, for that he did resign his dictatorship; "Sylla was ignorant of letters, he could not dictate."

172. Seneca said of Cæsar, "that he did quickly shew the sword, but never leave it off."

173. Diogenes begging, as divers philosophers then used, did beg more of a prodigal man, than of the rest which were present. Whereupon one said to him; "See your baseness, that when you find a liberal mind, you will take most of him." "No," said Diogenes, "but I mean to beg of the rest again."

174. Themistocles, when an ambassador from a mean estate did speak great matters; said to him, "Friend, thy words would require a city."

175. They would say of the duke of Guise, Henry; "that he was the greatest usurer in France, for that he had turned all his estate into obligations." Meaning, that he had sold and oppigenerated all his patrimony, to give large donatives to other men.

176. Cæsar Borgia, after long division between him and the lords of Romagna, fell to accord with them. In this accord there was an article, that he should not call them at any time all together in person. The meaning was, that knowing his dangerous nature, if he meant them treason, he might have opportunity to oppress them all together at once. Nevertheless, he used such fine art and fair carriage, that he won their confidence to meet all together in council at Cinigaglia; where he murdered them all. This act, when it was related unto pope Alexander, his father, by a cardinal, as a thing happy, but very perfidious; the pope said, "It was they that broke their covenant first, in coming all together."

177. Titus Quinctius was in the council of the Achaians, what time they deliberated, whether in the war then to follow, between the Romans and king Antiochus, they should confederate themselves with the Romans, or with king Antiochus? In that council the Ætolians, who incited the Achaians against the Romans, to disable their forces, gave great words, as if the late victory the Romans had obtained against Philip king of Macedon, had been chiefly by the strength and forces of the Ætolians themselves: and on the other side the ambassador of Antiochus did extol the forces of his master; founding what an innumerable company he brought in his army; and gave the nations strange names; as Elymæans, Caducians, and others. After both their harangues, Titus Quinctius, when he rose up, said; "it was an easy matter to perceive what it was that had joined Antiochus and the Ætolians together; that it appeared to be by the reciprocal lying of each, touching the others forces."

178. Plato

178. Plato was amorous of a young gentleman, whose name was Stella, that studied astronomy, and went oft in the clear nights to look upon the stars. Whereupon Plato wished himself heaven, that he might look upon Stella with a thousand eyes.

179. The Lacedæmonians were besieged by the Athenians in the port of Pyle, which was won, and some slain, and some taken. There was one said to one of them that was taken, by way of scorn; Were they not brave men that lost their lives at the port of Pyle? He answered; "Certainly a Persian arrow is much to be set by, " if it can choose out a brave man."

180. Clodius was acquitted by a corrupt jury, that had palpably taken shares of money: before they gave up their verdict, they prayed of the senate a guard, that they might do their consciences, for that Clodius was a very seditious young nobleman. Whereupon all the world gave him for condemned. But acquitted he was. Catulus, the next day seeing some of them that had acquitted him together, said to them; "What made you ask of us a guard? Were you afraid your money should " be taken from you?"

181. At the same judgment, Cicero gave in evidence upon oath: and when the jury, which consisted of fifty-seven, had passed against his evidence, one day in the senate Cicero and Clodius being in altercation, Clodius upbraided him, and said; "The " jury gave you no credit." Cicero answered, "Five and twenty gave me credit; " but there were two and thirty that gave you no credit, for they had their money " beforehand."

182. Sir Henry Savil was asked by my lord of Essex his opinion touching poets? He answered my lord; "that he thought them the best writers, next to them that " writ prose."

183. Diogenes having seen that the kingdom of Macedon, which before was contemptible and low, began to come aloft when he died, was asked, how he would be buried? He answered; "With my face downward; for within a while the world " will be turned upside down, and then I shall lie right."

184. Cato the elder was wont to say; that the Romans were like sheep; a man were better to drive a flock of them, than one of them.

185. When Lycurgus was to reform and alter the state of Sparta; in consultation one advised, that it should be reduced to an absolute popular equality: but Lycurgus said to him; "Sir, begin it in your own house."

186. Bion, that was an atheist, was shewed in a port city, in a temple of Neptune, many tables of pictures, of such as had in tempests made their vows to Neptune, and were saved from shipwreck: and was asked, How say you now? Do you not acknowledge the power of the Gods? But saith he; "Ay, but where are they painted " that have been drowned after their vows?"

187. Cicero was at dinner, where there was an ancient lady that spake of her own years, and said; "she was but forty years old." One that sat by Cicero, rounded him in the ear, and said; "She talks of forty years old; but she is far more, out of " question." Cicero answered him again; "I must believe her, for I have heard her " say so any time these ten years."

188. There was a soldier that vaunted before Julius Cæsar of the hurts he had received in his face. Julius Cæsar knowing him to be but a coward, told him; "You were best take heed next time you run away, how you look " back."

189. There

189. There was a fuitor to Vespasian, who to lay his suit fairer, said it was for his brother; whereas indeed it was for a piece of money. Some about Vespasian told the emperor, to cross him: that the party his servant spoke for, was not his brother; but that he did it upon a bargain. Vespasian sent for the party interested, and asked him; "Whether his mean employed by him was his brother or no?" He durst not tell untruth to the emperor, and confessed he was not his brother. Whereupon the emperor said, "I his do, fetch me the money, and you shall have your suit dispatched." Which he did. The courtier which was the mean, solicited Vespasian soon after about his suit: "Why, faith Vespasian, I gave it last day to a brother of mine."

190. Vespasian asked of Apollonius, what was the cause of Nero's ruin? Who answered, "Nero could tune the harp well, but in government he did always wind up the strings too high, or let them down too low."

191. Dionysius the tyrant, after he was deposed and brought to Corinth, kept a school. Many used to visit him; and amongst others, one when he came in, opened his mantle and shook his clothes; thinking to give Dionysius a gentle scorn; because it was the manner to do so for them that came in to see him while he was tyrant. But Dionysius said to him; "I prithee do so, rather when thou goest out, that we may see thou stealest nothing away."

192. Diogenes, one terrible frosty morning, came into the market-place, and stood naked, shaking, to shew his tolerance. Many of the people came about him pitying him: Plato passing by, and knowing he did it to be seen, said to the people as he went by; "If you pity him indeed, let him alone to himself."

193. Aristippus was earnest fuitor to Dionysius for some grant, who would give no ear to his suit. Aristippus fell at his feet, and then Dionysius granted it. One that stood by said afterwards to Aristippus; "You a philosopher, and be so base as to throw yourself at the tyrant's feet to get a suit." Aristippus answered, "The fault is not mine, but the fault is in Dionysius, that carries his ears in his feet."

194. Solon, when he wept for his son's death, and one said to him, "Weeping will not help;" answered, "Alas, therefore I weep, because weeping will not help."

195. The same Solon being asked; whether he had given the Athenians the best laws? answered, "The best of those that they would have received."

196. One said to Aristippus; 'Tis a strange thing, why men should rather give to the poor, than to philosophers. He answered, "Because they think themselves may sooner come to be poor, than to be philosophers."

197. Trajan would say of the vain jealousy of princes, that seek to make away those that aspire to their succession; "that there was never king that did put to death his successor."

198. When it was represented to Alexander, to the advantage of Antipater, who was a stern and imperious man, that he only of all his lieutenants wore no purple, but kept the Macedonian habit of black; Alexander said, "Yea, but Antipater is all purple within."

199. Alexander used to say of his two friends, Craterus, and Hephæstion; that Hephæstion loved Alexander, and Craterus loved the king.

200. It fell out so, that as Livia went abroad in Rome, there met her naked young men that were sporting in the streets, which Augustus went about severely

to punish in them : but Livia spake for them, and said ; “ It was no more to chaste women, than so many statues.”

201. Philip of Macedon was wished to banish one for speaking ill of him. But Philip answered ; “ Better he speak where we are both known, than where we are both unknown.”

202. Lucullus entertained Pompey in one of his magnificent houses : Pompey said, “ This is a marvellous fair and stately house for the summer : but methinks it should be very cold for winter.” Lucullus answered, “ Do you not think me as wise as divers fowls are, to change my habitation in the winter season.”

203. Plato entertained some of his friends at a dinner, and had in the chamber a bed, or couch, neatly and costly furnished. Diogenes came in, and got up upon the bed, and trampled it, saying, “ I trample upon the pride of Plato.” Plato mildly answered, “ But with greater pride, Diogenes.”

204. Pompey being commissioner for sending grain to Rome in time of dearth, when he came to the sea, found it very tempestuous and dangerous ; infomuch as those about him advised him by no means to embark ; but Pompey said, “ It is of necessity that I go, not that I live.”

