Things you need to get started

I recommend obtaining the following equipment for your first year of beekeeping. This should get you through the first year of beekeeping, and will get you prepared for the next spring.

Each hive should have the following elements:

1) BOTTOM BOARD

a. You have a choice between a standard wooden bottom board or a screened bottom board. Most people are now using a screened bottom board as an IPM method for controlling varroa mites.

2) BROOD NEST HIVE BODIES

a. **If you are using DEEP hive bodies** for your brood nest, you will need to obtain 2 deep hive bodies, and 20 frames (10 per each hive body) to use for your brood nest.

b. **If you are using MEDIUM hive bodies** for your brood nest, you will need to obtain 3 hive bodies, and 30 frames (10 per each hive body) to use for your brood nest.

c. **FOUNDATION**: Each frame in the hive body should also have a sheet of foundation. Foundation provides a cell pattern for the bees to draw out the frame. The frames that go in the hive bodies can be one of the following types of foundation:

> SPECIAL NOTE: Don't mix and match foundation. It won't work to get a couple frames of each type of foundation and throw it in a box. Decide on which type you will want to use and stick to it. Once the frames are drawn, it won't matter what the foundation was but it makes a big difference when you are having the bees draw out the comb.

i. **Beeswax foundation** – thin sheets of real beeswax. Supposedly, the bees accept this type of foundation the best. (I personally use plastic foundation, so I can not attest to that statement)

ii. **Plastic foundation** – plastic sheet with cells molded into them. Different vendors call it different things (RiteCell, PlastiCell, etc). If you choose to use plastic foundation, I recommend getting BLACK foundation for the brood nest and white foundation for honey supers (see "HONEY SUPERS" below)

iii. **Duraguilt – NOT RECOMMENDED**. This is a sheet of plastic with beeswax sculpted on it. The cells are not plastic, but are beeswax instead. The problem is that when

the cell walls become damaged, the bees do not rebuild it like they do with beeswax or plastic foundation. Once again, this is NOT RECOMMENDED. I provide it here so you aren't confused by it if you see it in a catalog.

iv. **PermaComb – NOT RECOMMENDED**. These are frames with the entire full depth cell (so bees don't need to draw it out). These have a tendency of breaking in cold weather, and it makes harvesting a little more difficult. Once again, this is NOT RECOMMENDED. I provide it here so you aren't confused by it if you see it in a catalog.

3) HONEY SUPERS

a. **USE MEDIUM HIVE BODIES** for your honey supers. Fully loaded, these will weigh 40+ pounds. Use shallow hive bodies if are worried about carrying this much weight. For your first year in beekeeping, you will need to obtain 2 or 3 hive bodies for the honey supers. You will obviously need 10 frames for each hive body and the foundation to go in it. You won't need these honey supers on DAY ONE, but it should be your goal to have those 2 or 3 honey supers completely drawn out by September (and hopefully full of honey).

b. **FOUNDATION FOR HONEY SUPERS**: Each frame in the hive body should also have a sheet of foundation. Foundation provides a cell pattern for the bees to draw out the frame. The frames that go in the hive bodies can be one of the following types of foundation:

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4) INNER COVER

Every hive will need an inner cover to prevent the bees from gluing the outer cover down onto the hive. You have a couple choices for inner covers. I personally use both types at different times in the year. In the hot days of summer, I use a screened inner cover to help keep the hive cool (although…). In the cold winter, I always use a wooden inner cover.

a. **WOODEN INNER COVER -** Although similar in appearance, not all wooden inner covers are the same. Look for an inner cover that has an elliptical opening on the top and a notch on the side.

   The opening on the top should be the perfect size for fitting a bee escape. Although bee escapes aren't really feasible in our area (the evenings don't get cool enough during harvest time), you can use the hole for feeding using a pail type feeder (more on this during the Feeding Bees lecture).

   The notch on the side can be used in the winter to provide an upper entrance. It is also useful to exhaust the warm, moist air from the bee's breath during the winter.

b. **SCREENED INNER COVER –** This is merely a screen stapled onto a wooden outer frame. The idea is to provide a quick way for the bees to exhaust moisture from the hive when they are trying to cure unripe honey. Some beekeepers provide this exhaust path by staggering the hive bodies so there is a gap between hive bodies (the lower hive body is pushed forward, the upper is pushed backward, etc). Others use a screened inner cover. Others don't do anything and just use their wooden inner covers year round.

