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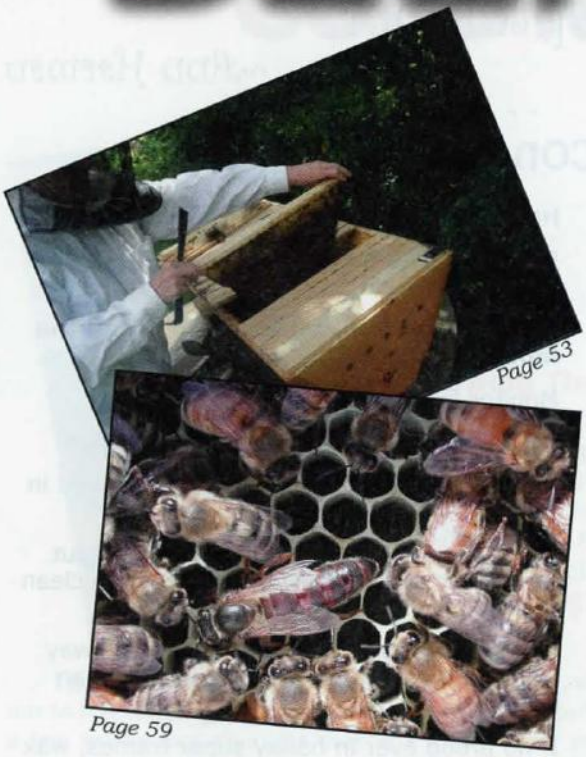


Hive Tasks

July, August, September

~Ann Harman

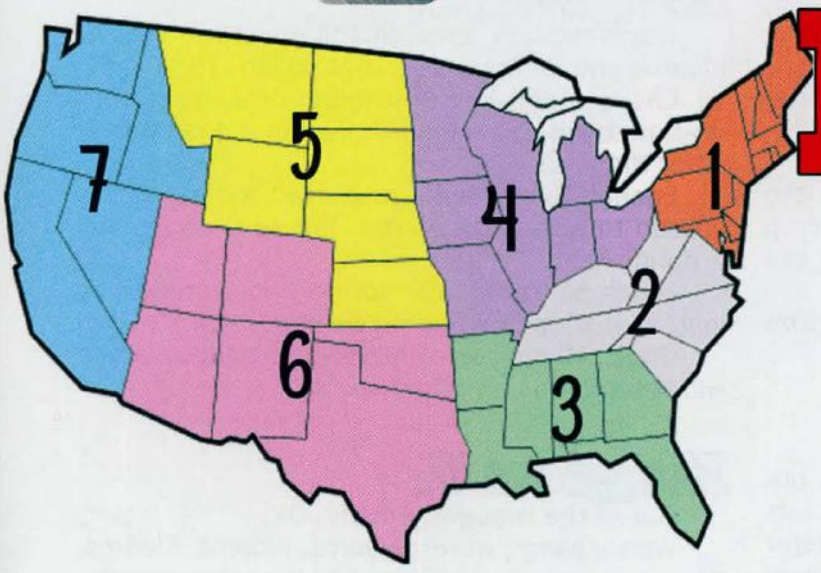
First Year

- Monitor and decide on *Varroa* treatment in July. Winter survival depends on *Varroa* control during July.
- If choosing a chemical treatment, **read the label** for important application information.
- Monitor and treat for small hive beetle
- Packages and nucs started in spring should be in fully-completed hives with all foundation drawn by the end of July.
- Keep weeds and grass mowed in beeyard.
- Beekeepers monitor themselves for ticks acquired in beeyard.
- August begins the bees' New Year.
- Monitor bees' water supply — do not let it dry up.
- Examine queen's performance.
- If colony is weak examine for disease or other conditions.
- If colony is weak because of poor queen, plan on combining or requeening.
- Never combine two weak colonies — combine week with strong; eliminate weak queen.
- Maintain good ventilation in hives.
- Be a Plant Watcher and Weather Watcher to know if there's a dearth of bee forage.
- If a dearth, feed 1:1 sugar syrup and possibly a pollen patty.
- Be sure that small hive beetles are not infesting a pollen patty.
- Feed sugar syrup inside the hive and feed all colonies to prevent robbing.
- Keep hive inspections to a minimum to avoid robbing.
- In cold climate areas feed 2:1 sugar syrup in September for winter stores.

Second & Third Year

- Harvest honey during first half of July.
- Immediately after harvest decide on *Varroa* control and treat.
- If choosing a chemical treatment, **read the label** for important application information.
- Monitor for small hive beetle and treat.
- Keep weeds and grass mowed in beeyard.
- Check yourself carefully for ticks acquired in beeyard.
- If in region of small hive beetle do not put wet honey supers above inner cover to clean them up.
- Wet honey supers can be placed well away from the beeyard for a few hours to clean them up.
- If no brood ever in honey super frames, wax moth is not a problem.
- If brood was raised in honey super frames protect them against wax moth.
- Honey supers can be placed in a plastic bag and put in a freezer for a week to kill any eggs of wax moth and small hive beetle. Leave in plastic bag upon removal from freezer but protect from mice that can chew through a plastic bag.
- Be a Weather Watcher and a Plant Watcher.
- Be certain bees' water source does not dry up.
- Robbing can be a problem if a dearth of plants occurs.
- If feeding is necessary, feed inside the hive and feed all hives to prevent robbing.
- Keep hive inspections to a minimum to prevent robbing.
- Late summer is the time to monitor queen performance
- If a weak colony has no disease plan to requeen or combine with strong colony; kill poor queen.
- In areas with cold climate, feed 2:1 sugar syrup for winter stores in September.

Regional Reports



We have reporters in 7 Regions across the U.S. who send in notes and comments on what's going on in their regions, and what they expect to see in the coming months. Our report gives those comments, with a state abbreviation from where it came to provide you with some reference points.

Region 1.

It was a long, cold spring, with not nearly enough rain, and mite build up is expected to be fast this season because beekeepers couldn't visit their hives often enough. NY

Rain, cold, wind, rain, cold wind. Slow, slow buildup and bloom. DE

Great spring weather means great spring buildup and lots of early, early swarming. But then it got cool and slowed things down. Always the weather. NH

Cold, cold, cold in Vermont this spring. Slow build up and unsure honey crop. VT

Not sure what average is, but it's been average in Rhode Island. That's not bad. RI

Cold, wet, cold, wet spring and early summer means low and slow honey crop and buildup. Watch feeding. MD

A mild winter, easy spring and strong colonies this season. Best in years some say. Should be good honey crop. Constant mite treatments needed to stay ahead of that beast. NJ

But PA had more than enough rain and things are on schedule and looking OK, but it has been cooler than usual so there's some balance and even some late buildup. Foreign honeys showing up on grocery shelves. PA

Long and tough winter, but well fed and treated colonies are doing great and swarming like mad. Making splits and formic has kept mites in check. Waiting for good honey flows. ME

Region 2.

Cold wet spring. Late package arrival. Lousy weather early, but looks promising now. WV

Good early spring weather helped on time buildup and favorable nectar and pollen flows so far, but too dry in some parts of the state. Lots of swarming, of course. SC

OK spring temperatures, and favorable weather helps honey flow this year. NC

Late cold snap killed a lot of late spring blooms and lots of lost honey. TN

Cold and way too much rain meant lost crop in spring and early summer. Pesticides around corn an issue. VA

Region 3.

Fair weather helped during early buildup. So, swarming. Watching hive beetle build up. Don't let them get ahead of you. AL

Finding a place to put bees becoming an issue because good weather has led to a lot of growth. GA

Slow buildup this spring because of way too much rain. Lost blossoms meant no honey crop so far, but late build up beginning. Probably too late for a crop, but enough for winter. MS

Lots of flooding from too much rain. It's that simple. LA

Region 4.

Long cool spring held beekeepers back, but didn't seem to slow the bees at all. Lots and lots of early swarms surprised beekeepers. But later weather slowed build up after swarms, so a slower than normal late spring early summer. Locust and tulip poplar had simultaneous bloom this year which darkened the locust honey a bit. OH

Cool, wet and slow build up, but watch for Nosema issues. MI

Regular rain, but too cool for too long has slowed buildup so far. Lots of bloom though...so when it breaks lots of foraging. MO

Dry, cold spring, but warmer, wetter early summer. Things look OK. MN

Region 5.

Strong demand for honey and not enough being produced because of cool, wet weather early, but still lots of early swarms. Lots of simultaneous bloom. Summer is warming up though. Be prepared. NE

Just enough rain to get by during the spring, but need more now. Knapweed a honey of a crop and it looks strong, so far. But overall – forage losing out to crops. SD

Region 6.

Warm enough, enough soil moisture. Lots of blooms and lots of nectar and pollen. TX

Enough rain, lots of irrigation means strong, on-time build up and a promise for a good honey crop. NM

Enough rain, maybe just a tad too much this season to give a good crop. But AHB issues still around. AZ

Loads of blooms for spring and summer, as long as it keeps raining on demand. CO

Good soil moisture and lots of irrigated alfalfa will keep things on schedule. NV

Region 7.

Out of the drought. Finally. OR

Warm, warm, warm. Blooms. Blooms. Blooms. Bees in excellent condition. And then they swarm. WA

A bit of rain, finally! Warm weather and lots of flying. Sage seems strong again. Mites building fast. CA

Good weather mix stated off early, but moisture always a concern. Need enough to get enough honey to overwinter. Watch flows. OR

I DREAM OF A WORLD WHERE CHICKENS CAN CROSS THE ROAD WITHOUT HAVING THEIR MOTIVES QUESTIONED.

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You can't go wrong when introducing your kids to your bees. Make sure they have good gear, and show them everything without them having to worry. Have fun!

CITY BEES

Mosquito Summer

~TONI BURNHAM

I have to credit one of our most impressive new(-ish) bees, Ted Mcginn, for first asking this question of our government bee-regulating person: "What about the Zika virus and the plans for mosquito spraying downtown this year?" The virus has resulted in alarming birth defects and is carried by the *Aedes aegypti* mosquito, which is also associated with dengue and yellow fever.

But it will come as no surprise that spraying for mosquitoes is not neutral for bees. According to the North Carolina State University Department of Entomology, "Problems may arise if these insecticides come into contact with honey bees. Honey bees are susceptible to many insecticides, and in fact pesticides are a major cause of honey bee deaths." Some compounds create fewer problems than others: NCSU says "Sumithrin (Anvil) is relatively safe." But there are lots of other things to know, such as what kind of application (aerial or ground), what formulation (dusts or sprays) and what time of day or temperature they are applied.

Though this town (Washington DC) (with all the diplomatic, international development, ethnic, and even intelligence communities jetting all over the place) is absolutely going to be ground zero for serious mosquito abatement, it is likely that every city with a bug control budget is upping the ante this year. What do you know about local plans? Who can you talk to about it? How will you protect your bees with the information you manage to get?

But wait! There's more! Government officials are not the only folks who are going to want to take action to protect vulnerable people: this is going to be a banner year for every pest control business in town, especially the ones that already advertise mosquito control, and if you have a pregnant neighbor, "Just say no" may not be persuasive advice. So it might help to have some information your fellow citizens can use as well, and a relationship with them that they value enough to do so.

If you want to read no further, here is the summary for the rest of this article:

- Know who in your local government is in charge of mosquito control, and what their plans are;
- Make sure that it's known that beekeepers are there (if possible exactly where);
- Give official folks facts on what practices will protect bees and other pollinators;
- Express your preferences for which kinds of control (chemical, delivery system, location) you prefer;
- Get more than one beekeeper or green ally to repeat the message (lots more);
- Find out when abatement is going to happen near you, and protect your bees as best you can;
- Tell your neighbors that their abatement efforts could kill your bees, and try to give them similar preference and application information;
- Ask neighbors to share info back (like when the pest guy is coming); and
- Tell them you care about their health as much as you are asking them to care about your bees.

You have probably figured out that I use communication as a primary tool in solving urban beekeeping problems. In this case, the communication takes place mostly between people, not via social media. Important stuff requires real connection. We talk with non-beekeepers about bees, we talk with other beekeepers about bee science and how to talk to the public, we talk with community organizations about how to include bees in the structure of our shared lives.

In the eyes of many, I am also a lackey: I want people to register their bees and keep them according to best management practices and the law (where the latter was not written by Alice in Wonderland, anyway). I want beekeepers to take primary responsibility for the health of their hives with an eye to the hive down the street as well, and to lose some sleep if they might be creating a nuisance condition for the non-beekeepers around them. Because of all this communication, now that we have a potential problem, I have ongoing conversations going with folks who might listen. And we need them to listen.

In this city, the beekeeping rules and registrations are managed by the same agency that oversees pesticide use and applicators. Right up front, our point of contact has told us that we could face fines for not registering colonies and creating a nuisance (which was not popular news), but if we are registered and our bees are harmed by an illegal application (off label, wrong time of day, etc.) the

A Beekeeper's Mosquito Control "Asks"

- Tell me ahead of time: here's my contact info
- Tell them that my bees are here
- Indoor rather than outdoor spraying
- Time (pre-dawn, post-dusk) when bees are not flying
- Wait for weather that bees don't like: Low temps, high winds, rainy days
- Less toxic compounds (Want a list? Here's a good one from Clemson–Pgs.3/4: http://tinyurl.com/hgpn5la–google your state extension service, too!)
- Ultra-low volume application
- Ground applications rather than aerial
- Sprays rather than dusts
- Granules rather than sprays
- Water soluble sprays rather than emusifiable ones
- Fine sprays rather than coarse
- Avoid microencapsulated products (that can be collected like pollen)

fines on applicators run into orders of magnitude more. And the agency is very interested in hearing about such bee kills. If they know where the bees are, and a public spraying is planned, they also have the opportunity to let beekeepers know and/or alter their plans with an awareness that we are there. As the former president of a nearby state association, I know that this sort of arrangement seemed like a lovely dream there. In the city, maybe more than almost anywhere else, this kind of collaboration is possible.

According to experts in countries that have had Zika for a long time, the whole spraying thing is a long-term losing proposition, anyway: it not only kills nearby beneficial insects, it fails to eradicate the target species as well: creating resistance. Joseph Conlon of the American Mosquito Control Association, has said "For that reason, people need to understand that chemical sprays are not the answer to *Aedes aegypti*." Some point out that indoor spraying may be helpful: it collects on walls and other surfaces where mosquitoes land, poisoning them and not beneficial in the environment at large, and Zika mosquitoes also tend to collect around human habitations. But remember, local officials are going to be asked to respond quickly to something that the World Health Organization has identified as a public health emergency, and what they have at hand is sprayers and chemicals they have purchased before. Short term, the best hope might be to get them to use the lesser of all the evils at the least damaging time of day. Going forward, you might start a conversation that could save bees and beneficials for years ahead.

Your neighbors, however, are not bound by these choices, and that can be either scary or hopeful. The website of a local squad that targets mosquitoes says something your neighbors may not know, however: "This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow to drift to blooming crops if bees are visiting the treatment area." (They also mention that it is acutely toxic to aquatic wildlife when it washes off.) If you live in downtown Washington DC, I can assure you that bees are visiting the treatment area. So you need to ask your neighbors for one of two things: to get this service to come when flowers are not blooming and bees are not flying, or to help you protect your bees from their application by letting you know what is happening, where and when. Frankly, I am not too hopeful that we can get through this unscathed.

I have loads of other criticisms of these services, like depositing pesticides on the tops of leaves misses the bottom, where the mosquitoes hang out, and since they fly, what's the use of spraying one yard? To cut to the chase, it would be better to encourage standing water management, mosquito dunks, and technologies that target biting insect behavior specifically through the release of CO_2. Having a couple of dunks in your pocket to give away might be a nice gesture, too. My buddy Del sometimes goes around with his cordless drill, offering to poke holes in the bottom of garbage cans that collect rainwater. You get the idea.

What can you do when you know sprays are coming? If you can, move those hives away, if you can't, please close and/or cover them (some sources suggest burlap soaked in water: make sure you know where that burlap came from). If your bees have been using nearby water sources, empty them and refill after the treatment. If you are closing your bees in hot weather, try to provide internal water, and open up ventilation once any airborne chemicals are no longer present. If you do have a bee kill, report it locally, and there is a national reporting site at http://pi.ace.orst.edu/erep/

So here is another reason to talk to your community about bees, especially your neighbors, and to build positive, collaborative networks in cities that look out for bees and each other. You don't get one without the other. If you have already been out there with outreach and the odd jar of honey, this might not be as hard as you think. If you have not, this is a really good reason to start.

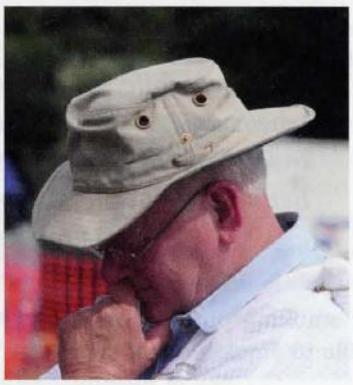
~Toni Burnham

Keeps bees on rooftops in the Washington, DC area where she lives.

Selecting the Appropriate Protective Clothing

Go to task at hand with proper gear

~JAMES E. TEW



I grew up in a hot climate, but I will spare you the memory walk. Upon taking up beekeeping, my primary concern was to avoid all stings. Not just to avoid a few stings, but to avoid ***all*** stings. To that end, I dressed myself in the typical designer beekeeper ensemble: A full length white bee suit, a securely tied veil, gloves up to my neck, special boot leggings, and duct tape placed in various and sundry questionable places. Looking like something from a late night fright show, I robotically staggered out to the beehives and tried to squat to light my smoker -- all the while feeling impenetrable. No bee could get me. With smoker lighted and hive tool in my gloved hand; I was ready for the attack.

In general, I was never seriously stung, but I have long grown to appreciate the procedure that I performed necessary to work bees in my earlier years. But while stings were not usually very bad during spring, summer, and early autumn, I got hot in a hurry. At this point, I hope that I have painted a mental picture for you of a fully protected beekeeper wearing every known piece of beekeeping protective equipment designed to deter stings. Now, hold that thought while I discuss various attributes of protective gear.

Facial Sweat

Much like a big truck blowing black smoke while pulling a steep hill, I have noticed that, even in cooler weather, a white cotton suit is surprisingly warm. I heat up quickly when performing the most routine of tasks (like walking). Resultant sweat runs down my neck from my face. Breathing becomes a bit labored. As I lean over the hive to remove frames (potentially resulting in a weak bad back), sweat begins to run down from my forehead and puddle on the backside of my eyeglass lens. Inside my veil, there is no way to get to them to wipe them off. I have tried putting a tissue within my veil to address that need, but with gloved hands, it is to no purpose. I have tried removing my glasses and letting them lay inside my veil, and then doing the best I can with my natural eyesight.

Why not wear a sweatband? I did that. It only prevented perspiration buildup for a few minutes. If one is only going to be in the bee yard for a few minutes, a sweatband may be a good idea. However, after wearing a sweat-saturated sweatband all day, my skin beneath the wet band becomes angry and irritated.

Even though they can't reach inside their veils, people with long hair must deal with keeping hair out of their face -- plus the hair can add heat inside the veil. Moistened bandannas can be tied around the neck, across the forehead, and underneath hair in the back. Frequently, after being sweat saturated, I simply push the sweatband up into my bee helmet. *(So my glasses are in the bottom of my veil while my sweatband is pushed up on top of my balding head. It sounds as though this beekeeper is becoming increasingly disheveled.)* To this day, if working on a hot day, sweaty glasses are a problem for me.

Lightweight nylon suit. Easy to open, but does allow for more potential stings

Life Inside the Veil

Aside from facial sweat, there are other considerations when wearing a bee veil under hot weather conditions. While fully suited, water (or liquid) intake is impossible. As a younger beekeeper, I tried pouring water though the wire cloth on the veil -- both for drinking and for cooling. While the cooling part worked okay, the drinking part was pretty miserable. The water had a *"taste"* about it - to say the least. I have had a degree of success pushing a long plastic straw through the fabric portion of the veil and getting to water than way. The small hole can be re-taped with duck tape - ever the beekeeper's able ally. The drinking cup must be capped or the bees will be drinking along with you.

Ironically, veils in years past can be fitted with an *"expectorate tube"* for tobacco chewers, or gum chewers or whatever.

In almost all instances, zippers on any style of suits are – at one time or another – annoying. The problem? Sometimes they just are not happy zipping. Nylon zippers break open. Metal zippers jam or require a straight track to function. Not much to be done about this problem. Expect it.

My mental image of that device incites a bit of a retch reflex, but happily such veil modifications are now only found in beekeeping history. Though some early hive smokers were fueled with coarse tobacco stems and were patterned after smoking pipes, I have never known of anyone being able to smoke, drink, or eat inside a bee veil.

Bee suits are bright white and clean – for just a short while. They quickly become soiled with beeswax, propolis, smoker soot and dirt on the knees from lighting the smoker. The white color of bee suits is intended to reflect sunlight (heat), but white sure does show soiling.

The hats commonly worn under the veil are damnable things. A bee veil and hat seems happiest when worn in the beekeepingly fashionable "half-on/half-off" position. This position requires the hot beekeeper to tilt his head back and peer from under the brim of the cockeyed hat -- sweat band up on the top of his head and glasses loose in the bottom of the veil. Though the hat can be easily straightened, just a quick lean-over to check a colony issue, pick up a hive tool, or see if that really is the queen that you just stepped on, and the hat (held on by the veil) will again go its wild way.