205. Demosthenes was upbraided by Æschines, that his speeches did smell of the lamp. But Demosthenes said, “ Indeed there is a great deal of difference between that which you and I do by lamp-light.”

206. Demades the orator, in his age was talkative, and would eat hard : Antipater would say of him, that he was like a sacrifice, that nothing was left of it but the tongue and the paunch.

207. Themistocles, after he was banished, and had wrought himself into great favour afterwards, so that he was honoured and sumptuously served, seeing his present glory, said unto one of his friends, “ If I had not been undone, I had been undone.”

208. Philo Judæus saith, that the sense is like the sun ; for the sun seals up the globe of heaven, and opens the globe of earth : so the sense doth obscure heavenly things, and reveals earthly things.

209. Alexander, after the battle of Granicum, had very great offers made him by Darius ; consulting with his captains concerning them, Parmenio said, “ Sure I would accept of these offers, if I were as Alexander.” Alexander answered, “ So would I, if I were as Parmenio.”

210. Alexander was wont to say, he knew himself to be mortal, chiefly by two things ; sleep, and lust.

211. Augustus Cæsar would say, that he wondered that Alexander feared he should want work, having no more worlds to conquer : as if it were not as hard a matter to keep, as to conquer.

212. Antigonus, when it was told him that the enemy had such volleys of arrows that they did hide the sun, said, “ That falls out well, for it is hot weather, and so we shall fight in the shade.”

213. Cato the elder, being aged, buried his wife, and married a young woman. His son came to him, and said ; “ Sir, what have I offended, that you have brought a step-mother into your house ?” The old man answered, “ Nay, quite contrary, son ; thou pleasest me so well, as I would be glad to have more such.”

214. Crassus the orator had a fish which the Romans called *Muraena*, that he made very tame and fond of him ; the fish died, and Crassus wept for it. One day
faling

falling in contention with Domitius in the senate, Domitius said, " Foolish Crassus, you wept for your *Muraena*." Crassus replied, " That it is more than you did for both your wives."

215. Philip, Alexander's father, gave sentence against a prisoner what time he was drousy, and seemed to give small attention. The prisoner after sentence was pronounced, said, " I appeal." The king somewhat stirred, said ; " To whom do you appeal?" The prisoner answered, " From Philip when he gave no ear, to Philip when he shall give ear."

216. There was a philosopher that disputed with the emperor Adrian, and did it but weakly. One of his friends that stood by, afterwards said unto him : " Methinks you were not like yourself last day, in argument with the emperor; I could have answered better myself." " Why," said the philosopher, " would you have me contend with him that commands thirty legions?"

217. When Alexander passed into Asia, he gave large donatives to his captains, and other principal men of virtue; inasmuch as Parmenio asked him, " Sir, what do you keep for yourself?" He answered, " Hope."

218. Vespasian set a tribute upon urine, Titus his son emboldened himself to speak to his father of it: and represented it as a thing indign and fordid. Vespasian said nothing for the time; but a while after, when it was forgotten, sent for a piece of silver out of the tribute-money; and called to his son, bidding him to smell to it; and asked him, whether he found any offence? Who said, No: " Why so?" saith Vespasian again; " yet this money comes out of urine."

219. Nerva the emperor succeeded Domitian, who had been tyrannical; and in his time many noble houses were overthrown by false accusations; the instruments whereof were chiefly Marcellus and Regulus. The emperor Nerva one night supped privately with some six or seven: amongst whom there was one that was a dangerous man; and he began to take the like courses as Marcellus and Regulus had done. The emperor fell into discourse of the injustice and tyranny of the former time; and by name, of the two accusers; and said, " What should we do with them, if we had them now?" One of them that was at supper, and was a free-spoken senator, said; " Marry, they should sup with us."

220. There was one that found a great mass of money digging under ground in his grandfather's house; and being somewhat doubtful of the case, signified it to the emperor, that he had found such treasure. The emperor made a rescript thus; " Use it." He writ back again, that the sum was greater than his estate or condition could use. The emperor writ a new rescript, thus: " Abuse it."

221. Julius Cæsar, as he passed by, was, by acclamation of some that stood in the way, termed King, to try how the people would take it. The people shewed great murmur and distaste at it. Cæsar, finding where the wind stood, slighted it, and said; " I am not king, but Cæsar;" as if they had mistaken his name. For *Rex* was a surname amongst the Romans, as King is with us.

222. When Cræsus, for his glory, shewed Solon his great treasures of gold, Solon said to him; " If another king come that hath better iron than you, he will be master of all this gold."

223. Aristippus being reprehended of luxury by one that was not rich, for that he gave six crowns for a small fish, answered; " Why, what would you have given?" The other said, " Some twelve pence." Aristippus said again; " And six crowns is no more with me."

224. Plato reprehended severely a young man for entering into a dissolute house. The young man said to him ; “ Why do you reprehend so sharply for so small a matter ? ” Plato replied, “ But custom is no small matter.”

225. Archidamus, king of Lacedæmon, having received from Philip king of Macedon, after Philip had won the victory of Chærona upon the Athenians, proud letters, writ back to him ; “ That if he measured his own shadow, he would find it no longer than it was before his victory.”

226. Pyrrhus, when his friends congratulated to him his victory over the Romans, under the conduct of Fabricius, but with great slaughter of his own side, said to them again ; “ Yes, but if we have such another victory, we are undone.”

227. Plato was wont to say of his master Socrates, that he was like the apothecaries gally-pots ; that had on the out-side apes, and owls, and satyrs ; but within, precious drugs.

228. Alexander sent to Phocion a great present of money. Phocion said to the messenger ; “ why doth the king send to me, and to none else ? ” The messenger answered ; “ Because he takes you to be the only good man in Athens.” Phocion replied ; “ If he think so, pray let him suffer me to be so still.”

229. At a banquet, where those that were called the seven wise men of Greece, were invited by the ambassador of a barbarous king ; the ambassador related, that there was a neighbour mightier than his master, picked quarrels with him, by making impossible demands ; otherwise threatening war ; and now at that present had demanded of him, to drink up the sea. Whereunto one of the wise men said, “ I would have him undertake it.” “ Why,” saith the ambassador, “ how shall we come off ? ” “ Thus,” saith the wise men ; “ let that king first stop the rivers which run into the sea, which are no part of the bargain, and then your master will perform it.”

230. At the same banquet, the ambassador desired the seven, and some other wise men that were at the banquet, to deliver every one of them some sentence or parable, that he might report to his king the wisdom of Greece, which they did ; only one was silent ; which the ambassador perceiving, said to him ; “ Sir, let it not displease you ; why do not you say somewhat that I may report ? ” He answered, “ Report to your lord, that there are of the Grecians that can hold their peace.”

231. The Lacedæmonians had in custom to speak very short, which being an empire, they might do at pleasure : but after their defeat at Leuctra, in an assembly of the Grecians, they made a long invective against Epaminondas ; who stood up, and said no more than this ; “ I am glad we have brought you to speak long.”

232. Fabius Maximus being resolved to draw the war in length, still waited upon Hannibal’s progress to curb him ; and for that purpose he encamped upon the high ground : but Terentius his colleague fought with Hannibal, and was in great peril of overthrow ; but then Fabius came down from the high grounds, and got the day. Whereupon Hannibal said ; “ that he did ever think that that same cloud that hanged upon the hills, would at one time or other give a tempest.”

233. Hanno the Carthaginian was sent commissioner by the state, after the second Carthaginian war, to supplicate for peace, and in the end obtained it : yet one of the sharper senators said, “ You have often broken with us the peaces whereunto you have been sworn ; I pray, by what god will you swear ? ” Hanno answered ; “ By the same gods that have punished the former perjury so severely.”

234. Cæsar, when he first possessed Rome, Pompey being fled, offered to enter the sacred treasury to take the moneys that were there stored ; and Metellus, tribune of the people,

people, did forbid him : and when Metellus was violent in it and would not desist, Cæsar turned to him, and said ; “ Presume no farther, or I will lay you dead.” And when Metellus was with those words somewhat astonished, Cæsar added ; “ Young man, it had been easier for me to do this than to speak it.”

235. Caius Marius was general of the Romans against the Cimbers, who came with such a sea of people upon Italy. In the fight there was a band of the Cadurcians of a thousand, that did notable service ; whereupon, after the fight, Marius did denison them all for citizens of Rome, though there was no law to warrant it. One of his friends did present it unto him, that he had transgressed the law, because that privilege was not granted but by the people. Whereunto Marius answered ; “ That for the noise of arms he could not hear the laws.”