   Personal note: I have doubts about the effectiveness of screened inner covers in our area. The idea is to provide an easy path for moist air to escape while the bees are curing unripe honey. Bees have a natural way of evaporating the moisture out, and they have an ability to setup a rather complex air circulation system throughout the hive when they need it. I wonder if using a screened inner cover is actually working against us here in Maryland. Our area is so humid in the summer. It would be like leaving the windows and door open in your house while you are trying to run the air conditioner. Hmmm… Just a thought.

5) FEEDERS

You will need to feed your bees a lot during the first year. Although we will cover Feeding Bees in another lecture, you will need some method of feeding the bees starting on the day you get them. **I recommend getting a hive top feeder with your basic setup.** Here are the options you can pick from:

a. **HIVE TOP FEEDER –** This is probably the most effective way of having the bees consume a lot of feed in a short time. You will need this ability in your first year because the bees will need to consume a lot of sugar syrup to turn all those frames of foundation into beautiful drawn comb.

   Hive top are effective only when the weather is relatively warm (above 50 degrees F). In colder weather, you will want to go with a different type of feeder

b. **DIVISION BOARD FEEDER** – These also provide an effective way of having the bees consume a lot of feed, but the hold less sugar syrup than a hive top feeder and you will need to open the hive to refill the container.

c. **PAIL TYPE FEEDER** – Hive top feeders are not always the best way to feed the bees. Sometimes you want to feed the bees a trickle of sugar syrup instead of a humongous flow. This can be useful in the late winter/early spring when you are trying to simulate a nectar flow. You can do this with a pail type feeder.

   When the weather gets colder (drops down below 45 degrees or so), then the hive top feeder is ineffective because the bees will not leave the cluster to reach the sugar syrup. In these cases, you want to provide a way to bring the feed directly to the cluster. You can also do this with a pail type feeder.

   Pail type feeders are containers or jars with lids that close air tight. They can be made of plastic (oyster jars work well), or glass (mason jars). A few holes are poked into the lid using a small nail and the container is inverted. Some water leaks out, but soon a vacuum is built in the jar where the air is, and the water stops flowing.

d. **BOARDMAN FEEDER – NOT RECOMMENDED**. These are feeders that you stick at the entrance of the hive. They are okay for feeding water, but they are not recommended for feeding sugar syrup because this will incite robbing behavior.

OUTER COVER

You will also need to get an outer cover. There are several options:

e. **TELESCOPING OUTER COVER –**These are the mostly widely used covers. They are flat topped and are wider and longer than a hive body, which makes the outer cover extend over the hive body on all four sides.

f. **MIGRATORY OUTER COVER – NOT RECOMMENDED.** These are generally used by commercial beekeepers or beekeepers that need to move their hives frequently. They are flat topped and extend over the hive in the front and back, but not on the sides. This allows migratory beekeepers to stack the hives on pallets side by side. I don't recommend this for beginners or backyard beekeepers because the outer cover tends to slide from side to side, making it more difficult to get it centered over the hive correctly.

g. **ENGLISH GARDEN OUTER COVER – NOT RECOMMENDED.** These are sold by many vendors. They are not flat – they are pitched like a house. The top is typically clad with copper instead of tin. They look wonderful. I don't recommend them because they are heavier than the other types of outer covers and the pitched roof isn't as useful. I frequently use my outer cover for stacking things when I am inspecting – I lay the outer cover upside-down on the ground and then I stack hive bodies on it while I go through the hive. I wouldn't be able to do that with an English Garden outer cover.

You will also need the following miscellaneous items:

6) **WOODEN ENTRANCE REDUCER.** This is used to reduce the amount of space that the colony needs to defend. You will need one for each hive.

7) **SMOKER**. You want a smoker that won't run out of fuel while you are working the bees.

8) **HIVE TOOLS.** There are several types and several sizes. I find that I use both a regular hive tool and a Maxant style hive tool at different times.

9) **VEIL.** There are several types and they come in several sizes. In your first year, it is normal for you to feel nervous with the bees crawling over you as you inspect the hive. Buy a veil that you will feel comfortable working the bees in.