Plastic hats seem to be the most durable; however, if worn alone when used for other tasks, such as mowing the lawn, they amplify noise. I also feel that they tend to drop forward more than others. Occasionally, I will see a beekeeper using a chinstrap on the traditional plastic pith helmet, but such straps are not common. Fiber hats are the lightest and coolest, but don't stand water well, and will easily become misshaped. Indeed, they can take on an outright comical look after a few wettings.

What about veils that don't require hats? I prefer them. Most of the suits having the *"monk-looking"* veil can be worn with a baseball cap underneath. Such veils can also be more easily unzipped for drinking water or taking a cool break. Normally, I wear a half suit and tuck the bottom edge in my pants.

Dressing for the Occasion

When deciding how much to dress, consider the tasks to be completed. A short job will normally only require lightweight protection. However, if the day's task is to remove hundreds of pounds of honey from strong colonies that just went into a nectar dearth, it's time to really suit up. Removing a colony from a dwelling – time to really suit up. Moving hives at night – go in full protected. Under such heavy work conditions, especially in warm climates, sweating is inevitable. But that's not all bad. Sweating yourself wet also cools more than having bare skin exposed to the sun ...in my opinion. But a wet suit is a clingy suit. A tee shirt underneath will offer an extra layer of padding against stings. As suits become saturated, they don't offer as much protection as a dry fluffy suit.

But all suits are not made equal. There are whole body suits, half suits and even no suits - just street clothes and a veil. Still the most common suit is the white full body suit. It gets dirty immediately, and it clearly shows all the propolis, wax, bee poop, grass stains, smoker residue, and fast-food droppings left from lunch. In general, the newer the beekeeper, the whiter the suit, but it will not stay snow white for every long.

As alternatives to cotton, protective suits can be made from other materials. *"Rip-stop"* nylon is one such material. Stinging bees purportedly cannot hold onto the smooth surface of nylon to administer a sting. But rest assured, they can hold onto the veil cords to sting; plus I never found these suits to be particularly cool, but they are lightweight.

Another interesting suit, also made from a plastic composition, is the ventilated bee suit. Its fabric is a lot like that of a plastic dish washing scouring pad or some kind of nylon lace. You can easily blow right through it. Because it is so thick, the bee's stinger can't reach you. It has Velcro® straps on the wrists and ankles. When worn, it tends to be a bit scratchy, so plan to wear tee shirts and shorts underneath. Smokers are the bane of all plastic composition suits. A hot smoker can cause permanent damage to plastic suits by melting spots the smoker contacts.

A ventilated suit. Air passes through freely but it is a bit scratchy

Naturally, with any specialty suit, you should plan to spend a bit more. Suits made from plastic reinforced paper are available from some bee supply outlets or from chemical or scientific sources. The advantages are that they are functional, relatively inexpensive, reasonably cool, generally clean, and very nearly disposable. The disadvantages are that they, for the most part, are good for use only a few times; and though affordable, they are not free, and not all that cool either.

Gloves - Clumsily Useful

Most new beekeepers and commercial beekeepers who are working large numbers of colonies will wear gloves. In general, they protect your hands, but specifically, they protect your hands from stings. The problem with gloves is that when handling frames or picking up supers, they obviously make you a bit clumsier. Canvas gloves are the cheapest and can be washed, but they quickly wear out.

Gloves prevent stings, but they are hot and clumsy

Better gloves are made of leather or even goatskin, but all gloves are hot. I like gloves that have the ventilated wrist. I have tried plastic gloves or chemical resistant gloves on many occasions only to have my sweat-saturated hands look like something not of this world. These gloves allow more nimble movements, but hold sweat and water too well. They are good for a quick use, but not for the big jobs. Importantly, under the right conditions, bees can sting through them – especially the disposable ones.

No secret – protective clothing can be hot to wear

No doubt about it. Under very normal conditions, protective clothing can be very hot, and there's not always much that can be done. If removing honey with a gasoline-powered bee blower or a typical leaf blower, slip the air exhaust nozzle in any available opening in your suit and then hit the throttle. Looking like the *Pillsbury Dough Boy®* with your suit ballooned out, you may cause a community spectacle, but it will result in a cooling burst of sweat evaporation. BC Editor Flottum has recently told me that battery-powered leaf blowers are available. They might be useful in keeping cool inside a bee suit on a hot day.

A fully protected beekeeper

Years ago, I explored using a water-cooled vest that was designed to be worn beneath toxic waste cleanup suits. A vest having a plastic reservoir for holding water and frozen cold packs is attached to a circulating pump that causes the enclosed cool water to pass over your chest and back and be re-circulated. Though causing a fairly strange sensation, it did offer cooling, but required charged batteries, frozen cold packs, and a good deal of money. These protective suits are still available but now cost a lot of money. Search *water-cooled protective suits* on the Internet.

For a while plastic pith helmets sporting a small electric fan were available to the beekeeping industry. The little fan would blow, and when its solar panel was exposed to the sun, charge its battery. Its air stream was blown into the helmet across the forehead. I still see these hats advertised occasionally, but they aren't as common as they once were. Again find them on the Internet.

Use common sense

Don't work in the heat of the day but rather in early morning or late afternoon. Find shade. Be reminded that shade does not always equate with coolness - but still, it's better than being in direct sun. But what if worst comes to worst and your best plans cannot be followed? What if you are forced into working under conditions that are too hot for whatever reasons? What are the signs for which you should watch?

How to know when you are too hot

Heat exhaustion occurs when your heated body loses excessive amounts of body fluids and important salts. Heat exhaustion can really make you feel bad, but worse, if left untreated, it can lead to heat stroke which is a bona fide medical emergency. Just as you would take precautions against excessive numbers of stings, take precautions against high heat. Always have cool water or a cool drink nearby. Some beekeepers drink something like Gatorade® diluted fifty percent with water. Beekeeping can be hard work. Don't make it worse by getting too hot.

Symptoms of Heat Exhaustion

* Flushed skin, which may be pale & clammy
* Body temperature of 100° F
* Weakness/Dizziness
* Headache
* Nausea/Vomiting/Diarrhea

Treatment for Heat Exhaustion

* Assist person to a cool quiet environment
* Moisten skin with cool cloths
* Use a fan, if available
* Drink cool liquids, avoiding alcohol
* Raise the feet
* Remain quiet until symptoms subside
* Avoid further exposure to heat/humidity for several days
* If symptoms persist or become worse, see a doctor

Get professional medical assistance

The bit of information provided here is for general background knowledge only. If you are hot and working in a bee suit and feel strange and sickly, take measures to deal with the heat. Professional help and professional information are the best pathways.

Symptoms of Heat Stroke

* Hot, Dry Skin
* Temperature of over 105°F
* Confusion
* Stupor
* Delirium
* Seizures
* Coma

Treatment for Heat Stroke

* Heat stroke is a **medical emergency** and requires emergency treatment
* Remove excess clothing
* Cool the body with cool cloths or maybe a fan
* Give oral liquids **only** if the person is alert and able to swallow
* Transport to the nearest hospital or call 911

If this article sounds dire

Some of the points in this piece have a bit of a doomsday tone. For most of us, nearly all the time, beekeeping is enjoyable. It's those rare occasions when a bee task must be done. Most of us work alone. It happens. We get in a hurry. The hives and hive supers are heavy. We become tired and hot. Be cool, take a break and for a while, come out of those heavy clothes. Take care of yourself and the bees.

***~Dr. James E. Tew**, State Specialist, Beekeeping, The Alabama Cooperative Extension System, Auburn University; Emeritus Faculty, The Ohio State University. Tewbee2@gmail.com; http://www.onetew.com; One Tew Bee RSS Feed (www.onetew.com/feed/); http://www.facebook.com/tewbee2; @onetewbee Youtube: https://www.youtube.com/user/onetewbee/videos*

CATCH THE BUZZ

Hive Size Matters, Or so it Seems

University of Idaho professor Brian Dennis is helping scientists understand a baffling but vitally important puzzle: What is causing the decline of honey bees? Working in collaboration with William Kemp, a U.S. Department of Agriculture scientist and UI alumnus, Dennis has built a mathematical model that lays the blame squarely on the bees themselves.

"The tightly organized social lives of honey bees, once such an amazing adaptation for success in the world, turns out to lack resilience against the numerous environmental degradations contributed by humans across the landscape," said Dennis, who has a joint appointment in the UI College of Science and College of Natural Resources. Research studies have tried to pinpoint the cause of hive collapse, investigating such factors such as viruses, fungi, poor nutrition, parasites, pesticides and global warming.

Dennis and Kemp's model indicates that any or all of the suspected environmental factors, alone or in combination, could lead to hive collapse by destabilizing a hive's adult bee population.

Hive Size Matters

Adult worker bees cooperate to make the hive function almost as a single organism. The workers feed and tend to the egg-laying queen and eggs, larvae and pupae; regulate the temperature of the hive; fight enemies and predators; search for food and communicate its location; and gather food and transport it back to the hive.

Beekeepers know that a hive that has too few workers will tend not to thrive. Dennis and Kemp noted the reason for this: a queen can lay only so many eggs in a time interval, and too few adult workers cannot maintain all the functions of the hive at a quality level where new workers are produced faster than deaths of existing workers. Like a hotel with inadequate staff, the hive with too few bees fails to serve its residents.

If the number of adult bees drops below a threshold known as critical hive size, the bees decrease in number, leading to collapse. Normally, critical hive size does not pose a problem for bees. With favorable environmental conditions, the critical size for a beehive is quite small, in the neighborhood of 1,000 bees. Commercial bee packages for starting a hive contain well over 10,000 bees.

However, Dennis and Kemp's model found an unexpected surprise: Critical hive size turned out to be extraordinarily sensitive to any degrading of cooperative hive functions.

Dennis and Kemp built a mathematical model of the growth of adult worker numbers in a beehive. The presence of more adult workers reduced the deaths of adult workers. Likewise, having more adult workers improved "rearing effectiveness," or how well eggs, larvae and pupae are nurtured and raised to adulthood.

The critical hive size increases in response to any environmental factors that reduce rearing effectiveness or increase deaths of bees in the hive. In the presence of such an environmental factor, a beehive could find itself below the new, larger critical hive size. Loss of viability and hive failure would result.

Dennis and Kemp point out that a beehive is a severe example of an "Allee effect," a concept in ecology named after animal ecologist Warder Allee. Working in the 1930s, Allee suggested that a critical population size might exist when organisms become rare—for example, when mates cannot find each other, or when groups of cooperatively hunting predators are too small for effective hunting.

Help for Honey bees

In light of this study, how can honey bees be helped? Dennis and Kemp conclude that much might be gained from coordinated regional management of pesticides for beekeepers and crop producers and from conservation programs that contribute to improving foraging resources for all pollinator species.

Dennis and Kemp further warn that evidence of Allee effects has been found in many other species, and the prospect that minimum critical population sizes exist argues for adopting more stringent precautionary principles in environmental management.

Bringing Home Honey Liqueur

Honey infused liquors and cocktails for warm days.

"I'm bringing home a baby bumblebee" is the classic song we know from childhood, but we're taking an adult twist on the classic bumblebee that makes one of the sweetest and stickiest natural sugars: honey.

Bumblebees or rather honey bees are the only insects to produce an edible substance for humans. Honey is 17.1 percent water and 38.5 percent fructose, but rich in minerals and nutrients. It's used in everything from skincare to the cocktails and liqueurs mentioned in this article.

Honey liqueur? Yes, it is a thing and most popularly recognized in Jack Daniel's Tennessee Honey and Wild Turkey American Honey Sting. Tennessee Honey is a blend of whiskey and honey liqueur, specially crafted by Jack Daniel's. The underlying flavor of Tennessee Honey continues to be Tennessee Whiskey, however Tennessee Honey adds a sweet taste and nutty finish.

At 70 proof, the honey is not dominant, but adds a sweet characteristic to a Jack Daniel's classic. As Jack Daniel's describes it, Tennessee Honey is "a little bit of honey and a whole lot of Jack." Serve chilled over ice or add it to a cocktail such as Jack Honey Lemonade, a blend of Tennessee Honey and lemonade topped with a Cherry.

Wild Turkey American Honey Sting was another suggestion for a honey infused liqueur. With similar qualities to Jack Daniel's, but 71 proof, there's something that gives this liqueur a kick. It's blended with honey and ghost pepper for a little heat during the summer.

However, if you're looking for more natural uses for honey, incorporate tablespoons into your own cocktail. The Bee's Knees (an old classic) and the Democrat (a modern twist) cocktail are a few ways to sweeten gin and whiskey based drinks.

The bee's knees was slang for "the best" in the early 20th century during the prohibition era. To cover up the taste of "bathtub", or just awful homemade gin, honey and lemon were added. In this case add your choice of gin, lemon juice, and the main ingredient honey syrup (a mix of honey and water) to create a tastier version of a 20th century Bee's Knees.

Created by bartender Jon Santer in Emeryville, CA, the Democrat was inspired by 33rd president, Harry Truman. Truman often had cocktails on his back patio after a tiring day's work. When Santer read this, he pictured the Southern Summer in a drink; peach liqueur, fresh lemon juice, honey syrup, and choice of bourbon. Specific measurements are listed below, but as a suggestion, mix with Buffalo Trace bourbon or even Sazerac Rye for a straight rye whiskey addition.

Whether you're pouring straight over ice or preparing a mixed cocktail, honey provides a sweet compliment to whiskeys and gins. And don't forget the many uses for honey because when the night is over, add a tablespoon to your morning breakfast oatmeal or toast to help banish last night's hangover.

A Smart Kid, And Local Honey Win The Day

Mikaila Ulmer received a $60,000 investment on Shark Tank for her BeeSweet lemonade

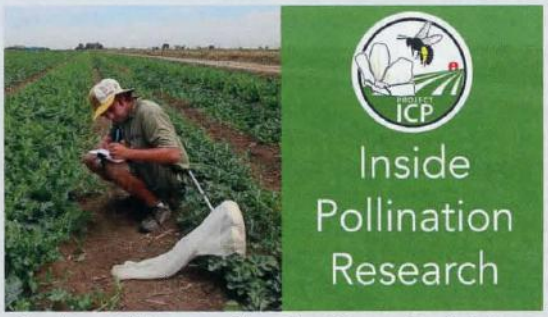
Not many kids turn their lemonade stands into successful ventures, but 11-year-old Mikaila Ulmer has raised the bar by securing a four-state contract with Whole Foods.

The Austin, Texas sixth-grader built her lemonade business, BeeSweet Lemonade (soon-to-be "Me & The Bees"), with a 1940s lemonade recipe from her grandmother that uses flaxseed and local honey as sweetener. Ulmer received a $60,000 investment when she appeared on ABC's Shark Tank with her business.

Whole Foods also saw the promise in her lemonade, which supports local bees by using honey. The supermarket chain signed a deal with Ulmer to sell the lemonade in 55 stores across Arkansas, Texas, Louisiana and Oklahoma. While the lemonade brand highlights the role of bees, Ulmer said she wasn't always a fan

"When I was four years old, I got stung by two bees in one week," she told NBC. "It was painful. I was terrified of bees." But that fear ended up inspiring her to learn more about the insects, and she decided to make her lemonade with local honey.

Xerxes Flowers



Check out this new video The Xerxes Society has produced about the day-to-day workings of research on the Integrated Crop Pollination project (www.projecticp.org). The video takes you inside a collaborative research project involving over 50 scientists and Extension professionals, 100 farm fields and 15 organizations working to understand and compare approaches to the pollination of almonds, apples, blueberries, cherries, raspberries, pumpkins, and watermelons.

https://www.youtube.com/watch?v=N2KYsQ1yFm8

In case you missed their previous video, you can watch the introduction to the concept of Integrated Crop Pollination for pollinating fruit, nut, and vegetable crops here:

https://www.youtube.com/watch?v=yMP5dTDRi6g

They've also put together playlists of videos on honey bees, wild bees, alternative managed bees, habitat for pollinators, and more on the Project ICP Youtube channel. Suggestions for additional great bee-related videos are welcome!

https://www.youtube.com/channel/UCN0Z_G59MEi7I-W4e1IfvkgA

Colony Development

Larry Connor

Mastering Bee Biology

To be sucessful beekeepers look at the activities of the house bees, foragers and drones.

House Bees (Bees Working Inside the Hive But Outside the Brood Area)

At a certain stage, as bees mature, they move away from the brood area to the areas immediately beside the brood. This includes the areas where pollen and nectar are being processed, as well as the area where nectar is being converted into honey. It is useful to call these older bees house bees since they are leaving nurse bee duties but are not yet leaving the hive to collect pollen, nectar, propolis or water.

Pollen Processing – Bees transition to food processing after being the primary consumers of the products. Field bees serving as pollen forgers enter the hive with two pollen pellets on their corbiculae (pollen baskets), and go to the comb near (and sometimes in) the brood area. Once they find an open cell containing other recently collected pollen, they reverse the packing direction and kick off the pollen loads directly into the cells, each pellet in pairs. The house bees then add additional stomach contents (including nectar/honey that contains microbes for conversion to bee bread) and compact the pollen into the cells by pushing with their heads. This increases the efficiency of storage by two and half times. In the fall, the pollen may be covered with a thin layer of honey, but most of the year the house bees keep the pollen cells open and available for consumption.

Packing in pollen.

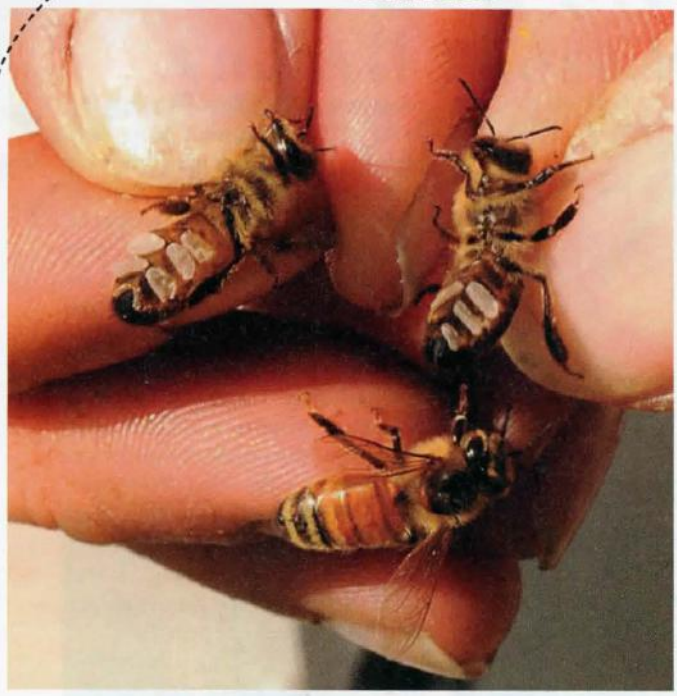
Nectar processing – When a forager returns to the hive, she seeks a house bee (one that has not flown) to transfer the nectar to her. The field bee carries the nectar in a specialized organ called the honey stomach. The forager passes the nectar in droplets to the waiting house bees for ripening before she returns to the field. If the honey isn't transferred, the forager must ripen the nectar herself.

To ripen the honey, a bee rests quietly on the honeycomb and produces a bubble of the nectar, exposing it to the warm and dry air inside the hive. She repeats this process for perhaps as long as 20 minutes before placing the nectar into empty cells in the hive. At that time the nectar has been infused with the enzyme invertase and has been reduced in moisture content. Now it needs time to complete the conversion process in the dry air of the hive. The worker puts drops along the ceiling of a drawn-but-empty cell inside the honey chamber to ripen. The availability of ripening space represented by abundant, empty, drawn comb appears to be one reason why bees collect more honey when such comb is present. Chemical conversion of the honey continues while in these uncapped cells; exposed to the warmed, dry air of the hive as the moisture continues to evaporate.

The house bees are the hive members that normally handle this duty. When the flow is heavy, many bees are required to ripen the nectar crop into honey. One advantage of a large and age-diverse colony of bees is their ability to change duties and be available to support a strong nectar flow. They do this much better than a smaller or less age-diverse colony.

Wax secretion – When house bees consume nectar and honey, it stimulates them to digest the carbohydrates and produce wax scales on eight wax glands on the underside of the abdomen. These bees manipulate the wax scales with their mandibles to build the amazing wax comb. Some of these bees are responsible for keeping the wax production area warm, using their antennae to measure the comb temperature and heat the area by flexing their wing muscles without moving their wings. These bees have been called heater bees.

Guard duty – There are bees that monitor the hive for invaders, including wax moths, small hive beetles and *Varroa* mites. Older nurse bees at the hive entrances greet you with hive defense in mind. Their regular duty is to keep bees from other colonies from robbing their hive of the



Young worker bees secreting wax from their wax glands. (photo by Kathy Keatley Garvey)

honey and pollen stored there.

Undertaker Bees – A specific group of house bees patrol the hive and remove dead members of the colony, taking them to the hive entrance, and flying away from the entrance for 15 feet or more. They then drop the body of their dead sister into the surrounding environment, making it difficult for the beekeeper to monitor colony losses under normal conditions.

Other duties – There are other duties of house bees, including general house keeping, queen and drone cell construction and regulation, wash-board activities at the entrance (in kept bees, removing bark from the non-existing bee tree entrance) and much more. Undoubtedly there are duties we have yet to discover.

