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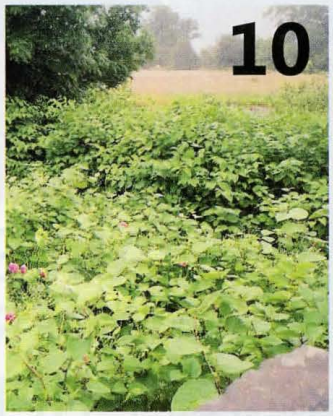

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Your First Three Years

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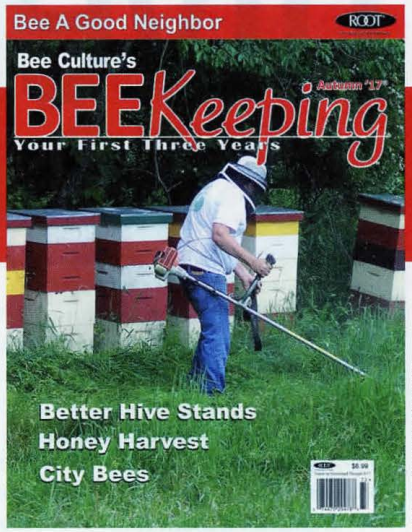
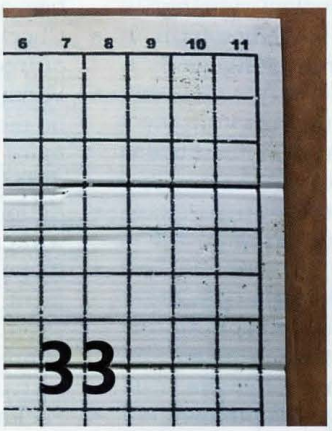
Your beeyard at home or away, needs attention all summer long. Keep weeds down, the ground clear, and over hang branches removed. You, and your bees will be glad you did.



(photo by Kim Flottum)

Features

Regular



hive First Year TASKS

~Ann Harman

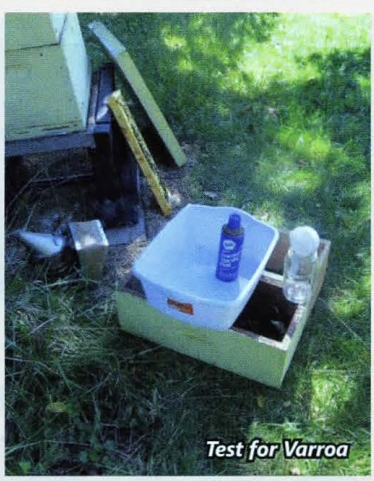
- The bees' New Year begins August first.
- Be a Plant Watcher and a Weather Watcher.
- Keep hive inspections to a minimum to prevent robbing.
- If bees were installed on foundation monitor drawing good comb.
- In the hot weather of mid-summer a colony can use 1 to 2 gallons of water a day to regulate hive temperature as well as provide a drink for the bees.
- Maintain good ventilation.
- If the original queen is not doing well, plan on requeening at end of August or the very beginning of September, depending on your climate.
- If a colony is weak examine for disease or other conditions.
- If colony is weak because of poor queen, plan on combining or requeening.
- Never combine weak colonies. Combine weak with strong and eliminate weak queen.
- Watch the weather. If drought or dearth of blooms then feed 1:1 syrup if needed.
- Robbing can be a problem during dearth of nectar. Put syrup on all colonies, not just on one, Feed inside the hive.
- For winter stores, feed 2:1 sugar syrup in September.
- Check the beeyard after heavy thunderstorms with high winds.
- Give the bees easy flight—keep grass and weeds trimmed in beeyard.
- Check yourself for ticks acquired in beeyard.
- Varroa population needs to be monitored and controlled if more than 3 mites per hundred bees are found.
- Action taken in July helps winter survival.
- If choosing a chemical treatment, read the miticide labels carefully and monitor daytime temperatures. Follow label instructions.
- Packages and nucs started in spring should be in completed hives with all comb drawn by the end of July.
- If small hive beetle is present use traps or other means for control.
- Check underside of pollen patties for small hive beetles.

Asters begin blooming about now until frost

Check for beetles

Goldenrod is another fall favorite

Check your hives after storms



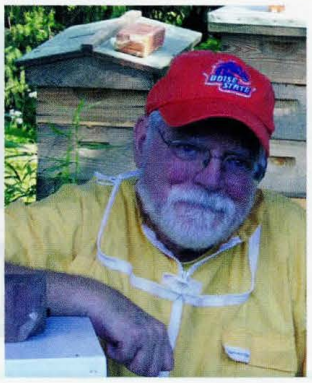
Test for Varroa

DON'T FORGET
Your Next Club Meeting

Ann Harman keeps bees and does her bee tasks in Flint Hill, Virginia

THE EDITOR'S HIVE

~Kim Flottum



By now your package should be on its way, with some comb drawn out, eggs, open and maybe even sealed brood apparent in some of the frames. For a brand new package, everything they collect they immediately turn into food for the young or wax for storage and nursery space. They are absolutely living hand to mouth this summer. Five days of rain could actually mean starvation to a colony that's really on the edge right now with lots of brood to feed, so your tasks are well defined. Don't let that happen.

One thing to recall with a package is that you start with, say 10,000 bees, minus a few, the day you install them. That day a bunch die of old age, chilled, or injured in the melee of dumping. The next day, more do the same. And the next and the next and the next. Although package producers try and shake bees from the center of the nest so they are the youngest, they get a mix and the old and injured begin to die, right after they get weighed in the field.

Your queen waits a respectable week to 10 days before she begins to lay eggs, and if all goes well, she is laying several hundred a day after a week, and pushing a thousand a day after a month. But, and this is important, that first egg isn't an adult for 3 weeks, or a forager for four weeks. It's a full month before new foragers take over, and in that month more than half of your original package expires. So it's fewer and fewer bees taking care of more and more brood. I hope you can sense the urgency in the colony, and I hope you can see your task here relative to making sure this colony has all the food it needs and then some.

This scenario also occurs when you get a nuc for a starter colony, but it's not quite panic city because, or at least maybe, your nuc supplier included a healthy laying queen, enough workers to take care of the brood in the nuc and do some foraging, several drawn combs for food and brood, and enough food to cover a few off days of rain. But again, your chores are well defined. Don't let them starve in the midst of plenty.

There is probably lots of available food for them to harvest. Early sources like dandelions are already gone, but you still have lindens, clovers and goldenrod are beginning to bloom now and supplying lots of food. But again, everything they harvest turns into wax or brood food so they just don't have a huge surplus to draw from should the weather turn sour.

So. Feeding is the task to most focus on right now. Making sure there is always, always food available for those rainy days. I typically recommend this...

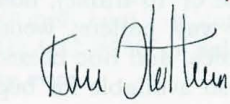
Keep feeding 1:1 (one part sugar, one part water, with a teaspoon/gallon Honey Bee Healthy or similar feeding stimulant) until the third batch has fermented. If in doubt, taste it...if it's a tad sour you, and your bees won't like it. Third. Not second or first. Third. At the same time, don't forget protein. If it's raining, they'll get neither nectar or pollen and they need both. So if you don't have natural, trapped pollen to feed, give them a protein supplement patty. You have to watch these carefully however, depending on where you are located and how much pressure small hive beetle plays here. Female beetles like laying eggs in the patty and the larvae simply love eating them when they hatch, so if you neglect to watch, you can raise a whole slew of these obnoxious pests. If you find a patty...I'd recommend using a half patty at a time...with larvae in it remove and discard, or better feed to your chickens, who will thank you for the treat.

Your colony's first year is playing catch up and getting ready, and a honey surplus usually isn't in the game. Yes, they may make enough honey to fill a box, but recall they will need that honey for overwintering. Don't be surprised if you are still feeding in the middle of July. One easy way to justify this is the cost of that package. If you neglect to feed and they starve this coming winter, how much to replace that colony? That much? Sugar is cheap in comparison.

At the same time, don't underestimate how much room they will need to put all this stuff away. In most places, most years, most beekeepers will put a second deep super, if you are using deep supers on by the middle or end of July. Maybe sooner if all is going well. That super, too, needs all of the wax supplied by the food the bees are....bringing in, or are getting fed. Either way, it's another box or wax that has to come from somewhere. So now you have a stack of boxes...what, four high? Three anyway. And that stack is getting heavier every day. How stable is your hive stand? How level? How solid is the ground? If you have stands like I do, large enough to hold three colonies, but only holding two, you can have four or five hundred pounds of wood, wax, bees and honey on that stand. Is it strong enough, level enough, protected enough?

Finding a hive stand tipped over some Saturday morning means a really bad day ahead, for you, the bees, maybe your family and neighbors. So before your colonies get so heavy they start straining your stand...double check to make sure.

There's lots of excellent information in this issue, but don't hesitate to contact us if there's something you'd like to see, or have questions on an article. We're here to help. Drop me an email at Kim@Beeculture.com (my other job) and I'll get back to you asap. In the meantime, have fun with those bees...there's nothing on earth that's as much fun or as fascinating as that box full of bugs.



Smartweeds AND KNOTWEEDS as bee plants

~ Connie Krochmal

MEMBERS OF THE BUCKWHEAT FAMILY CAN BE ANNUAL, PERENNIAL OR SHRUBBY

The various smartweeds and knotweeds are found throughout the world. The plants are sometimes known as heart's ease. Worldwide, there are over 200 species.

About 39 species are found in the U.S. with around half of those occurring in the Great Plains. They're major bee plants in the West, Southwest, Plains, and the Southeast. One main difference between the smartweeds and knotweeds is the location of the flowers. On the latter, they arise in the leaf axils while those of the former appear in terminal clusters.

Certain species are better honey plants than others. The honey can vary considerably, according to the location, weather, soil, and plant species.

General Description

Members of the buckwheat family, these can be annual, perennial, or shrubby. They usually grow from a tap root. Certain species are adapted to aquatic situations. Some of the introduced ones have naturalized and become quite invasive.

The various species vary greatly in growth habit, appearance, and size. Some are quite tall – over 10 feet. These can be erect, climbing, scrambling, or trailing.

The Latin genus name refers to the swollen nodes on the jointed, slightly angled stems. Knotweed is named for the sheath that encircles the nodes on the stems. The plants are called smartweed because they have a sharp, peppery flavor and their plant juice makes one's eyes run.

The leaves are at least an inch in length although in a few cases they're much larger. The shape varies widely from linear to lanceolate or elliptic.

The blossoms typically open from July or so to October, depending on the species. The small, showy, bracted blooms are brightly colored. They open on jointed short pedicels in clusters, spikes, or racemes. The colorful part of the blossom is the perianth, which is often pink or red. The white calyx can have a pink, white, or yellow border.

Habitats

For the most part, these are generally found in bottomlands, low woods, moist spots, and fields. They're also suited to ditches, meadows, coastal areas, dunes, swamps, marshes, clearings, low ground, railroad yards, waste places, thickets, prairies, and disturbed sites. Some are suited to wet spots, while others prefer dry, rocky, or gravelly soils.

Recommended Smartweeds and Knotweed Species for Bees

Of the many species of smartweeds and knotweeds that are found in America, the following are known to be good bee plants.

Bolander's knotweed
(Polygonum bolanderi)

Native only to California, this species occurs in some areas of the state, including Mt. Hood. It can be found most frequently in Napa Valley, the northern Sierra Nevada and a number of other northern locations. It is most common in the lower foothills but can occur to slightly over 5000 feet elevation.

Its preferred habitats are rocky, open areas, especially stony outcroppings. The species favors sandy loams, but is suited to very poor soils. Bolander's knotweed is intolerant of salt.

Often low growing, this plant can sometimes be shrubby. The tangled, slender, tough, wiry stems can reach about 1½ feet in length. Bolander's knotweed features slender, alternate foliage.

The pink or white blossoms with deeply colored veins open from the upper leaf axils. These emerge from July to October. Although the plant is less common than some knotweeds, it is considered a reliable bee plant.

Bolander's knotweed typically produces a small honey crop even in poor years. There is generally an

Japanese knotwood.

Knotweed

average of 20 pounds per colony. The amber colored honey is mostly left on the hives for the bees.

Common Knotweed
(Polygonum lapathifolium)

This species features numerous common names, including smartweed and pale smartweed. Found in all of the lower 48 states in damp places and gardens, this annual was introduced from Europe.

Reaching six feet in height, this has dotted stems with yellow glands. The foliage features clear glands. Variable in shape, the alternate leaves can be eight inches in length.

The very variable plant is similar to lady's thumb except for the flower color. This one features flowers that vary from light rose or dull pink to whitish-green. Opening during late Summer and Fall, these appear on nodding spikes.

This species can produce a small honey surplus. One particular variety (Polygonum lapathifolium var. incarnatum) is known to be a source of honey in some regions.

Giant Knotweed
(Polygonum sachalinense)

This fast growing, robust, spreading perennial was introduced from Sachalin Island, which was once part of Japan. The plant has naturalized in some states, including Alaska, Washington, Montana, Oregon, California, Idaho, Louisiana, Minnesota, Wisconsin, Illinois, Michigan, Ohio, Kentucky, Tennessee, New England, and from Pennsylvania to North Carolina.

Giant knotweed is quite similar to common knotweed except this species is much taller and rather coarse looking. The angular stems are marked with lengthwise lines. The foliage grows to ten inches in length and is almost as wide. The leaves have a heart shaped base.

The greenish blossoms open from July through September, depending on location, in crowded short clusters from the leaf axils. Bees are particularly fond of the flowers although the plants generally aren't known for yielding large honey surpluses.

The tips and young shoots are eaten cooked and raw in Japan. This is sometimes made into a rhubarb-like, tart tasting sauce. The seeds or fruits are also eaten.

Japanese knotweed
Polygonum cuspidatum)

Japanese knotweed is also known as Japanese bamboo, Japanese fleeceflower, and bamboo. Introduced from Japan and China, this fast growing, invasive perennial has naturalized in some areas. It is found in all states except Hawaii, Texas, Arizona, New Mexico, Nevada, Wyoming, North Dakota, Alabama, and Florida.

Usually shrubby, Japanese knotweed is a vigorous plant that forms dense colonies. It spreads mostly by rhizomes, which can be over 40 feet in length. Sometimes, the offshoots spread as well. Several varieties of the plant can be found.

Reaching 10 feet in height, this plant features erect, stout, smooth, hollow, jointed, grayish, mottled stems that resemble bamboo. During the Spring, the young shoots can be cooked as a vegetable.

The Latin species name refers to the abruptly pointed foliage. Generally alternate, the leaves, which grow to six inches in length and feature scalloped edges, can vary in shape. Often they're heart shaped at the base.

This species is quite floriferous and is covered with small flowers, up to ½-inch in length. The whitish green blossoms, which lack petals, feature five sepals and a winged calyx. These open from May to October or so.

More numerous on the upper part of the plant, they open terminally in six-inch-long terminal clusters or in racemes from the leaf axils. Opening on separate plants, the female blossoms droop, while the males are erect.

Well liked by bees, the blossoms provide bee forage when little else is available. The amber honey has a pleasing flavor.

Lady's Thumb
(Polygonum persicaria)

This is sometimes called heart's ease, spotted knotweed, and spotted lady's thumb. Introduced from Europe, this has naturalized in all states except Hawaii, particularly in damp or disturbed sites. It commonly occurs in all regions. There are several varieties of this annual. The plant spreads by seed.

Smartweed.

Reaching three feet in height, this has forked or branched, erect, reddish stems that are swollen at the base. Sometimes, they're hairy, especially along the fringed sheaths.

Resembling those of peach trees, the sticky, slightly rough leaves are easily identified by a dark blotch, which was once described as resembling a lady's thumb print, in the center of the leaf. Up to six inches in length, the foliage can be oval or lanceolate. The tender, young leaves and stems are eaten raw or cooked.

Lady's thumb blooms from June through frost. The blossoms emerge on terminal flower panicles that contain a number of crowded flower spikes, up to two inches long, which are usually interrupted on the lower portion. The blossoms are only ¼ inch or so in length.

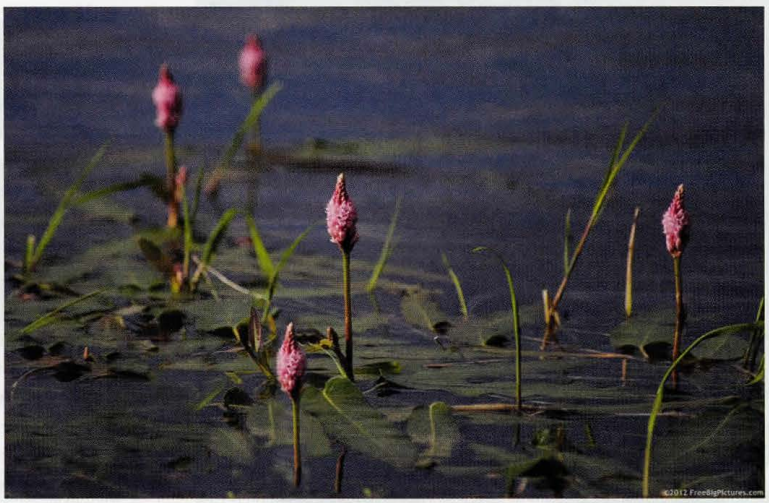
The flowers are typically pink but sometimes come in various other shades, including white, green, or purple. Lacking petals, these contain four to six colorful sepals. The calyx is generally pink but can also be purple, green, or white.

One of the best species for bees, this is a very good honey plant. It typically yields 100 to 200 pounds or more of honey per colony. Initially, the aroma can be slightly unpleasant, but it mellows with time.

Tending to granulate easily, this can be white, pink, or various shades of amber. In the comb, it is very white. The flavor is influenced by the weather and soil conditions. The honey quality can vary somewhat. Higher quality ones, which are usually labeled as heart's ease, have a mild, pleasing taste. The others, known as smartweed honey, are usually darker colored and stronger flavored.

Longroot smartweed
(Polygonum amphibium)

This variable perennial is found in many areas of the country. It occurs in both aquatic and terrestrial habitats. The terrestrial forms are typically found along shores, swamps, prairies, meadows, ditches, and harbors.



Water Smartweed.

Its stems can be hairy. This features long, slender, lanceolate leaves. The foliage can be rough on both surfaces and quite hairy. The pinkish blossoms open from June through September on terminal spikes.

One particular variety (Polygonum amphibium var. emersum) is called pinkweed, water smartweed, heart's ease, and tannin plant. It is known to be an excellent bee plant.

Pennsylvania smartweed
(Polygonum pensylvanicum)

Sometimes called pinkweed, this species is found in all states except Hawaii, Utah, Idaho, and Washington. It occurs most frequently in moist and wet soils.

Spreading by seed, this annual reaches five feet in height. The branched, erect or ascending, jointed, sticky, reddish stems, often hairy, are swollen at the nodes. Sheaths surround the lower part of the stems.