236. Pompey did consummate the war against Sertorius, when Metellus had brought the enemy somewhat low. He did also consummate the war against the fugitives, whom Crassus had before defeated in a great battle. So when Lucullus had had great and glorious victories against Mithridates and Tigranes ; yet Pompey, by means his friends made, was sent to put an end to that war. Whereupon Lucullus taking indignation, as a disgrace offered to himself, said ; “ that Pompey was a carrion crow ; “ when others had stricken down the bodies, then Pompey came and preyed upon them.”

237. Antisthenes being asked of one what learning was most necessary for man’s life ? answered ; “ To unlearn that which is nought.”

238. Alexander visited Diogenes in his tub ; and when he asked him, what he would desire of him ? Diogenes answered ; “ That you would stand a little aside, “ that the sun may come to me.”

239. The same Diogenes, when mice came about him as he was eating, said ; “ I see, “ that even Diogenes nourisheth parasites.”

240. Hiero visited by Pythagoras, asked him, “ of what condition he was ?” Pythagoras answered ; “ Sir, I know you have been at the Olympian games.” “ Yes,” saith Hiero. “ Thither,” saith Pythagoras, “ come some to win the prizes. Some come “ to sell their merchandize, because it is a kind of mart of all Greece. Some come “ to meet their friends, and to make merry ; because of the great confluence of all “ sorts. Others come only to look on. I am one of them that come to look on.” Meaning it, of philosophy, and the contemplative life.

241. Heraclitus the obscure said ; “ The dry light is the best soul :” meaning when the faculties intellectual are in vigour, not drenched, or, as it were, blooded by the affections.

242. One of the philosophers was asked ; “ what a wise man differed from a fool ?” He answered, “ Send them both naked to those that know them not, and you shall “ perceive.”

243. There was a law made by the Romans against the bribery and extortion of the governors of provinces. Cicero saith in a speech of his to the people, “ that he thought “ the provinces would petition to the state of Rome to have that law repealed.” “ For,” saith he, “ before the governors did bribe and extort as much as was sufficient for themselves : but now they bribe and extort as much as may be enough not “ only for themselves, but for the judges, and jurors, and magistrates.”

244. Aristippus sailing in a tempest, shewed signs of fear. One of the seamen said to him, in an insulting manner : “ We that are plebeians are not troubled ; you that “ are a philosopher are afraid.” Aristippus answered ; “ That there is not the like “ wager upon it, for you to perish and for me.”

245. There was an orator that defended a cause of Aristippus, and prevailed: Afterwards he asked Aristippus; "Now, in your distress, what did Socrates do you good?" Aristippus answered; "Thus, in making that which you said of me to be true."

246. There was an Epicurean vaunted, that divers of other sects of philosophers did after turn Epicureans; but there never were any Epicureans that turned to any other sect. Whereupon a philosopher that was of another sect, said; "The reason was plain, for that cocks may be made capons, but capons could never be made cocks."

247. Chilon would say, "That gold was tried with the touchstone, and men with gold."

248. Simonides being asked of Hiero, "what he thought of God?" asked a seven-night's time to consider of it: and at the seven-night's end, he asked a fortnight's time; at the fortnight's end, a month. At which Hiero marvelling, Simonides answered; "that the longer he thought upon the matter, the more difficult he found it."

249. A Spaniard was censuring to a French gentleman the want of devotion amongst the French; in that, whereas in Spain, when the sacrament goes to the sick, any that meets with it, turns back and waits upon it to the house whither it goes; but in France they only do reverence, and pass by. But the French gentleman answered him, "There is reason for it; for here with us, Christ is secure amongst his friends; but in Spain there be so many Jews and Moranos, that it is not amiss for him to have a convoy."

250. Mr. Popham, afterwards lord chief justice Popham, when he was speaker, and the house of commons had sat long, and done in effect nothing; coming one day to queen Elizabeth, she said to him; "Now, Mr. Speaker, what hath passed in the commons' house?" He answered, "If it please your majesty, seven weeks."

251. Themistocles in his lower fortune was in love with a young gentleman who scorned him; but when he grew to his greatness, which was soon after, he sought him: Themistocles said; "We are both grown wise, but too late."

252. Bion was sailing, and there fell out a great tempest; and the mariners that were wicked and dissolute fellows, called upon the gods; but Bion said to them, "Peace, let them not know you are here."

253. The Turks made an expedition into Persia; and because of the strait jaws of the mountains of Armenia, the bashaws consulted which way they should get in. One that heard the debate said, "Here is much ado how you shall get in; but I hear no body take care how you should get out."

254. Philip king of Macedon maintained arguments with a musician in points of his art, somewhat peremptorily; but the musician said to him, "God forbid, Sir, your fortune were so hard, that you should know these things better than myself."

255. Antalcidas, when an Athenian said to him, "Ye Spartans are unlearned;" said again, "True, for we have learned no evil nor vice of you."

256. Pace, the bitter fool, was not suffered to come at queen Elizabeth, because of his bitter humour. Yet at one time, some persuaded the queen that he should come to her; undertaking for him, that he should keep within compass: so he was brought to her, and the queen said; "Come on, Pace; now we shall hear of our faults." Saith Pace; "I do not use to talk of that that all the town talks of."

257. Bishop

257. Bishop Latimer said, in a sermon at court, " That he heard great speech that the king was poor ; and many ways were propounded to make him rich : for his part he had thought of one way, which was, that they should help the king to some good office, for all his officers were rich."

258. After the defeat of Cyrus the younger, Falinus was sent by the king to the Grecians, who had for their part rather victory than otherwise, to command them to yield their arms ; which when it was denied, Falinus said to Clearchus ; " Well then, the king lets you know, that if you remove from the place where you are now encamped, it is war : if you stay, it is truce. What shall I say you will do ?" Clearchus answered, " It pleaseth us, as it pleaseth the king." " How is that ?" saith Falinus. Saith Clearchus, " If we remove, war : if we stay, truce : " and so would not disclose his purpose.

259. Alcibiades came to Pericles, and stayed a while ere he was admitted. When he came in, Pericles civilly excused it, and said ; " I was studying how to give mine account." But Alcibiades said to him, " If you will be ruled by me, study rather how to give no account."

260. Mendoza that was vice-roy of Peru, was wont to say, " That the government of Peru was the best place the king of Spain gave, save that it was somewhat too near Madrid."

261. When Vespasian passed from Jewry to take upon him the empire, he went by Alexandria, where remained two famous philosophers, Apollonius and Euphrates. The emperor heard the discourse, touching matter of state, in the presence of many. And when he was weary of them, he brake off, and in a secret derision, finding their discourses but speculative, and not to be put in practice, said ; " O that I may govern wise men, and wise men govern me."

262. Cardinal Ximenes, upon a muster, which was taken against the Moors, was spoken to by a servant of his to stand a little out of the smoke of the harquebuses ; but he said again, " That that was his incense."

263. Nero was wont to say of his master Seneca, " That his stile was like mortar without lime."

264. Augustus Cæsar, out of great indignation against his two daughters, and Posthumus Agrippa his grand-child ; whereof the two first were infamous, and the last otherwise unworthy ; would say, " That they were not his seed, but some imposthumes that had broken from him."

265. A seaman coming before the judges of the admiralty for admittance into an office of a ship bound for the Indies, was by one of the judges much slighted, as an insufficient person for that office he sought to obtain ; the judge telling him, " that he believed he could not say the points of his compass." The seaman answered ; " that he could say them, under favour, better than he could say his *Pater-noster*." The judge replied ; " that he would wager twenty shillings with him upon that." The seaman taking him up, it came to trial : and the seaman began, and said all the points of his compass very exactly : the judge likewise said his *Pater noster* : and when he had finished it, he required the wager according to agreement ; because the seaman was to say his compass better than he his *Pater-noster*, which he had not performed. " Nay, I pray, Sir, hold," quoth the seaman, " the wager is not finished ; for I have but half done : " and so he immediately said his compass backward very exactly ; which the judge failing of in his *Pater-noster*, the seaman carried away the prize.

266. There

266. There was a conspiracy, against the emperor Claudius by Scribonianus, examined in the senate; where Claudius sat in his chair, and one of his freed servants stood at the back of his chair. In the examination, that freed servant, who had much power with Claudius, very saucily, had almost all the words: and amongst other things, he asked in scorn one of the examines, who was likewise a freed servant of Scribonianus; "I pray, Sir, if Scribonianus had been an emperor, what would you have done?" He answered, "I would have stood behind his chair and held my peace."

267. One was saying, that his great grand-father, and grand-father, and father, died at sea; said another that heard him; "And I were as you, I would never come at sea." "Why," saith he, "where did your great grand-father, and grand-father, and father die?" He answered; "Where but in their beds?" He answered; "And I were as you, I would never come in bed."