Foraging Activities

The oldest worker bees in a hive are usually the field bees, or foragers. They search and collect nectar, pollen, water and propolis. Some constantly look for a better supply of food than the one they currently have. Nurse bees require food for brood feeding and beg for food to stimulate foragers to forage for additional food resources. As long as they are able to gather nectar from flowers and unload it at the hive, they will continue to forage. Foragers spend two to four weeks foraging in the summer. Foragers may be found dead in the field, often in flowers—their bodies worn and wings tattered. From emergence to death, this bee may have lived for just four to six weeks.

Nest Reproduction (Swarming)

Bee colonies are social organisms with complex behaviors. One of these complexities is in the way the colony nest reproduces. With social wasps, bumble bees, and other social insects, new colonies are established by a single mated female reproductive (queen). For example, bumble bee queens mate in the fall and overwinter in the leaf litter in the ground and search for a new nest in the spring. They do not use the nest they were produced from in the previous year as the hives are often destroyed by small mammals and must build their colony slowly.

Honey bees are unique in reproducing their social unit by swarming. This is an amazing process that involves thousands of worker bees and a queen leaving the hive in a process that stimulates them to find a new home. The rest of the bees and a replacement queen will stay behind and maintain the old home site. Some colonies of bees swarm more than once each year, producing more than one new bee family with each swarm. This is a good thing, since new colonies in nature have a very difficult time living to be one year old.

While clustered in a temporary location, swarms regroup for a few hours to a few days while scout bees leave the colony and search for a good home. Scout bees search for a cavity that is big enough, but not too big. It should be safe from predators and environmental hazards. Empty holes in trees, cavities in rocks and human structures are common sites for bees to select. Once the nest is selected, the bees all fly to it and build beeswax comb and start foraging for food. The queen starts laying eggs, and a new colony is established.

Drones

A drone. Note the large eyes that touch at the top.

Drones are the males and have no apparent duty in the hive other than to mate with new queens from area hives. They are genetic envoys actively seeking nearby virgin queens necessary to supply the diversity of sperm healthy colonies need for survival against diseases. Drones die when they mate. It is unusual for drones to mate with queens from the same location – both queens and drones have behaviors that ensure out-crossing and minimize inbreeding. This makes the small-scale beekeeper dependent on the drones produced in colonies within a mile or more radius.

Drone saturation requires multiple nearby locations for success. Sustainable beekeepers must understand that the drones they produce in one apiary are probably NOT the drones that will mate with their virgin queens. Instead, the queens will mate with drones from neighboring apiaries and bee trees.

Drones have a 24-day development time, the longest of the bees. Drone brood is produced only when the colony is in a growth period, or if the queen has depleted her supply sperm stored in her body.

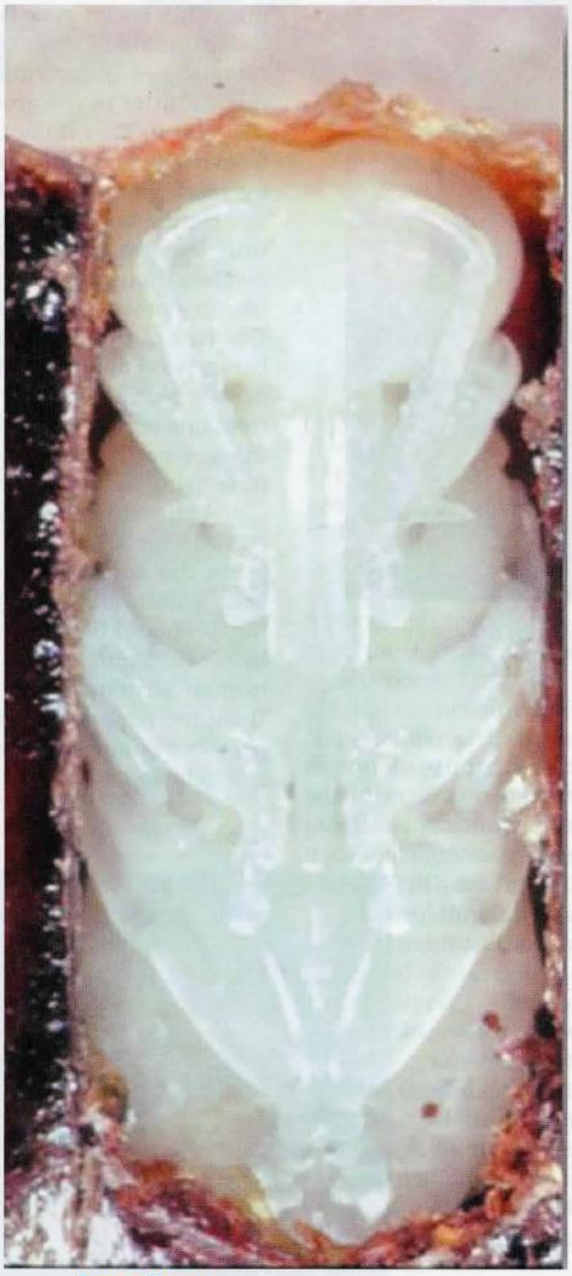
Healthy and diverse drone populations are necessary for genetically robust, disease resistant colonies. When maintaining a special line of bees like the Russian stock, it is necessary to produce large colony numbers of Russian drones adequate to supply the need for successful production of Russian queens. This may be a real challenge when the nectar flow is over, or when a colony is in stress, as workers expel drones from the hive to save resources (pollen and nectar).

Drone Comb

Drone cells are larger than worker cells, usually about 16 per square inch of comb space compared to 25 worker cells per square inch. Drone cells are used for the production of drone brood, but they are also the most efficient use of wax for honey storage.

Drone Brood

Drone brood is present as part of the total brood population during the spring and summer. The brood is usually located to the side or below the worker brood. These eggs, larvae and pupae are kept in a compact region of the hive at 95 degrees F. to ensure rapid and healthy development of the young bees. Drone brood may serve as a heat sink for the worker brood during exposure to cold, but this has not been established.



Drone Pupa

Adult Drones

Drone bees in the hive develop from unfertilized eggs and are essential for the mating of new queen bees. Drones are a natural part of the hive, but they are normally produced by the colony only during natural mating weather. We do not find new drone production in cold climates during the Winter or when there is no food coming into the hive. Drone populations peak when worker bee populations peak, about the same time as swarming. In strong colonies with abundant food reserves, drones are present for most of the Summer, but their production slowly declines as Summer begins. While Florida hives start drone production in January or early February, any drones in Michigan colonies in January reflect a queen failure the previous season.

Seeley and Morse's' work showed that vigorous, healthy colonies produce about five percent of the colony population in drones. By the Summer equinox the key stimulation of increasing day length slowly reverses, but drone rearing continues until September or November (depending on latitude). A strong incoming food supply prolongs drone production, or it may be done by early June if the pollen and nectar supply has already dried up. This happens in parts of Florida and Texas, as well as other areas of North America. There may be a second cycle of drone production in the late summer and early fall to coincide with local nectar flows, if they happen. When the incoming food is reduced or stops, worker bees become selective about the number (and age) of the drones they keep, even if they are their brothers. The colony rules!

Successful beekeepers learn to accept normal drone populations in a colony as a reflection of a healthy colony. It indicates that virgin queens in the area will be well served by your healthy, strong and well-fed drones. Drones are the only bees suitable to give to curious types who want to handle a bee. They are often warm from the heat of the hive and fuzzy to touch. Use drones to practice marking bees with paint. If you mark the drones in one colony, you can watch how they spread to other colonies in the apiary over a period of several days. Who knew you could use drones as both an art project and a science experiment.

Consult www.wicwas.com for the latest quality books on beekeeping.

~Larry Connor

Beat the Heat

~Kaitlin Newcombe

With Summer well underway, it is important to take proper precautions while working outside in the apiary. Full bee suits provide adequate protection from direct sunlight but they may also restrict cooling air flow around the body. The human body strives to maintain homeostasis – in other words, it desires to regulate internal systems as well as an inner core temperature. The regulation of the body's internal temperature is known as *thermoregulation*. Improper *thermoregulation* may occur in people of any age and could lead to cardiac distress.

Know the signs

Two identifiable forms of improper *thermoregulation* are **heat exhaustion** and **heatstroke**.

Heat exhaustion occurs when sweating, your body's natural way of cooling itself, is no longer enough to keep you cool. Some common symptoms of heat exhaustion are: weakness, confusion, dizziness, nausea, fatigue, and dark-colored urine.

Heatstroke occurs when the body's internal temperature reaches 104°F (40°C) or higher. Heatstroke is more severe than heat exhaustion and can occur suddenly. Importantly, you can experience heatstroke without experiencing heat exhaustion. Common characteristics of heatstroke include: fever, severe headache, nausea, vomiting, flushed skin, confusion, disorientation, hot and dry skin, fainting, and seizures. Symptoms for heat exhaustion and heatstroke are generally the same for children, adolescents, and adults.

Treatment of heatstroke and exhaustion

If an adult or child is experiencing symptoms of heat exhaustion, move them to a cool place such as an air-conditioned indoor area or a shaded area outside. Remove excess clothing, especially if the person is wearing a bee suit. Have the affected individual lie down and slightly elevate their feet. If the individual is alert and the resources are available, place them in cool bath water or if outside, spray them with mist from a garden hose. Ice packs can also be applied to the person's armpits, groin, neck, and back. Cooling these specific areas can help the person cool down overall since these areas contain many blood vessels that are close to the surface of the skin. If the person begins to vomit, turn them onto their side to prevent choking. When an adult or child begins to experience symptoms of heatstroke, **contact emergency medical services immediately** and provide the same treatment as above until personnel arrive.

Prevention is key

Both heat exhaustion and heatstroke are preventable. Wear lightweight, light-colored, loose-fitting clothing to allow airflow around your body. Drink plenty of water and avoid drinking beverages that contain caffeine or alcohol. Try to schedule outdoor activities for cooler times of the day – generally before 10:00 a.m. and after 4:00 p.m. While outside, do not overexert yourself. Take plenty of breaks in cool, shaded areas and drink clear fluids every 15-20 minutes, even if you're not thirsty. Some allergy medications, blood pressure and heart medications, amphetamines, laxatives, antidepressants, seizure medications, and water pills (diuretics) can make you more susceptible to heatstroke because of how they can affect the body's response to heat. Any concerns should be discussed with one's doctor.

Have A Plan

1. Plan your work conditionally. Pay attention to the temperature, heat index, and humidity for each day. You may not be able to spend as much time in the apiary one day as you did another day. As always, your personal health and safety come first.
2. Alert others of your plans and location(s). Have at least one contact person who would be able to provide aid in case of an emergency. Call that person every 30 minutes to an hour (depending on how long you are outside) and check in with them. If they do not receive a call or some sort of notification around the set time and are unable to contact you then they should go out to your location and check on you.
3. Stay hydrated. Bring plenty of clear fluids with you to drink throughout the day and leave them in a cool or shaded place. Take a few sips every 15-20 minutes, even if you're not thirsty. If you plan to be outside for an extended period of time on a certain day then begin hydrating and drinking excess water one to two days in advance.
4. Take frequent breaks. Do not overexert yourself. Take a break in a cool, shaded area outside or in an air-conditioned area inside. Remove any bulky items that could restrict air flow around you. Check for signs of possible heat exhaustion or heatstroke.
5. Contact emergency personnel immediately if you begin to feel ill. If you experience symptoms of heat exhaustion or heatstroke then contact emergency medical services immediately and alert them of your location and symptoms. After contacting EMS, alert your personal contact of your location and have them provide medical care until EMS arrives

~Kaitlin Newcombe *is a student currently studying civil and environmental engineering at Case Western Reserve University in Cleveland, Ohio. She is a Student Member of the American Society of Civil Engineers (S.M.ASCE).*

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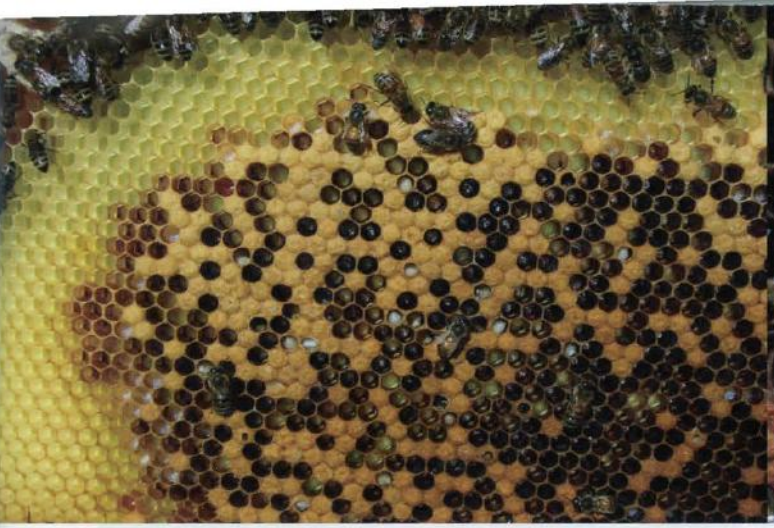
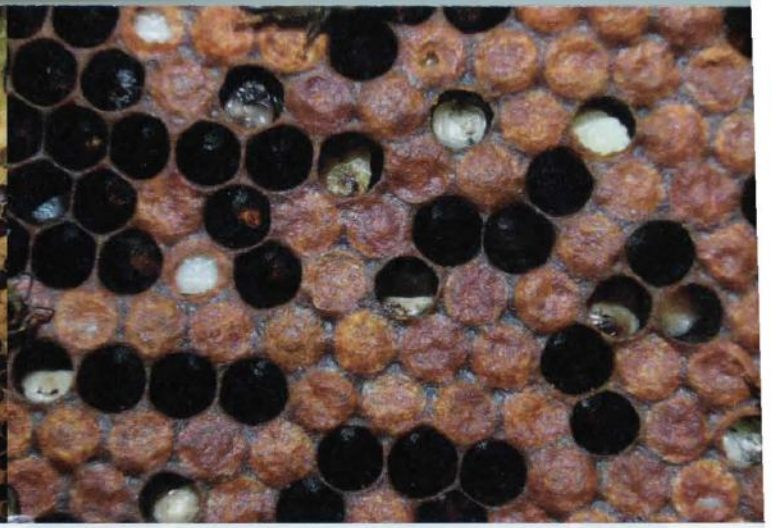




Control Mites

Because Bees Don't Take Care Of Themselves

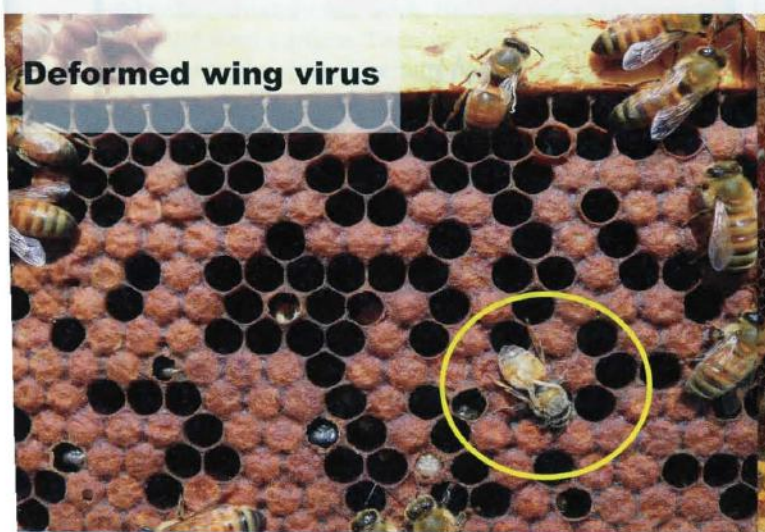
~Roy Hendrickson

The above photos illustrate the fate that awaits colonies when mite treatment is denied, or where treatment has been applied in an inappropriate or haphazard fashion. Unfortunately many new or aspiring beekeepers are of the opinion, or have been mislead into believing that mite control really isn't necessary. If left alone bees can take care of themselves, or so they're lead to believe. Hopefully this article will help illustrate the opposite that mite control is necessary, and when applied properly treatment marks the difference between success and failure.

Mite Buildup

Varroa rears its offspring in the capped brood cells by feeding on the hemolymph or blood of the developing pupae. The foundress, or mother, mite and her mature offspring emerge along with the young bee. (The male mite and any immature females die) Once out of the brood cell they attach themselves to a host bee where they remain until they are able to reenter a suitable brood cell to begin the reproductive cycle anew. It's easy to understand why maximum mite reproduction coincides with the high rate of brood production found throughout the spring and early summer period. While reproductive rates vary depending on the time of year and colony condition, it's probably conservative to assume that *Varroa* is capable of doubling its population every thirty days. At that rate a colony that contains 100 mites on the 15th of March will be host to approximately 6400 mites by the middle of September!

Enter the Viruses. I found my first *Varroa* mite in the spring of 1990. I knew it was coming, but none-the-less it was a rather stressful event. I remember sitting on the tailgate of my pickup trying to convince myself that it wasn't the end of the world! Realistically it was the end of the beekeeping world as I then knew it. However, it took several years for that reality to sink in. For the next 10 years or so my primary focus was on preventing *Varroa* from simply overwhelming my colonies. Gradually the mite-bee relationship began to change. It took fewer and fewer mites to decimate a colony. I started seeing wingless bees, bees with stubby abdomens, and dead or decaying brood with symptoms that mimicked some of the traditional brood diseases. Research explained that



by routinely biting and chewing on the pupae and adult bees in order to feed, *Varroa* was vectoring or transmitting a host of different bee related viruses. There are no medications to control viruses. The only way to control or prevent virus outbreaks is to keep the mite loads low, very low. In other words, you want to prevent the virus outbreaks from ever getting started. This brief, crude summary brings us to the present. Where the road leads from here is anybody's guess. The only thing I know for sure is that if you ignore *Varroa* you not only put your own bees at great risk, you are also placing your neighbor's bees in jeopardy. You are your neighbor's beekeeper.

Sampling for *Varroa*

There are a variety of methods that can be used to sample adult bee populations for *Varroa* mites. However, when you factor in speed, accuracy, and consistency nothing approaches an alcohol wash. Best of all, it immediately allows you to determine whether or not treatment is necessary. Personally I prefer a smaller 150 bee sample over the standard 300 bee version. You destroy fewer bees, use less alcohol, and you recover a larger percentage of mites than with the larger sample.

Start by selecting a brood comb that contains some older open brood, brood within 24 hrs of being capped. This will provide the highest possible ratio of mites to adult bees. Check carefully to make sure that the queen isn't on the selected frame. Hold the frame by an end bar and shake a portion of the bees into the collection container. A common 8 by 10 inch Rubbermaid dishwashing tub works exceedingly well. Once the bees have been shaken into the collection container, check again for the queen. Then tap the bees to one corner of the container and scoop up the desired number of bees. (A level ¼ cup equals approx 150 bees, 1/3 cup 200 bees, and ½ cup 300 bees) I prefer the 150 bee sample size; with the larger samples the additional bees act as a filter to inhibit mite shake-out. Whichever size you choose, dump the bees into a wide mouth pint Mason jar and install the outer ring fitted with an 8 mesh per inch screen. Tap the bees to the bottom of the jar and pour in enough 70% Isopropyl to cover the sample, and then install the solid center cover. Alcohol doesn't immediately kill *Varroa* mites, so let the sample to sit for a minute or so before shaking. This will allow the mites' time to extricate themselves from under the bee's abdominal segments. When ready, shake the jar vigorously for 15 to 20 seconds. Now reverse the procedure and remove the center cover and replace the screened lid. For easy visibility I prefer to shake the sample into a Cool Whip container, but any light color container will work. Hold, or place the container on a solid level surface. Then with a single motion, invert and vigorously shake the sample jar up and down five or six times. The idea is to use the alcohol to assist in washing the mites out of the sample jar. Once the shake is complete, count the mites collected in the bottom of the container. Take care to count any mites adhering to the center cover or the inside wall of the jar.

The final step is to compare the total mite count to the predetermined treatment threshold number. From here it should be a simple matter to determine an appropriate treatment regimen based on the local conditions and time of year. I would suggest following Randy Oliver's recommendation (www.Scientificbeekeeping.com) of not allowing the mite level to rise above 2 mites per hundred bees sampled. Translated, that means the treatment threshold for a 150 bee alcohol wash is 3 mites.

Treatment Options

There are a variety of different mite treatments on the market. They range from the hard or heavy duty synthetics such as Apistan (Fluvalinate), Check Mite (Coumphos), and Apivar (Amatraz) to the softer organic products such as MAQS or Mite Away Quick Strips (formic acid) and Apiguard or Api Life Var (thymol based products). I favor two of the organics, specifically Mite Away Quick Strips and Apiguard. Both of these products are relatively easy to use, and both are effective mite control agents. Best of all, each of these products allows you to easily adjust the dosage based on colony size and the existing mite load.

Mite Away Quick Strips are my preferred form of mite control for full or medium strength colonies. The active ingredient is formic acid which kills by chemically burning the mite. There are two treatment options. The full treatment consists of two strips per colony containing six or more frames of bees. Under normal conditions this treatment should kill between 93 and 95% of the mites, including those mites hidden under the brood cappings. However, under certain conditions two strips can cause varying degrees of brood damage, especially on smaller colonies. Consequently I've switched to the alternate half treatment, or one strip per colony of the same size. This treatment is somewhat less effective, probably eliminating somewhere between 50 to 60% of the mites on the adult bees. To offset the reduced efficacy I repeat the treatment every three or four weeks depending on the existing mite load.