Either alternate or opposite, the thick, shiny leaves, six inches in length, can be hairy. They can vary in shape.

Opening from May through October, the abundant flowers, ¼ inch in length, open on crowded racemes or spikes, about 2½ inches long. The blossoms are usually pink or rose, but are sometimes white. Lacking petals, these feature showy sepals and a pink calyx. The female flowers can open on separate flower spikes. Pennsylvania smartweed produces lots of pollen.

Native Americans used Pennsylvania smartweed for medicinal purposes.

Silver fleece vine
(Polygonum aubertii)

Also called silver lace vine, this bee plant is closely related to the smartweeds and knotweeds. The fast growing, slightly woody, twining, deciduous plant has stems that can grow up to 20 feet annually. Hardy to zone 4, this Asian introduction has escaped from cultivation in some areas and is typically found along fences and walls.

The very tiny, pale green foliage is often heart-shaped. This very floriferous plant is covered with scented flowers that open in dense clusters for several weeks during late Summer. Bees favor the flowers, which are sources of nectar and pollen although the plants aren't known to yield honey.

Water Smartweed
(Polygonym punctatum)

Sometimes called dotted smartweed, this species is found in all of the lower 48 states except Nevada and Utah. It grows in swamps, low ground, wet places, moist meadows, and along shores.

An annual or perennial, this arises from tough rootstocks. It can be slightly over three feet in height. Water smartweed can assume a loosely spreading growth habit.

The firm, dark green, lance-oblong to broadly lanceolate foliage is over an inch wide and nearly 5½ inches long. The leaves are covered with dotted glands, which can be clear or colored.

Water smartweed blooms from July through October. The blossoms open on spikes that contain a number of panicles. The calyx, which is dotted with glands, is usually white with green but is occasionally rose.

This species is an especially good bee plant, particularly in the East. In California, it has been known to yield a lower quality honey that is darker in color.

A number of water smartweed varieties occur in some areas. Some are branched and grow to less than a foot in height. One particular variety (Polygonum punctatum var. punctatum) is an excellent honey plant. It is known as dotted smartweed.

MENTORING

~ David E. MacFawn — *Chief Information Officer, Global Apiology*
~ Larry Coble — *South Carolina Beekeepers' Association*
~ Jack Banker Elliott III, Founder — *Chairman of the Board, Global Apiology*

Mentoring new beekeepers is beneficial and improves the success of new beekeepers. However, mentoring can be time consuming for an association's personnel resources. Luckily, new beekeepers have a wide variety of knowledge resources to learn beekeeping. Knowledge can be obtained from not only association sponsored beekeeping classes, but books, YouTube videos, periodicals, and on-line discussion boards, as well as state and regional conferences. Other not so obvious resources include local bee club social gatherings, educational events, and community outreach efforts. With all of these opportunities, new beekeepers need to assess the source of information and obtain information from trusted resources. "Ask, and it will be given to you; seek, and you will find; knock, and it will be opened to you" Matthew 7:7.

Early Days

In the early days, an established beekeeper took on an apprentice to train. The apprentice worked side by side with the experienced beekeeper to learn the trade. The apprentice was taught how to assemble equipment, work a colony, diseases, and many other beekeeping topics.

The apprentice regularly visited the established beekeeper's bee yard and worked with the beekeeper for a couple years. The first year, the apprentice may have worked the beekeeper's bees with the apprentice watching, listening, fetching, and peering over the beekeeper's shoulder as he described what they were seeing and doing. The second year the beekeeper may have made a split to give to the apprentice. The split, kept in the beekeeper's yard, would be worked by the apprentice under the watchful eye of the seasoned beekeeper. Further direction was given as needed as the apprentice increased his knowledge base. The third year, the apprentice was on his own keeping his colony in his own bee yard with little supervision and consulting from the seasoned beekeeper.

With the apprentice traveling to the beekeeper's yard, the beekeeper's travel time was minimized allowing the beekeeper to mentor more apprentices. The onus was on the apprentice to secure an apprenticeship spot with the established beekeeper. One weakness on this model, however, is the apprentice was dependent on the mentor and did not receive a diversity of opinions. Given the many ways to keep bees, this limited growth and innovation in new beekeepers.

Newer Model

In the newer model, a new beekeeper takes a beekeeping class with a local association to learn the basics, then obtains a mentor to help him manage his colonies. Typically, a "day in the bee yard" is offered at the end of the class. New beekeepers then obtain bees and begin the adventure independently with the local association and mentor as supports. Often the mentor travels to the new beekeeper's colonies. It should be noted, this consumes time and travel cost for the mentor.

The ever-increasing interest in beekeeping over recent years has resulted in local associations offering an increase in classes. Sometimes these classes grow year after year

to accommodate local interest. The result is growing bee clubs and associations made up largely of beginning beekeepers. This lack of mentors and a lengthy time of practical training in a bee yard, as once offered with the older mentor model, results in failure when problems develop. Often the honeymoon period of a spring nectar flow lulls the beginning beekeeper into assuming beekeeping is easy. Attendance at local bee association meetings, study, and contact with mentors wanes until their bees decline and the mentor is called into action. At this stage the mentor is no longer mentoring but rather acting as the physician for both the bees and the new beekeeper. When called in it becomes strikingly obvious many new beekeepers do not know what a "normal" colony looks like. Unfortunately, too many new members do not call and "fizzle out" if their colonies do not make it through the winter. Many new beekeepers leave beekeeping if they do not have proper, ongoing mentorship (education). Increasing contact with mentors and local beekeeping educational offerings results in an increase in new beekeepers' success.

Blending the Old Model with the New

It seems apparent that the interest in beekeeping is outstripping the availability of mentors in many local bee clubs and associations. This article proposes that a blending of old and new schools of thought can result in a positive outcome for those interested in learning the craft of beekeeping. The problem is one of having enough mentors to efficiently and effectively convey their knowledge to the ever growing number of new and beginning beekeepers. Additionally, that knowledge needs to be conveyed without mentors traveling the county making home visits and before a crisis occurs.

I'm going to suggest a new mentorship model towards getting the new, prospective beekeeper the mentorship they need to find success in this challenging mix of science and art we call beekeeping. This is beekeeper education not babysitting, handholding, nor bee hive autopsying. It's written as advice to the new beekeeper wishing to study beekeeping with the onus on them to find and develop their knowledge base. The information is out there!

First, a word to those wonderful and giving individuals called mentors. You are the glue that holds beekeeping education together. And you are the gold within every club and association. Your knowledge base is needed more now than ever before. So, precious is your knowledge that it needs to be shared with all the ever-increasing number of people expressing an interest in beekeeping. Consider reaching more new beekeepers by giving presentations and lectures.

Let's look closely at those identified sources of information, mentioned earlier, which are available to the individual wishing to become a beekeeper: association sponsored beekeeping classes, books, periodicals, and on-line discussion boards, local bee club social gatherings, educational events, community outreach efforts, and state conferences and online videos. From the perspective that the beginning beekeeper needs to acquire the necessary knowledge, here are suggestions for finding that knowledge:

1. The new beekeeper should find a local club or association and start attending meetings.

Local association monthly meetings are available to new beekeepers to learn what is going on in the bee yard that month and in their local area. Most clubs place their most trusted and experience beekeepers in front of the group to offer lecture topics of interest. Simply put, these trusted and experienced beekeepers are the club mentors delivering the knowledge directly to the new beekeepers. Overheads, PowerPoints, and handouts deliver the information needed for the attendees to learn what "normal" and "abnormal" looks like. Additionally, based on the season, the new beekeeper is coached on what they should be doing that month to be successful. Topics covering feeding, assessment of mites, proper evaluation, and treatment are covered at a time corresponding to the local climate and beekeeping season. Too often, new beekeepers do not attend especially during the "good times "of the nectar flow, missing their monthly mentoring session.

2. The new beekeeper should attend a good beginning beekeeper class.

Half-day or single day classes are good for determining if beekeeping is something they'd like to learn. Better introductory beekeeping classes span multiple evenings or weekends and offer Certified testing. If a local club doesn't offer one, look for a class at the next closest club. Attend their meetings too. The drive may be worthwhile.

3. Sign up and take the next beginning beekeeper class offered.

Read the handouts; read the book. Don't be satisfied to be spoon fed the information and don't limit yourself to only the information in the class. Consider this class your foot in the door, your introduction, the beginning of your adventure.

4. Visit your local library and check out books on beekeeping.

You will find some entertaining, some are scientific, and some are histories. Read all that you find helpful.

5. Decide right now that coming to monthly meetings is an important part of your continuing beekeeping education.

Miss one at your own risk. Many club meeting topics follow the bee's annual cycle through the seasons. Important things to do and observe are discussed at meetings. The meeting you miss may be the one that offers the information you needed to hear that month.

6. Volunteer for club activities.

If your club offers community outreach at festivals and events talk to your club's event coordinator. Volunteer to work with someone else "talking bees" with the public. If you took the beginning beekeeper class, you know 100% more than the general population. Listen to the experienced volunteer you are paired with and learn from them. Talk with them during breaks. If you enjoy speaking to children there is a real need to visit with elementary classes. Senior centers also appreciate visits and often contact clubs to schedule brief talks.

7. Watch your bees.

Even if you aren't going inside the hive. Get a chair and sit and watch them coming and going. Soak it in. At first, you'll not have a baseline with which to compare their comings and goings. As the seasons progress, nectar flows begin and end, temperatures change, their behavior will change as well. Soon you will notice

subtle changes in their behavior on the landing board. With time, you'll know when something's wrong and needs further inspection – just by watching them on the landing board.

8. If your club has social events like pre-meeting dinners, occasional social events, or days in the beeyard, attend them.

Beekeepers tend to want to talk about bees – exhaustively. Only other beekeepers want to talk about it as much as you will. You will learn a lot talking with others at these events.

9. Find a bee buddy.

A bee buddy may be another first-year beekeeper in your neighborhood or a second-year beekeeper that lives close by. Your bee buddy is the one you call when your hive swarms and you need to borrow a box. A bee buddy is someone to visit and look at their hives; they come over and look at yours too. Bee buddies share new discoveries and together you learn how to manage your bees. Find a bee buddy at meetings, events, or during meeting fellowship time.

10. Enter your hives as often as is prudent.

During some seasons the bees are docile and tolerant of your intrusions. In the spring visit them often – even every week. When you enter the hive go in with an idea of what you wish to accomplish in mind. What do you want to observe? The first few times you will be so filled with excitement you'll forget to look for those things you set as your goal. That's okay, look on your next visit. There are other seasons when the bees are best left alone such as when they are arranging and securing their winter home or during colder months. Take every opportunity to observe them.

11. Join your club's online discussion group if it has one.

You'll find quick answers to questions you have. Often a photo and description to the group will result in helpful responses or allay your anxiety about something you've never seen before. If you do have an emergency often a club member can swing by after work and take a look. Other club members will find online links to good videos, magazine articles, and other information they found useful and wish to share. Both girls and guys participate in forums and sometimes you find that you're neighbors!

12. Read your club's newsletter.

Local happenings are listed. Important dates too. Sale ads and articles of interest as well as your club's minutes and scheduled speakers and topics keep you informed. Often the club will have an article directly related to seasonal beekeeping letting you know what to observe and do in your hives that month.

13. Attend local educational offerings.

Some clubs bring in out-of-town speakers for special topics of interest. Other times clubs or local beekeepers offer day classes on specific topics of interest: Queen rearing, Moving hives, Making Splits, Africanized bees, oh my!

14. Attend state conferences.

Even if you can't stay for two and a half days at least go for a single day. The information you hear will be from the scholars in bee research around the country. They have a knack for breaking it down for us simple beekeepers though so it all works out. Have lunch with fellow beekeepers. If you overnight, find out where your club or neighboring club will be having dinner and socialize. Carpool with your bee buddy. Hang out in the hotel lobby and talk bees until late.

15. Placed last because you may never need it if you're working all the above. Visit your club's mentor list and find a mentor close to you.

Preferably one that also attends meetings. Sit with them, or watch and listen to them teach at the front of the room. If you don't understand something, ask after the meeting. Offer to help your mentor do hard work like pulling supers, rotating boxes, or extracting honey. Tell them you'll gladly help with their next swarm retrieval. Ask them tough questions that show your enthusiasm and that you're making every effort to learn. If they know you're dedicated to learning, attending, and making an effort it makes all the difference in the world.

In the end, it's all about learning about bees, their biology, behavior, and management. Along with that come the seasons, foliage, the bees' cousins, and foes. Today's prospective beekeeper has more resources that ever before: face to face education, fellowship, books, YouTube videos, discussion groups, community outreach, conferences, and more. Take advantage of every offering available and you will succeed. Now, get to a meeting!

The Future

Many experience beekeepers can reach more new beekeepers by giving presentations and lectures. We need mentoring to be both successful and efficient during these times of expanding interest. This model of mixing old and new methods can be utilized to reach more new beekeepers by increasing the mentor's audience as he or she imparts their wealth of knowledge at the many events where new beekeepers gather. It is hoped that the suggestions above are taken and built on by beekeeping clubs and leadership. The suggestions are not all inclusive and should be molded to meet the individual needs and circumstances of each group. Hopefully this article will provide some ideas that can be implemented and result in increased in success for all.

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A GOOD NEIGHBOR ISSUE

~ Bill Miller

IF YOUR ATTORNEY SAYS BEEKEEPING IS OK **get it in writing!**

While most non-beekeepers think having a neighborhood beekeeper is amusing and/or harmless, our neighbor initiated a lawsuit intended to force my wife and I to remove bees from our property. What follows is the story of that lawsuit from our point of view. Along the way, we made many observations that need to be shared with the rest of the beekeeping community, especially those who are considering starting beekeeping in a suburban neighborhood.

I am not an attorney myself. Based on what happened to us, I highly recommend you talk with your attorney before you start beekeeping in a suburban/urban neighborhood. Assume someone will try to sue you to force removal of the bees – you need to know if he can fabricate a case. Those folks who will want to sue you are out there. If one of them can get a case going, then you might just get a certified letter inviting you to spend many thousands of dollars on attorney's fees.

Let's start at the beginning of our case. When we first moved to Dothan Alabama in 2006, we knew we wanted to keep bees on our property, and so informed our real estate agent. We also said we did not want to live in a place with covenants, and preferred a mostly rural location. We found what looked like a suitable house – 3.2 acres with a hayfield for one "neighbor" and a cow pasture for another "neighbor". There was a house behind the one we were considering, it had a large open pole barn where a farm tractor was stored. When we asked about covenants, we were told there were none. We bought the house; and as expected the deed did not reference any covenants.

We moved in, met our neighbors in the house behind ours and told them of our proposed beekeeping on the property. They didn't voice any concerns then. The next spring (2007), I set up hives (at first unoccupied) and told my neighbors that if they had any objections let me know before I installed bees in the hives. Again, the neighbors didn't object. I installed packages in the hives, and again no comments from the neighbor.

That's things stood until late that summer, until one day my neighbor drove over in his farm tractor (incidentally running over my wife's garden in the process), and told us that beekeeping was forbidden on the property per the covenants. We called the attorney who handled the closing to find out what was going on, and on double checking learned that we had bought in a development consisting of 2 houses, there were covenants on the property, and the covenants forbade the keeping of "animals" other than dogs and cats (I'm paraphrasing a bit here). The attorney who handled the closing was properly embarrassed at his missing the covenants when he prepared the house settlement package. His advice was that for the moment we should sit tight and see if anything further developed.

Let's get back to the event history. For several years, the closing attorney's advice of "Sit tight and see if anything develops" was valid. I maintained the colonies, and no objections were voiced. When the bees swarmed into one of my neighbor's trees, my wife got a phone call from my neighbor saying "Please tell Bill his bees are trying to leave home, and they are camped in the tree by our carport". That is the kind of reaction to a swarm I would expect from someone who lives next to an apiary. Of course, I retrieved the swarm. Also, the neighbor came over one day when I was working the bees and I showed him what goes on in a colony. He seemed interested. Everything looked to be working out well, and I didn't hear any more complaints. The bees and their hives were accepted (or so I thought). By the way, I never heard about another swarm on my neighbor's property, or for that matter heard any other complaints about alleged bee misbehavior.

Lesson Learned:
If your attorney tells you something such as beekeeping is legal to do, get a letter from him stating his opinion. In our case, the attorney who handles our next house closing will be asked to include a letter stating that the property is legally suitable for beekeeping without further restrictions (or these are the applicable legal restrictions). Also, document that you asked your neighbors about beekeeping and they were OK with it.

Also during this period, the attorney who handled our property closing had a stroke and was forced to retire.

In 2014, I received a letter from an attorney stating that he had been retained by my neighbor to file suit to force me to remove my beehives as a covenant violation. The letter claimed my bees were a nuisance to my neighbors and so they had to go. They also claimed my beehive color scheme (FYI, they have yellow boxes with green outer covers and bottom boards) were nontraditional and garish. This letter was a courtesy to

let me act before the suit was actually filed.

You can't let a letter like this go unanswered. I was fortunately able to locate an attorney who also kept bees in a neighborhood, and the correspondence between the attorneys began. My neighbor couldn't produce backup information for claiming my bees were a nuisance. Slowly the real issue began to surface; my neighbor didn't like having to look at beehives when he looked across my property. He claimed that when I taught my beekeeping classes I advocated keeping beehives hidden from view, and had even written a pamphlet advocating keeping beehives hidden. The neighbor further accused me of being a hypocrite for ignoring my own advice. Having never written such a pamphlet (I do not advocate keeping beehives hidden from view), I told my attorney to ask my neighbor to produce the pamphlet. Of course, he couldn't produce a pamphlet, and his attorney lost interest in the case. No suit was filed. I had spent $2000 in attorney's fees, but our beekeeping on our property was safe (at least for the moment).

In April, 2016 my wife and I got a certified letter stating my neighbor had filed a lawsuit against us to force me to remove the bees from my property. He had found a new attorney; this one specialized in being a trial attorney for plaintiffs. All the same claims were made that my beekeeping was a nuisance that prevented my neighbors from using their property, my property was overrun with too many hives, and an additional claim that we were running a beekeeping business contrary to another part of the covenant. My neighbor wanted my beekeeping business profits, and subpoenaed copies of my tax returns to ensure he was getting the full amount due.

I retained the same attorney I had before, and set about answering the claims made in the suit. The bees were a nuisance? Dothan has "Good Neighbor Guidelines" giving the expectations for beekeeping. I got our state bee inspector, our local extension agent (he does keep bees), and an Alabama Master Beekeeper to look over my beekeeping. They all wrote affidavits saying my beekeeping was conducted in accordance with the Guidelines. The colonies were registered, peaceful, an appropriate distance from property lines, the equipment was in good condition, and the number of colonies was appropriate for the 3.2 acres we own. We run a beekeeping business? We provided copies of our tax returns (with the information not related to beekeeping redacted by our attorney) along with a letter from our accountant stating that since our "business" lost money, we were actually hobby beekeepers. Our bees interfere with our neighbor's use of his property? I took pictures of our neighbors using their property with no apparent concern for our bees.