268. There was a dispute, whether great heads or little heads had the better wit? And one said, "It must needs be the little; for that it is a maxim, *Omne majus continet in se minus.*"

269. Sir Thomas More, when the counsel of the party pressed him for a longer day to perform the decree, said; "Take faint Barnaby's day, which is the longest day in the year." Now faint Barnaby's day was within a few days following.

270. One of the fathers saith, "That there is but this difference between the death of old men and young men; that old men go to death, and death comes to young men."

271. Cassius, after the defeat of Crassus by the Parthians, whose weapons were chiefly arrows, fled to the city of Charrus, where he durst not stay any time, doubting to be pursued and besieged; he had with him an astrologer, who said to him, "Sir, I would not have you go hence, while the moon is in the sign of Scorpio." Cassius answered, "I am more afraid of that of Sagittarius."

272. Jason the Theffalian was wont to say, "That some things must be done unjustly, that many things may be done justly."

273. Demetrius king of Macedon would at times retire himself from business, and give himself wholly to pleasures. One of those his retirings, giving out that he was sick, his father Antigonus came on the sudden to visit him; and met a fair dainty youth coming out of his chamber. When Antigonus came in, Demetrius said; "Sir, the fever left me right now." Antigonus replied, "I think it was he that I met at the door."

274. Cato Major would say, "That wife men learned more by fools, than fools by wife men."

275. When it was said to Anaxagoras; "The Athenians have condemned you to die;" he said again, "And nature them."

276. Alexander, when his father wished him to run for the prize of the race at the Olympian games, for he was very swift, answered; "He would, if he might run with kings."

277. Antigonus used often to go disguised, and to listen at the tents of his soldiers; and at a time heard some that spoke very ill of him. Whereupon he opened the tent a little, and said to them; "If you would speak ill of me, you should go a little farther off."

278. Aristippus said; "That those that studied particular sciences, and neglected philosophy, were like Penelope's wooers, that made love to the waiting woman."

279. The

279. The ambassadors of Asia Minor came to Antonius after he had imposed upon them a double tax, and said plainly to him ; “ That if he would have two tributes in one year, he must give them two feed-times, and two harvests.”

280. An orator of Athens said to Demosthenes ; “ The Athenians will kill you if they wax mad.” Demosthenes replied, “ And they will kill you if they be in good sense.”

281. Epictetus used to say ; “ That one of the vulgar, in any ill that happens to him, blames others ; a novice in philosophy blames himself ; and a philosopher blames neither the one nor the other.”

282. Cæsar, in his book that he made against Cato, which is lost, did write, to shew the force of opinion and reverence of a man that had once obtained a popular reputation ; “ That there were some that found Cato drunk, and were ashamed instead of Cato.”

283. There was a nobleman said of a great counsellor, “ That he would have made the worst farrier in the world ; for he never shod horse, but he cloyed him : for he never commended any man to the king for service, or upon occasion of suit, or otherwise, but that he would come in, in the end, with a *but* ; and drive in a nail to his disadvantage.”

284. Diogenes called an ill physician, Cock. “ Why ?” saith he. Diogenes answered ; “ Because when you crow, men use to rise.”

285. There was a gentleman fell very sick, and a friend of his said to him ; “ Surely, you are in danger ; I pray send for a physician.” But the sick man answered ; “ It is no matter, for if I die, I will die at leisure.”

286. Cato the elder, what time many of the Romans had statues erected in their honour, was asked by one in a kind of wonder, “ Why he had none ?” He answered, “ He had much rather men should ask and wonder why he had no statue, than why he had a statue.”

287. A certain friend of Sir Thomas More’s, taking great pains about a book, which he intended to publish, being well conceited of his own wit, which no man else thought worthy of commendation, brought it to Sir Thomas More to peruse it, and pass his judgment upon it ; which he did : and finding nothing therein worthy the press, he said to him with a grave countenance ; “ That if it were in verse it would be more worthy.” Upon which words, he went immediately and turned it into verse, and then brought it to Sir Thomas again ; who looking thereon, said soberly ; “ Yes, marry, now it is somewhat ; for now it is rhyme ; whereas before it was neither rhyme nor reason.”

288. Sir Henry Wotton used to say, “ That critics were like brushers of noble-mens clothes.”

289. Hannibal said of Fabius Maximus, and of Marcellus, whereof the former waited upon him, that he could make no progress, and the latter had many sharp fights with him ; “ That he feared Fabius like a tutor, and Marcellus like an enemy.”

290. When king Edward the second was amongst his torturers, who hurried him to and fro, that no man should know where he was, they set him down upon a bank : and one time the more to disguise his face, shaved him, and washed him with cold water of a ditch by : the king said ; “ Well, yet I will have warm water for my beard : and so shed abundance of tears.”

291. One

A P O P H T H E G M S.

291. One of the Seven was wont to say ; “ That laws were like cobwebs ; where
“ the small flies were caught, and the great brake through.”

292. Lewis the eleventh of France, having much abated the greatness and power
of the peers, nobility, and court of parliament, would say, “ That he had brought
“ the crown out of ward.”

293. There was a cowardly Spanish soldier, that in a defeat the Moors gave, ran
away with the foremost. Afterwards when the army generally fled, this soldier was
missing. Whereupon it was said by some, that he was slain. “ No sure, said one,
he is alive ; for the Moors eat no hares flesh.”

294. A gentleman that was punctual of his word, and loved the fame in others,
when he heard that two persons had agreed upon a meeting about serious affairs, at a
certain time and place ; and that the one party failed in the performance, or neglected
his hour ; would usually say of him, “ He is a young man then.”

295. Anacharsis would say, concerning the popular estates of Græcia, that “ he
“ wondered how, at Athens wife men did propose, and fools dispose.”

His lordship, when he had finished this collection of Apophthegms, concluded
thus : Come, now all is well : they say, he is not a wise man that will lose his
friend for his wit ; but he is less a wise man, that will lose his friend for another
man’s wit.

A P O P H T H E G M S

Contained in the original edition in octavo, but omitted in later copies.

1. **W**HEN queen Elizabeth had advanced Raleigh, she was one day playing
on the virginals, and my lord of Oxford and another nobleman stood
by. It fell out so, that the ledge before the jacks was taken away, so as the jacks
were seen : my lord of Oxford and the other nobleman smiled, and a little whis-
pered. The queen marked it, and would needs know what the matter was ? My
lord of Oxford answered ; “ That they smiled to see, that when jacks went up, heads
“ went down.”

22. Sir Thomas More, who was a man, in all his life-time, that had an excellent
vein in jesting, at the very instant of his death, having a pretty long beard, after his
head was upon the block, lift it up again, and gently drew his beard aside, and said ;
“ This hath not offended the king.”

27. Demonax the Philosopher, when he died, was asked touching his burial. He
answered, “ Never take care for burying me, for stink will bury me.” He that
asked him, said again ; “ Why, would you have your body left to the dogs and ra-
“ vens to feed upon ?” Demonax answered ; “ Why, what great hurt is it, if hav-
“ ing sought to do good, when I lived, to men ; my body do some good to beasts,
“ when I am dead.”

30. Phocion the Athenian, a man of great severity, and no ways flexible to the will
of the people, one day, when he spake to the people, in one part of his speech, was
applauded : whereupon, he turned to one of his friends, and asked ; “ What have I
“ said amiss ?”

34. Bion was wont to say ; “ That Socrates, of all the lovers of Alcibiades, only
“ held him by the ears.”

37. There

37. There was a philosopher about Tiberius, that looking into the nature of Caius, said of him ; “ that he was mire mingled with blood.”

42. There was a bishop, that was somewhat a delicate person, and bathed twice a day. A friend of his said to him ; “ My lord, why do you bathe twice a day ?” The bishop answered ; “ Because I cannot conveniently bathe thrice.”

89. When Sir Thomas More was lord chancellor, he did use, at mass, to sit in the chancel ; and his lady in a pew. And because the pew stood out of sight, his gentleman-usher, ever after service, came to the lady’s pew, and said ; “ Madam, my lord “ is gone.” So when the chancellor’s place was taken from him, the next time they went to church, Sir Thomas himself came to his lady’s pew, and said ; “ Madam, my lord is gone.”

104. A Græcian captain advising the confederates, that were united against the Lacedæmonians, touching their enterprise, gave opinion, that they should go directly upon Sparta, saying ; “ That the state of Sparta was like rivers ; strong when they “ had run a great way, and weak towards their head.”

108. One was examined upon certain scandalous words spoken against the king. He confessed them, and said ; “ It is true, I spake them, and if the wine had not failed, “ I had said much more.”