This is the only mite control product that can be applied when there are honey supers on the colony, or in other words, during the honey flow. It is also the only product currently on the market that kills mites under the brood cappings. For that reason this is the go to product when you encounter a colony(s) with an out of control mite load. The full strength treatment should eliminate the heavy mite load in relatively short order. Hopefully this will allow the colony(s) time to rebuild prior to winter shutdown. Regardless of treatment size or specific usage, carefully follow label instructions for handling and temperature tolerances.

Tools Needed


Shaken bees in tub

Apiguard is a thymol gel that kills by drying out the mite's body orifices. Apiguard is marketed in a 50 gram peel off tray for the smaller operator with a few colonies, or in a 6.6 lb bucket for larger operations. The recommended dosage is 50 grams per colony, repeated at two or three week intervals. As with MAQS the full strength dosage can cause some brood loss under certain conditions. However, a 25 gram half dose appears to be nearly as effective, and with minimal brood loss. Treatment application can be achieved a couple of different ways. For those with only a few colonies simply divide the contents of a 50 gram peel-off tray in half. Use a hive tool or small spatula to remove and place each portion on a 2 ¼ inch square piece of waxed paper (dry wax paper works best). Don't spread the gel, leave it in a clump and center the treatment on the top bars between brood boxes. If you're treating a nuc or a single hive body colony, use a spacer or deep rimmed inner cover to provide the necessary accommodation space. For multiple colony treatment remove a 25 gram dose from the bucket, (weigh or estimate the volume) and apply in the manner described above. I prefer this product for nucs and small colonies not quite strong enough to tolerate MAQS. I also use Apiguard as a rotational alternative to MAQS, especially during mid summer after the supers have been removed.

Oxalic acid doesn't work well in my erratic environment

When is Treatment Most Effective

One of the great *Varroa* fallacies is the general implication that colonies contain only a few mites in the early spring. Virtually all of the *Varroa* buildup projections I've ever read started with that assumption. I used a similar example to illustrate *Varroa*'s reproductive potential earlier in this article. Reality is somewhat different. For example, I sampled a fairly strong colony in my home yard on April 16th of this year. I used a 150 bee alcohol wash and collected 14 mites. Using a little simple math, that translates into roughly 9 mites per hundred bees! That's a horrendous mite load for this time of year. If left unchecked that colony will begin to fail before the end of the main honey flow! By early August the mite infestation along with the associated viral infection will have doomed that colony. A quick check of last years records indicated the home yard had been periodically treated with either formic strips or Apiguard. The last treatment with formic strips occurred on September 10th. (This is about the latest I can treat with MAQS or Apiguard and still remain within the temperature thresholds) Obviously my bees re-acquired a mite load by robbing out nearby collapsing colonies during the unusual warm weather we experienced in October and early November.

When you couple an existing mite load with the massive amount of brood rearing that occurs during the spring buildup period, (creating the ideal mite reproductive environment) it should be obvious that you initiate your mite control program as soon as weather permits. In other words, once the weather warms enough to work bees, it's warm enough to begin sampling. DO NOT ALLOW *VARROA* TO GAIN THE UPPER HAND. The idea is to keep the mite counts low, thereby preventing the viruses from gaining a foothold and eventually destroying the colony.

For larger apiaries, sample several colonies. This should give you an overall yard perspective. Mite loads can vary significantly between colonies for a variety of reasons. If you encounter one or more colonies with a high mite load, assume the remaining colonies contain (or soon will) a similar number of mites. (Both workers and drones drift freely between colonies within an apiary) Failure to treat all the colonies in the yard will allow drifting bees from non-treated colonies to quickly re-infest the treated colonies. Mite loads can vary significantly from one location to another. View each yard as an individual entity, periodically sample and apply treatments accordingly.

Small operators have a huge mite control advantage (the absence of drifting between colonies) due to the limited size of their apiary. These folks only have to worry about mite reproduction within an individual colony or

two. Periodic sampling, along with timely treatment, should provide a relatively mite free environment throughout the active season.

The post honey flow period is the next time frame of concern. While MAQS can be applied just prior to, or during the honey flow, most beekeepers wait until crop removal to rejoin the mite battle. The primary danger now lies with mite transfer from nearby collapsing colonies, both managed and feral. Since prevention is not possible, it's imperative that you periodically sample to determine the extent of any unanticipated mite buildup, and treat accordingly. A second option is to treat on a periodic basis throughout the remainder of the season to prevent or eliminate any abnormal mite influx.

August and Beyond

Locally we generally enter a nectar dearth period starting around the tenth of July, give or take a few days. By the first of August pickings have become few and far between. This marks the beginning of the robbing season. Now the main mite worry comes not from within, but from nearby untreated colonies. This is one of the great negatives of the massive influx of new beekeepers over the past decade or so. Many of these folks either don't know about *Varroa* and the necessity of control, or they have been lead to believe that treatment isn't necessary, "the bees can take care of themselves". Either way, you lose. Your bees eventually end up taking advantage of the free lunch, (robbing out their collapsing colonies) and in the process they bring your neighbors mites back home to your colonies.

This mite transfer continues throughout the late summer and fall, whenever the lack of incoming nectar promotes a robbing opportunity. To add insult to injury, for the past couple of years we have experienced above normal temperatures throughout October and the first half of November. This unusual warmth has extended the late season flight time, during a period of total nectar dearth, and has dramatically increased the prospect of mite transfer from nearby collapsing colonies. That is no doubt one of the reasons I'm seeing such high mite counts in early spring.

Treatment Recommendations

Successful mite control is best achieved by keeping the mite counts below the damage threshold throughout the active season. I can't stress enough the importance of starting your mite control program as early as possible. It's imperative that you prevent the mite associated viruses from becoming established and causing further, perhaps irreparable long term colony damage.

Full strength treatment with either MAQS or Apiguard during the spring buildup period can cause brood loss beyond acceptable limits. As a consequence I recommend using the weaker dosages at two or three week intervals should your early season mite counts trend above acceptable limits. Later in the season after the honey crop has been removed I would not hesitate to use the full strength (two strips) formic treatment to knock back an out of control mite load!

(Remember, a full strength MAQS treatment kills 93-95% of the mites under the brood cappings)

My goal is to keep the average mite level as low as possible. While I strive to keep the adult bee mite count at 2 mites per hundred bees or less, that's not always possible in my erratic environment. But, I try! A quick check of my colony records for the past two years indicated that I treated my four yards an average of three to four times per year. The smaller yards that contained early or mid season splits had the lowest number of treatments. The larger production yards, with the strongest colonies required more treatment. All the treatments over that two year period were of the half-strength variety, either one formic strip or 25 grams of Apiguard. On average treatment was applied in mid May, mid to late July, the last half of August, and as late in September as weather would allow. The September treatment was intended to help offset any late season mite transfer due to the collapse of nearby untreated colonies.

Some will wonder why I don't use oxalic acid as a late season mite control agent. Good question. Because of my prolonged overwinter-early spring confinement period, (7 months on average) I try to avoid opening colonies any later than the mid September. The prospect of applying an oxalic acid dribble during late October or November is in my opinion, not worth the risk of incurring an alternative injury, such as killing the queen. And I have absolutely no interest what-so-ever in fooling around with oxalic acid sublimation, period.

~Roy Hendrickson *is a 40 year beekeeper from North East, Ohio. He writes for many bee journals and is active in the Ohio State Beekeepers Association.*

Winter in ...

July

~Ann Harman

In Antarctica, yes. But here in the temperate area of the United States Winter is far from our minds. (If you are complaining that today is a scorcher, please think back to last Winter – those thoughts may cool you off a bit.) At this time you may have pulled your honey off and your thoughts are that the bees will be just fine until you check on them in early autumn to get them ready for the coming Winter.

Actually that colony needs to be thought about during July. Remember that August is the bees' New Year. Depending on your climate, in August your bees will be either producing Winter bees or getting ready to do that. Now just who is going to take care of the Winter Bee Project in August and September? The queen and those bees that are in your hive in July – the field bees bringing in food, the hive bees taking care of brood, and the brood itself – when those become adult bees. Bees are really so efficient. It's the beekeeper who is always running to catch up.

Perhaps the major item of concern during July is *Varroa*. Your colony has been doing very well, meaning plenty of brood starting in early Spring to bring you that honey crop. However, the more larvae the more mites. July is a great month to evaluate your *Varroa* control. No, you cannot eliminate every last one of them but you can control the *Varroa* population.

And you thought July would be a quiet month for beekeeping.

When was the last time you checked your screen bottom board? Probably in the middle or at the end of March when you went through your hives to see how everything was after the Winter. Some colonies keep the screen bottom board, and also solid bottoms, very clean. Other colonies don't bother getting rid of trash. July is a hot month so any ventilation is beneficial. Take a look now and make a note (you are keeping records, aren't you?) of untidy colonies.

Do you think your *Varroa* monitoring techniques – powdered sugar, sticky boards, alcohol wash, etc. – are giving you good information? Now is a good time to review those. Think back to the end of Winter in your area. How did your bees cope with Winter conditions? We cannot escape Mother Nature's wintertime tricks (or Summer ones, either) but plenty of food and plenty of healthy bees can get bees through the Winter in good condition.

Do you plan to use one of the *Varroa* medications? If so, review then to see which one would be the best for your bees and for your climate, as well as for your approach to beekeeping. The equipment suppliers have good descriptions in their catalogs or on their websites. Please pay attention to the label instructions for the temperature range. July is a hot month! It may be too hot in your area to use some of the medications.

Why so much fuss about *Varroa*? Well, it is considered the Number One problem of bees in the world. It is impossible to eliminate them from our hives. But it is possible to control them and the damage they can do. Take action before Summer. September may be too late. You need those strong, healthy Winter bees.

While we are thinking about pests, we need to consider the small hive beetle. In areas with loose sandy soil and reasonable or high humidity, the small hive beetle can be a terrible pest. In those areas with heavy, dense clay soil or low humidity the shb can just be a nuisance. However, any stress that a colony has to endure is simply not beneficial to its overall health and success. Since you are reviewing your *Varroa* control program, give a thought to your beetle control program.

You thought July would be a quiet month for your beekeeping. In some ways yes, but it is an excellent month for review.

As long as we are thinking about health problems, let's consider *Nosema ceranae*. This is again a worldwide problem. Early research showed that *ceranae* was quite different from the familiar *Nosema apis* that gave problems during the Winter. This *Nosema* seems to be infesting the bees the year around. Unfortunately no consensus seems to exist on exactly what to do, what is best for our bees. Plenty of food and plenty of healthy bees seem to be the best defense. However, keep up with information from current research.

Beekeepers tend to make thorough inspections of their colonies in the Spring. If all is well at that time then all must be well in July. Maybe. When you made those Spring inspections you probably decided if a queen or two needed replacing after the Winter. Now, some months from Spring, have you thought about all the queens? Do you have records about the ages of your queens? If so, it's time to review those to see if an autumn requeening will be needed. Go ahead and see what your queens are doing. Note the colonies that need a new one and decide on the appropriate time to requeen. Those new queens will be needed to lay the eggs for the Winter bees.

Did you have similar honey harvests from all your colonies or was there one that just didn't produce? Now is the time to decide the fate of that wimpy colony. It does not show any signs of disease or parasites. Its problem

is probably a wimpy queen. July is an excellent time to decide on her fate. A new queen could definitely be in order. However, would those bees be a good addition to another colony a bit later? Remember: one wimpy colony plus another wimpy colony equals a wimpy colony. Nothing really gained. Go ahead and blame the queens but don't try to coddle along a wimpy colony. If you do, your reward will be a dead colony before next Winter ends.

Have you been keeping track of your weather, at least during the past month or so? Too much rain? Too little rain? Some parts of the United States may have been experiencing drought, even severe drought conditions. You probably paid more attention to the effects of drought on your tomato plants. Bee forage will suffer from drought – small and sparse blossoms, very little nectar. Go ahead and water your tomatoes then mix up some sugar syrup for feeding your bees.

It does not matter what month your calendar says.

What about too much rain, especially day after day? Bees will stay home. Incoming food, pollen and nectar, could be in short supply. Plants tend to grow more foliage but not necessarily more blossoms. Nectar may be more dilute. The higher level of humidity will make it more difficult for the bees to evaporate water from the nectar.

There is no point in adding more stress to your colonies by plowing too frequently through the hive to discover what is going on. Take a few minutes and watch bees at the entrance. Do you see any arriving bees with pollen? Those appearing to arrive with 'nothing' could be scout bees, nectar carriers, water carriers – or actually really nothing. Link the weather with action at the entrance.

Nobody with pollen? Brood is still being reared. Check entering bees at different times of day since blossoms release pollen at different times. Sunny and incredibly hot? Bees will be bringing in water (the 'nothing' bees). Do you know your water sources? In severe drought conditions tiny streams may dry up completely. Are you familiar with the nectar plants in your area? If not, find out to make certain some of those 'nothing' bees are bringing in nectar. Bees fanning at the entrance? Good! Nectar being evaporated and/or the cooling-hive bees are at work. Watching bees at the entrance is lots of fun and quite informative, too.

Now that the July assessment of colony conditions has been done you can make your plans for the months to come. Remember – those plans must be somewhat flexible – weather from now until next Spring can alter them.

When August, or early September, arrives you may be requeening. Those beekeepers who plan to overwinter nucs will be caring for those. In many temperate areas August can be a dearth month for blossoms. However the eggs for winter bees will be laid. These are the bees responsible for successful wintering of a colony. The larvae will need good nutrition to be vigorous healthy bees.

In general beekeepers just have the months of August and September to help the bees create a good Winter colony. As cooler weather and diminishing light appears in October many perfectly healthy queens are guided into diminished egg laying, beginning their rest period.

You have turned the calendar page to October. The colorful Autumn leaves will give you a pleasant backdrop to your finishing touches of preparing your hives for Winter. When Halloween arrives you should be finished with hive work. The queen is resting. Plenty of pounds of honey are available for Winter. Promise your bees that you will look into the hive from time to time to be certain all is well. Now you can go and enjoy goblins and ghosts and skeletons!

The calendar says November now. If you have done a good job of feeding you can finish cleaning up the beeyard, your smoker and hive tools. Be certain you launder any bee jackets or coveralls that you have been wearing. Dried venom, if inhaled, can cause venom allergy.

Did you think you could ignore the weather? No, indeed. A good chilly November keeps the bees in a cluster and being conservative of food. A series of warm days for flight means the bees are eating more. Will their food stores last the Winter? Make a note in your records because when January arrives you will have totally forgotten November.

The days are now short and cold, telling us it's December and Winter. Is there anything special to note about the weather this month? Find a day, just one day, in December when you could remove the covers and take a quick look inside. The grumbling hum of annoyed bees does tell you that they are in residence. Since it is early in Winter you probably will not see the bees. That means they are far below their stores and doing well. Gently replace the covers and wish them a Merry Christmas.

~Ann Harman

COLONY ROBBERS

WHEN GOOD BEES GO BAD

~ROSS CONRAD

Honey bee workers normally forage for nectar and pollen from flowers which are brought back to the hive and converted into honey and bee bread. Unfortunately, foragers can also seek to obtain a quick payload by seeking out anything sweet they can find, even to the point of ransacking another colony. Such foraging activity known as robbing, can spread disease, cause colonies to become abnormally aggressive and defensive, make queen introduction more difficult, and working with colonies unpleasant. In extreme cases robbing can cause a colony to starve to death due to the loss of all honey stored within the hive.

What causes the fall from grace?

For one reason or another, foraging bees tend not to be very interested in robbing or even going after exposed honey when natural nectar sources are plentiful. Thus, a dearth of nectar is a primary trigger that leads to robbing behavior. Especially vulnerable are weak hives whose populations are low, such as newly hived packages and nucleus colonies, queenless hives, or hives suffering from a mite overload and/or disease. Such colonies may not have enough guard bees to protect the entrance(s) to the hive adequately. If the hive entrance is too large an opening, or if there are too many entrances, even a strong hive may have trouble protecting itself and keeping robbers at bay.

Robbing Tupperware

Feeding colonies from open containers can also cause robbing among hives. Worker bees dancing to recruit additional foragers to a food source close to the hive will communicate using a circular dance. During the dance, the worker will occasionally stop and offer a taste of the food that has been gathered to prospective foragers that are following the dance within the hive. When the food source tastes and smells like honey, or has little to no scent as in the case of sugar syrup, then any other hive located within about a hundred yards of the colony will become a target for the foragers. Even when a feeding stimulant is added to the sugar syrup in a bulk feeder to endow the feed with a unique scent, other colonies will become the target of robbers as the foragers from those colonies bring in the scented feed and make their hives smell like the food source. The same is true for any feed or honey that is spilled or left exposed in or around the beeyard.

The boardman entrance feeder that fits in the bottom opening of a standard Langstroth hive and is often sold as part of a beginner's kit, is notorious for precipitating robbing behavior from neighboring colonies. This feeder, located so close to the hive entrance, is difficult for a colony to protect from robbers especially when the daytime temperature cools down and many bees are needed to maintain the warmth of the brood nest.

Tips for recognizing and catching robbers red-handed

One sign that robbing may be occurring in your hives is the presence of dead bees laying about in front of the hive or on the inner cover when the outer cover is removed. These carcasses are the remains of robbers that were caught stealing from the hive and guard bees that died defending their nest. Another telltale sign of robbing are the remains of cappings torn from the combs as the robbing bees worked to get the loot and get out of there as quickly as possible. As a result, the cells of the empty combs from hives that have had their honey stores robbed out will be ragged looking since the robbers don't take the time to remove the cappings neatly.

Colonies that have been the target of robbing will be more defensive than normal. Guard bees will be aggressive and will tend to closely inspect all foragers upon their return. Robber bees that are challenged in this way will be quick to take to the wing, flying around the hive waiting for another chance to try and enter. This should not however be confused with bees that are hovering around the front of the hive as they leave the colony to take their

first flights. This is where your ability to notice the fine details of honey bee body language and behavior comes in handy. Bees on their maiden flights will be facing the hive entrance, smoothly and purposely flying back and forth as they orient themselves to their colony's appearance and location. Robber bees by contrast will tend to act more like they don't belong there, flying in irregular patterns around the hive, darting to-and-fro looking for a chance to slip past the guards. Foraging workers with the intent of robbing can be seen inspecting cracks in the hive and places on the hive that are in stark contrast to the color of the hive, such as knots in the hive's wooden exterior, as they seek out a way inside that is not well guarded.

To the beginner's eye, a hive being robbed out can seem normal due to the abundance of bee activity around the entrance. It is upon opening such a hive that the signs of robbing activity become more obvious. Rather than stay in the hive and on the combs, robber bees will act nervously, abandoning the combs and taking to the air as soon as the hive is opened. Upon opening up a queen-right hive full of bees that belong there, a high percentage of the bees that immediately take to the air they will typically do so because they are intent on attacking you. Of course if the colony is smoked appropriately, few if any will actually do so. When a hive that is being heavily inundated with robbers is opened up, lots of bees will take to the air, even when smoke has been used, but few of these bees will actually come after you. These robber bees are much more interested in returning to the combs in the hive as soon as you are done disturbing them so they can finish the job they started.

Prevention . . . the best rehabilitation

As with many hive challenges, keeping healthy, strong colonies with large populations is the best defense. This means dealing with mites and diseases before they become an issue. It is also helpful to match the size of the cavity of the hive with the colony's population. With bees concentrated on fewer combs, rather than spread thin among many combs, the hive will be easier for the colony to defend.

Reducing entrances down to a single small (approximately one-inch) opening can compensate for a hive that lacks enough guard bees to do the job. Equipment that is new or has been well maintained really helps here. Rotten, broken, or cracked supers whose wood is split or warped will need to be repaired or at least caulked or filled with spackling compound, beeswax, or mud.

It also helps to leave your apiary neat and tidy without broken combs, hive scrapings, bee feed, or honey drippings scattered about. Feeders that can be placed inside the hive (such as division board or frame feeders that replace one or more frames within the brood nest, hive top feeders, and feeding pails enclosed within an empty hive body) are preferable to feeding from open containers or entrance feeders. Freshly extracted honey supers, or frames containing bits of honey that you want the bees to clean up should be placed at least 100 yards away from your apiary.

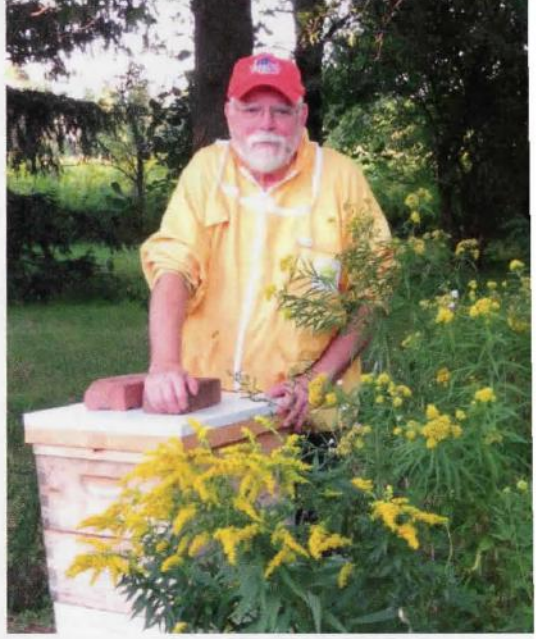
It is far better to work to prevent robbing behavior rather than try to stop it once it has begun. Once it has started, robbing behavior can be very difficult to stop the same day. As a general rule, it is best not to work hives when robbing is prevalent. This is why harvesting honey is much easier and more enjoyable a task when done a little early in the season, before the last of the blossoming plants have lost their flowers and gone dormant in preparation for the winter season. Unfortunately, despite our best efforts there are going to be those times when working with the bees just can't wait. When harvesting honey, inspecting, or manipulating hives when robbers are active and could become a problem, work quickly and try not to leave hive open too long, and keep all hive bodies and supers covered as much as possible. Inner covers, outer covers, or a damp cloth can all be used to keep exposed hives and equipment covered up thereby reducing robbing exposure. It is during times like this that one must be extra careful to replace all covers securely and not accidentally leave supers or hive bodies askew creating additional openings for robbers.