As before, the real issue had nothing to do with bees. My neighbor thought beehives on my property spoiled his view when he looked out across his yard into ours. He also didn't want to have to see beehives when he drove down the road.

Lesson Learned:
The real issue in a lawsuit can be remarkably petty. In this case my neighbor wanted us to run our property to meet his desires, and was using the covenants to try to force his desires on us. Also, plaintiff's attorneys are paid to win cases for their clients. They are not paid to confirm the allegations their clients make in complaints are justified.

The neighbor then submitted a proposed settlement that we rejected as unacceptable, and we submitted a proposed settlement that the neighbor rejected. The neighbor's attorney then filed for summary judgement against us, and our attorney filed a counter. Of course, all this time the attorney bills are adding up. Finally came the day of the summary judgement hearing. The plaintiff's attorney argued that since the bees were biologically "animals", they were forbidden by the covenants. Our attorney argued that using the biological definition of "animal" was inappropriately broad, and the plaintiff's attorney's interpretation would have meant people couldn't live on the property either. He also argued that the bees had been there for many years, and the statute of limitations for bringing up the issue was long expired. Summary judgement in favor of the plaintiff was denied, and the judge ordered us to mediate the issue.

A mediator was appointed, and he stated that he didn't know anything about beekeeping. I tried my best to educate him in the few minutes we had with him before mediation started, but some of his remarks told me he had no feeling for the emotional attachment we have for our bees, or the risks involved in moving a hive any time we feel like it. By the way, the mediator also charges for his time.

In mediation, the plaintiffs and the defendants (my wife and I were the defendants) are placed in different rooms, and the mediator shuttles between them with the proposals, counterproposals, and a very high pressure sales pitch for all these proposals. In the end, we accepted a proposal that amounted to an 85% win for my neighbor. I have to move some hives, but I do get to do it in the spring when moving bees is feasible. We will be allowed to keep bees on our property, but we will be more restricted in colony numbers and locations than those allowed in the Good Neighbor Guidelines.

Had we rejected the mediation solution and instead gone to a full-blown trial, I am 90% certain we would have won (In the legal business, nothing is certain until the judge bangs his gavel for the last time). So why did we accept an 85% loss? Two reasons apply: 1) Money – going to trial would have probably cost at least another $10,000. 2) I became convinced that my neighbor was the irrational type who would have done anything to "enforce" his view of how we should manage our property; this includes sneaking over onto our property in the evening and shooting wasp spray into my hives.

I do treasure a comment our attorney made to my wife during mediation: "Now don't do anything like putting out old toilets with flowers planted in the bowls to get him (our neighbor) riled up".

So now the case is essentially resolved (the attorneys still have some paperwork to finish up). We can't sue our original closing attorney for malpractice on the grounds he missed the covenants; that attorney is out of business. We are going to make a claim on the title insurance as the

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property was not properly represented on the deed.

Those are our personal actions. On a State level, I will be working through the Alabama Beekeepers Association to get state law to say beekeeping is legal unless specifically banned by name by some applicable legal instrument. Some covenants do say "No beekeeping"; I have no arguments with that. I just don't want someone to be able to use an overly broad interpretation of a term like "No animals" to stick his nose into other people's affairs. As you can see from my story, once that nose is stuck into your affairs, it's very difficult to get it out.

I will also be working to get a version Dothan's Good Neighbor Guidelines made into Alabama law, with the proviso that people who follow the Guidelines will be immune from beekeeping lawsuits. My understanding is that West Virginia and Virginia already have such laws; I encourage all State beekeeping associations to do the same.

With the increased interest is suburban beekeeping, this sort of lawsuit will become more common; our judge said he had several in his in-basket. For the State beekeeping associations, the task is to stop these lawsuits before they start. For the average beekeeper (and especially a prospective beekeeper in a suburban area), it might be a good time to have a chat with your attorney.

CATCH THE BUZZ

Grower Comments On Pyrethroids Being Sought by EPA

EPA reopened the official comment docket (https://www.regulations.gov/document?D=E-PA-HQ-OPP-2010-0384-0092) regarding the preliminary ecological risk assessment for the pyrethroid class of insecticides in late May. It will remain open until July 7.

Pesticide industry experts note that grower comments are needed to ensure that EPA understands the importance of these pest control tools and that it has the most up-to-date use information to consider in its assessment.

Food crops including almonds, apples, tomatoes, and citrus, as well as feed crops including corn, soybean, and alfalfa, are among the 120 crops nationwide protected from pests because of bifenthrin (FMC; Brigade WSB, Hero, Mustang Maxx) and other pyrethroid products.

One of the most high-profile uses is against spotted wing drosophila, a pest capable of devastating soft fruits. Bifenthrin is used on an estimated 70% of the nation's raspberries.

Growers and other interested stakeholders can submit comments in one of the following ways:

Defendbifenthrin.com – This website provides guidelines and draft sample comments that can be customized and automatically submitted to the official EPA docket

Regulations.gov – Stakeholders can upload comments directly to the docket here.

Pyrethroid Working Group website – This website provides a sample comment draft that can be further customized and submitted directly to the EPA docket.

BEE VENOM AND THE CHEMISTRY OF OUCH

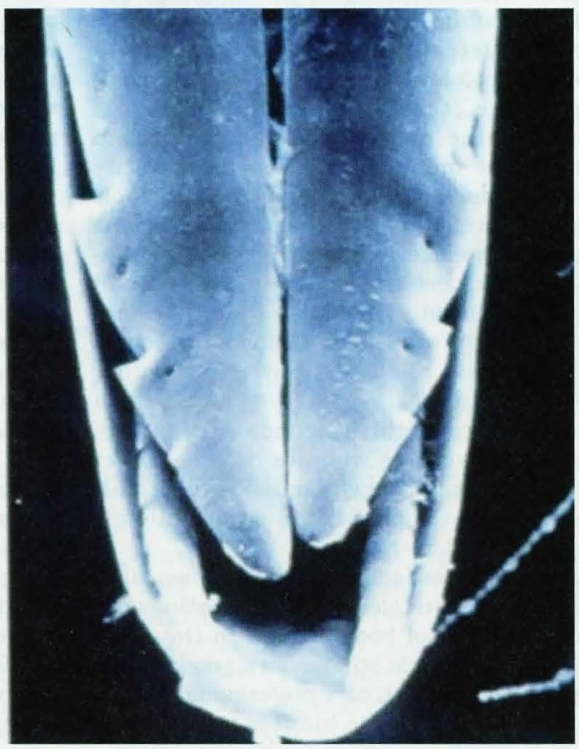
Zap!

~ Sharla Riddle

Stings happen. Even the most experienced beekeepers catch a sting occasionally. It's the price we pay for those beautiful jars of honey. Bees aren't "seek and destroy" insects. They really aren't itching for a fight, and are quite content to ignore humans. After all, they have work to do. We're basically a nuisance to them, so stinging is really a last resort for a bee. But, they are, in the end, social insects and protecting the hive is Job 1. So if a worker bee senses a threat, it will sting and then use alarm pheromones to call in the cavalry. It's these chemical weapons in the bee's arsenal that have scientists fascinated. Bees are remarkable, so it's little wonder that their venom is proving to be an amazingly complex and useful substance.

Bee venom is mostly water-88% to be exact. Because of this water solubility, bees sting in moist tissue in order for the venom to disperse effectively. Unfortunately, that's why the venom works so well on humans – we have lots of nice moist tissue. Painful to think about, huh? Unlike alarm pheromones, bee venom is odorless with a pH of 4.5 to 5.5 which can make it slightly acidic. Because of this acidity, some home remedies advise using a baking soda paste on stings to neutralize the stings. Most scientists doubt the effectiveness of such topical treatments. (That's because the venom is injected into skin and not onto skin.)

The allergen in bee venom that causes the main "ouch" is melittin. It's by far the most abundant ingredient in bee venom – 50% of venom's dry weight comes from melittin. Melittin causes red blood cells at the sting site to burst and the blood vessels to expand. This blood vessel expansion is why some people have a dangerous drop in blood pressure after bee stings. And, unfortunately, melittin isn't the only ingredient in bee venom that causes pain. Phospholipase A_2 is another protein that works with melittin to destroy cell membranes at the sting site. This ingredient, which makes up 12% of venom, causes pain and inflammation.



But wait – the pain from that one sting isn't quite over yet. 9% of bee venom consists of histamine. Histamine causes your tiny capillaries to leak fluid. This is why bee stings cause itchy red spots. Histamine also contributes to some of the pain of the sting. Not all the proteins in bee venom cause pain. Finally, some good news, right? Wrong. Some ingredients help to strengthen the toxicity of the venom. Apamin, which makes up 3% of venom, destroys nerve tissue. Hyaluronidase (2% of venom,) helps the reaction to spread to surrounding tissue by breaking down one of the components of cell tissue.

It's not just the chemicals in a bee's venom that make it such an effective defensive weapon. Bees also have an excellent dispersal mechanism – their stings. Only female insects can sting, and scientists believe this is because the sting evolved from the insect's egg-laying organ-the ovipositor. The structure of this modified ovipositor allows the sting to act like a self-guided missile. The bee doesn't need much force to embed the sting into its victim; the barbs are positioned on the sting in a way that helps pull it further into the wound. Attached to the sting is the bee's venom sac, containing the bee's chemical cocktail of mellitin, histamine and other proteins. When a bee stings, venom is released into a space on the sting between the barbs and the stylet. Honey bees won't sting unless they sense a threat, because

Venom Sac

they can't withdraw their stings. Once they sting, they die. The venom sac and sting of the bee are torn from the abdomen and left behind. Amazingly, even when the sting is no longer a part of the bee, it can keep pumping venom into a victim. That's why getting the sting out quickly after a sting is important.

When a bee stings, an alarm pheromone is released by its Koschevnikov gland. Located near the sting shaft of the worker bee, this gland is responsible for most of the bee's alarm pheromones. When worker bees detect this alarm pheromone blend, they fly faster and buzz more. It's a bee home security system. It signals the defenders (aka stingers) to seek and sting threats. That's why it's a good idea to apply two or three puffs of smoke to the sting site after removing the sting to mask the tell tale alarm odor.

The alarm pheromones of honey bees contain about 20 compounds. Of these, isopentyl acetate is the key compound. Bees begin to produce this IAA (also known as isoamyl acetate), at about day 15. The production will peak at 2½ weeks. IAA has a very familiar smell, because it has the exact same chemical composition as banana oil. That's why there's a banana smell when bees sting another animal. Fortunately, smoke tends to mask the smell of this pheromone. This loss of signal results in just a few angry bees rather than a swarm of stingers ready to defend the colony.

Bee stings are one of the hazards of the beekeeping trade. They are inevitable, even when every precaution is taken, and researchers are working on ways to reduce the impact the bee's venom. Because the sting keeps pumping venom the sting site, scientists are izing that the method of removal isn't nearly as important as getting the sting ASAP. In the past, the rule of thumb was to avoid pulling barb out with fingers or twee- The thinking was that more om would be squeezed in. scientists are advising speed precision. Forget digging around in your wallet for a credit card to scrape it. Unit's handy, that wastes time. Studies have shown that leaving the stinger in just eight seconds can increase the size of a bee welt by 30%. It doesn't really matter how you remove the sting; just flick it off as fast as possible. Your hive tool is the perfect scraper, by the way.

Once a bee stings, your body chemistry begins to change to combat the toxins. Because your immune system considers the unknown proteins of bee venom to be invaders, it makes antibodies. The job of these antibodies is to strengthen the immune system against future attack. Unfortunately, some people develop an overly-sensitive immune response. In about 5% of the population, bee stings are much more than just painful – they're life threatening. Two out of every 1000 people are at risk of anaphylaxis from bee stings. This inability to breathe can occur within seconds or minutes. Beekeepers who are prone to other allergies have a much greater risk of developing these severe allergic reactions to venom.

Most adults without known allergies can tolerate about 10 stings per pound of body weight. In the event of multiple stings, it's a good idea to see a health care professional. That's because your kidneys might need monitoring for a few weeks. When a sting occurs, cell tissue is damaged. The kidneys' job is to eliminate this damaged tissue. In the case of multiple stings, however, there may be too much damaged cell tissue for the kidneys to process. This can cause the kidneys to clog and fail days after an extreme stinging event.

Reactions to bee venom are classified as systemic or localized. Systemtic reactions require immediate medical attention. Swelling in these reactions may occur in areas other than the sting site. Shortness of breath, dizziness and a drop in blood pressure can signal anaphylactic shock, which can result in death if not treated. The usual treatment for these allergic emergencies is epinephrine. This form of adrenaline slows the blood pressure drop by forcing the blood vessels to constrict. It improves breathing by relaxing the airways and also helps to reduce swelling and itching. Once an allergic reaction has occurred, it's necessary to carry an Epi-Pen or sting kit at all times. Doctors also advise wearing a medical alert bracelet.

Most localized reactions to bee venom (except stings to the eye) can be treated at home. Swelling is normal in a bee sting and ice helps because it constricts the blood flow to the sting site by narrowing the blood vessels. Less blood flow means less swelling. A few topical ointments, such as calamine lotion, can also offer relief. Calamine lotion helps because its crystals are large and cause moisture on the surface of the skin to evaporate quickly. Much like an evaporative cooler, this rapid absorption of moisture helps the skin feel cooler. The histamines in bee venom that cause itching, swelling and pain can be blocked by certain medicines. The molecules in the cell membrane at the sting site are called receptors. Histamines "turn on" these receptors when bee venom invades tissue. Antihistamines, such as Benadryl, work because they keep these receptors from "turning on." Thus, the capillaries don't leak fluid and swelling is reduced. Pain relievers that contain aspirin should be avoided with bee stings. There's already quite a bit of bleeding under the skin and aspirin makes it worse.

Even though the chemical compounds in bee venom can pack quite a punch for predators, those same compounds have the potential to be remarkably effective in medicine. Researchers have discovered that melittin is a strong anti-inflammatory agent. When venom in injected into the body, the melittin stimulates the production of cortisol, also known as the "fight or flight" hormone. In addition to giving the body an extra boost of glucose energy, cortisol also reduces inflammation. Scientists hope that the use of melittin will aid

patients with diseases such as arthritis and MS, where inflammation can be debilitating. Melittin has also been shown in laboratory studies to slow the growth of certain cancer cells, such as melanoma and breast cancer.

When researching bee venom for medical purposes, scientists begin with dry bee venom. When exposed to air, venom dries into grayish-white crystals. These crystals are then converted into a powder form. The hope is that this powdered bee venom can be used to produce injectable venom for the treatment of certain diseases. Because it takes a whopping one million bee stings to collect just one gram of dry bee venom, it's quite expensive. Scientists are developing an artificial form of melittin in order to further their research.

Bee venom is a complex substance, and laboratory research into its medical applications is relatively new. Although many people swear by at-home bee therapy, known as apitherapy to treat their MS and other conditions, science moves a bit more cautiously. Bee venom is a toxin, so a scientific approach to research and treatment must be taken. Even so, the hope is that bee venom may lead to medical breakthroughs for those suffering from debilitating inflammatory diseases. So, while bee venom might sometimes be a pain, it might also be a cure. Maybe the occasional "zap" isn't such a bad trade-off after all.

Sharla Riddle is a retired educator and freelance author. She has been named a Huddleston Scholar, Tandy Scholar and RadioShack Science Chair.

References

Abdu, Mahmoud Al-Samie and Mohamed Ali. *Studies on Bee Venom and Its Medical Uses.* International Journal of Advancements in Research & Technology, Volume 1, Issue 2, July 2012.

About Honeybees. University of Arkansas: Division of Agriculture Cooperative Extension Service. April 2016.

Bee Stings. United States Department of Agriculture. Agricultural Research Service. April 2016.

Breed, Michael D., Ernesto Guzman-Nova, and Greg J. Hunt. *Defensive Behavior of Honey Bees: Organization, Genetics, and Comparisons with Other Bees.* Annual Review of Entomology. 2004. 49:271-98.

Caron, Dewey M. *Honey Bee Pheromones.* Lewis County Beekeepers. April 2016.

Communication: Basic Bee Biology for Beekeepers. Bee Health: Extension.org July 2009.

Dockterman, Eliana. *Scientists Think Bee Venom Could Fight Cancer.* Time.com (2014): 1.

Hunt, G.J. Flight and Fight: *A Comparative View of the Neurophysiology and Genetics of Honey Bee Defensive Behavior.* Journal of Insect Physiology 53 (2007) 399-410.

Kaplan, Alan. *Once Stung, Twice Shy.* Bay Nature 8.3 (2008): 44-45.

Loveridge, Joel. *Bee Stings.* University of Bristol School of Chemistry. April 2016.

Morse, Roger, and Brenda Bull. *Insects that Sting.* Conservationist 49.6 (1995): 22.

Murdoch, Guy. *Sting Treatment.* Consumers' Research Magazine 80.6 (1997): 2.

Wright, Russell, Phil Mulder and Hal Reed. *Honey Bees, Bumble Bees, Carpenter Bees, and Sweat Bees.* Oklahoma Cooperative Extension Service Fact Sheet EPP-7317. April 2016.

CATCH THE BUZZ

BIP Tech Transfer Team To Start In May In Michigan

The Bee Informed Partnership is proud to announce the start of a new technical transfer team in Michigan beginning May 2017. This will be the 6th regional team and will service migratory and honey producing commercial beekeepers in that area. Some of these commercial operations travel to CA for almond pollination and many include Florida in their route for overwintering, requeening and creating splits in addition to honey production in Michigan. It is a sister team to our already existing Florida team since the migratory routes greatly overlap. This is true also, of our Midwest (MN/ND) and Texas team. Many beekeepers travel the same paths to move to safe overwintering yards that enable them to get a jump start on the season in the winter where it would be far too cold to requeen or make splits in Michigan or North Dakota in March. Florida and Texas are warmer and allow the bees to build up for other early pollination events before honey production kicks in later in the summer.

Our Michigan team will be hosted at Michigan State University and will be part of Dr. Meghan Milbrath's lab. Meghan is the coordinator of the Michigan Pollinator Initiative at Michigan State University and wrote one of our most widely read and recirculated blogs last year. We are proud and excited to move into that part of the country and work with the Michigan beekeepers. The commercial operations in Michigan have already been very receptive to BIP and we had the opportunity to sample a few of their operations in Florida in November of 2016 to give them a feel for what BIP does and the type of services we can provide.

2 HIVES

WHY TWO?

~Ann Harman

Every beginner needs to start beekeeping with two hives. However, as a beekeeper-to-be, your response may be 'I don't need that much honey.' Or perhaps 'my garden is so small that I don't need that much pollination.' An experienced beekeeper can tell you there are many reasons why beginning with two hives is much better than only one.