10) **GLOVES.** Sometimes wearing gloves gives too much confidence, and the beekeeper tends to thrash about in the hive. Obviously, the bees won't like the thrashing. That is why I recommend that you try to work the bees without wearing gloves. That being said, there are times when you will need them regardless of whether you are a beginner or an expert. For first year beekeepers, I recommend purchasing a good set of gloves,

but I also recommend that you try not to use them (or use them only when you need to).

NOTES

1) Make sure you use glue when assembling the frames. This makes a HUGE difference in the strength of the frame.

2) Each frame gets ten (10) nails. Four (4) are nailed on the top down into the side bar (2 on each end). Another four (4) are nailed on the bottom bar into the side bar (again, 2 on each end). And finally, two (2) are angled up from the sidebar into the top bar (one on each end).

3) You should paint anything that gets exposed to the weather:

   a. The bottom board needs to be painted all over (on the top and bottom).

   b. The **outside** of every hive body needs to be painted, regardless of whether it is a brood nest box or a honey super. (NOTE: Don't paint the frames. Don't paint the inside of the hive body. Only the outside of the box itself is painted)

   c. The inner cover needs to be painted (or does it?). I paint both surfaces, but I probably really didn't need to since only the edges are exposed to the weather, and the edges are generally protected pretty well by the telescoping outer cover. It wasn't any hassle to paint it since it was so small, and I had the paint out anyway. Why not?

   d. The outer cover needs to be painted all over (on the top and the bottom).

   e. The outer sides of the hive top feeder need to be painted since it will be exposed to the weather (and it isn't as protected as the inner cover).

Drawn Comb – How to make it, How to store it

You can purchase virtually anything related to bees from a beekeeping supply vendor. Need a bottom board? They can sell you one. Need a double screen board? They have those too. Need hive bodies? Yep – they'll sell you one – even assembled if you want it that way. They'll even sell you the bees! You can get almost everything you need from a supplier, with one notable exception: You can't purchase drawn comb. If you call a supplier and ask for drawn comb, they will try to sell you frames of foundation instead. It will be up to you and your bees to get the foundation drawn into comb.

Drawing comb is hard work for the bees. Studies have shown that for every pound of beeswax generated by the bees, they need to consume energy equivalent to make 8 pounds of honey. That's an 8:1 ratio! Yet bees need more than just honey to efficiently create wax. Studies have shown that protein is also important during wax production. Bees lose about a fifth of their body protein in about 2 weeks of intensive wax production if the hive was lacking an incoming protein source. The primary source of protein for bees comes from pollen or in the pollen/honey mixture known as "bee bread". All this can be summed up by saying: **The bees need a strong nectar flow and an ample supply of pollen to draw comb**.

As you might guess, not all castes of bees can generate wax. Workers are the only caste possessing wax glands, and their glands are in their prime when the worker is between 12 and 18 days old. The wax glands are located between the last 4 segments of the underside of the worker's abdomen. Each segment has 2 glands, one on either side of the bee, giving the bee 8 wax glands in all. Wax is secreted from the glands as tiny scales (approximately 0.1mm or 0.2mm in diameter) which are then moved to the bee's mandible. Secretions from the mandibular glands are added to the wax, this mixture is then chewed, and then the wax is deposited to the comb. This process can take 4 minutes per scale.

As with everything else, the bees have developed an efficient way of manipulating wax over the years. For example - Why create new wax if you can take it from somewhere else? If available, the bees will borrow some wax from other places. This is important to remember if you are drawing comb on beeswax foundation. If you tried to have them draw comb in the absence of a nectar flow, or if you gave them too much foundation to draw, the bees will dig up some of the beeswax foundation and use it to draw the comb where they need it. When they're done chewing out the foundation, you'll be left with a few frames of drawn comb, but many more frames that were stripped down all the way to the support wires.

With the amount of effort needed to create wax, you can see that the bees first need a really good reason to draw comb. What is the purpose of this stuff anyway? Drawn comb provides the structure of the interior of the hive, is used to raise the brood and is used for storage space. In a nutshell, they need comb for everything they do. However, since it takes a lot of effort to create, the bees need a really good reason to make it and they also need the resources (nectar, pollen) to be available before they can begin. When you install a swarm or a new package on foundation, the reason they have to build comb is to build out their new home and give a place for the queen to lay eggs. For established hives, the reason may be that they need a place to raise brood or store honey.