A strong hive

~Ross Conrad is the author of the revised and expanded edition of Natural Beekeeping: Organic Approaches to Modern Apiculture.

The Editor's Hive

~Kim Flottum



Getting Behind

Everything suffers when you can't take care of everything. Take our garden. Our timing early on was perfect. We snuck in between storms and stuck in the tomatoes and squash and peppers and cabbage and beans and radishes and basil and the cukes we wanted...sometimes starting just as the showers were quitting, and finishing just as they were starting again. But we got them in on time, or even early so they should do well we figured. But there was, it seemed, 40 days of rain and no way to get to it to work after it was planted and it simply went to weeds. Let me tell you about the weeds. Last summer we didn't even get a garden in. Gone too much, wet too much. Work too much. Suddenly it was August. Did a few tomatoes in pots on the deck and a few beans, but that was it. Farm Market sellers did good by us last year...and, this year.

Anyway, two summers ago, a neighbor who has since left (to cheers from everybody in the neighborhood) decided he'd fix his wet basement by changing the topography of his lot, and the course of the drainage from his front yard. It used to run straight across his driveway, straight into the north east corner of my basement. Some time ago we put in drainage pipe and shunted that waterway away and had a dry basement. Then the new drainage from his lawn changed the course and it now went into the south east corner of my basement. So, because this guy's a jerk, I had to put in more drainage pipe and it was almost perfect again.

Well, the guy who put in the pipe also does top soil and asked if I wanted a load added to my not-being-used garden plot so it could overwinter and be ready to go this summer. Good idea, I thought, and in it went. We spread it out and let it sit all winter, and this spring waited for the first batch of weeds to come up, tilled them down and then the rain started (see above).

But it was the weeds in that top soil that surprised me. Grasses I've never seen. Broad leaves from another planet. Sedges and plantains and things I'm not even sure are plants came back with a vengeance. Again and again and more and more, smothering anything that was supposed to be there in only days. We tried. We really did. Small rototillers, shovels, finally resorting to small, then big weed whackers just to get to the plants that are producing about 10% of what they should be.

You can imagine what's left. After a decent day whacking those alien weeds, it looks like I'm growing tomatoes and squash and beans and cukes and peppers in sod. A nice, green, lush carpet of living, breathing sod. Thank goodness for the Farm Market.

During our recent trip to the UK to visit friends and do a bit of magazine business we were able to see quite a bit of the country. We were down in Cornwall first off,

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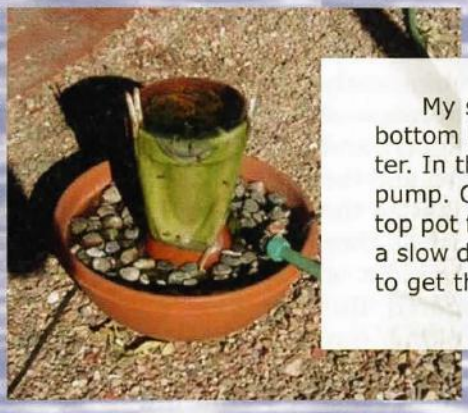
Water Gardens

Bees Need Water And Will Find It ... Somewhere.



My system. Three containers. The large one on the bottom holds small stones and is partially filled with water. In the center is a smaller pot that houses the water pump. On top of that is another pot. The pump fills the top pot from the water in the bottom, which is filled with a slow drip hose. The cloth provides footing for the bees to get their drink.

Larry **Shreffler**

Russ **Gilmore**

I live in Southwest Ohio. Here's my water garden in two seasons. The water lily plant shown in the picture is seven or eight years old and even though the water in the container freezes each Winter, the plant is able to "Winter over" and begin sprouting the following Spring.

The proper ingredients to my successful water gardens are as follows:

Container – 30 to 50 gallons or more

Water lily – only use hardy water lilies, not hybrid

Fish – five or six cheap feeder goldfish (I get mine at Wal-Mart)

The planting process:

- The initial water fill is the most difficult part, as my remote apiary locations do not have water hose access. I may add water once or twice. Obtain a container whose opening is wide enough to capture maximum rainwater.
- Water lilies require full sun. Water lilies do not "like" much movement in the water and the system, as described, does not require oxidation or mechanical filtering.
- Hardy water lily plants are purchased from a nursery. Place in a plastic wash pan packed with good quality topsoil, with a minimum of mulch or compostable matter. Submerge the planted pans to about 18". As the plant grows, the leaves spread and cover the surface of the water providing two key benefits:

1. A landing pad for bees
2. A cover over the surface of the water to restrict algae growth and evaporation

- At the beginning of the following season, remove the pan, divide the lily, replant in the pan and the other half can be utilized in another container or discarded. I dump the container, rinse out the gunk and start over with a fresh water load.

The fish:

- The goldfish are an important element in the loop as they keep the system in balance by consuming mosquito larvae and other microscopic entities. I do not feed the goldfish. I purchase five or six inexpensive "feeder" fish per container and most of them remain alive throughout the warmer months of the year. Occasionally, gold fish "Winter over"; however, I do not count on that.

The results:

- Water that stays clear through the year and is available to the bees without the introduction of chemicals and without the need to service the water supply on a regular basis.

You do have to make a few things but it works, is easy and also can be used successfully in an outyard.

It's easy to demonstrate but a bit difficult to describe but here goes –

You need a bucket (your choice of a three-gallon or a five-gallon) with lid, A brick or rock to hold lid down – you do NOT want to press the lid in place – it would end up with a vacuum and not work.

You need either: a faucet OR an IV drip line (obtain from friendly veterinarian). The drip line can be trimmed to desired lengths keeping the control of course.

A board – the ideal board is an old oak fence board (not with lots of paint) – farmers usually have some lying around and are glad to give you one.

Make a stand for the bucket – height not too important but three feet high is a convenient height for ease of refilling bucket.

Install either the faucet or the IV drip line on the side of the bucket close to the bottom of the bucket.

Take some tool and scrape or mill or otherwise create a zigzag pattern down the length of the old fence board – shallow in depth since the bees will be standing on the edges of the zigzag drinking from the channel.

Prop and fasten old fence board at a slant (about 45° or a bit more is good) so the top is under the faucet or end of trimmed drip line.

Fill bucket with water. Put lid on so leaves and junk don't fall into bucket. Put rock on top to keep lid from flying off in a wind.

Adjust drip so that the water enters the zigzag and trickles a bit down the zigzag but the board is dry at the bottom.

For an outyard a five-gallon bucket means you won't have to refill it very often.

If a suburbanite objects to the appearance of such an item in or close to beeyard, plant bee flowers around it.

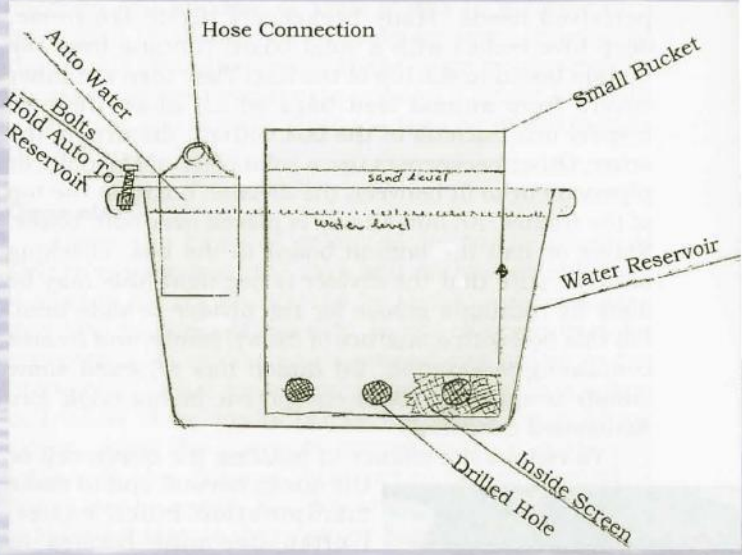
If you have trouble figuring my instructions out, let me know.

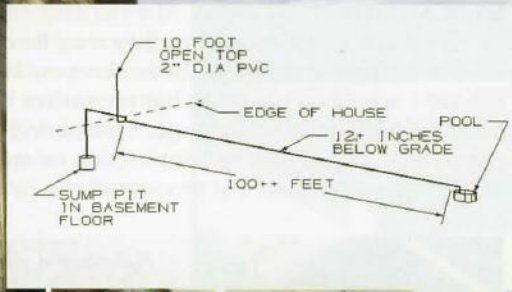
Ann **Harman**

John **Smith**

I feed crysalix to my cows, so its container is part one – water reservoir. An automatic tank waterer to keep the water level constant is part two. A plastic bucket that fits between auto waterer and container wall, is part three. The inside bucket has to have holes drilled in its lower sides, and a strip of screen placed inside to keep the sand from falling out. Add sand to ¾" above the water height, attach a hose and level. Adjust sand height to compensate for evaporation and bees will not have to dig too deep.

The downside is it grows grass, moss and whatever. Will not work in freezing temperatures, in fact. The bucket of sand has to really be drained before Winter/Fall.






line going to pool (one foot below ground)

Patrick **Driscoll**

I believe I have developed a solution to the problem of providing water for bees (and birds) year round, that I have been using for nearly 15 years. It uses water from the sump pump, which evacuates water from around your house without burning up the sump pump.

I buried a 2" PVC line about a foot deep going back over a hundred feet from my house to a plastic pool in the ground. It works all year long because the groundwater around a home is warmed by the heat of the house. Note well: When I first hooked up this system, the sump pump choked, having to push water up from the basement, then out back over one hundred feet. I added a vertical ten foot high OPEN ENDED two inch PVC pipe line at the point where the pipe exits the house, which allows the water column to rise and evacuate air, then gradually fall as the water is pushed out to the back yard. It does not ever flow over the top of the open pipe. I have an ordinary sump pump which has been working the entire time!

The snow always melts above ground along the top of this line. Bees are drinking water there year round!

Summer Increase

~ Larry Connor

Summer increase colonies are easy to make up if you follow these simple steps. Allow enough time, and make sure you have everything you'll need before you begin.

Equipment Preparation

You may want to make up double four- or five-frame nucleus boxes from eight- or ten-frame equipment, depending upon your equipment inventory and your perceived needs. Many beekeepers divide ten-frame, deep hive bodies with a solid board running from the bottom board to the top of the box. They then cut inner covers from animal feed bags which allow them to inspect one nucleus in the box without disturbing the other. Other beekeepers use a solid piece of Masonite or plywood cut to fit between the division board at the top of the frames. An outer cover is placed over both boxes. Staple or nail the bottom board to the box, checking to make sure that the divider is bee tight (this may be done by routing a groove for the divider to slide into). Fill this box with a mixture of drawn combs and frames containing foundation. Ed Simon has reviewed some simple-to-make nucleus equipment in his book *Bee Equipment Essentials.*

To reduce the chance of injuring the queen cell or the queen herself, and to make manipulation much easier, I often use nine frames in 10-frame equipment. With the divided nucleus box, you may use five frames, or increase the spacing by using four frames on each side. Do not make up special equipment with unusual dimensions – keep in mind your cross utilization elsewhere in your beekeeping operation or future resale value.

Setup for a double nucleus.

Some beekeepers use special division board feeders in the nucleus box. They fill it before they add the queen cell. A few Summers ago, we had a dearth in the Summer and Summer feed was essential for new colony growth. An entrance or hive top feeder may also be used. A frame or two of honey taken to the apiary, or removed from a strong colony, will guarantee a food supply. That said, nothing ensures the success of increase colonies as a nectar flow does. The colony will grow rapidly and be ready for more space very quickly.

Arriving at the apiary

With all the equipment loaded into a vehicle, you are ready to work. If the apiary has been managed so that colonies are about the same strength level, you will be able to remove the same amount of brood, bees and stored honey from each unit. Take what the colony can spare to reduce the swarming instinct from developing but you do not want to weaken the colony so much that it does not produce a honey crop.

Systematically work one hive at a time

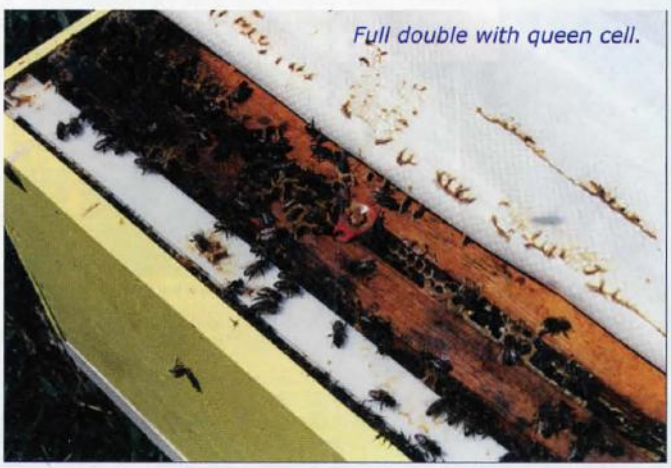
Remove whatever frames of brood the colony can spare; usually two or three frames per hive. Also collect frames of honey. Replace the brood frames with drawn comb so the queen will immediately lay into it. If there is a nectar flow underway, replace the honey frame with foundation to increase your number of new frames. Make sure to keep the brood together and not divide it unintentionally. I place drawn comb on the outside of the brood nest and foundation outside that. Drone brood foundation may be added if not already present.

Inspect each frame for a queen. Carefully check each frame for a queen as you remove it from the hive body. As you place frames in the box, inspect each frame again for both the queen and for queen cells. If you find one queen, look for another. Between 10% to 20% of all colonies have mother-daughter queens laying in close proximity to each other. Add brood and bees from multiple hives if needed.

Once filled, place the lid on the colony and screen the entrance, placing the colony in the shade if it is to be moved to another location. If it is to stay in a permanent site within the same apiary, move it to that location and restrict its entrance.

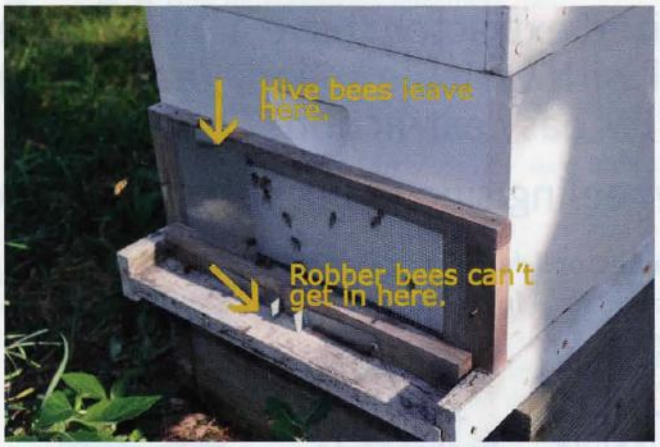
What strength?

As colonies are made up, they may be custom made for the strength needed by the beekeeper. Many increase colonies are often made up lighter earlier in the season because the colony has a longer time period to expand its population. If you seek full production colonies, however, add six or more frames of brood and two or three frames



Full double with queen cell.

of honey and pollen. If you wish to install queens or queen cells and keep them for production colonies later in the Summer, make up the nucleus colonies with two partial frames of brood, a frame of honey and an empty drawn comb. This will allow the queen an adequate population to support growth but not become so strong as to swarm. If you want to mate the queen in a smaller unit and later move it to 10-frame equipment, add three frames of brood and one frame each of pollen and honey. As you make up these colonies, make sure you move primarily sealed and emerging brood. Look for queen cells in development on any frames since this may interfere with queen or cell acceptance.



Robber screen from Brushy Mountain. (photo by Phil Craft)

Reduce the entrances

Robbing from other colonies is a real problem with small colonies. Once robbing gets started in an apiary, it can be very destructive. This may be avoided by keeping the entrances of smaller colonies reduced with a block of wood or screen. This allows a smaller number of guard bees to protect the colony entrance. If the hives are located in the sun, consider using window or small mesh screen as part of the entrance reducer so the bees are able to get adequate ventilation. Adding screened vent holes helps too.

In areas of chronic robbing, use a robbing screen. These work by allowing the bees inside the hive to fly in and out of the hive using a variation in the entrance. Robber bees are attracted to the odor of a colony, so place screens so they are unable to enter the hive.

Add cell or queen

Once a group of bees have been queenless for several hours, it is safe to introduce a queen cell or a queen in a push-in cage. Many beekeepers do this at the time they make up the colony, relying on the general confusion and mixing of bees to ensure queen acceptance. A cell protector that fits around a queen cell but allows the queen to emerge may be a suitable compromise for those worried about the 'foreign' queen cell being destroyed. Personally, I add queen cells after the nucleus or full-sized colony is in its permanent location, either in the same apiary or in another location. This will add several hours to the queenless period, and seems to reduce queen introduction problems.

The use of different colored plastic cell cups allows you to identify the breeder queen or line you grafted from. If you move frames of brood from colonies undergoing swarming, mark the top of the frame with a colored thumbtack. This mark will identify the colony from which you removed the frame.

Using virgin queens

Some queen producers emerge queen cells into small cages in cell builders or vials stored in incubators. I have used small emergence cages for years, producing thousands of virgin queens. These virgin queens may be successfully used in increase colonies if introduced with a candy or marshmallow plug at the end of the cage or the holding cylinder.

Once sited

Leave the increase colony alone so the queen is able to emerge from the cage and become established. If already mated, she should be laying in several days and may be checked, quickly, in five to seven days for acceptance as evidenced by normal egg laying in the brood cells. If you have used a virgin queen or a queen cell, allow three weeks before you check for a laying queen. Allow the queen to emerge, mature, mate and initiate laying. Waiting three weeks before removal is better for the queen, nucleus and the colony the queen is installed into as they mature together.

Follow-up inspections

Let the queen fill the colony with brood and, about four weeks later, evaluate her performance for brood pattern, appearance of newly emerged worker bees, and the appearance of any problems. Make sure the colony continues to have adequate food reserves (one honey frame in five-frame nucleus and three frames in a nine- or 10-frame hive). Queenless colonies should be stacked on top of a strong colony. Watch for wax moth and hive beetle larvae in queenless colonies.


Each side is occupied with a separate queen, with no pheromone communication betwee units.

~Larry Connor
Larry is owner of Wicwas Press - www.Wicwas..com Selling beekeeping books.

Phil Knows!

Q: How to recognize a queenless hive
From a Tennessee beekeeper:

I recently heard you speak in Kentucky and you talked about the problem beekeepers can have with queenless hives. How can I know that my hive is truly queenless, or inversely, be sure that it has a queen?

A: A colony that has lost its queen and failed to produce a new one faces decline, and ultimately ceases to exist. Ascertaining that a hive has a viable, laying queen is as important as making sure that it has enough food, and that diseases and parasites are controlled. It takes 21 days for a new worker bee to develop from an egg. That means that three weeks after a colony goes queenless, its population starts to dwindle as old bees die and are not replaced. Too often, novice beekeepers do not detect the absence of a queen until the colony is beyond recovery.

Part of my regular hive checks, which I do about every ten days to two weeks in the spring and early summer, is looking for the queen or evidence that one is present. The easiest way to do this is by examining a few frames near the center of the brood area. The queen herself may be elusive, but since eggs hatch within forty-eight hours of being laid, their presence attests to her recent activity. However, recognizing eggs is a skill which can take time to master. If you don't see them, look for large, white, "C" shaped larvae which are easy to spot. Once you locate them, look for the smallest larvae that you can see, which will be on the same frame or on one nearby. These larvae are two to four days old, which means the queen was laying five to six days earlier. Though seeing eggs is better, I find a six day time frame is acceptable as long as you are doing regular hive checks.

If you fail to see eggs or young larvae, the search must continue on all brood frames (meaning all frames under queen excluders.) Quickly glance at those filled with honey, nectar and pollen and concentrate on frames with empty cells. As you proceed, watch for the queen herself; it helps if you bought one that was marked. Sometimes a queen is present,

but not laying, as during dearths when no nectar is being brought into the hive, or shortly after swarming when the new queen has yet to mature and mate. As much as two weeks may elapse from the time a new queen emerges until she makes her mating flights and begins to lay. Add to that the time she spent in larval development after her cell was capped and before she emerged, and the colony can experience a three week gap in egg laying. That is why, when I think a hive has swarmed and I fail to see eggs or young larvae, I wait as long as three weeks (about the time that all the capped brood has emerged) before concluding that the hive is queenless. Once I have done so, it is time to install a new queen or merge the hive with one that is queen right.