Beekeeping is both a science and a craft. The world's scientists are hard at work seeking to understand the hidden secrets of a honey bee's life along with the problems facing the bees today. Beekeeping magazines and clubs with speakers on many different topics can bring to all beekeepers the science of beekeeping. Paying attention to the science of bees helps you understand them better and gives you the opportunity of being a better beekeeper. The craft side of beekeeping has to be learned by doing.

Think of the various crafts, sports or hobbies you have tried and learned. Cooking is a craft with its own language—'baste with marinade....' Perhaps you tried tennis or golf—both involve hitting a ball but have a much different approach. Whatever craft, sport or hobby interests you, it comes with its own language and development of skills. And so it is with beekeeping.

Watching bees at the entrance to their hive can give us some useful information about foraging and defense. But what are the bees doing inside? Some hives today have glass or plastic windows, covered with a removable opaque panel but the view of colony activity is extremely limited. Any such window does have to be kept covered except for the brief periods of observation. Bees prefer a completely dark home to carry out their work. Their recognition of odors and sense of touch are almost all they

Beekeeping is both a science and a craft. The world's scientists are hard at work seeking to understand the hidden secrets of a honey bee's life along with the problems facing bees today.

need to function as a colony. So the activities constantly going on—yes, 24 hours a day'—can be a mystery.

Observation hives do reveal many activities but since they are usually made of two or three single combs, they are not totally like a colony in a hive. (They also are notoriously difficult to manage.)

Starting beekeeping with two hives has numerous advantages. Let's start with one that will be a bit different in your very first year. Have one as a 'let alone' hive that is opened only for pre-determined inspections and necessary management. The other one can be called a 'play hive,' one that can satisfy the initial curiosity of a beginning beekeeper. It can be opened any time in suitable weather whenever a newbee wishes. Once a day, four times a day, whenever you are curious about bee activities. If you thought of a question from your classes or from a book, go ahead and see if the colony can give you an answer. This play hive can be kept open for a few minutes or much longer. The play hive is your teacher. You will see where the queen is laying eggs and where she laid eggs a week ago. You may even see the queen backing into a cell to lay an egg. A play hive can show you many things that an experienced beekeeper takes for granted. Frequently those activities are not conveyed to a new beekeeper.

Beginning beekeepers may have a difficult time judging whether the new colonies are progressing into full-sized colonies. A small group of about 3000 bees may seem 'a huge number of bees' to someone who has never seen a full colony before. The newbee must learn to recognize if a colony has a good population or is really a weak colony and needs help. Books will show pictures of a good brood pattern, along with some other aspects of a good colony but actually seeing the real colony in a real hive is best.

With two hives a beginning beekeeper can compare the sizes of the two colonies as they progress and determine if both are making good progress or if one colony has a problem. Without that comparison, a weak colony could simply dwindle away, past the point of being able to help it advance.

If you decide not to have a play hive there are still very important lessons two hives will give you.

Can this play hive survive through the spring and summer and be ready to live through the winter? Maybe. Maybe not. However a beginning beekeeper can learn many management techniques that will be beneficial to all colonies in the future. Oops! The queen got killed! Here is an opportunity to learn how to requeen with a purchased queen. Or let the colony raise its own emergency queen. Or learn how to combine colonies. Another management technique, weather and season of year permitting, would be splitting the combined colony if it became large enough. Part of learning a craft is learning what to do with an apparent disaster.

If you decide not to have a play hive there are still very important lessons two hives will give you. One of the first is that each colony has a different 'personality,' meaning different behavior. One colony may be quiet and undisturbed when you open the hive and remove frames for inspection. Another colony may have a number of bees launched into the air, in spite of appropriate smoking. A colony can even be a bit defensive with some bees buzzing your veil.

Different behavior is to be expected. Two colonies can certainly demonstrate that!

A good queen has mated with from 12 to 20 drones, each of those with their own 'built-in' behaviors. The queen herself is different from other queens even though the two queens came from the same beeyard. All these many different genes give many different results. Think about your own family. You will hear people saying 'he has his grandfather's eyes.' Or 'she really resembles her cousin.'

Just when a beekeeper has decided the behavior of a particular colony, that behavior can change. A colony with reasonably calm behavior can turn into a nasty, disagreeable, defensive one. The queen is present but are all the drones she mated with nice, mild-mannered ones? It is impossible to know. True, if nocturnal skunks are annoying the hives, the bees can become overly defensive. But chances are that both colonies would be annoyed by skunks and both would be defensive. In areas known to have Africanized bees the nice colony could have been usurped

With two hives a beginning beekeeper can compare the sizes of the two colonies as they progress and determine if both are making good progress or if one colony has a problem.

and now has mostly Africanized bees. Here again, having those two hives for comparison is a big help. If the nice colony remains nice, then the problem may be a grumpy drone. The beginning beekeeper can now decide whether to requeen the nasty colony or wait to see if its behavior improves.

Sometimes one new colony seems to be lagging behind the other one. The population of bees seems to be smaller. The energetic colony definitely has more adult bees. Without two colonies to make the comparison a beginning beekeeper could not have noticed the slow development. Inspection shows no disease, no invasion by small hive beetle or wax moth. The brood pattern seems normal but definitely a smaller area than the other colony.

Here is where the other colony, the energetic one, can come to the rescue. Inspections show this one has no disease. Small hive beetle is under control. A varroa check done on each colony shows excellent control of the mite. A frame of brood can be selected to donate to the slow colony. Bees clinging onto the brood frame will not cause a fight in the small colony. However, the queen must not be on the frame being transferred. Look carefully. Queens do run from light. If all is well, then the frame of brood can be transferred. Frequently a boost in young bees can help a struggling colony.

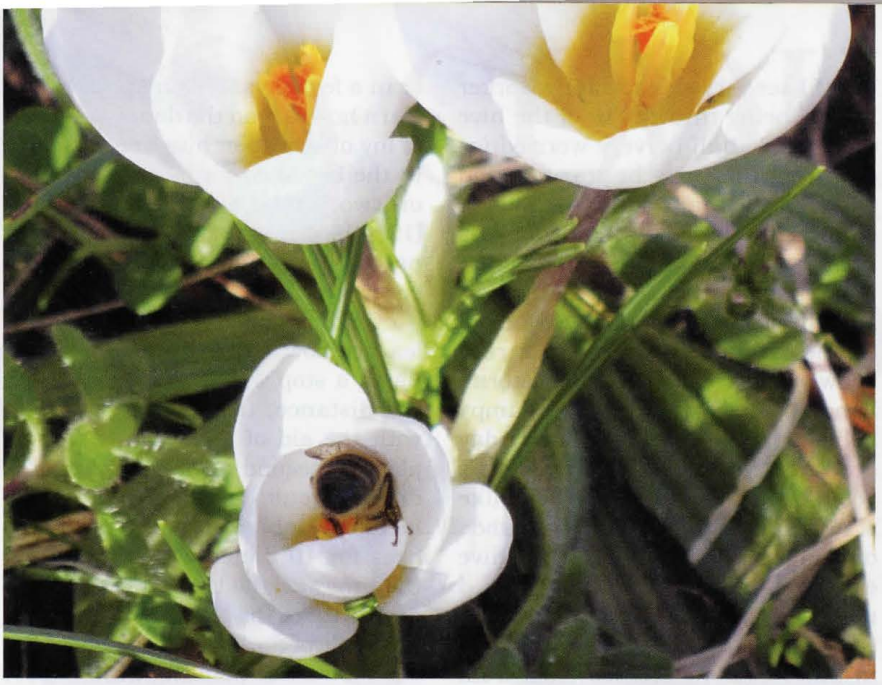
Queens today seem to have more problems than in the past. Brood inspection is important so that any queen problems can be caught before it is too late to salvage a colony. Drone cells are normal during the spring and summer. However if a colony inspection shows that one of the colonies has excessive drone brood cells and too much comb has been converted to drone production, then the queen has become a drone layer. For some reason she has insufficient sperm. Although too much drone comb could be noticed without a comparison of the two colonies, having that comparison certainly makes the situation evident.

If the drone laying is caught early a queen can be purchased and the colony requeened. The colony could also use a boost in workers by transferring a frame of brood from the normal colony. A new queen and that boost in workers can bring the colony back from oblivion.

As winter approaches colonies do need a bit of extra attention. For successful wintering a colony need plenty of good food stores in the right place. The colonies need to go into the winter with a good population. The amount of food depends on the climate, more in cold climates and less in warm. Of course varroa and small hive beetle populations have to be controlled.

So as the late summer slips into early autumn a comparison of the two colonies can be done. Never try to take a wimpy colony into winter. It will probably die during a winter month. It is wimpy for a reason—probably a wimpy queen. No queens are for sale. But with two hives, bees can be saved. Combine the two colonies but the wimpy queen must be killed. Now the chances of survival of one large colony are excellent.

When springtime comes and queens are available, the overwintered big colony can be split. Now you are back to having two colonies again. For a newbee a number of management techniques have been learned. Now you are on your way to being a good beekeeper. Be certain to pass on the value of starting beekeeping with two colonies to anyone wishing to become a beekeeper.



WHAT my Bees tell me

YES, THEY WILL TELL YOU MUCH IF YOU LISTEN

~Ann Chilcott

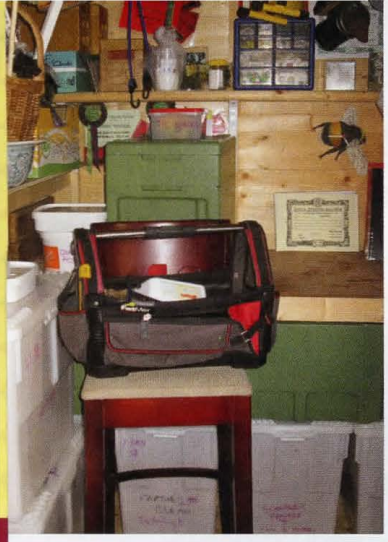
For instance, on a bright Spring morning when the birds are tuning up and perfecting their mating songs, I can go into my apiary and see, coming into the hives, bright yellow pollen packed tightly into the corbiculae on the bee's back legs. The forager bees are telling me that their queen is laying well, that there are lots of larvae to feed, and that the crocuses are in full bloom. I hurry along to the lawn where I laboriously, but lovingly, dug the tough matted soil to plant two hundred crocus bulbs two autumns ago to give rich pollen in early Spring when little else is available. The chilly day keeps the temperature down around 41°F (6°C) but the sun shines; and there, inside the twitching petals, are my bees working away inside the flowers, protected from the chill wind by their unique protective coverings and microclimate.

Water collectors come to the bird dish on my shaded patio when the temperature is only around 41°F (6°C) – often lower – and this indicates that they really need water badly to risk death from chilling. The cold water cools the aorta carrying haemolymph to the brain so they are very vulnerable. I've seen them drinking when the temperature is way down low at around 40.8°F (4.9°C), but then these bees are darker and hairier than some races, and local to my Nairnshire home in the Scottish Highlands so must be adapted to working at lower temperature ranges. I'm happy to see them drinking because I know then that the queen must be laying well – great amounts of water are needed to make brood food for the young.

Nevertheless I'm still perplexed – why come round to the shaded patio when I laid on water in a dish lined with drown-proof black sponge sitting in full winter sun on a low tin roof? Bees don't get adequate salts and minerals from plants so they must crave these from the muddy moss that now lines the bird dish following my discovery of several near-drowned bees floating in the water. I took them indoors, and when they warmed up they flew to the window and off out again. The birds weren't impressed with their new bathing facilities so I've set them up with something better close by.

Witnessing masses of drones flying in early Spring long before they would normally be required to mate with a new queen would fill me with a sinking feeling of gloom. I would know that the colony was queenless and workers were laying unfertilised eggs, or that the queen had run out of semen and had become a "drone layer." I would take appropriate measures to help the bees, and I might let the spare queen, waiting in the wings and overwintering in the cosy polystyrene nucleus box, come to their rescue.

Later in the season, if I am too busy to notice local forage, the bees will tell me that there is a nectar flow on, that the nearby oilseed rape crop is in full bloom, and that I need



to super up and give them plenty space to hang out drying nectar and to store precious honey. I notice the pale yellow pollen – various pollen charts may tell me that the colour is different but I know that my bees will add saliva to tamp down the pollen and prevent it blowing away on the inbound flight which will alter the color of the pollen. I notice increased traffic and congestion at the hive entrance with bees bumping into each other – some are knocked off course as they land. In the evenings I hear the satisfying harmonious hum as the fanning bees evaporate the nectar and reduce the water content from around 80 to under 20 per cent. I smell that familiar sweet cruciferous scent in the air and I rejoice for I know that the bees will thrive and multiply.

If the ambient air temperature is above 57.2°F(14°C) I may look inside the hive and marvel at the wax works as I check for specific developments. Frames holding new foundation are bee-festooned, and bulging with white wax confirming the oil seed rape crop just four fields away. A little later on in May, the bright yellow wax will herald the dandelion season. Again in August, I may see bright yellow wax and smell "sweaty old socks", but I am being told that the local farmer has not heeded the law and that ragwort (Senecio jacobaea) is abundant in the field up near the old ruined dwelling. The textbooks denounce ragwort honey as unpalatable, but, if left for a couple of months to mature, it is delicious – in my view –especially mixed with a little heather (Calluna vulgaris) nectar from the nearby forest.

A long spell of poor weather in early Summer may compromise the quality and availability of forage. If I have missed this cue, my bees will soon tell me that they are suffering a dearth of income and their usual calm behaviour may change to defensive crankiness. If I see drones being evicted I will be suspicious, but if I see larvae, especially worker larvae, being thrown out of the hive entrance I shall be very worried indeed that they may be starving and will feed them at once if the lack of stores in the brood box confirms this sorry state.

Since the bees can detect atmospheric pressure changes before I can, they can alert me to a rain shower or electrical thunder storm. I should heed any defensive grumpy behaviour on a hot still muggy day and shut up the hive if I know what's good for me. If I see what looks like a swarm in reverse with thousands of foragers tumbling into the hive entrance, instead of issuing forth, I needn't panic and run for my skep (swarm collecting basket) – no, I need to take cover in my bee shed from the rain when it comes. See pictures below – a peep into Ann's bee shed, for storing equipment, and a swarm collecting skep with sheet to cover

skep and secure swarm for bringing home.

I think that what my bees tell me could fill a book and that I might be nominated winner of a, "Bore for Britain" competition – if there was such a thing. So, before this happens, I must tell you the most wondrous thing that my bees tell me.

Bees and humans are the only animals that share information about desirable things such as food. That's pretty cool don't you think? But what is even more astounding, I think, is that I can eavesdrop carefully on my bees and find out to the nearest few yards where they are foraging.

Last year, a friend gave me a copy of "The Dancing Bees" by Karl Von Frisch which I read from cover to cover in a few days. This inspired me to learn how to read the dance language of my observation hive bees who live in the bee shed for most of the year on two jumbo sized brood frames (12"x 14") in a beautiful glass sided palace insulated by "kingspanned" covered sides.

With the help of another friend, I learned how to time the waggle dance using a stop watch and to interpret the distance, they were indicating, with the aid of a graph. For example, one second of waggling in each dance circuit equals one thousand metres. I observed and timed 10 bees for 10 dance cycles averaging the times for the latter. I then held a protractor to the glass and measured the angle of the dance from where the bee's head was pointing with respect to up. Then I used an astronomical chart, obtained from the internet, giving the sun's altitude (position above the horizon) and its azimuth (direction of the sun). I needed to be able to work out the position of the sun easily at all times during the day given that the earth moves round the sun and that the bees orientate to the sun and alter their position on the dance floor accordingly. Then I worked out the positions of the sites, advertised by the bees, and plotted them on my ordnance survey map.

What the bees told me was that the furthest away patch of forage they were visiting was one and half miles away from our homes in Piperhill Village near the River Nairn, and that they were foraging on Himalayan balsam (Impatiens glandulifera).

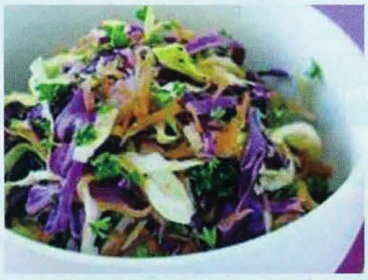
To be honest, I knew already that they were working the Himalayan balsam for some had the tell-tale silvery white stripes running down their thoraxes and painting their wings. The pollen was creamy peach. What I hadn't known was exactly where they were working this plant, and so when I followed the directions on the map and found them there I was filled with great satisfaction and jubilation.

The things my bees tell me have enriched my life, but more importantly they have taught me to be a more sensitive and more aware beekeeper. I'm also much better equipped now to pass on knowledge and skills to others. Often I'm able to work out what's going on inside the hive without having to open up, move the furniture, and disturb the bees which has great advantages.

COOKING with Honey

Summertime is for picnics, grilling, and enjoying the bounty of vegetables pollinated by the bees. These three recipes combine to make a nice meal. Remember—just because a recipe contains honey it does not make it taste sweet. Honey enhances other flavors.

~ Ann Harman



HONEY LEMON SLAW

8 HALF CUP SERVINGS

This is a delicious variation on traditional slaw. It may become your favorite one.

½ cup mayonnaise
2 tablespoons honey
½ teaspoon grated lemon rind
2 tablespoons lemon juice
¼ teaspoon ground ginger
4 cups shredded cabbage
½ cup raisins

Stir together first 5 ingredients. Add cabbage and raisins. Mix well and chill.

HONEY GRILLED VEGETABLES

SERVINGS: 4

12 small red potatoes, halved
¼ cup honey
3 tablespoons dry white wine
1 clove garlic, minced or pressed
1 teaspoon crushed dried thyme leaves
½ teaspoon salt
½ teaspoon pepper
2 zucchini, halved lengthwise
1 medium eggplant, cut into ½-in thick slices
1 green bell pepper, halved
1 red bell pepper, halved
1 large onion, cut into wedges

Cover potatoes with water in large saucepan. Bring to boil over medium high heat. Cook 5 minutes; drain. Combine honey, wine, garlic, thyme, salt and pepper in small bowl; mix well. Place potatoes and remaining vegetables on oiled barbecue grill over hot coals. Grill 20 or 25 minutes, turning and brushing with honey mixture every 7 to 8 minutes.

Uh oh – the thunderstorm chased you indoors just as you were ready to grill the vegetables. Use your oven.

Toss vegetables with honey mixture.

Bake uncovered at 400°F for 25 minutes or until tender, stirring every 8 or 10 minutes to prevent burning.

HONEY MUSTARD HERB STEAKS

2 rib-eye steaks
2 tablespoons Dijon mustard
1 teaspoon garlic powder
½ teaspoon pepper
1 teaspoon thyme
½ teaspoon salt
¼ cup honey
1 tablespoon water
1 teaspoon basil

Combine all seasoning ingredients and rub onto steaks on both sides. Grill; turning occasionally for 10 or 15 minutes, depending on desired doneness.