110. Trajan would say, “ That the king’s exchequer was like the spleen ; for when “ that did swell, the whole body did pine.”

111. Charles the Bald allowed one, whose name was Scottus, to sit at the table with him, for his pleasure : Scottus sat on the other side of the table. One time the king being merry with him, said to him ; “ What is there between Scott and “ for ?” Scottus answered : “ The table only.”

113. There was a marriage between a widow of great wealth, and a gentleman of a great house, that had no estate or means. Jack Roberts said, “ That marriage was like “ a black pudding ; the one brought blood, and the other brought suet and oatmeal.”

149. Cræsus said to Cambyfes, “ That peace was better than war ; because in peace “ the sons did bury their fathers, but in the wars the fathers did bury their sons.”

154. Carvajal, when he was drawn to execution, being fourscore and five years old, and laid upon the hurdle, said ; “ What ! young in cradle, old in cradle !”

161. Diogenes was asked in a kind of scorn ; “ What was the matter, that philoso- “ phers haunted rich men, and not rich men philosophers ?” He answered ; “ Because “ the one knew what they wanted, the other did not.”

162. Demetrius, king of Macedon, had a petition offered him divers times by an old woman, and still answered ; “ He had no leisure.” Whereupon the woman said aloud ; “ Why then give over to be king.”

172. There were two gentlemen, otherwise of equal degree, save that the one was of the ancients house. The other in courtesy asked his hand to kiss : which he gave him ; and he kiss’d it : but said withal, to right himself, by way of friendship, “ Well, “ I and you, against any two of them :” putting himself first.

198. Themistocles would say of himself ; “ That he was like a plane-tree, that in “ tempests men fled to him, and in fair weather men were ever cropping his leaves.”

199. Themistocles said of speech ; “ That it was like arras that spread abroad “ shews fair images, but contracted is but like packs.”

211. Lycurgus would say of divers of the heroes of the heathen ; “ That he won- “ dered that men should mourn upon their days for them as mortal men, and yet “ sacrifice to them as gods.”

213. There is an ecclesiastical writer of the Papists, to prove antiquity of confession in the form that it now is, doth note, in very ancient times, even in the primitive times, amongst other foul slanders spread against the christians, one was ; " That they did adore the genitories of their priests. Which, he saith, grew from the posture of the confessant, and the priest in confession : which is, that the confessant kneels down, before the priest sitting in a raised chair above him."

216. Fabricius, in conference with Pyrrhus, was tempted to revolt to him ; Pyrrhus telling him, that he should be partner of his fortunes, and second person to him. But Fabricius answered, in a scorn, to such a motion ; " Sir, that would not be good for yourself : for if the Epirotes once know me, they will rather desire to be governed by me than by you."

221. Thales said ; " that life and death were all one." One that was present asked him ; " Why do not you die then ?" Thales said again ; " Because they are all one."

223. An Ægyptian priest having conference with Solon, said to him ; " You Græcians are ever children ; you have no knowledge of antiquity, nor antiquity of knowledge."

227. Diogenes was one day in the market-place with a candle in his hand, and being asked ; " What he sought ?" he said, " He sought a man."

228. Bias being asked ; How a man should order his life ? answered ; " As if a man should live long, or die quickly."

229. Queen Elizabeth was entertained by my lord Burleigh at Theobalds : and at her going away, my lord obtained of the queen to make seven knights. They were gentlemen of the country, of my lord's friends and neighbours. They were placed in a rank, as the queen should pass by the hall ; and to win antiquity of knighthood, in order, as my lord favoured ; though indeed the more principal gentlemen were placed lowest. The queen was told of it, and said nothing ; but when she went along, she passed them all by, as far as the skreen, as if she had forgot it : and when she came to the skreen, she seemed to take herself with the manner, and said, " I had almost forgot what I promised." With that she turned back, and knighted the lowest first, and so upward. Whereupon Mr. Stanhope, of the privy-chamber, a while after told her : " Your majesty was too fine for my lord Burleigh." She answered ; " I have but fulfilled the Scripture ; *the first shall be last, and the last first.*"

235. Sir Fulke Grevill had much private access to queen Elizabeth, which he used honourably, and did many men good ; yet he would say merrily of himself ; " That he was like Robin Goodfellow ; for when the maids spilt the milkpans, or kept any racket, they would lay it upon Robin : so what tales the ladies about the queen told her, or other bad offices that they did, they would put it upon him."

240. There was a politic sermon, that had no divinity in it, was preached before the king. The king, as he came forth, said to bishop Andrews ; " Call you this a sermon ?" the bishop answered ; " And it please your majesty, by a charitable construction, it may be a sermon."

244. Henry Noel would say ; " That courtiers were like fasting-days ; they were next the holy-days, but in themselves they were the most meagre days of the week."

247. Cato said ; “ The best way to keep good acts in memory, was to refresh them with new.”
259. Aristippus said ; “ He took money of his friends, not so much to use it himself, as to teach them how to bestow their money.”
260. A trumpet said to Aristippus ; “ That she was with child by him :” he answered ; “ You know that no more, than if you went through a hedge of thorns, you could say, This thorn pricked me.”
263. Democritus said ; “ That truth did lie in profound pits, and when it was got, it needed much refining.”
266. Diogenes said of a young man that danced daintily, and was much commended ; “ The better, the worse.”
271. There was a nobleman that was lean of visage, but immediately after his marriage he grew pretty plump and fat. One said to him ; “ Your lordship doth contrary to other married men ; for they at the first wax lean, and you wax fat.” Sir Walter Raleigh stood by, and said ; “ Why, there is no beast, that if you take him from the common, and put him into the severall, but he will wax fat.”
272. Diogenes seeing one, that was a bastard, casting stones among the people, bad him take heed he hit not his father.
275. It was said by many concerning the canons of the council of Trent ; “ That we are beholden to Aristotle for many articles of our faith.”

Certain A P O P H T H E G M S of Lord BACON.

First published in his *Remains*.

1. **P**LUTARCH said well, “ It is otherwise in a commonwealth of men than of bees : the hive of a city or kingdom is in best condition when there is least of noise or buz in it.”
2. The same Plutarch said of men of weak abilities set in great place, “ that they were like little statues set on great bases, made to appear the less by their advancement.”
3. He said again ; “ Good fame is like fire. When you have kindled it, you may easily preserve it ; but if once you extinguish it, you will not easily kindle it again ; at least, not make it burn as bright as it did.”
4. Queen Elizabeth seeing Sir Edward ----- in her garden, looked out at her window, and asked him in Italian, What does a man think of when he thinks of nothing ? Sir Edward, who had not had the effect of some of the queen’s grants so soon as he hoped and desired, paused a little ; and then made answer, “ Madam, he thinks of a woman’s promise.” The queen shrunk in her head, but was heard to say, “ Well, Sir Edward, I must not confute you.” Anger makes dull men witty, but it keeps them poor.
5. When any great officer, ecclesiastical or civil, was to be made, the queen would inquire after the piety, integrity, and learning of the man. And when she was satisfied in these qualifications, she would consider of his personage. And upon such an occasion she pleased once to say to me, “ Bacon, how can the magistrate maintain his authority when the man is despised ?”
6. In eighty-eight, when the queen went from Temple-bar along Fleet-street, the lawyers were ranked on one side, and the companies of the city on the other ; said

Mr. Bacon to a lawyer who stood next to him : " Do but observe the courtiers, if " they bow first to the citizens, they are in debt ; if first to us, they are in law."

7. King James was wont to be very earnest with the country gentlemen to go from London to their country houses. And sometimes he would say thus to them ; " Gentlemen, at London, you are like ships at sea, which shew like nothing ; but " in your country villages, you are like ships in a river, which look like great " things."

8. Soon after the death of a great officer, who was judged no advancer of the king's matters, the king said to his solicitor Bacon, who was his kinsman, " Now " tell me truly, what say you of your cousin that is gone ?" Mr. Bacon answered, " Sir, since your majesty doth charge me, I'll e'en deal plainly with you, and give " you such a character of him, as if I were to write his story. I do think he was " no fit counsellor to make your affairs better: but yet he was fit to have kept them " from growing worse." The king said, " On my so'l, man, in the first thou " speakest like a true man, and in the latter like a kinsman."

9. King James, as he was a prince of great judgment, so he was a prince of a marvellous pleasant humour ; and there now come into my mind two instances of it. As he was going through Lufen by Greenwich, he asked what town it was ? They said, Lufen. He asked a good while after, " What town is this we are now in?" They said, still 'twas Lufen. " On my so'l," said the king, " I will be king of Lufen."