Q: How to recognize a colony that has swarmed and what to do and watch for
From an Indiana beekeeper:

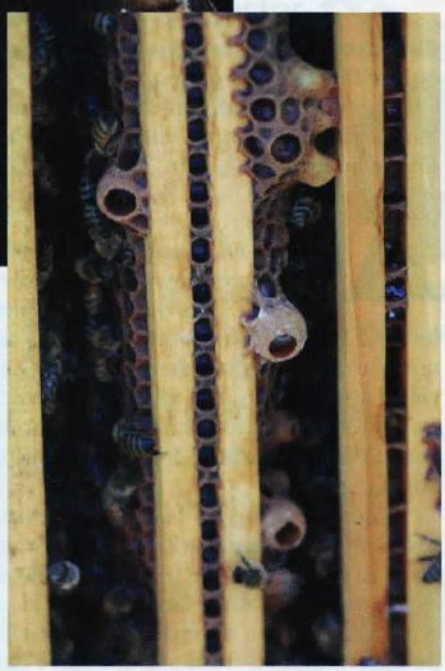
Last year I had two swarms from my four hives. I had seen numerous queen cells there shortly before the swarms appeared, so I am pretty sure that one of the swarms was from that hive. However, I never was sure which of the other hives swarmed. In the future when I have swarms, how can I tell which hive they came from?

A: Of course, the surest way to identify the source of a swarm is to see it emerge from the hive. This does sometimes happen, at least for me. I work from home, my hives are near my house, and during swarm season I make at least a couple of visits a day to my bee yard. However, not everyone is in this situation. A sudden reduction in a hive's population can be an indication, but that is difficult to gauge in a strong colony.

The other way to tell is from evidence INSIDE your hives. In spring and early summer you should be checking them at least every ten to fourteen days. Numerous queen cells are an indication that a colony is preparing to replace a queen about to depart with a swarm. Swarm cells can be distinguished from supersedure cells (which colonies make to replace an old, injured, or infertile queen) by their number. Supersedure cells are produced five or six at a time; swarm cells by the dozen. During inspections, pay special attention to the bottoms of the center frames where queen cells are most likely to be found. You can often see them, without pulling frames, simply by tilting the brood boxes back until part of the bottom is visible. If you see a number of capped queen cells, there is a good chance that a swarm has already emerged, which they typically do soon after closing the cells. Cells like the one

in the picture which have been closed and then opened at one end (often with a flap attached), indicate that an adult queen has emerged by eating her way out.

It's important to identify hives which have swarmed because they are at a vulnerable stage and require attentive monitoring. With the old queen gone, the continued existence of the colony depends on producing a viable replacement. Sometimes the process breaks down. The virgin queen may be prevented by bad weather from making mating flights during her window of fertility, or she may be injured or killed in route. The resulting queenless hive can only be saved by the beekeeper's alert intervention. For more on how to recognize this situation, see the question in this issue from a beekeeper in Tennessee.



~Phil Craft I welcome your questions. You can send them to me by email at: phil@philcrafthivecraft.com, or by mail to Bee Culture magazine. Though only a few will appear in the magazine, I will respond to all questions personally. As in my "Ask Phil" column in Bee Culture, I identify correspondents only by state, never by name. I look forward to hearing from you, and wish you the best in getting started in beekeeping.

Is Natural Really?

~Jennifer Berry

When the most recent and well-publicized phenomenon of honey bee disappearance, termed Colony Collapse Disorder (CCD), began, it gave rise to serious concerns not only among those in the commercial beekeeping industry, but also among environmentalists, academics, and even the mainstream media and general public, as well.

Bees were dying at alarming rates. Large commercial beekeeping operations, having sustained crippling losses, were on the brink of bankruptcy. And, thousands of acres of pollinator-dependant crops were in jeopardy. Theories and rumors quickly arose as to why colonies were dying. In response, researchers raced across affected areas to collect samples and begin their investigations. The initial, knee jerk blame claims, ranging from cellular emissions and high-voltage power lines to UFOs and the wrath of God, began to fill the airwaves. However, cooler heads prevailed and the Coordinated Agricultural Project (CAP) was started to actually examine the facts; just the facts ma'am. The project attracted 17 institutions from across the U.S. to study why bees were dying, and, hopefully, to find a cure. For four years, nutrition, disease, mites, environmental toxins, miticides, habitat loss, along with other potential culprits have been investigated. The conclusion; there is no single "smoking gun," but that the causation of the syndrome seems to be a combination of stresses on the bees, chiefly from *Varroa* mites and chemicals (in the hive and environment). Many of us sensed this all along. But, because of the project, we now have a much better understanding of honey bees and the effects of these stresses than we did back in 2007. This is a good thing!

Whether triangular, rectangular, circular or hexagonal, we keep bees in a box. Is that natural?

However, this article is not about the outcome of the CAP research, but, instead, it is about a silver lining, or positive twist, so to say, that has spun off from the CCD disaster.

As bees were dying, the media jumped and jumped hard. News vans rolled into apiaries. Reporters and camera folk scrambled in search of beekeepers to interview. Jackets and ties were donned, shirts tucked in, lipstick and makeup applied, sound checked, cameras rolled, lenses focused, and mics turned on: "In, 3, 2, 1..."

"Hello this is Melinda Jo Johnson standing in a field that used to have 100s of healthy, honey bee colonies. But, that's not the case today. Instead, the boxes you see behind me [camera pans] – are empty. Why are they empty, you ask? Well, for some unknown reason, all the bees have left or died. What does this mean for us? Could the bees be the proverbial 'canaries in the coal mine'? Is this a sign – some manifestation of global warming? And, without bees to pollinate the fruits and vegetables that we eat, will mankind starve? These, along with many other questions, may never be fully answered, but beekeepers and researchers alike are struggling to find out what is happening to the bees. Let's just hope it's not too late. Back to you, John, in the studio." And . . ., fade to black.

News reporters from the big guys (Fox, CNN, ABC, NBC, CBS) to the neighborhood stations were all racing to do a story. The newspaper and magazine giants were involved as well. Movies and shorts were filmed, and books were written. Even the local journalism majors in high schools and colleges were writing about CCD. And, with this blitz of media attention, the plight of honey bees reached a huge audience of non-beekeepers. This is the positive twist mentioned earlier; the CCD frenzy facilitated mass public awareness of the importance of bees and pollination. **YES!!!**

Then a second wave crashed in as individuals from all backgrounds wanted to become a beekeeper. Interested folks started reading books on honey bees, joining beekeeping clubs and associations, buying equipment, and taking bee classes across the country. A few wanted to help to save the bees. Others sought a hobby for their kids. Some wanted to ensure the pollination of their farm, orchard or garden while others just wanted bees for the fun of seeing them flying to and from their porch, deck , rooftop or backyard. And, the trend still continues today.

Now, let's turn back to CCD. When symptoms first appeared, it resembled classic, in-field pesticide poisoning. Remember, there were no adult "forager" bees present. There were only brood, a queen and young bees. Plus, secondary scavengers or robbers were not present. As mentioned, pesticides were certainly a part of the problem, but it is much more complicated than that. Yet, at least early on, pesticides received the brunt of the blame. In response, a purist, "all natural" movement arose. Beekeepers, especially new ones, began to stay completely away from any chemical use. This new level of public awareness led to an upsurge of new beekeepers, who in turn, fueled the natural beekeeping movement. Maybe a stretch but seems like a logical stream of events to me.

However, the concept of "natural" beekeeping is not new. Many beekeepers have been claiming their naturalness for decades now. Yet, it has, irrefutably, gained much more attention recently. This is a good thing. Beekeeping should be more natural because beekeeping

If anyone tells you NOT to feed your bees, walk away.

is so natural to begin with . . . Or, is it?

Whether it's triangular, rectangular, circular, or hexagonal, we keep bees in a box. Is that natural? Then, we put that bee box or boxes where we want them, next to our garden, gazebo or lining an open field. On average, feral hives tend to be a good distance apart, yet we (beekeepers) line them up, sometimes even side-by-side, for convenience. Natural? Next, during the Spring months, we take swarm prevention measures (cutting queen cells, rotating hive boxes, and adding more space) because we don't want to loose our foraging force. How natural is that? What about the idea of harvesting honey, pollen or propolis? Taking something away from the bees for which they have worked so very hard doesn't seem very natural. Then we re-queen to address issues of defensiveness, poor colony strength, hygiene against pests, low honey production, or simply because she's a year old or the wrong color. Does this sound natural? What about even lifting the lid and inspecting the colony? How natural would it be for the wall of a tree cavity to pop off and magic forest hands to reach in and rearrange "the furniture" in a feral hive?

In the end, keeping bees isn't very natural, is it? So, where do we draw the line between using bees as factors of production and treating them as fellow creatures of this planet? What really defines natural beekeeping? How about we do the best we can to keep our bees healthy and alive for their own sake as well as for the benefits to humans from their amazing abilities. Ok, the definition probably needs a little more work, but, it's a start.

Drawing haphazardly from numerous sources, let's consider these general parameters for a natural beekeeping objective: minimal intervention, no toxic chemicals applied to the bees, their hives or apiary, and, finally, taking only what the bees can afford to give without directly putting their quality of life and survival at risk. I'm sure there are hundreds of other additional ideas we could also consider, but let's begin with these.

Not only has there been an explosion of new, natural beekeepers, but there is also more natural beekeeping information available. A good bit, though not all, has been accumulating on the Internet. While doing some background research for this article (and other searches), I came across some seriously **BAD** information on the net. Some of it was just down right **WRONG** from beginning to end! That provoked me to do a quick survey among beekeepers (hobbyist and commercial), honey bee academics and beekeeping supply purveyors. I asked them to answer a simple question: what books or beekeeping information would you recommend to 1) a beginner and 2) a more experienced beekeeper.

Here is the list of titles (in order of most nominations to least):

Beginner information

The Beekeepers Handbook
First Lessons in Beekeeping
The ABC & XYZ of Bee Culture
Honey Bee Biology and Beekeeping
The Hive and the Honey Bee
Backyard Beekeeping
Bee-sentials
A Book of Bees: And How to Keep Them
Beekeeping: A Practical Guide
Hive Management

More Advanced

The Wisdom of the Hive
Honey bee Democracy
The Biology of the Honey Bee
Honey bee Ecology
The Buzz About Bees
Bee Culture Magazine
American Bee Journal

Of course you know this, but not everything you read or see on the Internet is correct!

Anyone can post a blog or YouTube video on his/her practices, thoughts, opinions, conclusions, personal views, belief, ideas, etc. And, because we've been somewhat trained to trust what's in print and other media, subconsciously we expect that it MUST be right! Please be careful while searching information in cyberspace. Especially, if you're a new (newer) beekeeper, start with credible information. Build your foundation of beekeeping knowledge from reliable, sound, and peer reviewed material. Don't buy into some fly-by-night, who's only credible experience is website building, and has had only one bee hive (now a dead-out) in his/her life. Yet, people of this ilk have convinced novice beekeepers to follow their nonsensical beekeeping theories, which invariably leads these new beekeepers to lose their colony, become discouraged, and likely give up beekeeping entirely. Thus, our cause loses a potentially great beekeeper.

A rectangular box on a roof top. Natural? (Photo by Cindy Hodges)

A diverse selection of food source - Natural?

Now, I didn't mention feeding above when exploring what is natural beekeeping. Is feeding your colonies natural? There are two obvious camps on this. If you were to call the UGA bee lab with the question of to feed or not to feed, this is what we would recommend: if your colonies are light in stores, feed them! If anyone tells you it is unnatural to feed your bees, walk away. If they write about how they don't feed because they want to stop perpetuating weak genetics and allow only the strong to survive, turn the page. If they blog about the fact they let their bees starve because the bees aren't smart or strong enough to find their own food source, hit the back button.

It's early April as I'm writing this. It has been a challenging spring for the bees. Georgia and the southeast experienced a very warm December and January. So, the queens never shut down; in other words, they continued laying eggs through the Winter. These eggs hatched into brood, which were fed copious amounts of honey and pollen before pupating. Then, they emerged into hordes of active, hungry bees with little-to-no food sources in the environment. Then, to compound the crisis, a cold, wet winter returned for several months, which resulted in starving bees across the state. These circumstances also perpetuated the growth of mites.

For the past three months, we've fed about 800-1000 pounds of sugar per week to keep over 400 colonies alive. If we hadn't, at least 75% of our colonies would have starved, if not more. Their own stores were depleted by February. So, I have to strongly disagree with the naturalist camp who would write off this situation to bad genes, weak genes, or say that the world is better off without these bees. Nope. Sorry. As everyone who relies on agriculture for a living knows, you can't control the weather. And trust me, the lab staff would prefer not to feed; it's time consuming and messy. There are much better things we could be doing with our time and money than mixing up syrup, cleaning and filling jars, and enduring the wrath of hungry bees while swapping out jars in the field. However, I refuse to let bees die when it's within my control to take care of them – even if it calls for "unnatural" practices.

There are a whole host of reasons why a colony may not have enough food to survive the dearth: bad weather, inappropriate hive location, ill-timed swarming, queen injury, poisoning, infections, infestations and other disorders such as a bear attack. Of such circumstances too numerous to list, few have anything to do with the bees having inferior genetics.

As extension personnel for the University of Georgia, we apply our knowledge and expertise to sift through information and disseminate the most important and applicable to the public. Beekeepers pose questions to our office by phone and email all the time. One common question in the late Winter and early Spring, unfortunately, is, "Why did my bees die?" After a few minutes of discussion we can usually figure out what happened. And, nine times out of 10, it's either starvation or mites. This is probably why I tend to go a bit overboard when talking about feeding and mite control. But, I will say this: If your bees are healthy and surviving without your intervention then, by all means, keep doing what you are or aren't doing. I only know what works here, in the Piedmont region of Georgia, under conditions similar to the lab or my own apiaries. So, our course of action may not be the same as that for beekeepers in other areas of the country or with different situations.

In any case, remember that the bees we have today aren't indigenous to the Americas. Settlers brought them here. Then, we imposed our human management techniques on them, laced our environment with a myriad of toxic chemicals, proceeded to convert vast amounts of natural landscape to golf courses, shopping malls and parking lots, and imported exotic honey bee pathogens and parasites. How can we expect honey bees to thrive on their own under these conditions? How can we stack the odds against them, and then demand that they survive without our help? If our environment was more "natural," then perhaps we could expect honey bees to proliferate more naturally and independently.

Take care of you & your bees!

Choosing queen stock that comes from mite resistant stock is a good choice, but essentially impossible because they are almost completely unavailable.

***~Jennifer Berry** is the research director at the University of Georgia Honey Bee Research Lab.*

TREATMENT TRUE

~DEWEY CARON

Electing not to treat bees or seeking to move toward treatment-free is one of several possible options in bee colony stewardship. Managed colonies, along with bee colonies in the wild, experience heavy overwintering losses. It seems that one treatment regime doesn't work in all instances and some consider that treatment is not the "solution." Consequently Treatment-Free conferences on both coasts have grown in popularity, and at state, regional and national meetings there may be one or several talks covering treatment-free. Four new books on top-bar beekeeping, colonies largely managed treatment-free, have been published in the last couple of years.

Tom Seeley, at a recent treatment free conference in Forest Grove, OR described his research on where and how bees live in the wild in contrast to what we "require" of those same bees when we site them in our apiary. He believes keeping bees more similar as occurs in nature is smart beekeeping. He is researching why bees in the wild seem to accommodate more to mites and begin to survive in a more balanced equilibrium with mites.

In his forward to Steve Repasky's recent book on swarming (Wicwas Press), Tom expressed this concept as follows:

"When we beekeepers put a colony of bees in a hive, we gain control over where they live and we make it easy to open their nest and do what we want, but we actually gain little control over the bees."

Pretty, but best for bees?

In the wild, escaped beekeeper swarms must find a suitable cavity, grow in strength and store enough reserves to overwinter. They must also deal with mites and other diseases, as not doing so results in colony death. The strong survive; earlier studies by Dr Seeley estimated only one in five survive the first season. During better weather in the Spring, the bees thrive and emit swarms to repopulate vacant cavities. Surviving colonies grow in strength with Spring resources and seek to store enough reserves to overwinter.

Beekeepers generally wish to improve the odds of colony survival. How do we assist our managed hives to be survivors? As experienced beekeepers know, there is more than one way to assist bee colonies. We provide comfortable domiciles (hives), we supply drawn comb to splits and captured swarms, we feed supplemental sugar, we bolster brood populations and we can seek to minimize the impact of predators and diseases.

We can elect to treat for diseases/mites and provide supplemental feed when colonies lack adequate stores or we wish to bolster/stimulate weaker colonies. Not treating or working toward not treating colonies, if you are currently treating and wish to reduce doing so, or want to start new colonies without treating, are perfectly good options in our striving to reduce our continuing heavy bee losses. If we do not wish to treat, can beekeeping still be profitable and colony stewardship fun?

Keeping bees without or with minimal treatments, a desire of the majority of small-scale beekeepers in my survey experience, lies, I believe, in considering four components – the beehive, the apiary, the bee stock and finally our approach to colony stewardship.

THE HIVE

Our Langstroth hive is considered both the greatest advance in modern beekeeping and yet it probably helped contribute to great epidemics of disease (think the American Foulbrood epidemic in the early part of the 1900s in the U.S. and in the late 1800s in Ireland or Isle of Wight Disease epidemic (often ascribed as due to tracheal mites) in Europe in the 1920's). The increased adoption of Langstroth movable comb hives of course was not in isolation with other advances in beekeeping that may equally have contributed to disease spread and these epidemics. Could the Langstroth hive (combined with how we have changed our beekeeping) be a contributory factor to the current loss epidemic, ascribed as due to a combination of factors but most surely *Varroa* mites and their transmission of viruses?

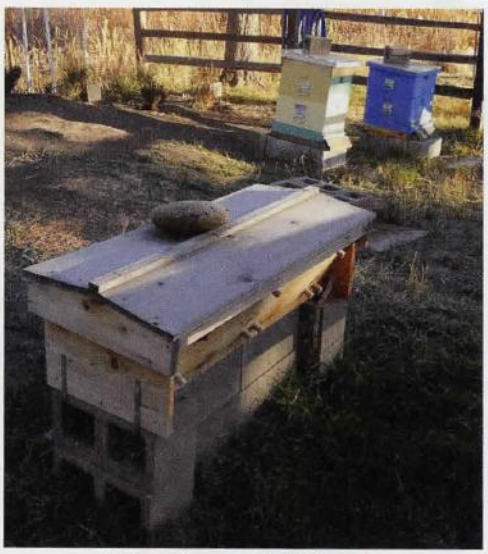
Treatment–free advocates often champion a different

Colonies well distinguished.

hive, such as top-bar hives. In the last two years, four books on top-bar-hive beekeeping have been published alone. Top-bar hives are seldom opened (particularly after they are larger), frames or bees are not moved (within or between hives), and treating for mites or diseases or even feeding is not practical (although some techniques have been described to treat or feed). The hive encourages less intervention. A number of beekeepers now include both types in their backyard apiaries and wait the results to see if a different hive makes a difference.

In reality the type of hive to use might be dictated by the intentions of bee stewardship. Not all beekeepers desire or seek large populous colonies, with highly interventive management nor do all beekeepers seek to maximize the potential honey surplus or use their colonies multiple times in planned pollination. Smaller colony populations, heavier swarming and losing colonies is considered part of normal beekeeping.

Although the Langstroth hive is most practical for colony manipulations and larger-scale beekeeping, it is not necessarily the best one for all beekeepers. The Langstroth hive might be better utilized for beekeepers wishing to work toward treatment-free beekeeping by moving frames less, keeping colonies weaker and planned interruption of the brood cycle. So although not necessarily the hive, how we manage the hive, the way we site it and our interventions might be reevaluated if we seek to reduce treatments.



Each unique and distinct.

THE APIARY

It seems clear that keeping bees in similar boxes, all painted white, six inches to two feet above the ground, in neat even rows, without distinguishing identification features (for the bees not the beekeeper) promotes drifting and with it disease and mite spread. Bees in the wild are ½ mile apart in different trees at different heights above the ground. Drifting and robbing are not common behaviors of wild colonies but they are in our apiaries.

Manipulations, siting, hiving bee colonies in a small area, all with a common bee stock, seeks to make colonies more similar than dissimilar, consequently making treatment intervention more necessary to reduce heavy losses. Distinctive hives (whether all Langstroth design or mixture of hive types) and distinctive siting in the apiary are practical, non-expensive things we can do to work toward treatment-free beekeeping.

Apiaries with colonies facing different directions, with different numbers of boxes, each distinctly colored or patterned, spaced apart as the site allows, elevated differing distances off the ground or otherwise made distinct from every other nearby hive all represent smart beekeeping and may assist in working toward treatment-free bee culture. Mites, disease, drifting bees and competition all come from nearby neighboring colonies. Reducing sameness and promoting differences, when practical, is good bee stewardship.

We can read our colonies when we enter the apiary and not open colonies if there is no need to do so. Elevation reduces pest pressure and helps keep entrances more accessible to the bees. A simple yellowjacket trap (where these predators are common) can help reduce this stressor for our colonies. Sunshine reduces *Varroa* numbers and may help reduce disease pathogens. Think bee comfort and give bees a chance to fight back.

BEE STOCK

We can train bees to visit certain crops and to detect landmine chemicals, even certain human diseases. We have bred a better alfalfa pollen collector, bees that are more resistant to AFB disease, bees that are more hygienic (and fight mites more effectively), bees that are more productive and we have bees that use less propolis. We have imported bees into the U.S. that are better defenders against *Varroa* mites. Why then, do we persist in purchasing bees from the same source to replace overwinter losses or simply divide survivors and allow them to raise their own queen?