SIOUX HONEY ASSOCIATION

Check queen quality. If necessary, requeen

If you need to feed, feed inside the hive to prevent robbing

It's honey harvest time

hive TASKS

~Ann Harman

Test for Varroa

Weak hives can be overrun with wax moth

For Second and Third Year Beekeepers

- Harvest honey during first two weeks of July, depending on climate and nectar flow.
- In small hive beetle areas do not put wet honey supers on hive for bees to clean.
- Wet supers can be put well away from hives for a few hours for bees to clean.
- If no brood at all was raised in honey supers, then wax moth is not a problem.
- If any brood was raised in supers, they can be put into plastic bags then into a freezer for a week. Do not take bag off until ready to use for honey again or for needed repairs.
- Protect stored honey supers from mice.
- Monitor for varroa immediately after harvest.
- Take action against varroa if more than 3 mites per one hundred bees are found.
- If using chemical treatment read the miticide label, noting temperature information.
- Keep small hive beetle under control.
- Bees need from 1 to 2 gallons of water during intense summer heat.
- Maintain good ventilation.
- Mow grass and weeds in beeyard to give bees easy flight.
- Monitor yourself for ticks acquired in beeyard.
- Robbing can be a problem, especially during a dearth of blossoms.
- Feed all hives and feed inside hives to help prevent robbing.
- Monitor queen performance and requeen if necessary.
- Do not combine one weak colony with another weak colony. Combine weak with strong and kill weak queen.
- Feed 2:1 sugar syrup in September for winter food storage.
- Always be a Weather Watcher and a Plant Watcher.

DON'T FORGET
Your Next Club Meeting

Ann Harman keeps bees and does her bee tasks in Flint Hill, Virginia

VARROA COUNTING MADE EASIER

~ William Hesbach

Accurate estimation of a colony's population of varroa is key to assessing its health and determining the need for treatment. Sticky boards, inserted under colonies to capture falling mites,[1] are one way of estimating the total population of Varroa. They are widely used by both beekeepers,[2] and in research[3] but even with a long history of use, the interpretation of the data they provide is still a subject of discussion among both beekeepers[4]and researchers[5].

Sticky boards are unlike other methods used to evaluate a colony's infestation level. In other methods, like sugar rolls or alcohol washes, a sample of the phoretic mites[20] are collected and counted. In those methods, we assume the phoretic mite counts relate to the total population, and the numbers obtained are discussed as if they are. For instance, if we did an alcohol wash on 300 bees and three mites were counted we would say the mite "level" was 1%. It gives us a standard measurement system that works well under almost all conditions.

With sticky boards, the mites collected include those that are groomed off bees, mites that die naturally, and mites that exit from brood cells and fall before they can attach to a bee. Our assumption about sticky boards is that those different mite sources fall to the board at a rate commensurate with the total population influenced by factors like the seasonal brood cycle and the hygienic behavior of the bees.

Because sticky boards are allowed to collect mites for an extended period, some researchers say that the natural drops represent a more accurate assessment of the total mite population. But unlike the other methods, sticky board counts have not been standardized into a single percentage that we can determine just from counting the mites- there's more to it. Since a sticky board natural drop includes more information, an interpretation that accounts for the all the factors is critical, and fortunately, the science and counting methodology exists.

What follows is a review of some of the science on sticky board natural mite drops and a few illustrations on how they can be used to calculate the total population of varroa. Also, I've provided figures and examples to simplify the process used to determine treatment thresholds. Hopefully, after reading, you will be able to interpret a sticky board with confidence and teach others to do the same.

Sticky Board Basics

Sticky boards are any thin flat material, usually white and waterproof, approximately the same width, and length of the colony being tested that are coated with a sticky substance like Vaseline or cooking spray **(Figure 1).** In the case of a colony with a screen bottom, the boards can be placed under the colony, or they can be slid in the front entrance of a colony with a solid bottom board. The boards are allowed to remain in place for a specified time, and then the boards are removed, and the mites are counted.[2] In colonies with high mite counts, the counting can be tedious. In those cases, the counting can be simplified using technics which allow a beekeeper to sample areas of the sticky board and then estimate the total amount of mites on the board.[3] The next step is to interpret the count, but before that, a little background on the research will help establish a basic understanding of how it's done.

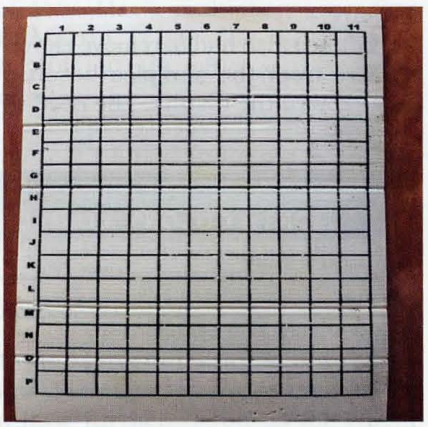


Figure 1. This sticky board is typical of ones purchased from suppliers with grid lines to make counting easier. I uses a small paint roller that fits into a wide mouth Vaseline jar and then roll the surface to make it sticky. They can be cleaned and reused many times.

Background Research

Pivotal in an understanding of what natural mite drops can reveal is outlined in the original work of Steven Martin done in 1998.[8] Martin's innovation was to build a model that could predict varroa populations using thoroughly researched mite reproduction cycles. Although mite reproduction is a continuing field of research,[9] contemporary researchers still cite Martin's original work as an important baseline,[10] which goes a long way in establishing its lasting credibility. Also, Martin's implied assumption that a model using individual reproductive behaviors can predict population growth has also been researched and supported, which further validates Martin's basic premise.[11]

Martin used the modeling software ModelMaker® for his calculations.[24] If you refer to **Figure 3**, you can see the extent to which Martin considered the inputs. Martin included data on average brood reproduction cycles,[11] mortality data of phoretic mites,[8] and mite cell invasion data.[12,13] Martin weighed heavily on the percentage of fertile mites in a colony using 42 studies conducted by various researchers. He also in-

March, April = 100
May, June, July and August = 30
September and October = 100
November, December, January and February = 400

Figure 3. Martin's basic model structure of the varroa life-cycle. The numbered compartments refer to the various model elements.

cluded the number of eggs a foundress mite lays in different cell types and the resulting offspring survival statistics.[14,15]

The part of his research that has the most practical value to beekeepers is his model's ability to predict the total live mite population over time plus the daily rate of mite population increase. The model also showed the variation in mite population that occurs seasonally, and Martin claimed that a seasonal multiplier he developed could be used with a sticky board count to estimate the total mite population anytime a count is done.

While a model is a convincing calculation, its accuracy and usefulness depend on the model maker. In this case, Martin seemed to have an informed understanding of population dynamics. But even when a model's author gets it correct, all models are a simplification[18], and as discussed by Rosenkranz et al. (2010),[21] natural systems have a considerable amount of variation. Therefore it's important to enhance a model with additional research and in particular with relevant field research. Although in Martin's paper he suggests there was some form of field research, in recent correspondence, he indicated that any field data was likely lost.

Supporting Field Work

In a paper by Branco, et al. (2005),[5] the authors compared three sampling methods using 22 live colonies carried out over a two-year period.

The first method in Branco's study combined the total mite counts from both alcohol washes and from uncapping of brood cells. Based on some earlier science,[19] combining these two totals was considered a more reliable method than either done separately. Second, natural mite drops using sticky boards were done over five separate one-week periods resulting in 63 independent data samples.

The third sampling method was used to determine the total mite population. By estimating the total mite population, you can mathematically determine the extent to which the data gathered in the first two methods is related to that population. The only way to do that is to kill as many mites as you can and count them. In this study, they used Apistan strips (fluvalinate) which, at the time, were still very effective at killing mites. After the strips had been applied, the dead mites were collected on drop boards and counted weekly for six consecutive weeks. That total six-week count was then considered equal to the entire mite population.

After some regression testing,[22] the results showed that sticky board drop data could be considered a reliable predictor of the total mite population. In mathematical terms, the datasets showed a high correlation. Branco did not find the same correlation between the combined mite counts from the first method which used alcohol washes and uncapped brood. Also, Branco's natural drop periods were a week long which gives us our first hint about sticky board drops- the longer they are allowed to collect data the more accurate they are.

Branco also had to remove eleven outliers from the samples because they skewed the results. The need to remove outliers highlights the second major consideration for natural mite drops. The natural mite drops became unreliable when a colony remained broodless, or the colony was collapsing due to parasitic mite syndrome. Sticky boards are not considered accurate if a colony suffers from either of those conditions or any condition that would disturb brood rearing. Therefore, beekeepers using sticky boards should always consider doing a simple inspection beforehand to determine the overall health of the colony.

A more recent field study by Flores et al. (2015),[7] designed to test the accuracy of various sampling methods, concluded that a four-day natural drop using sticky boards is all that's required to obtain a significant correlation to total mite population. Flores tested alcohol washes, powered sugar rolls, and mite samples from uncapping brood cells. In all cases, the only significant correlation to total mite population was the natural mite drop. Flores used a four-day sample because the detritus accumulating on the drop board with longer intervals complicated counting mites. But Flores acknowledges that the longer the sample, the better the reliability. The four-day drop is a good compromise between accuracy and practicality. I've done many longer drops and can attest to the fact that hive detritus can make counting very difficult.

Summary

The original work by Martin, suggests that a simple multiplier can be used to translate the average daily number of mites found on a sticky board into the total mite population. Martin also suggests that the daily average multipliers can be adjusted seasonally to account for the natu-

MONTH COLONY MONITORED	TOTAL MITE POPULATION
January–May	170
June	300
July	500
August	1000
September	2000
October to December	2500

Figure 4. Martin's daily average drop multipliers by month obtained from his work in 1998. Once a colony's daily average drop is obtained in any given month, multiplying that average by the number for that month will yield an approximation of the total varroa population.

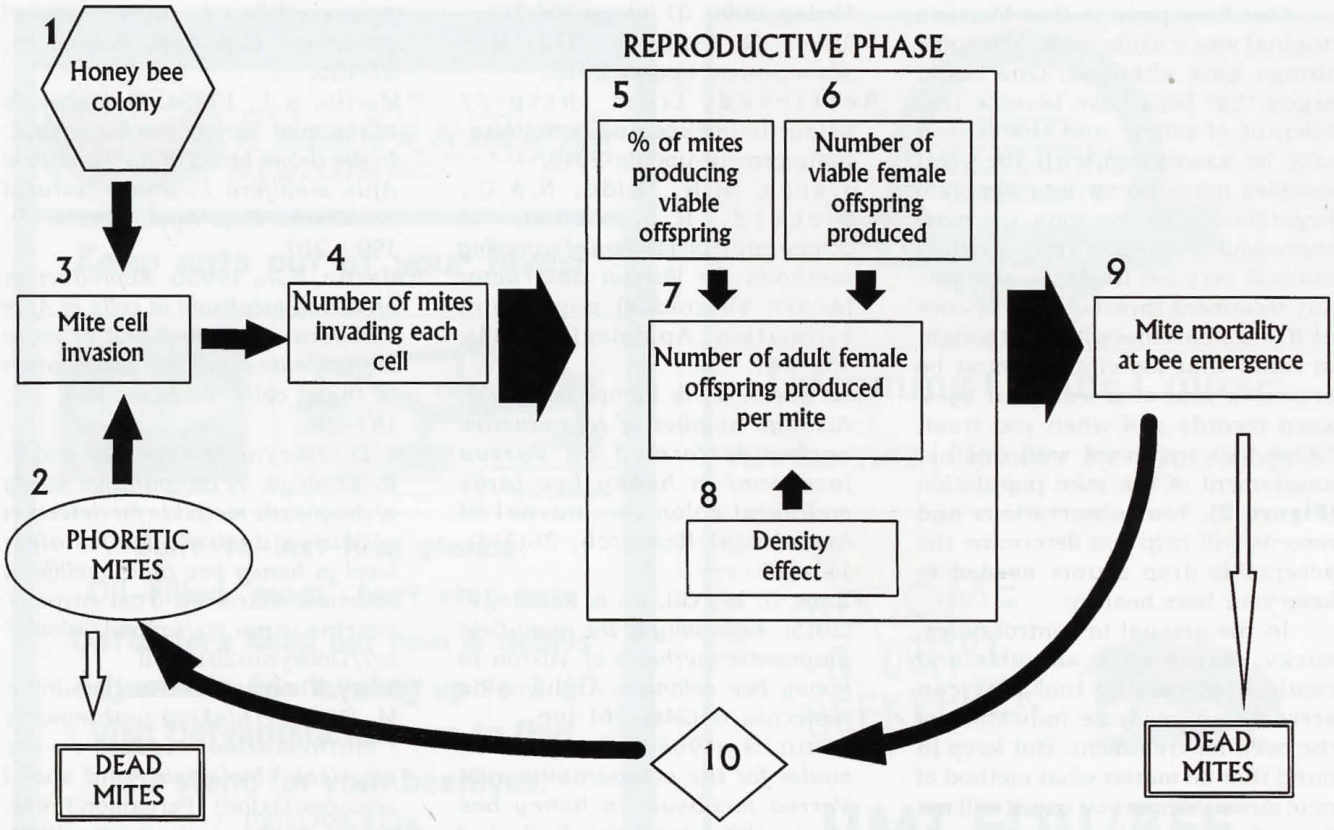


*Figure 5. *Treatment threshold values were obtained from a separate paper by Martin, (Martin, S. (1998b). Varroa jacobsoni: monitoring and forecasting mite populations within honey bee colonies in Britain. MAFF). Martin's total mite population treatment thresholds establish that no treatment is needed as long as the total mite population is below the number listed for each month. Total mite populations are calculated by multiplying daily drop averages by the monthly multiplier.*

rally occurring mite and bee brood cycles **(see Figure 4)**. The total mite population can then be used to determine a treatment threshold based on the season **(see Figure 5)**.

As discussed, support of Martin's hypothesis that natural mite drops correlate with total mite population is found in the work of Branco et al. (2006) and Flores et al. (2015). In both these field studies, mites were allowed to drop naturally, and daily counts were compared to the colony's total mites population. To determine the total mite population all the mites in the colonies were killed then counted. In each study, linear regression revealed that sticky board natural mite drops are highly correlated with the total population.

How to Use Sticky Board Drop Counts

Here's one way you could use your sticky board mite counts to determine treatment thresholds using Martin's multipliers. First, you would do a four-day mite drop and count all the mites, and then that number would be divided by four to get the average daily mite drop. The daily mite drop is the first data point.

Example:

Step 1: If a four-day drop resulted in a 40 mite count, then the daily average drop would equal 40 divided by 4 or 10 mites.

Step 2: Take the daily average drop of 10 and multiply it by the seasonal multiplier found in Figure 4. In this case, we'll say it's the month of May. May's multiplier, according to Martin, is 30. The result would be 300 (30x10), which is the second data point.

Step 3: This is just a simple look-up that's found in Figure 5. In this case, Martin's threshold for treatment in May is 170 mites. Therefore using this example, with the result of 300 mites, the colony would need treatment.

Doing these three steps is faithful to Martin's research, but there's another way to condense the process a little further. If you do the calculations backward meaning starting with the total mite population treatment threshold and then dividing each by its seasonal multiplier, you have a list of the maximum allowable daily drop averages for each month. For example, using May with a treatment threshold of 170 and dividing by its monthly multiplier of 30, the maximum daily average drop is approximately six. Knowing that you can read a treatment threshold right off the drop board. If you do a four-day drop the natural mite fall for the entire drop period must be less than 6x4 or 24 mites. You can do the same calculation for any total drop.

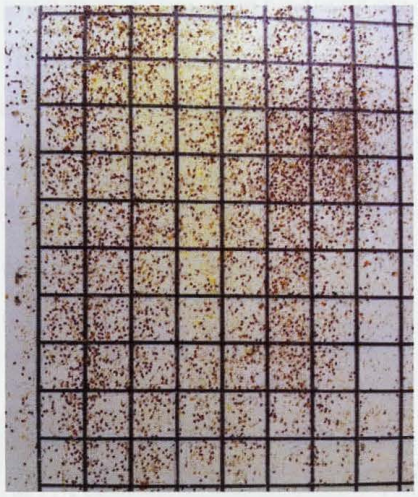


Figure 2. A typical sticky board with detritus and mites.

One final point is that Martin's original was a while back, and some things have changed. One could argue that bees have become less tolerant of mites, and the reason may be associated with the viral complex mites vector into bees.[25] Regardless of the reasons, the most successful beekeepers are controlling mites at very low levels. So evaluate any treatment threshold you choose as if it is a baseline with the thought in mind that it's efficacy must be proven in your area with your bees. Keep records and when you treat, follow that treatment with another assessment of the mite population **(Figure 2)**. Your observations and records will help you determine the acceptable drop counts needed to keep your bees healthy.

In the arsenal to control mites, sticky boards are a valuable and easily implemented tool that can serve as an accurate indication of the need for treatment. But keep in mind that no matter what method of mite measurement you use, it will not be perfect. Each time you approach your apiary, you're engaged with a complicated biological system that requires both judgment and art to manage, and even then will not yield easily no matter how much we wish it would. Your success as a beekeeper will always depend on your skill to observe the present conditions and take action. Treat your bees as if their existence depends on your care - because it does.

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Citations and Notes

[1] Parkman, J.P., Skinner, J.A. and Studer, M.D. 2002. *The Tennessee Varroa sticky board trap.* Bee Culture, 130: 30–33.

[2] Oliver, R. (2006) *IPM 4 Fighting Varroa4: Reconnaissance Mite sampling methods and thresholds.* Retrieved from http://scientificbeekeeping.com/fighting-varroa-reconnaissance-mite-sampling/

[3] Nancy Ostiguy, Diana Sammataro. *A simplified technique for counting Varroa jacobsoni Oud. on sticky boards.* Apidologie, Springer Verlag, 2000, 31 (6), pp.707-716.

[4] Oliver, R. (August 2013) *Mite Management Update* 2013. Retrieved from http://scientificbeekeeping.com/mite-management-update-2013/

[5] Branco, M.R., Kidd, N.A.C., Pickard, R.S., 2006. *A comparative evaluation of sampling methods for Varroa destructor* (Acari: Varroidae) population estimation. Apidologie 37 (4), 452–461.

[6] Martin, S. J., & Kemp, D. (1997). *Average number of reproductive cycles performed by Varroa jacobsoni in honey bee (Apis mellifera) colonies.* Journal of Apicultural Research, 36(3-4), 113-123.

[7] Flores, J. M., Gil, S., & Padilla, F. (2015). *Reliability of the main field diagnostic methods of Varroa in honey bee colonies.* Archivos de zootecnia, 64(246), 161-166.

[8] Martin, S. (1998a). *A population model for the ectoparasitic mite Varroa jacobsoni in honey bee (Apis mellifera) colonies. Ecological Modelling,* 109(3), 267-281.