10. In some other of his progresses, he asked how far it was to a town whose name I have forgotten. They said, Six miles. Half an hour after he asked again. One said, Six miles and an half. The king alighted out of his coach, and crept under the shoulder of his led horse. And when some asked his majesty what he meant ? " I must stalk," said he, " for yonder town is shy, and flies me."

11. Count Gondomar sent a compliment to my lord St. Alban, wishing him a good Easter. My lord thanked the messenger, and said, " he could not at present " requite the count better than in returning him the like ; that he wished his lord- " ship a good Passover."

12. My lord chancellor Elsmere, when he had read a petition which he disliked, would say ; " What, you would have my hand to this now ?" And the party answering, Yes : he would say farther, " Well, so you shall ; nay, you shall have both " my hands to it." And so would with both his hands tear it in pieces.

13. Sir Francis Bacon was wont to say of an angry man who suppressed his passion, " that he thought worse than he spake:" and of an angry man that would chide, " that he spoke worse than he thought."

14. He was wont also to say, " that power in an ill man was like the power " of a black witch ; he could do hurt, but no good with it." And he would add, " that the magicians could turn water into blood, but could not turn the " blood again to water."

15. When Mr. Attorney Coke, in the exchequer, gave high words to Sir Francis Bacon, and stood much upon his higher place ; Sir Francis said to him, " Mr. Attorney, the less you speak of your own greatness, the more I shall " think of it: and the more, the less."

16. Sir Francis Bacon coming into the earl of Arundel's garden, where there were a great number of ancient statues of naked men and women, made a stand, and as astonished, cried out, " The resurrection !"

17. Sir

17. Sir Francis Bacon, who was always for moderate counsels, when one was speaking of such a reformation of the church of England, as would in effect make it no church; said thus to him, "Sir, the subject we talk of is the eye of England; and if there be a speck or two in the eye, we endeavour to take them off; but he were a strange oculist who would pull out the eye."

18. The same Sir Francis Bacon was wont to say, "that those who left useful studies for useless scholastic speculations, were like the Olympic gamesters, who obtained from necessary labours, that they might be fit for such as were not so."

19. He likewise often used this comparison: "* The empirical philosophers are like to pismires; they only lay up and use their store. The rationalists are like the spiders; they spin all out of their own bowels. But give me a philosopher, who like the bee hath a middle faculty, gathering from abroad, but digesting that which is gathered by his own virtue."

20. The lord St. Alban, who was not over-hasty to raise theories, but proceeded slowly by experiments, was wont to say to some philosophers, who would not go his pace; "Gentlemen, nature is a labyrinth, in which the very haste you move with, will make you lose your way."

21. The same lord, when he spoke of the Dutchmen, used to say, "that we could not abandon them for our safety, nor keep them for our profit." And sometimes he would express the same sense in this manner; "We hold the Belgic lion by the ears."

22. The same lord, when a gentleman seemed not much to approve of his liberality to his retinue, said to him; "Sir, I am all of a piece; if the head be lifted up, the inferior parts of the body must too."

23. The lord Bacon was wont to commend the advice of the plain old man at Buxton that sold besoms: a proud lazy young fellow came to him for a besom upon trust; to whom the old man said; "Friend, hast thou no money? borrow of thy back, and borrow of thy belly, they'll ne'er ask thee again, I shall be dunning thee every day."

24. Jack Weeks said of a great man, just then dead, who pretended to some religion, but was none of the best livers; "Well, I hope he is in heaven. Every man thinks as he wishes; but if he be in heaven, 'twere pity it were known."

* See the substance of this in *Novum Organum*, Vol. IV. and *Cogitata et Visa*, Vol. V.

ORNAMENTA RATIONALIA:

O R,

ELEGANT SENTENCES,

Some made, others collected by the Lord BACON;
and by him put under the abovesaid title.

Collected out of the *Mimi* of Publius, and published in the *Remains*.

1. **A**LEATOR, *quanto in arte est melior, tanto est nequior.*
A gamester, the greater master he is in his art, the worse man he is.
2. *Arcum, intentio frangit; animum, remissio.*
Much bending breaks the bow; much unbending, the mind.
3. *Bis vincit, qui se vincit in victoria.*
He conquers twice, who upon victory overcomes himself.
4. *Cum vitia prosint, peccat, qui recte facit.*
If vices were upon the whole matter profitable, the virtuous man would be the sinner.
5. *Bene dormit, qui non sentit quod male dormiat.*
He sleeps well, who feels not that he sleeps ill.
6. *Deliberare utilia, mora est tutissima.*
To deliberate about useful things, is the safest delay.
7. *Dolor decrescit, ubi quo crescat non habet.*
The flood of grief decreaseth, when it can swell no higher.
8. *Etiam innocentes cogit mentiri dolor.*
Pain makes even the innocent man a liar.
9. *Etiam celeritas in desiderio, mora est.*
In desire, swiftness itself is delay.
10. *Etiam capillus unus habet umbram suam.*
The smallest hair casts a shadow.
11. *Fidem qui perdit, quo se servat in reliquum?*
He that has lost his faith, what has he left to live on?
12. *Formosa facies muta commendatio est.*
A beautiful face is a silent commendation.
13. *Fortuna nimium quem fovet, stultum facit.*
Fortune makes him a fool, whom she makes her darling.
14. *Fortuna obesse nulli contenta est semel.*
Fortune is not content to do a man but one ill turn.

15. *Faci;*

15. *Facit gratum fortuna, quem nemo videt.*
The fortune which no body sees, makes a man happy and unenvied.
16. *Heu ! quam miserum est ab illo laedi, de quo non possis queri.*
O ! what a miserable thing it is to be hurt by such a one of whom it is in vain to complain.
17. *Homo toties moritur quoties amittit suos.*
A man dies as often as he loses his friends.
18. *Haereditas fletus sub persona risus est.*
The tears of an heir are laughter under a vizard.
19. *Jucundum nihil est, nisi quod reficit varietas.*
Nothing is pleasant, to which variety does not give a relish.
20. *Invidiam ferre, aut fortis, aut felix potest.*
He may bear envy, who is either couragious or happy.
21. *In malis sperare bonum, nisi innocens, nemo potest.*
None but a virtuous man can hope well in ill circumstances.
22. *In vindicando, criminosa est celeritas.*
In taking revenge, the very haste we make is criminal.
23. *In calamitosa risus etiam injuria est.*
When men are in calamity, if we do but laugh we offend.
24. *Improbe Neptunum accusat, qui iterum naufragium facit.*
He accuseth Neptune unjustly, who makes shipwreck a second time.
25. *Multis minatur, qui uni facit injuriam.*
He that injures one, threatens an hundred.
26. *Mora omnis ingrata est, sed facit sapientiam.*
All delay is ungrateful, but we are not wise without it.
27. *Mori est felicis aniequam mortem invocet.*
Happy he who dies ere he calls for death to take him away.
28. *Malus ubi bonum se simulat, tunc est pessimus.*
An ill man is always ill ; but he is then worst of all, when he pretends to be a saint.
29. *Magno cum periculo custoditur, quod multis placet.*
Lock and key will scarce keep that secure, which pleases every body.
30. *Male vivunt qui se semper victuros putant.*
They think ill, who think of living always.
31. *Male secum agit aeger, medicum qui haeredem facit.*
That sick man does ill for himself, who makes his physician his heir.
32. *Multos timere debet, quem multi timent.*
He of whom many are afraid, ought himself to fear many.
33. *Nulla tam bona est fortuna, de qua nil possis queri.*
There is no fortune so good, but it bates an ace.
34. *Pars beneficii est, quod petitur si bene neget.*
It is part of the gift, if you deny genteely what is asked of you.
35. *Timidus vocat se cautum, parcum sordidus.*
The coward calls himself a wary man ; and the miser says he is frugal.
36. *O vita ! misero longa, felici brevis.*
O life ! an age to him that is in misery ; and to him that is happy, a moment.

A COLLECTION of SENTENCES

OUT OF SOME OF THE

WRITINGS of the Lord BACON.