The best time to build comb is in the spring. At this time, there is an abundance of nectar and pollen, the bees need more space for the queen to lay eggs, and they need additional space to store nectar or pollen. There is plenty of need for space in the spring. You can still get them to draw comb in other seasons, but it is considerably more difficult. Nonetheless, if you can trick the bees into think there is a nectar flow and you provide them with a reason to draw comb, you can get them to build comb in other seasons (within reason). How? You can simulate a nectar flow by feeding them sugar syrup. You can give them a reason to build comb using careful placement of the foundation.

HOWTO: DRAW COMB FROM FOUNDATION

When I was a beginner, I was confused about how to make drawn comb. My first attempt was a mess. The bees built bridge comb perpendicular to the frames, essentially gluing them together. I went to the next meeting of my local bee association and asked around. I soon realized the error of my ways. I would suspect most beginners have this same confusion - they might not realize it yet. So… Here is my process for making beautiful drawn comb from foundation:

STEP 1: **You should only draw comb on one (1) hive body of foundation at a time**. Don't put two boxes of foundation on the hive at the same time. You will only be inviting trouble, especially if you are using beeswax foundation. When using beeswax foundation, the bees will chew out the foundation in one hive body to build up the comb in the other.

STEP 2: It doesn't matter what type of foundation you begin with. The important thing is to **make sure that all the frames of foundation in the hive body have the same kind of foundation**. If you are using real beeswax foundation, then make sure all ten frames in the hive body are beeswax foundation. If you are using plastic foundation, then make sure all ten frames are plastic foundation. Avoid mixing the foundation types when drawing comb. If you do, the bees will tend to focus on one type and ignore the other. After the comb is drawn out, you can mix the frames within the hive, but avoid it when drawing it out.

STEP 3: **The hive body should have 10 frames in it.** (not 9! not 8!). The frames should be squished as close together as possible. When packed tightly together, the end bars of the frames will be touching. If you leave extra space, the bees will build bridge comb perpendicular to the frames, essentially gluing them together. Once squished together, you want to center the frames in the middle of the hive body, leaving an equal gap on either side of the grouping. If the group of frames is towards one side or the other, the bees will build bridge comb from the edge of the hive body to the frames, making a mess that you will have to clean up later.

STEP 4: Place the hive body of foundation directly over the brood nest. This placement is especially important if you are providing an artificial nectar flow instead of relying on a natural one. This gives the bees a reason to draw the comb: they will need to draw the comb to give the queen space to lay eggs. Do not put a queen excluder under the foundation.

STEP 5: Once you have the hive body directly over the brood nest (with no queen excluder), and there are 10 frames of foundation in the hive body, and the frames are mashed together, end bar to end bar, in the middle of the hive body, you are done for the time being. Close up the hive and come back in a week.

STEP 6: When you are drawing comb, **it is important that there is a nectar flow present**. You can provide an artificial nectar flow by feeding 1:1 sugar syrup in the absence of a real nectar flow.

STEP 7: Check on the progress of the comb when you return to the colony the next week. The amount of progress the bees make is dependent on many factors, so it is impossible to say how many frames will be drawn after a week. If there is a heavy nectar flow, the bees may have drawn out a fair number of frames. Without a natural nectar flow, the progress may have been slow. You still need to check on them, though.

STEP 8: When inspecting the progress, you will notice that the bees generally don't work all the frames at once. Typically, they work the 3 or 4 frames directly above the brood nest, and the remaining 6 or 7 frames are untouched. When the frames they were working on are close to finished, it is your job to rearrange the frames so the 3 or 4 they were working on are switched with some of the frames they were ignoring. Keep in mind that after rearranging the frames, you still want all 10 frames mashed together and centered in the middle of the hive body. They aren't ready to be spaced out within the hive body quite yet.

STEP 9: Keep up with the weekly inspections until all 10 frames are drawn out. Keep rearranging the frames until all 10 are completed. Once they are completely drawn, you can then add the next hive body of foundation to draw out if you are drawing more.