[9] Huang, Z. (2012). *Varroa mite reproductive biology.* American Bee Culture http://www. extension. org/pages/65450/varroa-mite-reproductivebiology.

[10] Lee, K. V., Moon, R. D., Burkness, E. C., Hutchison, W. D., & Spivak, M. (2010). *Practical sampling plans for Varroa destructor (Acari: Varroidae) in Apis mellifera (Hymenoptera: Apidae) colonies and apiaries.* Journal of Economic Entomology, 103(4), 1039-1050.

[11] Sumpter, D. J. T., & Broomhead, D. S. (2001). *Relating individual behaviour to population dynamics.* Proceedings of the Royal Society of London B: Biological Sciences, 268(1470), 925-932.

[12] Boot, W. J., Sisselaar, D. J., Calis, J. N., & Beetsma, J. (1994). *Factors affecting invasion of Varroa jacobsoni (Acari: Varroidae) into honeybee, Apis mellifera (Hymenoptera: Apidae), brood cells.* Bulletin of Entomological Research, 84(01), 3-10.

[13] Boot, W.J., Schoenmaker, J.N.M., Calis, J.N.M., Beetsma, J., 1995a. *Invasion of Varroa into drone brood cells of the honeybee, Apis mellifera.* Apidologie 26, 109–118.

[14] Martin, S.J., 1994. *Ontogenesis of the mite Varroa jacobsoni Oud. In worker brood of the honeybee Apis mellifera L. under natural conditions.* Exp. Appl. Acarol. 18, 87–100.

[15] Martin, S.J., 1995a. *Ontogenesis of the mite Varroa jacobsoni Oud. In the drone brood of the honeybee Apis mellifera L. under natural conditions.* Exp. Appl. Acarol. 19, 199 – 210.

[16] Martin, S.J., 1995b. *Reproduction of Varroa jacobsoni in cells of Apis mellifera containing one or more mother mites and the distribution of these cells.* J. Apic. Res. 34, 187–196.

[17] N. D. Dobryni, M. Colombo and F. R. Eördegh. *A comparative study of diagnostic methods for detection of Varroa destructor infestation level in honey bee (Apis mellifera) colonies.* Retrieved from https://acarina.utmn.ru/upload/iblock/ce7/Dobrynin2013.pdf

[18] Saaty, Thomas L.Alexander, Joyce M. (1981) *(Thinking with models : mathematical models in the physical, biological, and social sciences)* Oxford ; Pergamon Press.

[19] Fuchs, S., Langenbach, K., 1989. *Multiple infestation of Apis mellifera L. brood cells and reproduction in Varroa jacobsoni Oud.* Apidologie 20, 257–266.

[20] Phoretic means an association between two species in which one transports the other, for example when a mite attaches to a bee and is carried to larva on the bee's exoskeleton. In this state, they are exposed and can be removed and counted using powdered sugar shakes or alcohol washes.

[21] Rosenkranz, P., Aumeier, P., & Ziegelmann, B. (2010). *Biology and control of Varroa destructor.* Journal of invertebrate pathology, 103, S96-S119.

[22] If you want to learn a little more about the math, see this website. http://www.biostathandbook.com/linearregression.html

[23] Martin, S. (1998b). *Varroa jacobsoni: monitoring and forecasting mite populations within honey bee colonies in Britain.* MAFF.

[24] ModelMaker®, 1994. Cherwell Scientific Publishing, Oxford, UK. Internet: www.apbenson.com/cherwell-scientific

[25] Francis, R. M., Nielsen, S. L., & Kryger, P. (2013). *Varroa-virus interaction in collapsing honey bee colonies.* PLoS One, 8(3), e57540.

ASK AN EXPERT

~Brian Lacey

Q: *I often find large numbers of ants collecting above the inner cover of my hives. Should I be worried about them harming the bees? I brush them all off the hive but they always return. Is there any way I can get rid of them without using some sort of insecticide?*

A: In some parts of the world, particularly in tropical and warm temperate climates, ants are capable of overwhelming and destroying even a strong colony. Here in Ontario, however, the ants are less aggressive and are more likely to present a problem for the beekeeper than the bees. There are numerous species of ants that may be found around a hive, but they're often lumped into two broad categories: "big ones" and "small ones". Attracted by the warm, dry conditions, they have a tendency to nest in between the lid and inner cover, or between the hive stand and bottom board. Only when a colony is extremely weak will they venture inside the hive itself. Again, they rarely do the bees any harm, but it can be irritating for the beekeeper to get covered in ants while working in the hive. As with most issues facing beekeepers this is an age-old problem to which many ingenious minds have applied themselves in search of a solution. Here are a few of the more common methods of dealing with ants:

1. GRASS CLIPPINGS

This is my preferred method. It's easy, it's non-toxic and it works 9 times out of 10. Simply grab a handful of grass and drop it onto the nesting ants. I can't explain why it works, but for some reason the ants will be gone the next time you open your hive. Some people recommend using fresh spearmint, peppermint, or catnip instead.

2. FIRE

Use a propane torch to scorch the area where the ants have nested. I have tried this a couple of times myself and besides producing a stomach-turning crackling sound and a lingering sense of guilt, it doesn't seem to work in the long term. In my experience the ants were back within a couple of weeks.

3. CINNAMON

You can either sprinkle a ring of cinnamon around the hive or sprinkle it directly on the part of the hive where the ants are nesting, such as the top of the inner cover. Don't be stingy with the cinnamon – best to get it in bulk. Be aware that the ring around the colony will need to be reapplied after a rain. I haven't tried this method, but I've heard many reports of success.

4. MOAT

If you use a hive stand that has legs you can place the legs inside tin cans and fill the cans with water or vegetable oil to produce a moat. There are a few problems with this technique: some ants can walk on water, leaves and other debris may fall into the cans creating a bridge, and if you use oil it will eventually be displaced by rain water.

5. BORAX

For a serious or stubborn infestation try this: mix a cup of sugar syrup (2:1 mix if you have it) with a teaspoon of borax. Pour the mixture into empty pop bottles, drill several 1/8" holes in the upper part of the bottles (above the fluid line so the mixture doesn't leak out), and place them around the infested colony. It's important that the holes in the bottle are large enough for the ants to enter, but too small for the bees.

Bear in mind that different situations (climates, species of ant, levels of infestation, etc.) may require different solutions, so don't give up if at first you don't succeed. Good luck.

Brian Lacey, B.SC, Research Technician with the OBA Tech-Transfer Program

DON'T EAT THAT!

Can you answer the question; **Is your hive food grade?**

~Andrew Byers

As beekeepers, we concentrate great efforts on caring for our hives and supporting the health of our bees. With this as our focus, it is understandable that we sometimes need reminding there are other important aspects of beekeeping. As well as concentrating on husbandry, we need to remember that hives are also food containers and bees are food producers. Of course, we all take care when bottling and storing our actual honey and nobody would think of putting honey in anything in which it may be contaminated. But maybe we don't always think of the hive as the beginning of this farm to table process.

So, as we are in the food production chain, we should ask ourselves is our hive food grade? Often our husbandry and equipment decisions are based on practicalities related to economics and labor extension. But as with all things, cheap and easy is not always the best solution. So instead of thinking what is quickest and least expensive, let's got through a typical hive and consider what components fall into the category of food grade or alternatively, 'don't eat that!'.

As a food container wood is a natural product and acceptable for contact with honey. Historically we have used wooden dishes, spoons, cups and all manner of wooden utensils and food preparation surfaces. There is a movement back to using wood for food preparation and wooden cutting boards are promoted as a safe, natural alternative to plastic. Nothing about wood seems detrimental to our health or wellbeing and none fall into the 'don't eat that!' category.

However, beekeepers are always looking for new and better alternatives and some of us are considering or actually using hives made of non-traditional materials. One emerging product is high density polystyrene hives and hive components. There is really nothing new about using polystyrene as food containers; try to buy chicken or beef without the little Styrofoam tray underneath! What does this synthetic polymer do to bees and honey inside our hives is the question.

Consider that Styrene and Benzene are both harmful chemicals. Styrene is a suspected neurotoxin and benzene is a known carcinogen in humans and animals. The World Health Organisation is working to educate the public on the negative health effects of benzene and puts forward guidelines on eliminating and reducing its use. Both of these are examples of toxins that may leach out of polystyrene.

In humans, the main route of possible contamination from these chemicals is via inhalation with subsequent accumulation in fat tissue. Anything which accumulates in fat, like styrene, is termed lipophilic or fat loving and therefore will accumulate in substances high in lipids like beeswax.

The ultimate effect of polystyrene on the bees and the honey has yet to be determined. There are obviously differences in interspecies metabolism and toxicity between us and bees. Also, any effect will be variable and dependent on factors such as length of exposure time and temperature of the polystyrene material. In this case the length of time is determined by the individual bee's longevity as well as the ambient external and internal hive temperature, which we know can be high. The extent to which this leaching may affect honey or wax is also determined by the age of the polystyrene material as well as other environmental factors like those mentioned above. So no real answers at this point but certainly many questions!

Oh, by the way a polystyrene hive will last a long time, possibly 500 years before it completely breaks down! Pine on the other hand will last 1% of that time, cedar slightly longer. As polystyrene decomposes it releases chemicals into the environment and a lot of the material becomes nanoparticles which inevitably end up in marine ecosystems. Nanoparticles from polystyrene are particularly harmful to aquatic animals. This is a separate factor beyond the food production aspects of beekeeping but an important consideration for Beekeepers.

Users of polystyrene hives put forward advantages of better thermoregulation and there can be some monetary advantages to these types of hives. There is little published research on the biological effect of polystyrene hives on the bees. But one group of researchers from Turkey in 2004 suggest that wooden hives outperformed polystyrene when assessing overwintering colony survival, winter population loss, brood area, number of frames of bees and low defensiveness. This limited amount of research is insufficient for making informed

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So what about styrene hives?

Styrene boxes on the right, no paint at all in the middle, and, maybe the right color, but is it the right paint on the other end?

No foundation...

Is this plastic foundation food grade?

decisions but none the less thought provoking.

If wooden hives are used, then another consideration is how to treat the wood. Ask beekeepers what wood preservative they use and you will get a range of answers. Preferences seem to be from, whatever paint is on sale through natural oils to nothing at all. The general movement away from environmentally damaging oil based paints means that latex or water based paints are most available to beekeepers. One of the concerns with traditional oil paint is the release of VOCs or volatile organic compounds. These are compounds which easily become gasses and therefore are released from the original compound into the environment. The Environmental Protection Agency identified these as pollutants and presents a long list of possible human health effects. The EPA also suggests limiting exposures. But be aware that although latex paints are lower in VOC they are not necessarily VOC free.

If you are concerned about VOCs then look for paints that are labeled low or VOC free. But don't assume these paints are nontoxic. Most paints contain substances that although not identified as VOCs, are toxic. For example, the banned carcinogen PCB can still be found in some paints. Researchers have found concentrations of this ubiquitous chemical pollutant in certain wood preservatives. Worryingly, it seems that one type or congener of PCB, PCB11, is being produced inadvertently as part of the pigment creating process.

PCB is certainly not something we want around our food but the bad news is that, although banned for decades this carcinogen is found in measurable concentrations almost everywhere. This legacy is the result of the stability of the chemical which does not readily break down. It is thought that PCB, once in our bodies remains there for up to 10 years. A cautionary tale for the use of industrial chemicals and an example of how our choices have longer term implications!

Another chemical component of paint, 2-Butoxyethanol (2-BE), is perplexing for beekeepers or anyone involved in food production. This compound is considered a hazardous substance in some regions of the U.S. and the New Jersey Department of Health considers it a carcinogen. In Canada 2-BE is on the list of toxic substances due to it being harmful to human health. But perhaps of greater concern is that 2-BE is an excellent insecticide according to the National Center for Biotechnology Information! These facts seemingly conflict with this substance being approved for use in food processing. Surprisingly, 2-BE is used as a solvent to clean fruit as well as in food preparation. In addition to this, the USFDA has approved 2-BE as a direct food additive! These seemingly contradictory recommendations makes it difficult to categorize this as 'don't eat that!' but common sense would suggest caution.

Other options available for wood preservation are natural oil products. Many of these are also food products which will reassure us against the test of 'don't eat that!'. Linseed oil is a well know wood preservative but is also, when labeled as flaxseed oil, a food product. Other increasingly popular wood preservatives are hemp oil, neem oil and Tung oil. None of these are new but rather rediscovered traditional products. Their renewed popularity being due to increased environmental awareness.

But if you are thinking these oils are all natural then check because some have chemical drying and hardening agents. This may mean that from a health view point they are no better than traditional paints and perhaps in some respects worse than VOC free paints. So look for labels which state pure or raw, single ingredient oils. For example, boiled linseed oil has chemical additives, usually metals, to aid drying but raw linseed oil will not have these additives.

Another hive component which comes in contact with wax and honey is foundation. Most beekeepers have switched to plastic as the easiest, cheapest and most practical option. Many manufacturers and suppliers state that their foundation is made of food grade plastic but what does this actually mean? If you look in your kitchen, food grade plastic will be labeled with a fork and cup symbol. Foundation has no such labeling but most manufacturers will be able tell you if their products are food grade.

Personally, I would avoid any plastic foundation or other plastic hive components that are not food grade. This plastic is manufactured to a higher standard and more chemically stable. Manufacturing should be done in an ISO 9000 certified facility to ensure that the products meet the International Organisation for Standardization quality and consistency specifications.

If you look closely at the white buckets that many of us use for storage of honey on the bottom will be a number two in a triangle. This is the international recycling symbol and the number two means the material is high density polyethylene (HDPE).

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Honey Harvest

EARLY, OR LATER

When Is The Right Time For You?

~Ross Conrad

In much of the Northeast, the bees have typically stored honey in great quantities by the end of July. Thus the dilemma: to harvest honey now, or wait? Many beekeepers in Southern and Western states enjoy more than one honey harvest a year, but in the Northeast, most beekeepers don't have such luxuries. Let's explore some of the numerous benefits and drawback to harvesting at different times during the season.

Benefits of the Early Harvest

Harvesting honey early in the season while there are still many weeks or even months of nectar gathering to go, can allow the beekeeper to reap some special benefits. Top among them is the ability to harvest honey varietals. Blueberry, Orange Blossom, Buckwheat and others honeys are only possible when the honey is harvested immediately following the major bloom and before the bees have the chance to forage on a different crop. Honey varietals can be delicious, highly sought after and command a premium price. In many parts of the Northeast, harvesting late in July or early August will yield a honey that is primarily composed of the nectar from clover and alfalfa blossoms. Such honey is exceptionally light in color and flavor. Since the honey was harvested prior to the goldenrod bloom, it will tend to take a long time to crystallize, even when the honey is not heated at all during the extraction and bottling process.

Lots of honey on the hives creates a good problem to have, whether to take the honey off and extract it now, or wait until later in the season?

An early harvest can also provide the beekeeper with a marketing edge by allowing them to be the first to offer local honey harvested in the current season. Such a benefit is especially helpful to beekeepers seeking to overcome intense competition in areas with many other beekeepers, or when trying to break into a new market.

The early harvest allows plenty of time to treat before colonies begin the process of raising the all important Winter bees that will carry the hive through the Winter season. This is important because most commercially available treatments to control mites are not approved for use when honey supers are on the hive. It may be helpful at times to break the work of harvesting and extracting up so that there is not so much work to do all at once at the end of the season.

Drawbacks of the Early Harvest

The biggest problem with taking honey early is that it can make it difficult to accurately predict how much honey to take and how much to leave in order for the colony to survive Winter. While it is possible to harvest early and still have the bees collect enough honey during the remainder of the season in order to have plenty stored for Winter, it is also possible that the rest of the season will be a bust requiring that all your hives will need to be fed a lot of syrup to make up for the honey that was taken earlier in the season.

If there is a strong flow late into the year and honey will be harvested both early and later in the season, there is the issue of the extra work required to clean and set up the extracting equipment not once, but twice during the year. Given the extra work involved, it is important to make sure that the price you are getting for that varietal honey is worth it.

The Benefits of the Late Season Harvest

The big benefit of waiting until the very end of the honey season before harvesting and extracting your honey crop is the ability to accurately gauge how much honey is excess that can be safely harvested, and how much

Given all the work involved with setting up, extracting, and then cleaning up, beekeepers with Langstroth-style hives will often wait until the end of the season and harvest and extract all at one time. Alternatively, topbar beekeepers may have to harvest a few frames from each hive every couple of weeks in order to keep their colonies from becoming over crowded.

should be left on the hive for the colony to over-winter on. Sure you can get a lot more money for your honey than it will cost to purchase sugar for syrup, but when factoring in not only the cost of purchasing sugar, but the time and labor involved in mixing up the syrup, feeding the bees and then cleaning the feeders afterward, the benefits of leaving honey on the hive become more apparent.

Then there is the recent study published in the Proceedings of the National Academy of Sciences (Mao, Schuler, and Berenbaum) that discovered that substances found in pollen, such as *p-coumaric* acid, turns on the honey bee's detoxification genes, as well as some of the bee's antimicrobial peptide genes. Since small amounts of pollen naturally get into the honey during the colony's process of collecting nectar and converting it into honey, the consumption of honey is far better for a hive's health than sugar substitutes. In effect, the researchers found that honey may act like a neutraceutical helping to regulate the honey bee's immune and detoxification processes. The benefits of pollen-laced honey in the diet are especially important for hives that are exposed to toxic chemicals and pollutants. The researchers report that when p-coumaric acid is added to a diet of sucrose, it greatly increased the honey bee's ability to metabolize and detoxify coumaphos, the active ingredient found in the varroa mite treatment Checkmite+. These findings may help explain why the artificial diet that so many hives must contend with these days has been linked to the nutritional stress that is one of the factors correlated with the dramatic increase in colony loss experienced in the U.S. during the past six years. Even if you are mixing pollen into your sugar syrup, I suspect that it is better to harvest late and leave plenty of honey on the hive, than to harvest early and have to feed colonies honey substitutes.

The Drawbacks of the Late Season Harvest

A big problem with harvesting honey late in the season is that the honey becomes difficult to harvest. Since nectar sources are drying up late in the year, robbing is rampant among the hives and clouds of robbing bees can make the process of harvesting honey a miserable chore. In the Northeast, temperatures are falling significantly late September and October and this makes the job of extracting more difficult since cold honey becomes thick and does not flow as readily as warm honey. This will make the job of extracting combs more time and energy intensive. Some beekeepers let honey supers sit in a warm room for a couple days and allow the honey to warm up before beginning the process of extracting.

A late harvest can also be the death-knell for colonies that have high levels of *Varroa* mite infestation. As mentioned above, if colonies are not being managed in a way that keeps mite levels low throughout the year, hives must be treated early enough in late Summer or early Autumn in order to become healthy enough to raise healthy Winter bees so the hive will have a good chance of surviving Winter.

Just Right . . .