1. **I**T is a strange desire which men have, to seek power and lose liberty.
2. Children increase the cares of life; but they mitigate the remembrance of death.
3. Round dealing is the honour of man's nature; and a mixture of falshood is like alloy in gold and silver, which may make the metal work the better, but it embaseth it.
4. Death openeth the gate to good fame, and extinguisheth envy.
5. Schism in the spiritual body of the church, is a greater scandal than a corruption in manners: as, in the natural body, a wound or solution of continuity is worse than a corrupt humour.
6. Revenge is a kind of wild justice, which the more a man's nature runs to, the more ought law to weed it out.
7. He that studieth revenge, keepeth his own wounds green.
8. Revengeful persons live and die like witches: their life is mischievous, and their end is unfortunate.
9. It is an high speech of Seneca, after the manner of the Stoics, that the good things which belong to prosperity, are to be wished; but the good things which belong to adversity, are to be admired.
10. He that cannot see well, let him go softly.
11. If a man be thought secret, it inviteth discovery; as the more close air sucketh in the more open.
12. Keep your authority wholly from your children, not so your purse.
13. Men of noble birth are noted to be envious towards new men when they rise: for the distance is altered; and it is like a deceit of the eye, that when others come on, they think themselves go back.
14. That envy is most malignant which is like Cain's, who envied his brother, because his sacrifice was better accepted, when there was no body but God to look on.
15. The lovers of great place are impatient of privateness, even in age, which requires the shadow: like old townsmen that will be still sitting at their street door, though there they offer age to scorn.
16. In evil, the best condition is, not to will; the next not to can.
17. In great place, ask counsel of both times: of the ancient time, what is best; and of the latter time, what is fittest.
18. As in nature things move more violently to their place, and calmly in their place: so virtue in ambition is violent; in authority, settled and calm.
19. Boldness in civil business, is like pronounciation in the orator of Demosthenes; the first, second, and third thing.
20. Boldness is blind: wherefore it is ill in counsel, but good in execution. For in counsel it is good to see dangers; in execution not to see them, except they be very great.
21. Without good-nature, man is but a better kind of vermin.

22. God

22. God never wrought miracle to convince atheism, because his ordinary works convince it.

23. The great atheists indeed are hypocrites, who are always handling holy things, but without feeling; so as they must needs be cauterized in the end.

24. The master of superstition is the people. And in all superstition, wise men follow fools.

25. In removing superstitions, care would be had, that, as it fareth in ill purgings, the good be not taken away with the bad: which commonly is done when the people is the physician.

26. He that goeth into a country before he hath some entrance into the language, goeth to school, and not to travel.

27. It is a miserable state of mind, and yet it is commonly the case of kings, to have few things to desire, and many things to fear.

28. Depression of the nobility may make a king more absolute, but less safe.

29. All precepts concerning kings are, in effect, comprehended in these remembrances: remember thou art a man; remember thou art God's vicegerent: The one bridleth their power, and the other their will.

30. Things will have their first or second agitation: if they be not tossed upon the arguments of counsel, they will be tossed upon the waves of fortune.

31. The true composition of a counsellor is, rather to be skilled in his master's business than his nature; for then he is like to advise him, and not to feed his humour.

32. Private opinion is more free, but opinion before others is more reverend.

33. Fortune is like a market, where many times if you stay a little the price will fall.

34. Fortune sometimes turneth the handle of the bottle, which is easy to be taken hold of; and after the belly, which is hard to grasp.

35. Generally it is good to commit the beginning of all great actions to Argus with an hundred eyes; and the ends of them to Briareus with an hundred hands; first to watch, and then to speed.

36. There is great difference betwixt a cunning man and a wise man. There be that can pack the cards, who yet cannot play well; they are good in canvasses and factions, and yet otherwise mean men.

37. Extreme self-lovers will set a man's house on fire, though it were but to roast their eggs.

38. New things, like strangers, are more admired, and less favoured.

39. It were good that men, in their innovations, would follow the example of time itself, which indeed innovateth greatly, but quietly, and by degrees scarce to be perceived.

40. They that reverence too much old time, are but a scorn to the new.

41. The Spaniards and Spartans have been noted to be of small dispatch. *Mi venga la muerte de Spagna*; Let my death come from Spain, for then it will be sure to be long a coming.

42. You had better take for business a man somewhat absurd, than over-formal.

43. Those who want friends to whom to open their griefs, are cannibals of their own hearts.

44. Number itself importeth not much in armies, where the people are of weak courage: for, as Virgil says, it never troubles a wolf how many the sheep be.

A COLLECTION OF SENTENCES.

45. Let states, that aim at greatness, take heed how their nobility and gentry multiply too fast. In coppice woods, if you leave your staddles too thick, you shall never have clean underwood, but shrubs and bushes.

46. A civil war is like the heat of a fever; but a foreign war is like the heat of exercise, and serveth to keep the body in health.

47. Suspicions among thoughts, are like bats among birds, they ever fly by twilight.

48. Base natures, if they find themselves once suspected, will never be true.

49. Men ought to find the difference between saltiness and bitterness. Certainly he that hath a satirical vein, as he maketh others afraid of his wit, so he had need be afraid of others' memory.

50. Discretion in speech is more than eloquence.

51. Men seem neither well to understand their riches, nor their strength: of the former they believe greater things than they should, and of the latter much less. And from hence certain fatal pillars have bounded the progress of learning.

52. Riches are the baggage of virtue; they cannot be spared, nor left behind, but they hinder the march.

53. Great riches have sold more men than ever they have bought out.

54. Riches have wings, and sometimes they fly away of themselves, and sometimes they must be set flying to bring in more.

55. He that defers his charity until he is dead, is, if a man weighs it rightly, rather liberal of another man's, than of his own.

56. Ambition is like choler, if it can move, it makes men active; if it be stopped, it becomes adust, and makes men melancholy.

57. To take a soldier without ambition, is to pull off his spurs.

58. Some ambitious men seem as screens to princes in matters of danger and envy. For no man will take such parts, except he be like the feel'd dove, that mounts and mounts, because he cannot see about him.

59. Princes and states should choose such ministers as are more sensible of duty than rising; and should discern a busy nature from a willing mind.

60. A man's nature runs either to herbs or weeds; therefore let him seasonably water the one, and destroy the other.

61. If a man look sharply and attentively, he shall see fortune; for though she be blind, she is not invisible.

62. Usury bringeth the treasure of a realm or state into few hands: for the usurer being at certainties, and others at uncertainties; at the end of the game, most of the money will be in the box.

63. Virtue is best in a body that hath rather dignity of presence, than beauty of aspect. The beautiful prove accomplished, but not of great spirit; and study, for the most part, rather behaviour than virtue.

64. The best part of beauty is that which a picture cannot express.

65. He who builds a fair house upon an ill seat, commits himself to prison.

66. If you will work on any man, you must either know his nature and fashions, and so lead him; or his ends, and so persuade him; or his weaknesses and disadvantages, and so awe him; or those that have interest in him, and so govern him.

67. Costly followers, among whom we may reckon those who are importunate in suits, are not to be liked; lest, while a man maketh his train longer, he make his wings shorter.

68. Fame

SHORT NOTES FOR CIVIL CONVERSATION.

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68. Fame is like a river that beareth up things light and swollen, and drowns things weighty and solid.

69. Seneca saith well, that anger is like ruin, which breaks itself upon that it falls.

70. Excusations, cessions, modesty itself well governed, are but arts of ostentation.

71. High treason is not written in ice; that when the body relenteth, the impression should go away.

72. The best governments are always subject to be like the fairest crystals, wherein every isicle or grain is seen, which in a fouler stone is never perceived.

73. Hollow church papists are like the roots of nettles, which themselves sting not; but yet they bear all the stinging leaves.

S H O R T N O T E S

F O R

C I V I L C O N V E R S A T I O N .

1. **T**O deceive mens expectations generally, with cautel, argueth a staid mind, and unexpected constancy: namely, in matters of fear, anger, sudden joy or grief, and all things which may affect or alter the mind in public or sudden accidents, or such like.

2. It is necessary to use a stedfast countenance, not wavering with action, as in moving the head or hand too much, which sheweth a fantastical, light and fickle operation of the spirit, and consequently like mind as gesture: only it is sufficient, with leisure, to use a modest action in either.

3. In all kinds of speech, either pleasant, grave, severe, or ordinary, it is convenient to speak leisurely, and rather drawingly, than hastily; because hasty speech confounds the memory, and oftentimes, besides unseemliness, drives a man either to a non-plus or unseemly stammering, harping upon that which should follow; whereas a slow speech confirmeth the memory, addeth a conceit of wisdom to the hearers, besides a seemliness of speech and countenance.

4. To desire in discourse to hold all arguments, is ridiculous, wanting true judgement; for in all things no man can be exquisite.

5, 6. To have common places to discourse, and to want variety, is both tedious to the hearers, and shews a shallowness of conceit; therefore it is good to vary, and suit speeches with the present occasions; and to have a moderation in all our speeches, especially in jesting of religion, state, great persons, weighty and important business, poverty, or any thing deserving pity.

7. A long continued speech, without a good speech of interlocution, sheweth slowness; and a good reply, without a good set speech, sheweth shallowness and weakness.

8. To use many circumstances, ere you come to the matter, is wearisome; and to use none at all, is but blunt.

9. Bashfulness is a great hindrance to a man, both of uttering his conceit, and understanding what is propounded unto him: wherefore, it is good to press himself forwards with discretion, both in speech, and company of the better sort.