Voila! You now have drawn comb. Now that you know how challenging it is to create drawn comb, you want to protect it as much as you can. Your biggest enemy now is the wax moth. I use a chemical called Paradichlorobenzene (PDB) to keep them away…

HOWTO: PROPERLY STORE DRAWN COMB USING PARADICHLOROBENZENE (PDB)

The nectar flow in our area begins in May and ends in June. If you have a long nectar flow in your microclimate or if you are late getting the honey off your hives, you might extract sometime in late July or August. You will need to store your honey supers from August until the following April, a total of 8 months or more. Probably the biggest risk to your comb during this time is wax moths. Wax moth larvae feed on comb, honey, pollen and left behind larval skins of the honeybee. Wax moth larvae burrow through the cells, eating and defecating as they go. They can devastate the comb, leaving behind a grotesque mess of webbing and feces.

Female wax moths lay tiny eggs inside the hive in little cracks in the woodenware (frames or hive bodies) just big enough to hold the eggs. The cracks are smaller than the bees can dig out, so the bees generally leave the eggs alone. A female wax moth can lay 300 to 1500 eggs in her lifespan and she typically lays them in batches. These eggs hatch into larva 5 to 8 days after the egg was laid. After hatching out, the wax moth larva burrows into the cells looking for food. It is this stage that is most damaging to the combs. The wax moth stays in this larval stage for 1 to 5 months (depending on temperature) and is an eating machine. Towards the end of its larval stage, the larva has grown to 3/4 of an inch and resembles a hairless caterpillar. This caterpillar chews out a space in the wood of the hive in either the frame or the hive body and it spins a silk cocoon. The cocoon may hatch quickly or may take up to 2 months to hatch, again dependent on temperature. When it emerges, it is an adult wax moth.

This may come as a surprise, but the wax moth can not survive on beeswax alone. It needs other nutrients to survive. It finds these nutrients in honey, pollen and the cast away larval skins of the honeybee. This explains why wax moths tend to prefer comb from the brood nest instead of comb from the honey supers, although it is possible for the moths to exist in the honey supers as well. Frames containing only foundation are rarely a target for wax moths, since they lack the extra nutrients they seek (especially if the foundation is plastic!).

In general, wax moths can not survive in freezing temperatures. Temperatures below 32°F will kill virtually all stages of wax moths. Beekeepers harvesting comb honey should freeze the comb honey for a minimum of 24 hours to ensure that any wax moth larva that may be present in the comb are killed. Some beekeepers even freeze emptied honey supers before storing them as part of their regimen for controlling wax moths. This is not 100% foolproof. Moths lucky enough to be in cocoon at the time of freezing have a small chance of survival.

Wax moths are generally not a problem inside the beehive itself. When the hives are strong, the bees can keep the wax moths in check. However, when the hive is weak, or when the moths infest the storage area of honey supers or brood comb, the damage can be devastating. To prevent wax moths from infesting an active beehive, the best solution is to maintain strong colonies.

To prevent wax moths from infesting my frames of drawn comb while in storage, I use Para-Dichlorobenze (PDB) crystals, which is sold under the name Para-Moth by the beekeeping supply vendors. When using PDB, the hive bodies are stacked up and PDB is put in an aluminum foil dish at the top of the stack. The PDB volatizes (turns to gaseous state). The PDB gas is heavier than air, so it sinks down and fills the stored hive bodies. This PDB gas will kill young wax moth larva and is a deterrent to adult wax moths. (note that PDB does not kill adult wax moths)

STEP 1: After harvesting honey from the honey supers, place the emptied super back on the beehive to have the bees clean up the supers. They can normally clean an entire super within 24 to 48 hours. Note this is after the harvest – the nectar flow is already over. If you place the supers on the hive during a nectar flow, the bees won't clean it up – in fact they may even start filling it up again. When placing the emptied supers onto the hive, I first place an inner cover over the hive. The inner cover I use has a hole in the middle of the lid, which is normally used for a bee escape. I then put the emptied supers over the inner cover. The inner cover provides a barrier so the bees generally will not think of the honey supers as part of their hive. They will have access to the honey super through the hole in the inner cover.

STEP 2: Return to the hive in a couple of days to make sure they have cleaned out the honey supers. If they have, remove the super from the hive.