The right time to harvest your honey will depend on many factors including geographic location, climate, and preferred mite control methods. If you are producing comb honey in the Northeast for example, July is a great time to harvest those comb honey supers, before the bees have the chance to track up the cappings of the comb honey with travel stains.

When producing liquid honey, it is ideal if one can wait until it is possible to determine how much, if any, excess honey is on the hive that can be harvested safely while still leaving plenty to see the colony through Winter. Timing should be early enough in the season that any mite treatments that may be needed can be successfully applied well before Winter weather sets in, and early enough that for hives that do not have enough Winter stores, there is still plenty of warm weather left to feed colonies if necessary and allow them to evaporate the moisture from the syrup before Winter. And the right time will be before all the forage in the area dries up causing the bees to start robbing in earnest and cold temperatures lead to making the honey harvest and extraction more difficult than need be. Your timing must balance with the desire to harvest the maximum amount of honey possible and any specific varieties of honey you hope to obtain, with everything else we have going on in our lives. The right time to harvest the honey crop is similar to the right way of managing our hives in that it will be different for each of us and it will be different from year to year, especially as the climate continues to shift and become less predictable.

Ross Conrad is author of the newly released Natural Beekeeping: Revised and Expanded 2nd Edition, that delves into many of the changes in the industry that are mentioned in this article. ***www.dancingbeegardens.com***

MAKE CREAMED HONEY

~Ed Simon

You have finished with your extraction and the honey is sitting in your basement waiting to be sold. While it is sitting there it is turning into a semi-solid which requires liquefying before it can be bottled. Here is a product that is easy to make that will help you sell some of that honey.

It's called Creamed or Whipped Honey.

Creamed Honey is a smooth-textured, creamy, crystallized honey product that spreads with the consistency of butter. During manufacture, the crystallization process is controlled so the honey crystals are extremely small. This results in an easily spreadable product that will not flow until it warms up.

First a primer on super-saturated liquids.

Definition: Supersaturation is a measure of the deviation of a dissolved sugar crystal from its equilibrium state.

In every day terms, it is a solution that contains more of the dissolved material than could be dissolved by a solvent under normal circumstances.

Small particles called seeds can start the separation of the dissolved material from the solvent. In a solid form these seeds lead to the formation of crystals. The newly formed crystals tend to mimic the shape and size of the seed crystals.

See Wikipedia at http://en.wikipedia.org/wiki/Supersaturation for a more complete discussion.

What we actually have is a basic definition of HONEY as a solution of supersaturated sugars in a solution.

SO LET'S MAKE SOME CREAMED HONEY!

Here is a list of the equipment and supplies that can be used to make your creamed honey.

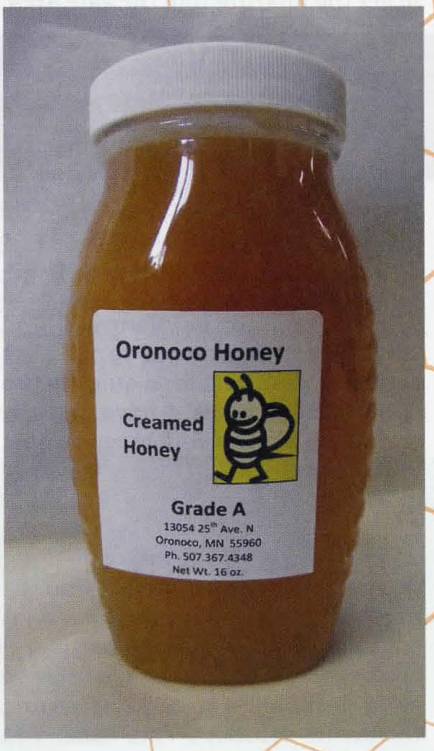
- Honey Non- crystallized Starter culture (Whipped or Creamed)
- Pails
  Mixing, with honey gate
- Containers
  Jars + lids and tubs
- Supplies
  Labels
  Shrink wrap
  Flavoring (optional)
- Mixing equipment
  Spatula, whisk, heavy duty
  Stirrer, electric mixer

Step 1: Honey Preparation

First go to the grocery store and buy a pound or two of commercial creamed honey. You will use this as a comparison to your naturally crystallized honey and eventually as a starter culture for your creamed honey.

Since you already have crystallized honey in the basement, why not use it directly? The problem is that it is not smooth. To test this out, place a small sampling of the crystals on your tongue and then run your tongue against the roof of your mouth. Most of the time, the crystals that you feel on the roof of your mouth are like pieces of sand. This is too rough for sale. The crystals must be smaller so the creamed honey feels smooth. Compare this to the commercial creamed honey you just bought.

To replace these large crystals you must first eliminate all of them. This is accomplished by heating your



honey until all the old crystals are dissolved. Just because you cannot see them, it doesn't mean that they are not there. Therefore you need to heat the honey for a long time (a week) at 110° or a short time at 140°. Then let the honey cool to 80-85°.

Step 2: Starter Culture

To crystallize honey it is recommended that at least 10-20 percent of the initial solution consist of the starter solution (by weight). Don't worry about the cost of the starter. It will be returned when you repackage it as part of your product. The higher percentage of starter the quicker the creamed honey will set up.

Step 3: Mixing

Mixing two pounds of the commercial creamed honey into ten to fifteen pounds of honey is not easy. The lumps just keep avoiding your mixing device. To solve this problem start small. Mix the two pounds into a small portion of honey. Once this is thoroughly mixed, add more honey. Eventually you can pour the thoroughly mixed starter into the remaining container of honey, again making sure it is thoroughly mixed. For ease of use, the final container should have a honey gate that will allow filling jars or tubs. If you are using a pail with a honey gate be sure to get the mixture into the gate area.

Warning:
Do not add the starter culture to your honey when it is hot or it will liquefy.

Step 4: Wait

Now comes the hardest part – WAITING – for the mixture to set up. Place your mixture in a cool area where it will not be disturbed and wait. The temperature range that seems to work best for a quick setup is 55 to 58 degrees. I have had the honey set up at 65 degrees, it just took longer.

Step 5: Mixing

Keep an eye on the mixture. First the air that was introduced into the mixture will rise and form bubbles on the surface. Then the mixture will start thickening. Now is the time to skim the bubbles off the surface and remix the solution. This time, you need to be careful to introduce as little air into the mixture as possible. A very sturdy spoon or mixing paddle is needed to stir this thick mixture.

Step 6: Wait Again

Now wait until the mixture partially sets. It should be thick, but not so thick that it won't flow. It has to be able to be dispensed into your final containers.

Step 7: Bottle It

Package your creamed honey. Be careful not to get any honey on the lids. Remember it will still move around since it has not completely set up yet. When finished, set the containers back in your cool area and wait again.

THAT'S ALL IT TAKES

Step 8: Label

Once the creamed honey has set up enough so it won't move around in the container you can label it and get it ready for distribution.

Here are some additional notes that will be of help to you.

- If you are flavoring your creamed honey, add the flavoring during the first mixing. That way it will be evenly distributed throughout the mixture.

  For a cinnamon flavor add dry cinnamon powder to the mixture at a rate of 1/8 tsp per 10 pounds of honey. It makes a great creamed honey for toast or English muffins. Be sure to remove the excess cinnamon that floats to the top when you remove the bubbles.

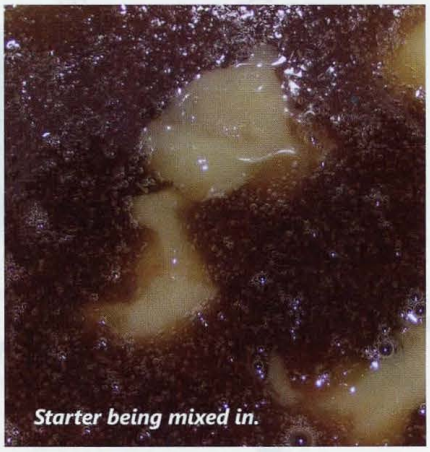
- When bottling, you will eventually get to a point where there may be bubbles or foam getting into the jar. This does not look good for sale. But there is nothing wrong with this honey. Set it aside for your own use.

- Make a little extra creamed honey and store it in a bulk container. Use this honey for the starter culture when you make creamed honey again. Be sure you test it for fineness before using it. The more starter culture you use the faster the solution will set up.

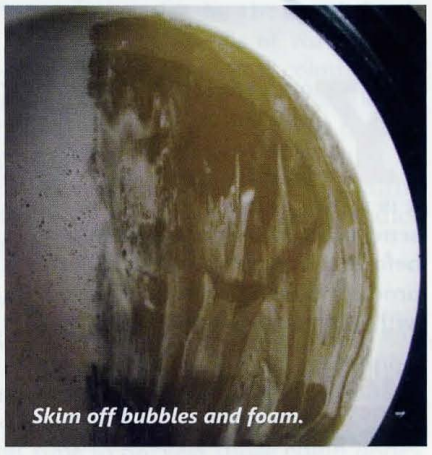
- As a test, pour a little of the initial mixture into a small container. Then add some flavoring. This way, if it doesn't pass the taste test, you have only lost a little honey.

Conclusion

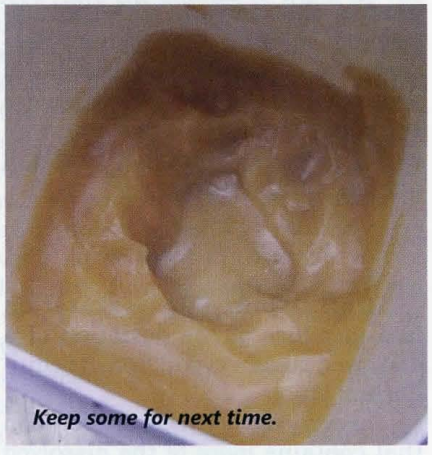
Creamed honey will keep in its creamed form as long as it is not heated. Do not leave it in your car during the Summer or it will turn back into a liquid.



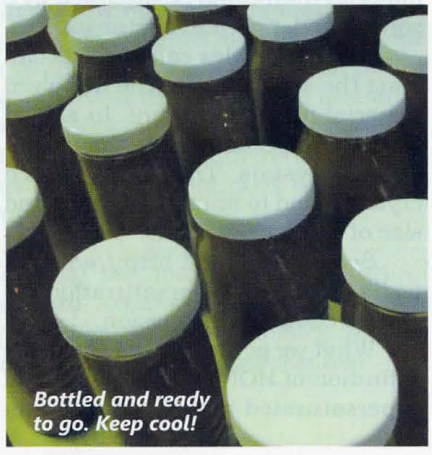
Starter being mixed in.



Skim off bubbles and foam.



Keep some for next time.



Bottled and ready to go. Keep cool!

So are white plastic buckets ok?

Don't Eat That!
Can you answer the question; Is your hive food grade? *Continued from page 40*

This is a food grade plastic which is suitable for contact with honey. But not all these symbols and numbers necessarily mean the products are food grade or recyclable locally. The label, food grade, means different things for different plastics. Some plastic such as number 1, polyethylene terephthalate or PETE, is often used for drink bottles and not recommended for reuse. Plastics labeled with numbers three, six and seven are not good for food storage.

So not all plastic is food grade and not all food grades are for all uses. Which plastic is best and most stable when placed in a hive has not been studied and information on the specific type of plastic used to manufacture foundation is not readily available. These factors combined make informed decisions difficult.

Also, it should be considered that plastic already accounts for up to 90% of the material in landfills and the oceans are literally awash with plastic debris. These are matters beyond food production in the hive but none the less as beekeepers we have a responsibility to environmentally friendly practices.

Honey, along with other hive products end up as consumables. Pollen is used as a dietary supplement, wax is burned in candles and placed in personal care products, propolis can be used for its medicinal properties. Economic and other practicalities of beekeeping often dictate our choices. We are all responsible food producers and environmental champions, otherwise why would we become beekeepers. The reality is we can't keep bees in wicker baskets preserved by cow dung like the traditional beekeepers of old. But nor can we ignore completely the impact of our choices on the quality of the honey and other food products we are producing.

There are other aspects of the hive which are not fully considered here. I have had many discussions with beekeepers about the pros and cons of glue to hold hive bodies and frames together. Composite materials like plywood and fibre board may release formaldehyde. But the message is the same! We all know that we don't need any more chemicals, petroleum products and plastics in the environment. Our customers trust us to provide a natural and healthy product. Along with this, they are asking more questions about our practices and processes. We must make informed pragmatic decisions about our hives and their components. Perhaps when selecting hive materials, we just need to ask would I tell my children, 'yes, you can eat that!'.

CITY BEES

Ten Things You Can Do to Help Urban Honey Bees

ON THE COVER
City Bees

~Toni Burnham

1. SPEAK UP FOR BEES AT HOME:

Every day Community Covenants and Condo Associations make decisions to eliminate bee habitat and restrict green activities, including beekeeping. Put in a good word for bees at your building!

2. RESIST RESTRICTIONS ON URBAN BEEKEEPING:

Cities like DC, NYC, and Chicago leagalized beekeeping, but often local governments restrict it. Bees have been great neighbors for thousands of years. Stress that to know honeybees is to love them, and to want them nearby.

3. PLANT POLLINATOR FRIENDLY PLANTS:

It turns out that bes love a lot of the plants that you do—herbs, fruit trees, and lots of veggies. Check out one of the regional gardening guides at www.pollinator.org/guides.htm (and there's an appf for that, too)!

4. GARDEN ORGANICALLY:

Every neighborhood has thousands of households making millions of choices about what ends up in rivers and streams. Consumers are the main culprits in overuse, and chemicals flow in unpredictable, untested combos into green spaces. Keep your garden simp[le and safe for you AND the bees!

5. SUPPORT GREEN CONSTRUCTION STANDARDS:

Buildings with efficient energy use, green roofs, and good watger management create urban bee habitats and lessen the effects of CO on habitat chang.

6. ENCOURAGE YOUR COMMUNITY TO PLANT TREES:

In many city ecosystems, trees are the major contributor to pollinator forage. A single tree can have tens of thousands of flowers! Trees also provide habitat, clean the air, filter groundwater, and cool summer days.

7. LEARN ABOUT BEEKEEPING:

The bees depend on what your local plants do, so most beekeepers learn from other beekeepers where they live. Get in contact through your local extension office or go to www.beeculture.com/contents/whoswho

8. WRITE A LETTER SUPPORTING POLLINATOR RESEARCH:

The labs that research threats to bees are often closed and usually underfunded, leaving us with few clues about how to help our bees in changing times. Write your Congressperson to support bee research.

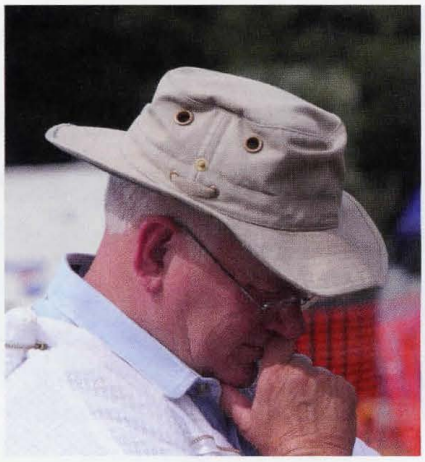
9. LOOK FOR LOCAL HONEY FARMERS MARKETS:

Much of supermarket honey is imported. If you want happy healthy bees nearby, support your local beekeeper by buying locally.

10. TAKE A MOMENT TO SEE THE BEES:

You won't see our busy beautiful bees unless you stop to smell the flowers! Next time you pass an urban garden, pause and watch, and you will see the lovely, lively pollinators you are helping to protect.

DC Beekeepers Alliance: www.dcbeekpers.org



better HIVE STANDS

this may be the golden age of hive stands

~James E. Tew

What a pleasant surprise

Last month, I wrote that, *"I would like to come up with a design for individual hive stands rather than the communal stands that I now use. If any of you have an idea for such a hive stand, I would enjoy having a look at it."* Some of you responded with photos and information about your personalized hive stands. All beekeepers have hive stands of some sort. Here's a look at what some of your peers are using.

L.C.'s hive stand for an eight-frame colony.

L.C. from Northeast Oregon

I read your article in *Bee Culture* magazine and am sending you pictures of the bee stand I made from 2x4s and 1x4 scraps and a picture of my bee set up. The stand is 18" tall and made for eight-frame hives. We have skunks in NE Oregon, and I thought a stand was something that ought to be made for the bees' sake. This is what I came up with

E.K. from Manlius, NY

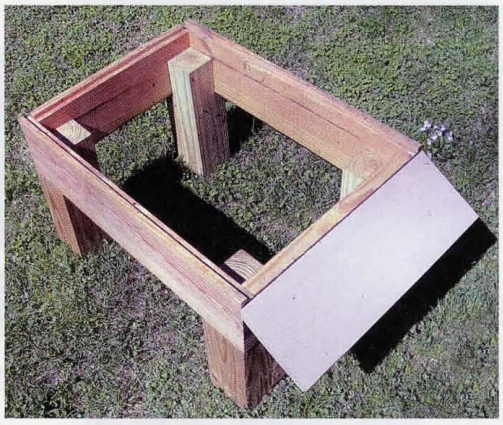
In response to your request for a hive stand, I am providing you with my design, which has stood the test of time. I have tried commercially produced stands with built in *Varroa* trays, concrete "cinder" blocks, 4" x 4" multi-hive rails, etc. This has ended up being the best (especially for northern beekeepers) and represents the culmination of ideas from other beekeepers and my own experiences. While it can be used as is, I designed it to work in conjunction with a screened bottom board of my own design (no mite tray) and black panels on all four sides to provide a dead space and control winds and Winter weather.

L.C.'s hive stands and convenient work table with storage.

Here are the benefits of the design:

1. Stands have been made with pressure treated lumber. I now use weathered pressure treated due to all the discussion about the impact on bees.
2. Approximately 16" off the ground to lessen the impact of skunks and other varmints. Height is less than 16" to maximize standard lumber dimensions.
3. Stand is flush with hive bodies on three sides to eliminate a perch for varmints (except the front where the bottom board overhangs). Landing board, part of bottom board, is just over 1" wide.
4. Stands are put on bricks/rocks rather than direct contact with the soil to increase life. I like to use two 2" x 8" x 16" solid concrete blocks (the kind used to cap a cinder block wall). I place one level under the front feet and one under the back feet.
5. The stands I use also have plywood panels on all four sides, painted flat black, to provide a 16" "dead space" due to the screened bottom board that the bees seem to like allowing the queen to lay down to the bottom of the lower box. The panels are removable for the Summer, although I have evolved from removing all four – to only removing one on the southern exposure – to leaving them on year-round. There is enough gap at ground level for plenty of ventilation although beekeepers in other climates may consider using a lighter paint color or foregoing altogether. I developed a system that allows me to install and remove the panels without tools, although it still needs some improvement. The reason the panels are painted "flat black" is to maximize solar gain at mid-day in the Winter, which allows the Winter cluster to move to honey stores during the more marginal cold spells.
6. Simple screened bottom board is placed on top to provide ventilation, lessen the impact of *Varroa* and create a dead space below.