Everyone agrees that our eventual mite "solution" will be bees that can live in better harmony with mites. We have bees that, to a limited degree, resist mites. It is possible for individual beekeepers to breed from survivors that have better mite resistance. Bee breeders are working toward the better bee but we still have a ways to go. If we are going to work toward treatment free or do not wish to treat our bees for mites, it seems clear we will continue to suffer heavy losses (30+% annually overwinter, 45% annually, from our national surveys).

Our role should be to support those programs and purchase those queens/bees that are the better stock. Treatment free means using better stock. As with much of beekeeping there is no one answer, no one stock that meets all our needs, including the ability to resist mites. For some beekeepers the better stock might be Carniolan bees, Russian queens, or hygienic stock, coupled with seeking to raise our own survivor queens. We need to speed the development of bees resistant to mites.

HIVE MANAGEMENT

We can change our apiary and make our hives look different for the occupants, less carbon copy-like, plus we can seek a better, more appropriate stock but it is our management that we can most easily change if we wish to treat less or not at all.

What can we change? Nothing will be easy – change takes us out of a comfort zone. We can seek to raise drones as a mite trap and cull capped drone brood as a management. It can help reduce the growing mite population. It is work. We can seek to keep colonies growing by dividing colonies and introducing the improved stock. Growing colonies give the bees the opportunity to "grow out" of their mite problems. This too is work. We can seek to inspect and understand the needs of our individual colonies rather than seek to make them all the same. Less transfer of frames (unless we move honey to help bolster colonies with fewer stores to improve overwintering success) is better stewardship.

Quicker, more directed inspections can be useful as well. Opening the colony is a stressor for the bees. Disruption of the normal brood pattern stresses bees. We do not need to see the queen to know our colony is queenright – we only need to see normal egg laying and the pattern of the brood nest to confirm all is OK in the colony. Simple may be better.

Larger-scale beekeepers feel aggressive *Varroa* treatment necessary to have sufficient colonies to be economically viable. Mite numbers can explode in colonies in the early fall leading to colony crash in early spring. Working toward treatment free may necessarily involve keeping mite populations under control in concert with other measures to reduce losses. There are alternatives for mite control and some treatments may be more "acceptable." They are not as easy to use and may not provide as effective control of *Varroa* but could help make a difference.

Not all beekeepers need or desire large populous colonies. Smaller, growing colony populations and keeping weaker colonies, with fewer inspections, may better serve the beekeeping goals of many smaller-scale beekeepers. No single change will solve all beekeeping problems but we should evaluate how we keep our bees and what we do to them as a first step toward less interventive, more successful beekeeping.

~Dewey Caron

Summering your top bar hive...

Consider Heat, Rain, and Queen Loss

~Christy Hemenway

The results of the 2015-16 Bee Informed Partnership annual survey are in. It hurts to think that beekeepers that responded to the survey lost 44% of their bees – and not only in winter, but in summer as well! We like to picture the summer as a peaceful, healthy, idyllic time for bees, but the survey seems to give the lie to that. It's unnerving that the jury remains out as to why that's happening.

When it comes to summer issues that affect your bees there are some things we DO know about and CAN work to prevent. So let's put our focus on those things, shall we?

Summer issues that top bar hive beekeepers may encounter can be caused by:

1) Heat
2) Rain
3) Queen loss

1) Heat. The most important feature of a top bar hive is what goes on inside - bees making natural beeswax comb. In a top bar hive that comb is attached by the bees to the comb guide on the bottom of the bar from which the hive derives it's name. The attachment runs the length of the top bar, instead of being surrounded by a wooden frame and possibly even supported in the middle by wires or rigid plastic foundation.

But beeswax is exactly that – wax – and wax melts. Beeswax melts to liquid at about 145 degrees F, (63 degrees C). It gets quite soft at about 100 degrees F (38 degrees C). Depending on where you live, you could experience temperatures that high in your bee yard. This makes for some very soft and fragile comb.

So how do you inspect safely in the heat? As always, time and temperature matter a great deal to all things bee. If the temperature is too warm at 2pm in the afternoon, inspect earlier or later in the day – avoid the hottest part of the day and inspect when it's a bit cooler.

Another option is to create some artificial shade at your hive. Lightweight popup tents are ideal for this – they make a noticeable difference for the beekeeper as well.

What do you do if a comb DOES break off the bar? Now you're facing a couple of problems... First, you don't want to give up the comb – at this time of year it is likely to be filled with eggs and larvae that are essential for the success of your hive. Second, the wax is very soft – as you have just been painfully reminded. This makes it tricky to "rehang" the comb because its weight is enough to thwart any attempts at sewing it back onto the bar. Another complication arises because you don't want to change the spacing of the bars – so you don't want to use anything to rehang a broken comb that forces the bars apart.

Rehanging a piece of broken comb
Photo credit: Gold Star Honey bees YouTube video: https://youtu.be/pdwxrByaqX0

The best method we've found of fixing this problem is the "sling method." To do this, you'll need four flat-head thumbtacks, and two strips of a slightly stretchy fabric (perhaps an old t-shirt) about ½" wide and long enough to reach from top to bottom of the comb twice and then a few inches more. Tack the ½" strips to the underside of your top bar. Space them apart enough so that they intersect the comb vertically into thirds. Lay the top bar on a work surface with the strips extending down and away from the bar. Place the piece of comb carefully on the fabric strips, then bring the end of the strips back up to the top bar. Tack them into place. Adjust things so that the comb hangs vertically below the bar, just as the bees built it. The sling supports the comb from below, and will hold the broken edge close to the bar where the bees can reattach it.

A typical top bar comb - Honey on top, pollen in the middle, and the darker comb at the bottom holds brood.

2) Rain. Rain in the summer is crucial. We understand that easily enough, right? Without enough rain the plants can't bloom, and they can't produce nectar and pollen – so the end result would be that there's no food for your bees to forage for. That's a real problem! But with too much rain – comes some problems of a different nature. Bees don't do much flying in the rain – so they aren't able to collect nectar to make honey, or pollen to feed baby bees. Even if they have their own honey stores, bees are so active in warm weather that they will consume

those stores very quickly when they are cooped up inside the hive while it's raining. It's actually possible for bees to starve in the summertime, due to an inability to forage during extended periods of rainy weather. Watch for this, and feed if needed – yes, even in the summertime, and especially with new hives being started from packages.

Another way that rainy weather can affect your bees concerns the mating of queens. Since honey bees mate "on the wing" – if they can't fly, they can't mate. This spells disaster for bees that are in the process of swarming, and for the beekeeper that was unprepared for a swarm that has already flown. This beekeeper is now pinning their hopes on the new queen and the bees that stayed behind when the mated queen flew with the swarm. The optimal window of time for that queen bee to mate successfully is quite short – about 7 to 10 days. If it rains during that time frame – then the number of mating flights that she can take, and thus the number of drones that she can mate with, is diminished. This is another real problem! Promiscuity in the world of honey bees is a very good thing – you might say "the more the merrier." Recent studies are showing that the bees are able to tell how "well-mated" the queen is, and that they show a distinct preference for "slutty" queens. The hive may attempt to supersede a queen bee that they don't consider to have been well mated. She is not likely to be a good layer and also not likely to give off a strong queen pheromone. This can lead to a "failure to thrive" for the hive and lessen the cohesion and viability of the colony. Plus, fewer matings mean less diversity, and less chance for survival.

Rain is therefore a two-edged sword, whether too much or not enough. It's definitely something that a beekeeper needs to be aware of in either case.

3) Queen-less-ness. Losing the queen bee is bad for your beehive. This is known. But one wonders what could possibly happen to a bee that doesn't fly but a few times in her life. I mean, really - just how dangerous is it inside that beehive? The sobering answer is that much of the time, the cause of the queen's demise or disappearance is the very beekeeper that most wants her to be happy and healthy. Inspections are important but they can also be risky.

There is a very real possibility that a beekeeper handling a frame or a top bar neglects to hold that comb over the hive while they are looking at it, and never notices the queen bee that falls off... and then gets crushed beneath their foot. It can also happen that the hive has built queen cells, in the course of preparing to swarm or to supersede their existing queen, but then during the course of an inspection the beekeeper accidentally crushes or tears open the queen cell.

So your hive is queen-less. Now what? Getting back to queen-right is your first concern, as this is crucial to your hive's health and will also preclude a worker bee turning into a laying worker. If your hive has eggs or just-hatched larvae, the bees can replace their queen on their own. They will take a tiny 3-day old larva and build the cell out to become a vertical queen cell. Then over the course of the next several weeks, they will be back in business with a queen of their own making. If your hive is without brood at this stage, but you have top bars that are interchangeable with another top bar beekeeper's, and if they have bars with brood of the appropriate age, (if you ask nicely!) you may be able to arrange to acquire some brood in that way. The time factor can be important here – if your local growing season is very short, the time that elapses while the bees make a new queen and she flies to mate and then finally gets started laying, can be costly.

Damaged queen cell

Another option is to purchase a mated queen bee. This will cause a complete changeover of the genetics of your hive – so be thoughtful about this process. If changing the genetics is your intent, you can purchase a new, mated queen that carries the genetics that you want and do this on purpose. Ten to twelve weeks after her arrival, you will have a hive filled with the new queen's offspring. If you do not want to change the genetics, be sure to purchase a replacement queen with the same genetics as your original queen.

Interchangeable equipment matters when needing to support your bees in making queens. Something important to consider when choosing your top bar hive!

Interchangeable top bars matter!

***~Christy Hemenway**, Author of The Thinking Beekeeper series, including "The Thinking Beekeeper – A Guide to Natural Beekeeping in Top Bar Hives" and the forthcoming "Advanced Top Bar Beekeeping – Next Steps for the Thinking Beekeeper."*

Good Stuff From Ann

Sugar Cane

It makes no difference whether you took some beekeeping classes, or worked with a mentor or read some books for beginners, you found that bees might need to be fed under a variety of conditions. Feeding bees sugar when they need it, whether as syrup or another form, is important to produce and maintain that strong, healthy colony that will survive and provide surplus honey and pollinate crops.

Over the many centuries that humans have kept bees, the necessity for food was recognized. Even Aristotle (384-322 B.C.E.) wrote that if the bees ran out of food they died. Through the centuries beekeepers were warned that being greedy and taking too much honey from the bees meant the loss of those bees. Before sugar became plentiful worldwide, beekeepers would cut honey-filled combs from one hive to give to a starving colony. Today beekeepers monitor the stored honey in their hives and feed sugar when necessary. So let's find out where sugar comes from, how bees use it and what is best for the bees.

Sucrose is the correct name for our familiar white table sugar. There are many other 'sugars' related chemically, each with its own name. But the one we are familiar with, sucrose, we know as white granulated sugar or sometimes table sugar. You may find other table or baking sugars on the market, but these are not suitable for bees. In fact such sugars as 'raw sugar,' 'brown sugar,' Turbinado, Demarara, and flavored sugars are actually toxic for honey bees and should never be fed to them. Neither should sugar substitutes, used to sweeten coffee and tea, be fed to bees. The bees also cannot tolerate such syrups as molasses, sorghum syrup, light or dark corn syrup, even if diluted with water. The honey bee's digestive system is quite different from ours.

Plants produce sugars. Green plants contain chlorophyll that, in a process called photosynthesis, initially produces glucose, known as a simple sugar. This is then converted to sucrose, the principal sugar of green plants. This sucrose is transported around the plant to the leaves and blossoms. Therefore, the sweet liquid called nectar contains sucrose as the principal sugar. The amount of sucrose and the amount of nectar varies with the type of plant. Commercial sources of sucrose are sugar cane, a tropical or warm temperate climate plant, and sugar beet, a cool temperate climate plant.

Sucrose is useless. In order to be used by bees, our bodies and also by those that eat green plants (cows, horses) sucrose must be broken down in the digestive system to the simple sugars, glucose and fructose. An enzyme is necessary for this process. Please note that if a **plant** is converting the sucrose the enzyme is called **invertase**. If an **animal** is converting the sucrose, the enzyme is called **sucrase**. The honey bee is an animal. So are we and the cows and horses. (Unfortunately many books for beekeepers will be using the wrong term.)

In bees the enzyme is found in the stomach, called the ventriculus. It is probably also in the salivary glands. In foraging bees sucrase is found in the head glands called hypopharyngeal glands. Therefore, the foragers can add the enzyme to the nectar as they are removing it from the plant. Thus the conversion from sucrose to glucose and fructose, the sugars in honey, has begun. If the bee eats some of the nectar (passes some nectar to the stomach), the sucrase in the stomach converts the sucrose.

Glucose can be used. Brains—of bees, humans, cows and horses— cannot function without glucose. It also supplies energy to muscle cells. And glucose aids all the body cell functions.

Fructose is also an energy source but the brain does not use it. Fructose is metabolized by our liver.

Now it is time to meet something else that is involved not only with feeding bees but also with processing honey. Since its full name is long and complicated, hydroxymethylfurfural, it is referred to as **HMF**. This substance is not found in fresh vegetables (remember, they are from plants). However it is found naturally in very small quantities in cooked vegetables. HMF is formed from fructose. Cooking usually means applying heat and it is heat that causes fructose to decompose, producing HMF.

Is HMF a problem? Yes! It is toxic to honey bees. And it is not good for people either. But there is such a very small amount in cooked vegetables that it is of no concern.

Here are the sugars, separately or combined, available to us for feeding our bees: Invert Sugar that is a commercially available combination of glucose and fructose, high fructose corn syrup (HFCS) and sucrose (white granulated sugar). Let us look at each of these individually.

Invert Sugar, used commercially by bakeries, is made from sucrose by one of two different processes. One is called acid hydrolysis and in this process HMF is produced because this process involves heat. If the enzymatic process is used no heat is used therefore no HMF is formed. This process is not used in Europe. Beekeepers may buy Invert Sugar for feeding bees but the commercial process may not be known. Therefore the HMF content is unknown.

Beekeepers do make Invert Sugar but it is called fondant, a smooth-textured solid that can be formed as a patty to be placed in the hive. Fondant is made by boiling a solution of sugar and water. Most of the recipes found for this call for the addition of an acid, vinegar or lemon juice or cream of tartar (acts a an acid). The acid prevents crystallization. However HMF is formed with the combination of acid and heat.

It is possible to make a safe, uncooked slab of sucrose for winter bee food. The minimal amount of water is ideal for winter supplementary or emergency feeding since the bees will not have to evaporate water. No cooking or acid—no HMF!

- 10 pounds of white granulated sugar
- 8 fluid ounces (1 measuring cup) water,

Mix well.

- Shape into slabs on waxed paper or plastic wrap.
- Allow to harden overnight.
- Remove plastic wrap to place in hive

Another popular food for bees is High Fructose Corn Syrup, HFCS, a cheaper sweetener than sugar in the U.S. HFCS is indeed made from corn. Cornstarch is hydrolyzed to glucose. Then the glucose is enzymatically changed to fructose. Now the mixture is 90% fructose and 10% glucose. That mixture is then diluted with glucose to give 55% fructose, 42% glucose. The rest is water. Although there are other proportions the one beekeepers use is HFCS 55.


Sugar Beet

As manufactured, ready to leave the processing plant, HFCS 55 does not contain any HMF. However, at temperatures above 113°F fructose will decompose. HMF will be formed. The higher the heat, the more HMF. The longer time exposed to heat, the more HMF. The syrup leaves the processing plant in tanker-truckloads. On a hot summer day the syrup in the metal tank can easily be heated up and decomposition will take place, yielding HMF. If the customer stores HFCS in drums to sell, does anyone know whether the drums are sitting in the hot sun or in a shed? A beekeeper may have no idea of the history of the HFCS after it leaves the processing plant. Analysis is not economical. Therefore it is the beekeeper's decision whether to use HFCS or not.

What about honey, the natural food for bees? Honey is a plant product. The bee only adds sucrase and evaporates water. So honey does contain glucose and fructose and a few percent of sucrose. Since honey does contain fructose can it contain HMF? Honey can after storage for a very long time. If exposed to heat it can contain HMF but usually a very small amount. However, if scorched, indicating excessive heat, it would not be a suitable food for bees.

Do not store honey in a warm place for a long period of time. For daily use at home, store honey at room temperature. For long-term storage, store honey in a freezer. Crystallization will be significantly delayed. Remember, the ideal temperature for crystallization is 57°F so a cool cellar can hasten crystallization.

With all the choices—what should I feed when my bees need food?

Sucrose is safe. It contains only one substance—sucrose. It is incredibly clean and pure. Kept dry it will last for years and years and...umpteen years. Sucrose is completely digested by bees, leaving no residue in the gut. Therefore it makes excellent winter food for bees.

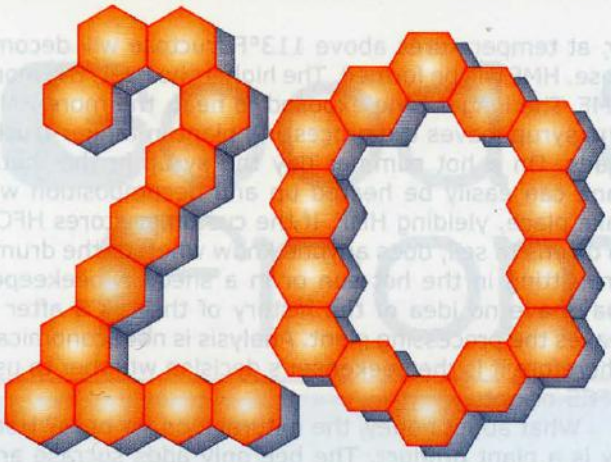
What about cane sugar or beet sugar? Basically there is no difference. Both are 99.95% sucrose. The differences are in the 0.05%. There are slight differences in the processing of cane and beet sugars. The compounds in the 0.05% are ordinary ones, found in many foods and water and completely harmless to us and to the bees. Virtually all beet sugar is GMO, while virtually all cane sugar isn't.

What about honey? New research has found that bees do need the variety found in the various plants bees visit. They will obtain some vitamins, some minerals and other nutrients. The quantities in honey may seem small to us but the bee is small, very small. On a diet of only honey, humans would have to eat 40 pounds of honey a day to have sufficient nutrition.

Research today is being done on the structure of the honey stomach and on the beneficial gut bacteria of the bee's digestive system. Keep up with new findings to improve the diet of your honey bees.

Weather is unpredictable. Plants depend on the weather. Bees depend on plants. If your bees need to be fed, keep the centuries-old beekeeping tradition—feed your bees when they need to be fed.

~Ann Harman



Awesome Facts About Honey Bees

~Gail Damerow

Honey bees make up less than one percent of all bee species, but are the best known and most widely studied bee, thanks to their significant contributions to agriculture, science, and the economy. Here are 20 more fascinating facts about honey bees:

1. The Western honey bee (*Apis mellifera*) is found on all continents except Antarctica.*

2. Honey bees are not native to North America, but were brought here in the 1600s by European colonists.**

3. Within the single species of honey bee found in North America, individuals are highly variable in color, even within the same colony. **

4. Industrious honey bees produce five products that are beneficial to both bees and humans: thick and syrupy honey, bees wax, protein-rich royal jelly, a mixture of wax and resins called propolis, and venom called apitoxin.*

5. The duties of a worker bee include cleaning brood cells, feeding larvae, feeding drones, feeding the queen, producing wax, building brood cells and honeycomb, sealing full honeycombs, attending the queen, storing pollen, removing dead larvae and workers, fanning the hive to maintain a constant temperature, carrying water, foraging for pollen and nectar, and defending the colony.**

6. A worker bee's job description changes as she ages and matures: she sequentially takes on various tasks within the hive until, for approximately the last half of her life, she becomes an active forager.**

7. Hard working honey bees have short life spans: foraging workers live only about one month; drones live for 3 months, or until they mate; the hive queen can live for several years.*

8. Unlike other bees, which are active based on the season, honey bees are active primarily on the basis of temperature, becoming most active between the temperatures of 60°F and 105°F.*

9. Because of their ability to forage under a wide range of temperatures, in contrast to native bees, honey bees are active somewhere in North America during every month of the year.*

10. Honey bees communicate information about the distance, direction, and quality of a food source by dancing, during which they transmit information by means of vibrations, sounds, movement, and scents.*

11. Honey bees head butt: If a dancing bee communicates a source of food where another bee has spotted danger, the other bee may head-butt the dancer to top the dance as a signal to other workers to stay away from the location.*

12. During three mating flights, a queen is typically mated by, and stores semen from, about a dozen different drones, although a single female may be mated by as many as 29 genetically distinct drones.*

13. A queen stores semen in her body for 2 to 7 years and chooses whether to lay an unfertilized egg (which will develop into a male bee) or fertilize the egg (which will develop into a worker or a new queen).**

14. A queen bee can lay up to 2,000 eggs a day, more than her own body weight. **

15. The reason honeycomb is designed in hexagonal cells is because six-sided walls allow bees to produce the greatest number of cells with the least amount of wax.**

16. Unlike many similar-looking native North American bees, honey bees may be seen dangling their legs as they fly from flower to flower.**

17. The honey bee genome has been sequenced and is about one-tenth the size of the human genome.*

18. Honey bees have been trained to detect explosives through their highly refined sense of smell, which otherwise is used to find food sources; when a trained bee detects the odor of an explosive it sticks out its tongue.*

19. Honey bees are the only bees with barbed stings and therefore the only bees that sting only once and then die after stinging; the sting's harpoon-like barbs catch in the victim's skin and, as the bee pulls away, she suffers a mortal wound when the sting organs are ripped out of her abdomen.**

20. Beekeepers shouldn't eat bananas: A stinging honey bee releases an alarm pheromone to attract other bees to assist in the attack, and this pheromone smells remarkably like bananas.*

These facts were gleaned from the following two books, each of which contains many more fascinating facts about honey bees and other species:

* The Bee, A Natural History by Noah Wilson Rich <http://press.princeton.edu/titles/10336.html>

**The Bees In Your Backyard, A Guide to North America's Bees by Joseph S. Wilson & Olivia Messinger Carril <http://press.princeton.edu/titles/10593.html>

THE BEEKEEPER

~JIM THOMPSON

Over the years a beekeeper develops a style of working their bees and it is hard to explain just how one should work the bees. When you talk to other beekeepers, they usually say that their systems are different and better. So you are really confused, but if you stop and analyze the different systems, you will find many similarities. I am going to try to explain my method and let you to develop your own system.