STEP 3: Where you stack your hive bodies in your storage area, place a piece of cardboard big enough to cover the footprint of the hive body down on the ground. On top of this cardboard, open up 5 to 10 sheets of newspaper. This is done so that when the hive bodies are stacked, they sink into the

paper/cardboard a little. This creates a seal at the bottom of the stack (keeping the PDB vapor from escaping from the bottom). The cardboard/newspaper also helps alleviate any issues you may have with the flooring not being level or where the bottom edge of hive body has been cracked or worn.

STEP 4: Stack the hive bodies on the cardboard/newspaper. The directions for Para-Moth say you can stack up to 5 deep hive bodies or 10 medium hive bodies on the stack. You don't want to go any higher than that since the vapor given off by the chemical won't reach all the way down to the bottom. I tend to make the stacks about 5 to 8 medium hive bodies high (it's as high as I can make it in my storage shed).

STEP 5: Cover any large cracks in the hive bodies with duct tape. I sometimes wrap a bit of clear plastic wrap (Saran Wrap) around the hive body to seal the cracks if there are many gaps, but duct tape works just as well (and is easier to apply). The object is to seal any cracks that may exist in the stack where the PDB gas might escape.

STEP 6: Fold a small sheet of aluminum foil in half and then fold the edges up all the way around, making a little dish out of the foil. The end result is a little dish about 6 inches long and maybe 2 or 3 inches wide. Place this aluminum foil dish on top of the stack.

STEP 7: Scoop about 6 tablespoons of the PDB into the aluminum foil dish. If you use less than that, you will need to check the stack more frequently and replace the PDB as needed. Using more will not win you any prizes either – the chemical will be used up more quickly, and you will be wasting it. (NOTE: read and follow the instructions on the jar of PDB – they may have changed since these instructions were written)

STEP 8: Place an empty hive body (small, medium or deep – it doesn't matter) on top of the stack. This is to give room above the PDB so it can volatize easier. A simple shim works well (assuming no holes exist in the shim). You can get shims in the bee catalogs – look for where they sell MiteAway formic acid mite treatment. An "Imrie Shim" works also, provided that the hole in the Imrie Shim is taped close (or else the gas will escape through the hole).

STEP 9: Place an outer cover over the stack. If you don't have a spare outer cover, you can use a piece of plywood or something else that would cover the top. Again, the idea is to cover the top so that the PDB gas can't escape.

STEP 10: The PDB will volatize (turn to a gaseous state) and the vapors will fill the insides of the stack of honey supers. The PDB vapors will kill the wax larva. Over time, the PDB will dwindle until it is all used up. The amount of time it takes to volatize completely is temperature dependent. In the summer, the PDB volatizes quickly. This means you will need to check the PDB and replace it more frequently. In the winter (December through March), it volatizes slowly so you can check it less frequently -- once a month or so. If you are storing the hive bodies in an unheated space (like a shed), you won't need to check them that often in the winter since the freezing temperatures would kill the wax moths in the winter anyway. However, you should still make a habit of checking the PDB from time to time and replace if necessary. It's better to be safe than sorry.

STEP 11: During the warm temperature months, check the PDB level more frequently. In cooler temperatures, you can check the level less frequently, but you still need to check it. Once the level has gone down considerably, add a little more PDB to bring the level up. Don't let it dwindle all the way down in warm temperatures.

STEP 12: Before you use the hive bodies again, take them off the stack and let them air out in an open space for a day or two. The directions that come with Para-Moth say that the PDB can kill bees so the combs should be aired out thoroughly before placing them on the hive. I have gone against this with bad results – beware! I once used a frame from the stack without airing it out and stuck it in an observation hive. It killed my queen. Learn from my mistake – air out the hive bodies for at least 24 or 48 hours before using them!