Hive stand without and with panels installed from E.K.



R.O.'s basic hive stand.

7. Height above the bottom board screen/landing front is only 3/8" high rather than the traditional ¾". Never had a mouse enter unlike my experience with ¾" traditional height rims (p.s. got the idea from a polystyrene BeeMax bottom board that I tried. It only has a 3/8" high space).

M.K. from Niskayuna, NY

Attached is recent picture of a hive stand I made. I made a 2x8 (2x10 would work, too.) rectangular structure with front to back cross pieces to maintain a width for the hive boxes, replacing concrete blocks that frost-heaved. This was screwed into garden fence posts that were hammered well into the ground. I added some small one-foot length one-inch angle brackets to keep the hives from sliding off, as there is nothing under them.

Frames that are removed from the colony for inspection can be temporarily stored in the structure's open space.

R.O. from Clinton, NY

I am a hobby beekeeper with about 10 hives. This is a stand I have all my hives on. It's about 13 inches high I use screened bottom boards and slatted racks. I can slide a sheet of quarter inch plywood under when treating or testing for mites or for Winter.

M.H. from Boulder Creek, CA

My husband and I are hobbyists now entering our fifth year with bees. We live in the redwood rain forests of the Santa Cruz Mountains about 30 minutes from San Jose and 30 minutes from Santa Cruz on the Monterey Bay.

When not suffering a drought we can see up to 70 inches of rain between Nov 1 and May 1 with an average of about 55 inches. In winter evenings, temperatures can be in the low 20sF with an occasional dusting of snow. In summer we frequently hit 100°F during the day. We also have all sorts of wild life to contend with ranging from raccoon, skunk, and possum to coyote, bobcat, and mountain lion (no bears).

R.O.'s hive stand with plywood insert in place.

When we decided to enter the beekeeping arena, we wanted hive stands that would keep the hives stable, off the ground (out of flood waters and away from the cooler air) and protected from Winter storm winds and hot Summer heat. We opted to position our hives along a six-foot western fence for wind and sun protection.

We came up with a very flexible hive stand configuration using groups of three cider blocks at the ends and 4x4s spanning the gap. The length of the 4x4s determines the gap distance.

Some folks may feel the 4x4s are too close together offering too little support front to back. We have not found this to be an issue. The hives could be angled to further reduce drifting possibilities. Ideally two hives on an eight-foot span gives ample space for placing equipment during inspections. We are currently set with three colonies in that span and things are a bit tight.

Last year most colonies were five or six boxes high – about 200lbs each – so weight on the 4x4s is not a concern. (We run all 8-frame medium equipment on screened bottom boards (open year round), with slatted racks and Vivaldi boards instead of inner covers.)

With our hives abutting the fence we must stand between hives for an inspection rather than behind. It's not ideal, but we have gotten used to it. Eventually we will lose a colony and regain the space between hives. (We have had an exceptional success rate with zero losses to date.)

Commercially produced hive stands

During recent years, commercial companies began to design and market hive stands that were made of some combination of wood, metal or recycled plastic. Since I am a longtime beekeeper I was trained many years ago to use the typical cement block hive stand – two blocks front and back of the hive bottom board. I have never really liked cement blocks for this use. The blocks were just ever-so-slightly too narrow and to this day, they are very heavy.

BeeSmart Designs produces a plastic hive stand that is available from many bee supply sources. Again, I confess that I have never – up to this point – used this or

Wintering colonies with protective wrap.

any other manufactured hive stand so my comments here are not an endorsement of the product. Since BeeSmart responded with information about their product, I am including it for your review. Some characteristics of the hive stand are listed below.

1. Raises hive 12" off ground for easier access and better ventilation.
2. Works with any bottom board, no wood hive stand needed.
3. Hive sits on heavy-duty rails for total support.
4. Available for eight-frame and 10-frame hives.
5. Built-in drains keep hive and hive components dry for longer life.
6. Large footpads spread load and ensure stability.
7. Fast and easy assembly. Less than two minutes with only a screwdriver.
8. Ballast ports allow legs to be filled with sand for additional stability.
9. Made in USA from recycled materials.

After all is said and done....

In 2008, I wrote an article for *Bee Culture* named *"The Lowly Hive Stand."* I went into some detail about the basic features that solid hive stands would need. At that time, other than educational efforts intended to help beekeepers of all levels, little was decided and no specific model arose to the top of the hive stand pile.

Through the years, nearly everything plausible has been used to support beehives. The time-honored slanted landing board style is still in all the bee supply catalogs. To my thinking, the only true benefit was that it kept the hive about four inches off the ground. It has a slanted landing board with the notion that it somehow helped heavy-laden returning foragers alight more safely. The main attribute that I found to be dependable was the appreciation that mice showed for being provided such a protected and warm nesting site beneath the hive. These four-pieced cypress devices have come as close as possible to being the standard hive stand. They were cheap, they were simple, and they worked (some). Indeed, the hive stand has always been a piece of beehive equipment that encouraged creativity. To many, nearly anything can be used as a hive stand, while others devise unique designs, and now many of us just buy our hive stand from commercial suppliers.

Why does the hive stand remain the most non-standardized piece of hive equipment? I'm guessing that it is because our time-tested system of keeping bees in artificial domiciles requires beekeepers to keep the hive too near the ground – but that's just me. There is no "natural" model for designers to follow because temperate honey bees rarely nest near or on the ground. On occasion, one may find a colony with the entrance *near* the ground, but the internal nest will be much higher up within the wall or hollow tree.

Hives positioned on 4x5 posts and cement blocks.

I simply must give up....

I have invested more than three hours time searching for a single black/white photo that I have seen of 20-30 beehives on a high platform in a Tupelo swamp. Through the years, I have seen this photo time and again, but now I simply cannot find it. The high platform was built to protect the hives from bears in southern Tupelo swamps.

The "Ultimate Hive Stand." by BeeSmart

I'm frustrated because this photo would help make my point – these tupelo-honey-producing beekeepers had unintentionally positioned the colonies on the perfect hive stand 10 to 15 feet high – perfect for the bees but probably not for the beekeepers. The amount of labor required to build the heavy platform in the swamp is mind-boggling.

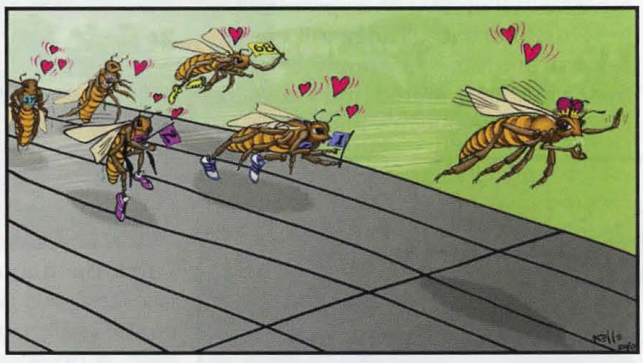
But that is not the only reason hive stands designs have always been wishy-washy. Space requirements. Even in our earliest beekeeping years, hive stands were unloved. Think about it. You are using a horse-drawn wagon loaded with bees and beehives. You travel at a glacial pace out and back. So you feel that using a good part of the wagon space to load hive stands is a good idea. Nope. In some of the old photos, beekeepers cut sections of old growth trees (about 10 – 12 inch thick wheels) to provide *"disposable"* hive stands. They were cut near the yard and were never moved from that yard. So cheer up beekeepers. Todays hive stand styles are as good as they ever have been. In fact, this may be the golden age of hive stands.

Dr. James E. Tew, State Specialist, Beekeeping, The Alabama Cooperative Extension System, Auburn University; Tewbee2@gmail.com; http://www.onetew.com; One Tew Bee RSS Feed (www.onetew.com/feed/); http://www.facebook.com/tewbee2; @onetewbee

THE QUEEN: RULER OR RULED!

~Morris Ostrofsky

The queen is often referred to as the "queen mother" because indeed she is the mother of all the bees in the colony. When we think about the role of a queen, we think about her as the decision maker within the colony. She is the morale glue that connects. She produces the young that supports the colony. Yet many "decisions" she appears to make are not hers alone. In reality she serves the workers who determine the length of her reign, when to expand, the gender and quantity of eggs she will lay. This article explores the relationship between the queen and her "subjects" as well as points out examples of queen related mellifera mysteries.



So who is the queen mother and what does she really do? Not all fertilized eggs are destined for royalty. Any fertilized egg has the potential to become a queen. The queen and workers are structurally the same except in the queen's case she has functioning reproductive organs. The difference in their developmental path occurs on day 6 of her life or 3 days after she hatches from an egg.

This difference is the result of a number of factors. The queen cell size is larger than worker or drone cells. The cell orientation is vertical and the quantity and quality of food is greater than that fed to workers. During the next 5.5 days (days 4 to 8.5) the queen larvae are almost constantly fed a rich diet of royal jelly. Workers, on the other hand, are raised in smaller cells and are fed royal jelly only for the first 3 days of their larval period. Once the queen completes her development of approximately 15-16 days, she goes on multiple mating flights and settles down to a routine life of just laying eggs. She can lay about 1000 eggs per day and roughly 200,000 eggs per year over her lifetime.

Photo Credit: Science of Bees Archives

Yes, as a matter of fact the world does revolve around me.

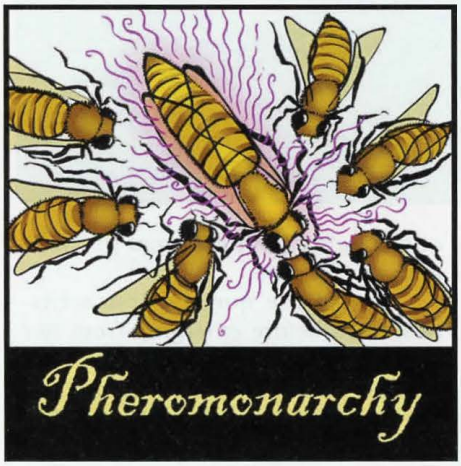
One of the queen's first activities, even before emerging from her queen cell, is piping. This is a rarely noticed series of sounds made by a queen. It has been described by A.I. Root as "a sort of zeep, zeep, zeep, zeep. It consists of a prolonged tone, or a long zeep followed by several much shorter ones."

There are two forms of piping: Tooting is an amazing phenomenon produced by a queen that has recently emerged from her cell. Quacking, a similar sound but more muffled, is produced by queens that are about to emerge from their cells. Virgin queens, who usually run throughout the hive, will stop running when they pipe. They hold onto the comb, press their thorax to the comb and vibrate their thorax muscles. The sound this creates travels through the comb and is "heard" through the bee's feet. The sound of piping is loud enough to be heard by beekeepers a few feet away from the hive.

Why do queens do this? The piping possibly serves as a warning to prevent multiple virgin queens from emerging simultaneously. And how the workers fit into this? They key

into the sound of the queens quacking inside their cells. Short term the workers prevent multiple queens from simultaneous emerging by physically keeping queens in their cells when feeding them. A video with sound can be heard at the following site. https://www.youtube.com/watch?v=xK8fEPsAc6U

After her exoskeleton hardens at about 5-6 days after emerging, the queen will take multiple mating flights to drone congregation areas. She does this when the weather is clear, not windy, and the temperature is about 69 degrees F. Mating takes place about 20 – 50 feet in the air. She will mate with approximately 12 to 20 drones. The result of successful mating is a supply of spermatozoa that is stored and viable for the rest of the queen's life.



There are three mellifera mysteries associated with mating. How do drone congregation areas (DCA) form in the same location year after year and how do the virgin queens know where to find them? How do the spermatozoa remain viable for well over a year is the third mystery.

Drones gather in specific locations where they hang out waiting for a virgin queen to visit. These DCA are smaller than an acre, and persist year after year. In England, for example, DCAs have been documented in the same location for hundreds of years. The mystery is how do the drones know where to congregate? Almost all drones in a colony are gone by the end of winter. Since the life span of a drone is 6-8 weeks, new drones could not possible know the location of the drone congregation areas from one season to the next. The answer remains an enigma.

Drones from a particular hive will fly about half a mile from home to a DCA. The virgin queens will fly about 2 miles from home. This separation of distance prevents inbreeding amongst the bees. How the queen locates the DCA remains to be discovered. Like the drones she has no memory of these locations.

One of the many fascinating queen abilities is gender selection of the eggs she lays. If she wants to produce a drone she lays an unfertilized egg. A worker on the other hand is produced by laying a fertilized egg. How she controls this internally and how she keeps the spermatozoa viable during her entire life is another mellifera mystery. What is known is how the workers influence her decision. Workers will build either large drone size cells, or the smaller worker sized cells depending on what is needed in the colony. When a queen approaches a cell in which to lay an egg, she measures the diameter of that cell with her front legs and then lays an egg of the appropriate gender. So, even here, a decision you would think is entirely up to the queen, is not. The workers are getting the first word on gender control.

The queen is essential to the functioning and homeostasis of the colony. She represents the main regulating factor of the colony functions. "This regulation is largely achieved by means of pheromones, which are produced by different glands and emitted as a complex chemical blend, known as the "queen signal." Maintenance of worker cohesion, suppression of queen rearing and inhibition of worker reproduction are some of the effects of the queen signal. The queen's chemical signal is passed among the bees by means of contact; touching as they move through the hive and by passing food to each other.

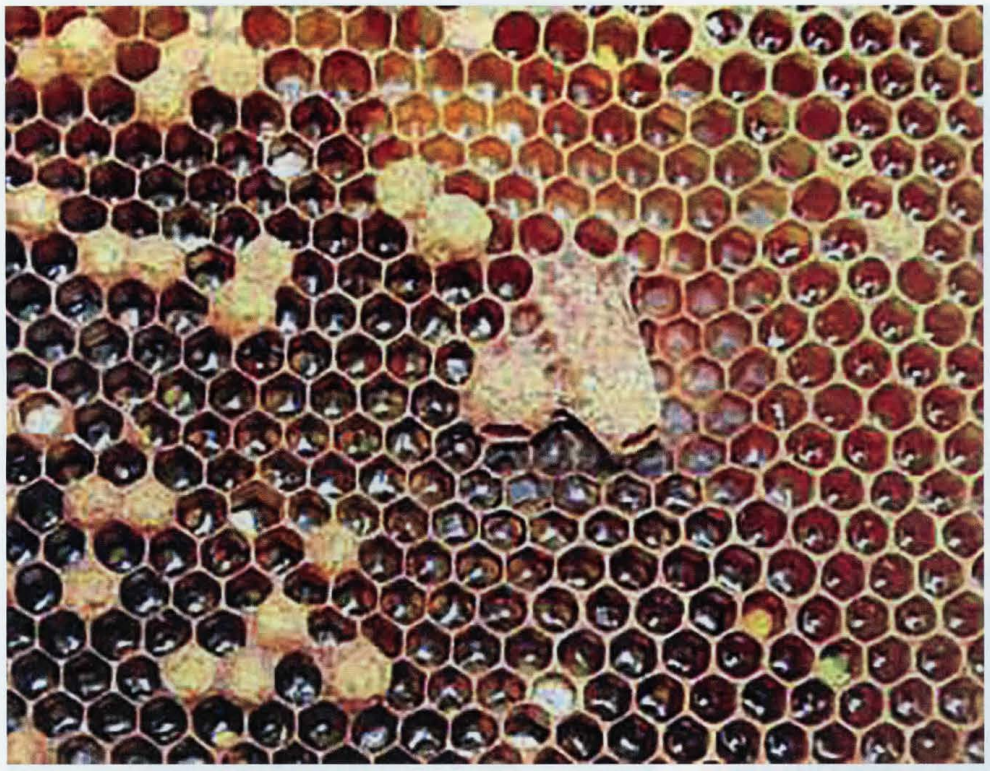
The presence, level or absence of the queen's pheromone bouquet is key to the actions the workers take regarding construction of new queen cells: when a queen is old or sick (low pheromone signal), has disappeared or is dead, or the colony has become so congested that her pheromone signal is diluted. In each case it is the workers who make the decision. Swarm, supercedure and emergency queen cells

are the workers' response to these conditions.

Swarming is the natural way that bees propagate new colonies. When there is a lot of food coming in and the colony population is increasing to the point of being overcrowded, the queen pheromone is spread thin. At this point the workers start preparing to replace the queen. Although swarming is the way colonies reproduce, a colony with young queen less than a year old is less likely to swarm. The colony with a new queen needs to build up its stores for winter; they would not have time to recover and prepare for winter if they swarm late in the season.

Swarm preparation starts with a queen cup. A queen cup is an inverted, empty cuplike structure usually found on the margins of the brood comb. The workers build queen cups any time during year but they only follow through and make a complete queen cell under certain conditions. Often new beekeepers will mistake a queen cup for a queen cell and assume their hive is

The queen is essential to the functioning and homeostasis of the colony. She represents the main regulating factor of the colony functions.



about ready to swarm. A queen cup by itself means nothing and in most cases is never used. Once an egg is laid in a queen cup, the metamorphosis to a queen cell begins. Here is the next mellifera mystery. Does the queen voluntarily lay an egg in a queen cup or do the workers direct her to one? It's just not known.

As soon as an egg is deposited into the queen cup, the workers enlarge it and it becomes a viable queen cell. These cells are referred to as swarm cells. The workers usually have a back up plan and build more queen cells than they need; approximately twenty. When the swarm cell is capped (plus or minus one day), the existing, old queen leaves the mother hive with roughly 50% of the workers and a small proportion of the drones.

Workers have a say regarding how long a queen remains on her throne. When a queen is perceived to be weak or damaged, the workers will replace her. This natural replacement process is called supersedure.

A queen's peak egg production is in her first year. Beyond that time her egg and pheromone production becomes diminished. Another cause for replacement is the bees' perception of damage to the queen; for example a missing leg due to a beekeeper's manipulation intentional or not. The jury is still out on whether or not wing clipping leads workers to supersede a queen.

To make a supersedure cell the workers modify existing cells that contain 24-36 hour young larvae. Supercedure cells can be distinguished from swarm cells in a number of ways. They are usually found on the face of the comb and are darker in color. There are fewer supercedure queen cells than swarm queen cells. Sometimes a recently emerged supersedure queen will work side by side with her mother, the old queen. However this two queen situation does not last very long. The old queen disappears soon after the new queen begins to lay eggs.

If the queen is suddenly no longer in the hive, the lack of her queen pheromone causes an immediate reaction by the workers. They will modify existing cells containing young larvae and produce emergency queen cells. These cells can be distinguished from other queen cells in that they appear to be melted or fused into the face of the comb. Emergency queen cells are not built under optimum conditions. The workers may not have access to larvae less than 36 hours old. This can result in a queen that is inferior.

Despite the queen's role as the perceived head of the colony, there are many reasons to believe she is not an absolute ruler. The question is does she rule or is she ruled? Most behaviors in the hive are initiated by her daughters. Like the queen of England, the queen bee reigns but does not rule.