First pick your time and weather condition. I have seen beekeepers try to work bees at night because they had gotten off work at 11 o'clock in the evening and had the time to work their bees. The "beekeeper" soon found that bees don't fly well at night and crawl like crazy and sting abundantly. While a flashlight may be used, it is like using a beacon guiding the bees to the beekeeper. Thus the beekeeper found out that he had to really suit up to work bees. In an attempt to calm the bees, he purchased the biggest bee smoker that was available so there would be plenty of smoke. He had heard that smoke calms the bees. Most of the books don't tell you about using too much smoke.

Learn to use your smoker at the right time, using the right amount of smoke

Don't work the bees when it is raining or threatening rain. All of the bees are trying to return to the hive or are in the hive, including the meanest field bees. Maybe they don't appreciate getting wet when they thought that they were safe from the rain. It isn't much fun for a beekeeper to be walking around when his clothes are all wet and clinging, and his smoker has a tendency to go out. Pick a time to work the bees when you see bees flying out of the hive.

If you see a hive that has tipped over, especially in the winter, make sure that you suit up before you decide to set the hive upright. It is similar to the rain situation. There isn't any flight of the bees, but when you start to move the hive, the bees will come out and say hello. Sometimes the hive is really large and heavy and must be set up in manageable sections. The bees may be confused as you break their cluster, so make sure that you put it back together as it was before it tipped over so the cluster will be put back together. Bees try to keep the temperature of the cluster area around 95°F and when it drops, they get irritated. Thus in the winter time you do not have much time to have the hive open. Bees can withstand the cold better than dealing with the moisture.

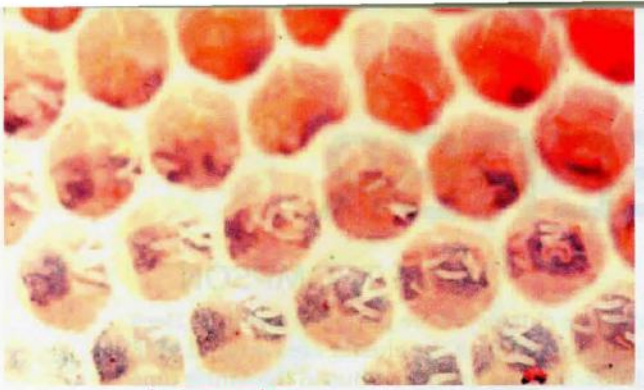
Look for the 'C' shaped larvae in the bottom of the cells

You will find that if you work bees when the weather is warm and the bees are flying, is the most pleasurable time. There might be an occasion when you may find the bees irritable, such as if the hive is queen less, if it has been pestered by skunks, if the hive is dead and being robbed or inhabited by yellow jackets, if there isn't any honey flow, or just temperamental due to their heritage.

Have a special purpose for going into the hive. A new beekeeper likes to see the queen and the other bees doing their duties, but every time you open the hive you disrupt the activities of the hive and it takes the bees several hours to recover. You do not have to see the queen every time that you look in the hive. All you have to do is see evidence that the queen is present. Thus you soon learn that when the queen lays an egg in the cell, that egg will be centered in the bottom of the cell. On the second day, the egg starts to lean over. On days three to six, the egg starts growing into a larva and is circular shaped in the bottom of the cell. On day six the ends of the larva almost touch. If you see the eggs and larva in these early stages, you know that there is or has been a queen somewhere in the hive in the last six days. If you accidentally kill the queen, six day old larva is the oldest larva that can be used in order for the bees to produce a suitable queen.

Seeing the queen is exciting, but not necessary

If you do not see eggs or larva, you should order a new queen immediately or transfer a frame of eggs into the hive. Sometimes if a hive becomes queen less, you may see cells with multiple eggs in the cell and most of these eggs are scattered around in the cell. The reason that the eggs are scattered is due to the shorter abdomen of the worker as compared to the queen's



laying workers

abdomen. You must make a decision on whether you combine this hive with a strong hive or let the hive dwindle and die. A problem of a hive that you are letting die is that wax moths, other insects, or mice may find the hive attractive and destroy the comb.

While you are looking in the hive, you should notice if the frames that contain the bees are centered in the hive or off to one side. Sometimes a mouse will take up residence in the combs on one side and the bees avoid using those combs. So you should clean out the mouse nest, replace those combs and slide the combs where the bees are to the center and have the replacement combs on either side of the cluster. If you were overanxious in putting supers on top of the hive, you may notice that the bees used the center frames and avoided the outside frames. As long as you have the same size supers with frames you may want to move the frames with brood down in the hive and put honey frames on the outside and over the brood area. If you can get a band or layer of honey over the brood area, that will act as a queen excluder.

Most of the bee books mention that you must put the frames back in the hive in the same order as they were. I disagree with this, as there are times where the bees will have drawn out one side of a frame and not touched the other. So I turn that frame around. There will be times then the bees seem to be content to live on six or seven frames and leave the outside frames alone. Before adding another super, I try to encourage the bees to work the outside frames by moving them into the space where the bees are living. Never move the frames into the absolute center of the cluster, but to its periphery, one frame on each side. Sometimes bees will make a real mess out of a frame by building brace comb, drone cells, or by chewing big holes. Those damaged frames should be either replaced with good comb, or moved to the outside frame position next to the wall of the hive. A frame with brood or honey that is moved to the outside will permit the bees to emerge without the queen laying new eggs in it. When those frames are empty, they can be replaced with good comb. This process may take a year to complete but may be done easiest during the time of spring reversal.

Brood frame

It may take you some time to develop the speed of motion that bees tend to accept. A beginning beekeeper likes to get things done quickly and so they move rapidly and get the bees excited. The bees pick up on this rapid movement and begin to attack.

The bees also notice things such as if you just petted a dog or cat and now have the odor of a pet. Some people may wear too much cologne or aftershave that may be objectionable to the bees. When I was an inspector, I was advised to wear light colored clothing. However, I have known beekeepers that have worn black and red clothes and have gotten along just fine. So I believe it might be the odor of some dyes in the clothes. Don't eat bananas and then go out and work your bees as the alarm pheromone is very similar to the smell of bananas.

When you have the hive open, you should be looking for a solid brood pattern. A spotty brood pattern is an indication of disease; however a healthy hive sometimes has a spotty brood pattern. If you come across a hive that has a spotty brood pattern and you don't know what is happening within the hive, close it and call another knowledgeable beekeeper to help you diagnose the problem. The worst thing that you can do is continuing working that hive and go on to the other hives and possibly spread disease. Sometimes when the nectar source is limited, the brood pattern can be spotty. Brand new plastic foundation may emit an odor that causes the bees to have a spotty brood pattern during the first year of its use. If you wired the foundation, the bees sometimes do not like the cells above the cross wires. An improperly bred queen may have a large number of bees that will not develop. You might have a hive that has chilled brood from an earlier opening of the hive in cold weather or there were not enough bees in the hive to keep the brood warm.

You should learn how to light the smoker and be able to keep it lit. The best luck that I have had is to light the smoker from scratch each time the smoker is lit. That insures that the fire will be below the fuel. Use a fuel that has pleasant smell; remember you will also be breathing it. Use just enough smoke to turn the bees around and let them know you are in the area. Too much smoke causes the bees to uncap the honey cells and may drive them out of the hive. Once they are in the air, the unhappy bees can find you and their wings will just drive the smoke away from them.

You should try to keep your visit to the hive to a 10 minute limit so the bees don't cool down. It should become a matter of habit and you react to a situation without thinking. If you make a mistake and move something around, it can be corrected at another time. However the only mistake that can't be corrected is if you kill the queen.

Somewhere I have been told that a beekeeper should go into the hive about eight times per year. This may vary a little, but I feel that it is a good policy. There are books and calendars that tell you the beekeeping activity that you should be doing. They have merit, but you have to figure out where the author of the calendar lives because there is a difference in blooming cycles throughout the country. The plants that bloom in Florida are four to six weeks ahead of the same plants in Ohio. So if you can find a calendar that tells when certain plants bloom in your area, that gives you better idea of the time to do certain tasks.

The following management scheme is for Northern Ohio:

January – On a warm still day in early January, you should check to see if an established hive is still alive and how much food it has. This is done by lifting the top cover and seeing where the bees are and if they are making any movements. If you can hear them and they are down in the super, they have plenty of food for now and are alive. If they are at the hole of the inner cover, they are out of food and need food immediately. The food given should be in solid or granular type form as the liquid forms may freeze. Place the food (usually sugar) around the inner cover hole, and replace the hive cover.

February – It may still be cold in February, so again you should check the food stores and if the bees are still alive as you did in January. If the bees are dead, you may order bees for a delivery in the third week of April. It may be a good time to repair or assemble equipment in your shop. I like to have three honey supers for each hive.

March – The weather should be getting warmer, there are some plants blooming, and the bees are flying. Check the bees to see where they are located within the hive. If they are in the top super you should reverse the supers and medicate for mites. Some people use Illinois depth equipment may have to move the top two supers to the bottom board and only the original bottom super is moved to the top. You do this so that the cluster is not broken. If the super that is being moved has bad comb, questionable frames or other problems, this is the time to clean it up or replace the bad frames. Since the weather is still questionable, the bees should be given food if they are short on stores. A thin mixture of sugar water will stimulate brood rearing. Pussy willows and maples are in bloom and provide pollen for brood rearing.

April – Now things are starting to get hectic because the weather is getting nicer, the bees are building up and most beekeepers haven't looked at their bees before now. Everything that should have been done needs to be addressed. Normally the medication that was put on the hives last month should be close to the 40 day period. and should be removed. The supers should have been reversed and are full of bees, and may be ready for the honey supers. The rule is that honey supers do not go on while you are medicating the hive. If you see little white specks of wax around on the frames, the bees are telling you that they need honey supers. Usually that occurs about the time that dandelions bloom. The best time to install a package of bees in our area is the third week. There are several methods in installing packages, but I like the cold weather method. When you install a package of bees, it will mean that you make several visits to the hive to assure that the queen is released; the queen has been accepted and is laying. Frames should be moved near the cluster for egg laying and filling out. Continue to feed until they have filled up at least one brood super. Now is also a good time to get a Nuc, if you want one.

May – This is another hectic month because this is the month when the majority of swarms issue from a hive. One year, I had 31 swarm calls on Memorial Day. Thus you should have some bee equipment ready to receive swarms and the telephone numbers of other beekeepers that would like swarms. If you got a Nuc last month, it may be time to transfer it into a full sized hive. Don't forget to feed any of the swarms that you have caught and make sure that the queen has room to lay eggs. Check the full sized hives to make sure that they have enough room for the queen to lay eggs and room for honey, but before you put on the honey supers, look to see if the bees have any swarm cells.

June – This is a confusing month as the swarm cells at the beginning of the month are welcome and the ones toward the end of the month are questionable. Later swarms won't have time to develop a hive that will over Winter. Usually the flowers produce surplus nectar this month and some beekeepers advocate removing the honey supers for harvesting. I usually move my supers above the lesser filled honey supers for further curing of the honey by the bees.

July – In our area July normally is a so-so month. Most of that is due to the heat and no rain which is not good on the honey production. If you plan to enter any hive products at the fairs, give yourself plenty of time to remove and process the items.

August – It has been about four months since the mite medication has been used and at the end of the month the goldenrod and asters bloom. You figure that the goldenrod and aster nectar will be enough for the bees to live on over the winter, but in recent years they haven't produced very well. When you remove the honey supers, you should check the queen and bees for strength and quality. You may have to equalize the hives or consider combining the weak hives. It usually does not pay to feed a weak hive because if you are able to have it over Winter, it will be a weak hive in the Spring. The timing of the medication varies as you must figure 40 days back from the final day that you plan on going into the hive this year. You are trying to get two cycles of "clean" bees going into Winter and no medication on the bees.

September –You may finish harvesting the honey, medicating the bees, although it is a little late, and removing any empty supers that are on top of the hive. You may notice that I did not mention the queen excluders and that is because I do not use them. However if you do use queen excluders, they are to be removed for the Winter. The various dates are used because you may chose a later date for you final working date.

October – Decide on the final day that you plan to inspect or go into the hive this year. Pull out the mite strips, check that the queen is in the bottom super and that there is honey above the brood and out to the sides of the bees. Bees tend to survive the Winter if: there is plenty of food (honey), plenty of bees to keep themselves and the other bees warm, a prolific queen (usually young), & freedom from disease and mites (which also includes beetles). I did not mention wrapping as many people wrap hives without ventilation and kill their bees.

November & **December** – Some time to plan what you will do next year and get equipment in shape.

~Jim Thompson

LOOKING BACK... AH, GOOD TIMES!

My first hive was a Langstroth hive. At age 14 (and a proud 4H beekeeper) I thought I was the only person in my county with such a fine hive, that is, until I took it home and suddenly discovered there were five neighbors within a mile that were also in the beekeeping business. It is amazing how you don't notice white bee hives along fence lines until you get your own bees.

Of course, as a kid I didn't realize that one hive would grow into two and two into four and next thing I knew I had 60 colonies as I finished high school. My parents really put up with a lot of my beekeeping growing experience. This was in State College, Pennsylvania. We lived seven miles out of town at the base of Bald Eagle Mountain. I produced about a ton and a half of honey, packaged it in one-half, 1 and 2 pound jars and 12 ounce bears and marketed my crop in seven small country stores in the local area under the brand name of Sunshine Honey. For a young kid, I did pretty well.

In college I took several beekeeping courses and worked with Professor E.J. Anderson in Penn State's beekeeping program. He was mentioned in ABC and XYZ (the bible of beekeeping) as the person who discovered the need for a ventilation hole placed in the top wintering super in cold climates. His recommendation and that of the Pennsylvania State Apiarist W.W "Bill" Clarke lead to my being a State Bee Inspector at age 19 when I looked to be about 12 years of age. I'm 76 now.

Back in the late 1950's, old time beekeepers didn't like inspectors looking at their bees because American Foulbrood was so prevalent and we burned hives when we found it. As a young person who shaved only once a week (did I tell you I was 19 years old), the old timers had little faith in my "book learning" about beekeeping. They asked where I learned about bees and if I had ever kept bees or even had some. I'd answer, "yea, in school and I have a few hives". I always got a reply like "how many you got, kid?" When I said sixty, they would settle down a little bit.

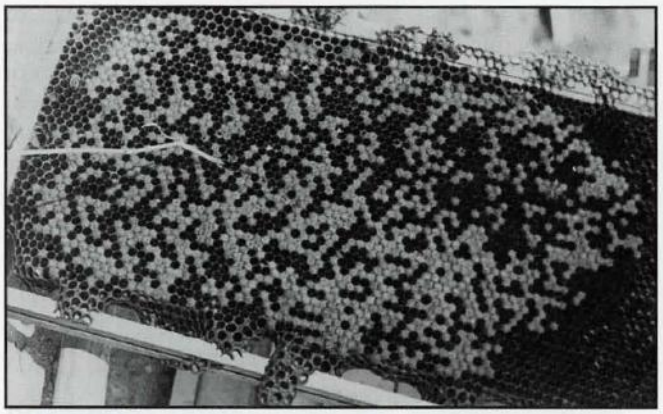
Looking young did not help me. We always encouraged the beekeeper to join us in our inspections so they could see what we saw. This was important in the event there was Foulbrood in the box. Their love for inspectors was often demonstrated when they would "help me" open the hive. Sometimes they would run right up to their hive and kick it. Did I mention inspectors burned hives with American Foulbrood?

Of course the bees were not happy and would come rushing out to see what all the commotion was all about. The bees would fly out about ten to fifteen feet from the hive and start circling to protect the boundary of their hive. The beekeeper after kicking the hive would back off about ten to fifteen feet to watch the fun. About this time, I'm standing directly over the hive but the beekeeper was getting bumped into by the bees searching for the reason for the big bangs on the side of their hive. They would bump into the beekeeper.

The next thing I knew, he would be swinging at bees and running to the house. I'd wait about twenty seconds and then open the hive comfortably.

Then there was the time the county map I was using to find the beekeepers showed a beekeeper just down a dirt road a mile but I had to cross a ford. A ford was not an automobile; in this case it meant a small river or stream that a person could easily cross with a depth of usually four to six inches of water. On paper it looked really good. Unfortunately, about half way across the sixty foot wide stream the water came rushing over the hood of the car. And of course, in a split second (because that is I all I had), I asked that famous (Dirty Harry) movie quote, "What do you do, (punk)?" I floored it and got up the bank on the other side only to discover about a hundred feet up the road (trail) and around the curve

A frame loaded with American Foul Brood



... The fate of the colony with American Foul Brood

was blocked with downed trees. I had to back my way back across the ford. What fun.

Then there was the time I went to inspect bees where the beekeeper had died a few years earlier. I could tell his bees had not been tended to because I had to hack my way through the black berry briar patch to get to the hives (one had a sapling growing through it) just to get the covers off. There was foulbrood throughout and several other inspectors helped for three days as we dug holes and burned 22 diseased colonies because the family forgot all about the bees when grandpa died.

It was fun to be an inspector. I learned as much or more about people of all ages and the way they kept their bees. It certainly saved me time in learning tricks and techniques that saves me time, keeps the bees happy and doing their jobs and makes for effective management producing quality results.

Times have changed, we all have gotten older and hopefully smarter, but we enjoy our bees whether we raise them for honey, pollination, raising bees or queens, wax, pollen collection, propolis scrapings or just watching and listening to the sound of mother nature doing her thing. Listen to the buzz. Enjoy.

~Roland O. Reed *was a Pennsylvania State Bee Inspector from 1959 to 1962, has been keeping bees for over fifty years, and is the inventor of the Modern Top Bar Hive which can be seen on the web site: Moderntopbarhive.com*

which is the farthest south west point of the island, and we stayed in the most southern point of the most southern point. Indeed, there were palm trees scattered here and there. We had to take a 4 plus hour train ride from London to get there so got to see much of the landscape in that part of the country. But those hedges! Along almost every road, and almost every mile of train track. You'd get a short glimpse of a field with something blooming but then whoosh...hidden again by the hedge. But I got to see enough to get a feel for the dairy, sheep and grain crops growing there.

Those hedges, however, serve several purposes. They keep cars on the road...I don't think you could drive a car through one, though maybe a large truck could barge through. But they are, or many of them are blooming plants enjoyed by bees, and thus beekeepers. When in Ireland last year I found than many of them were hawthorns. Good for bees, but no people would ever make it through one. Those I saw this time were a mix of plants, but many of them were bloomers, and protected by the beekeepers.

Another sight, along those roads that weren't hedged, were the plants simply growing by the side of the road. I was told that they used to keep the roadsides well mowed and trimmed, but budget cutbacks made them stop and these weeds took over. We should be so lucky. Butterfly bush, Buddelias, simply thrives in the climate there, and they were everywhere, larger than I've ever seen them. Eight, ten some almost 12 feet tall and almost as wide were growing everywhere. In yards, gardens, wild by the side of the road, in fields. They were in full bloom at the time and there were a rainbow of colors showing. What a treat.

And in some places, where there was lots of sun (not an easy place to find considering all the hedges blocking the light and making roads and roadsides shady most of the time) you would see willow herb growing. There would be a large patch, maybe six feet wide and 20 to 30 feet long about every 50 yards or so, or until the shade took over. You and I don't call this weed willow herb however. Every beekeeper in the US calls it Fire Weed, and it makes almost perfectly clear, water white honey that's to die for when it's pure.

Here and there would be a small canola field... oil seed rape as it's called there...and lots and lots of dairy pasture with clovers and thymes and all manner of blooms in full force. One of which was the yellow loosestrife plant, which was common, and legal.

So this is our first Autumn issue. We're learning the difference between a monthly magazine's demands and a quarterly magazine's demands. A monthly (our sister magazine *Bee Culture*) is definitely easier from the perspective of the window of time you need to cover, but more difficult from the perspective of the detail you have to include. It's an interesting, and challenging opportunity, and we feel it's made both magazines better because of the differences. It's certainly made me pay a different kind of attention to what we seek to include here each issue.

But I have a couple of questions for you. First off, would you be interested in receiving ***BEEKeeping*** on a **subscription basis**? We are going to explore that possibility starting next season, and would like some feed back from those who like reading us each time. If you would, let me know your thoughts by sending an email to Kim@BeeCulture.com, with *BEEKeeping* in the subject line. And the second question is does *BEEKeeping* meet the needs of someone – you – in their first, second or third year into this very interesting craft. What are we doing right, and wrong from your perspective. I'd like to know. So thanks for any insight on either or both of these querys. Until next time then, keep your smoker lit, your hive tool handy and your veil tied tight. And always, always, enjoy the bees.

Kim Flottum