Ufus promptos facit.

D d d d 2

An

AN ESSAY ON DEATH.

1. **I** Have often thought upon death, and I find it the least of all evils. All that which is past is as a dream; and he that hopes or depends upon time coming, dreams waking. So much of our life as we have discovered is already dead; and all those hours which we share, even from the breasts of our mother, until we return to our grand-mother the earth, are part of our dying days; whereof even this is one, and those that succeed are of the same nature, for we die daily; and as others have given place to us, so we must in the end give way to others.

2. Physicians, in the name of death include all sorrow, anguish, disease, calamity, or whatsoever can fall in the life of man, either grievous or unwelcome: but these things are familiar unto us, and we suffer them every hour; therefore we die daily, and I am older since I affirmed it.

3. I know many wise men, that fear to die; for the change is bitter, and flesh would refuse to prove it: besides, the expectation brings terror, and that exceeds the evil. But I do not believe, that any man fears to be dead, but only the stroke of death: and such are my hopes, that if heaven be pleased, and nature renew but my lease for twenty-one years more, without asking longer days, I shall be strong enough to acknowledge without mourning, that I was begotten mortal. Virtue walks not in the high-way, though she go *per alta*; this is strength and the blood to virtue, to contemn things that be desired, and to neglect that which is feared.

4. Why should man be in love with his fetters, though of gold? Art thou drowned in security? Then I say thou art perfectly dead. For though thou movest, yet thy soul is buried within thee, and thy good angel either forsakes his guard or sleeps. There is nothing under heaven, saving a true friend, who cannot be counted within the number of moveables, unto which my heart doth lean. And this dear freedom hath begotten me this peace, that I mourn not for that end which must be, nor spend one wish to have one minute added to the uncertain date of my years. It was no mean apprehension of Lucian, who says of Menippus, that in his travels through hell he knew not the kings of the earth from other men, but only by their louder cryings and tears: which was fostered in them through the remorseful memory of the good days they had seen, and the fruitful havings which they so unwillingly left behind them: he that was well seated, looked back at his portion, and was loth to forsake his farm; and others either minding marriages, pleasures, profit, or preferment, desired to be excused from death's banquet: they had made an appointment with earth, looking at the blessings, not the hand that enlarged them, forgetting how unclothedly they came hither, or with what naked ornaments they were arrayed.

5. But were we servants of the precept given, and observers of the heathens rule *memento mori*, and not become benighted with this seeming felicity, we should enjoy it as men prepared to lose, and not wind up our thoughts upon so perishing a fortune: he that is not slackly strong, as the servants of pleasure, how can he be found unready to quit the veil and false visage of his perfection? The soul
having

having shaken off her flesh, doth then set up for herself, and contemning things that are under, shews what finger hath enforced her; for the souls of idiots are of the same piece with those of statesmen, but now and then nature is at a fault, and this good guest of ours takes soil in an imperfect body, and so is slackened from shewing her wonders; like an excellent musician, which cannot utter himself upon a defective instrument.

6. But see how I am swerved, and lose my course, touching at the soul, that doth least hold action with death, who hath the surest property in this frail act; his stile is the end of all flesh, and the beginning of incorruption.

This ruler of monuments leads men for the most part out of this world with their heels forward; in token that he is contrary to life; which being obtained, sends men headlong into this wretched theatre, where being arrived, their first language is that of mourning. Nor in my own thoughts, can I compare men more fitly to any thing, than to the Indian fig-tree, which being ripened to his full height, is said to decline his branches down to the earth; whereof she conceives again, and they become roots in their own stock.

So man having derived his being from the earth, first lives the life of a tree, drawing his nourishment as a plant, and made ripe for death he tends downwards, and is sowed again in his mother the earth, where he perisheth not but expects a quickening.

7. So we see death exempts not a man from being, but only presents an alteration; yet there are some men, I think, that stand otherwise persuaded. Death finds not a worse friend than an alderman, to whose door I never knew him welcome; but he is an importunate guest, and will not be said nay.

And though they themselves shall affirm, that they are not within, yet the answer will not be taken; and that which heightens their fear is, that they know they are in danger to forfeit their flesh, but are not wise of the payment day: which sickly uncertainty is the occasion that, for the most part, they step out of this world unfurnished for their general account, and being all unprovided, desire yet to hold their gravity, preparing their souls to answer in scarlet.

Thus I gather, that death is disagreeable to most citizens, because they commonly die intestate; this being a rule, that when their will is made, they think themselves nearer a grave than before: now they, out of the wisdom of thousands, think to scare destiny, from which there is no appeal, by not making a will, or to live longer by protestation of their unwillingness to die. They are for the most part well made in this world, accounting their treasure by legions, as men do devils, their fortune looks toward them, and they are willing to anchor at it, and desire, if it be possible, to put the evil day far off from them, and to adjourn their ungrateful and killing period.

No, these are not the men which have bespoken death, or whose looks are assured to entertain a thought of him.

8. Death arrives gracious only to such as sit in darkness, or lie heavy burdened with grief and irons; to the poor Christian, that sits bound in the galley; to despairful widows, penfive prisoners, and deposed kings; to them whose fortune runs back, and whose spirit mutinies; unto such death is a redeemer, and the grave a place for retiredness and rest.

These wait upon the shore of death, and waft unto him to draw near, wishing above all others, to see his star, that they might be led to his place; wooing the
remorseless

AN ESSAY ON DEATH.

remorseless sisters to wind down the watch of their life, and to break them off before the hour.

9. But death is a doleful messenger to an usurer, and fate untimely cuts their thread; for it is never mentioned by him, but when rumours of war and civil tumults put him in mind thereof.

And when many hands are armed, and the peace of a city in disorder, and the foot of the common soldiers sounds an alarm on his stairs, then perhaps such a one, broken in thoughts of his moneys abroad, and cursing the monuments of coin which are in his house, can be content to think of death, and, being hasty of perdition, will perhaps hang himself, lest his throat should be cut; provided that he may do it in his study, surrounded with wealth, to which his eye sends a faint and languishing salute, even upon the turning off; remembering always, that he have time and liberty, by writing, to depute himself as his own heir.

For that is a great peace to his end, and reconciles him wonderfully upon the point.

10. Herein we all dally with ourselves, and are without proof till necessity. I am not of those that dare promise to pine away myself in vain-glory, and I hold such to be but feat boldness, and them that dare commit it to be vain. Yet for my part, I think nature should do me great wrong, if I should be so long in dying, as I was in being born.

To speak truth, no man knows the limits of his own patience; nor can divine how able he shall be in his sufferings, till the storm come, the perfectest virtue being tried in action, but I would, out of a care to do the best business well, ever keep a guard, and stand upon keeping faith and a good conscience.

11. And if wishes might find place, I would die together, and not my mind often, and my body once; that is, I would prepare for the messengers of death, sickness, and affliction, and not wait long, or be attempted by the violence of pain.

Herein I do not profess myself a Stoic, to hold grief no evil, but opinion, and a thing indifferent.

But I consent with Cæsar, that the suddenest passage is easiest, and there is nothing more awakens our resolve and readiness to die, than the quieted conscience, strengthened with opinion that we shall be well spoken of upon earth by those that are just, and of the family of virtue; the opposite whereof is a fury to man, and makes even life unsweet.

Therefore, what is more heavy than evil fame deserved? Or likewise, who can see worse days, than he that yet living doth follow at the funerals of his own reputation?

I have laid up many hopes, that I am privileged from that kind of mourning, and could wish the like peace to all those with whom I wage love.

12. I might say much of the commodities that death can sell a man; but briefly, death is a friend of ours, and he that is not ready to entertain him, is not at home. Whilst I am, my ambition is not to fore-flow the tide; I have but so to make my interest of it as I may account for it; I would wish nothing but what might better my days, nor desire any greater place than the front of good opinion. I make not love to the continuance of days, but to the goodness of them; nor wish to die, but refer myself to my hour, which the great dispenser of all things hath appointed me; yet as I am frail, and suffered for the first fault, were it given me to choose, I should not be earnest to see the evening of my age; that
extremity

extremity of itself being a disease, and a mere return into infancy: so that if perpetuity of life might be given me, I should think what the Greek poet said, Such an age is a mortal evil. And since I must needs be dead, I require it may not be done before mine enemies, that I be not stript before I be cold; but before my friends. The night was even now; but that name is lost; it is not now late but early. Mine eyes begin to discharge their watch, and compound with this fleshly weakness for a time of perpetual rest; and I shall presently be as happy for a few hours, as I had died the first hour I was born.

The END of the First VOLUME.