IN CLOSING

Following these guidelines will allow you to turn frames of foundation into beautiful drawn comb. Drawing comb is hard work for the bees. It takes the bees an equivalent of 8 pounds of honey to produce 1 pound of wax. Treat your comb with respect! It is the most valuable asset you have as a beekeeper.

race/ variety	scientific name	appearance	temperament/ behavior	honey production	propolis	disease/pests	brood production	overwintering	swarming	comments	origin
Italian (most common)	*Apis mellifera* lingustica	a classic golden yellow with black bands on the abdomen	very gentle, easy to work; prone to robbing and drifting, stay on combs during inspections; keep clean hives	very good under good conditions	moderate	fair resistance to European foulbrood and wax moths; robbing and drifting promote spread of diseases/pests	rapid spring build-up; maintains large brood area regardless of food supply, thus large portion of resources consumed for brood rearing	overwinter with large population, thus require large food supply for winter; can starve if food stores are exhausted	moderate	somewhat prone to drifting and robbing, but good mixture of characteristics makes the Italian a good choice for beginners; by far the most popular bee in the U.S.; queens are fairly easy to locate; these bees do well in temperate or warm climates, over long warm seasons with abundant forage and good weather, not as well during cold wet springs or hot dry summers;	Appenine Peninsula of Italy
Carniolan	*Apis mellifera* carnica	dark brown to gray or black, largest of domestic bee races	gentle, non-aggressive not prone to robbing, construct new comb slowly; forage earlier in the morning	reputed slightly less than Italians, but can do well in adverse climates	little	-	slow spring starters, but then build up very fast; brood production slows in times of nectar or pollen dearth, stops in fall	fly in cooler weather, overwinter in smaller clusters, efficient users of winter food stores, good choice for colder climates	can be very prolific, prone to excessive swarming	can be difficult to find the queen; does well in long cold winters, short springs and hot summers; better suited to northern climates than in the south; said to cross well with other races; best traits have been bred into "New World Carniolan" queens	alpine regions of Austria, Slovenia, Yugoslavia, and Danube Valley
Caucasian	*Apis mellifera* caucasica	silver-gray to dark brown or yellow; has longest tongue of domestic bee strains (can work flowers other bees can't reach)	very gentle; somewhat prone to robbing; forages earlier and on colder days; once alarmed, can be difficult to calm	fair to good, especially in wet climates	excessive, very sticky; also produces burr comb	susceptible to disease, especially nosema	slower build-up than Italians; becomes large and stong; can adjust boor rearing to current conditions; stops prd in fall	maintain good overwintering stores	low	difficult to locate queen; do well in both warm/humid and cold/damp climates; can fly in poor weather;	Caucasian mountains between the Black Sea and Caspian Sea; pure-breds not widely available in U.S.
German / English ("black bees")	*Apis mellifera* mellifera	dark brown to black	tend to be runny (run all over combs during inspection); often described as "excitble" or "mean" or "irritable"	can be good	lots	prone to diseases, especially EFB, don't defend well against wax moths	build up slowly in the spring	well-adapted to cold, damp climates	moderate to high	The bees orginally brought ot America by early colonists, later fell out of favor when Italians became available	northern Europe

race/ variety	scientific name	appearance	temperament/ behavior	honey production	propolis	disease/pests	brood production	overwintering	swarming	comments	origin
Russian	*Apis mellifera* caucasica	a sub-type of Caucasian	aggressive/defensive of hives, often observed to head-butt before stinging,	moderate to good	excessive, very sticky; also produces burr comb	able to remove some varroa mites/tolerate more mites in nest than other types	brood production slows/stops in times of nectar dearth	overwinter well with small stores	moderate to high; always keeps some swarm cells ready	swarming unpredictable; can be expensive	a type of hybrid, bred from Caucasian bees originally brought to U.S. from eastern Russia for its increased ability to resist/tolerate Varroa mites
Cordovan	not a tue race, but a color due to a recessive genetic trait; often found in Italians, but can be found in other races	yellow bodies; reddish brown legs, head	very gentle; prone to robbing; excellent comb builders	good	little	fair	fair	consumes large volume of honey in winter	-	Color makes queen easy to locate; may perform poorly under cold, wet conditions; cordovan color can be bred into any line of bees, thus making it useful for open-mated breeding programs	technically term refers a color, not a true race, so could be found in any type of bee, but usually of Italians
Buckfast	hybrid of many races	golden to light grayish-brown	fairly gentle, low instinct to sting; can be defensive when disturbed; inclined to rob	excellent	little	highly resistant to tracheal mites and chalkbrood, other common ailments; very hygienic	start later, but build up fast in spring, makes them pslow down in fall for small clusters, survive cold winters and cool damp springs	require less than Italians, but more than Carniolans	low	A hybrid developed by Brother Adam of Buckfast Abbey, a mixture of many races of bees; an excellent choice for beginners.	bred from bee races collected from all over
Minnesota-Hygeinic	hybrid of mainly Italians	yellow with black bands	exceptionally hygienic	good	moderate	bred to be very resistant to American Foul Brood and other diseases	similar to Italians	similar to Italians	moderate	selected for ability to detect, uncap, and remove diseased brood before they became contagious to the colony; some report that hygeinic behavior is lost or reduced after queen replacement.	developed as a result of research by Dr. Marla Spivak at the University of Minnesota,

race/ variety	scientific name	appearance	temperament/ behavior	honey production	propolis	disease/pests	brood production	overwintering	swarming	comments	origin
Starline	hybrid line of Italian bees	similar to Italians	gentle	excellent under good conditions (especially suited for clover)	minimal	-	prolific brood producers; fast spring build-up	overwinter poorly; due to large population, needs large food reserve	moderate; large populations may require attention to prevent	queens resulting from swarm/supercedure do not have same traits as mother; require requeening each year	hybrid produced by crossign two unrelated lines of Italians, produced for hobbyists, not suitable for commercial operations
Midnite	(hybrid) *Apis mellifera*caucasia X carnica	varies, generally darker	very gentle	fair to good	moderate	-	-	-	-	queens resulting from swarm/supercedure do not have same traits as mother; require requeening each year	hybrid of Caucasian and Carniolan bees
Africanized Honey Bee (AHB)	*(hybrid) Apis mellifera* lingustica X scutelata	much like Italians, very accuarte morphometrics or DNA sample needed to determine AHB prevalence	extremeny defensive of hive territory, occasionally dangerous; prone to absconding	generally have smaller colonies, so collect less honey per hive	-	resistance to varroa mites reported	maintain smaller colonies than Italians	lack ability to cluster, have not established in colder climates; well-suited for tropical climates	high	because of their defensive nature, these bees should not be kept near human dwellings or around tethered/penned livestock; hives should be spaced apart to prevent alarm pheromone from one colony spreading to another	The result of accidental release from a Brazilian breeding program bewteen African bees and European bees, attempting to produce a vigourous honey producer adapted to the tropics. Arrived in U.S. in 1990.
Yugo	sub-type of Carniolan	-	-	-	-	tracheal mite resistant; varroa tollerant	-	overwinter well	low	crosses usually produce queens with hybrid vigor	-
All American	strain of Italian	darker than normal Italian	gentle; don't run on the combs	good	moderate	resistant to tracheal mites	prolific and build up quickly	generally keep an open brood nest, but will store honey below if crowded down in time	low	adapt well to most North American climates, but do best in warmer regions, especially in the southwest	a strain of Italians that have been selected over many years in the US for desitreable characteristics

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Swarm Management FAQ

Assumptions

- This conversation assumes you know what a swarm is and why it is important that you try to reduce swarms in your apiaries
- This conversation will not discuss how to capture swarms, or what happens during or after a swarm has issued from a colony. Instead it will focus on what can be done to try to prevent swarms from occurring
- One of my fundamental beliefs in beekeeping is that it is easier and more productive to manage the bees in a way that goes with their natural behavior instead of against them. Because of this, it is important to learn and understand bee behavior.

Swarm Management Techniques

Swarming is a completely natural phenomenon in the life of a bee colony that is necessary for the bees to propagate their species. Because of this, we can not truly wipe out swarm behavior from the bees. The best we can do is try to minimize the likelihood of swarming by trying to prevent the swarm urge from developing and doing our best to control the situation if and when the swarm urge has developed.

- **Urge Prevention** – preventing the swarm urge from developing
- **Swarm Control** – if urge has developed, the next best thing we can do is to try to control the swarm

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Urge Prevention

Why do bees develop the urge to swarm?

Bees develop the urge to swarm for many reasons, some complex and some simple. Fortunately, the bee researchers have identified three things that cause most swarms…

- Congestion in the brood nest
- Inadequate storage space for nectar/honey
- Queen with inadequate amounts of queen pheromone

What can we do to prevent the urge from developing?

- **Reduce congestion in the brood nest by**:
  - Reversing
  - Expanding brood nest laterally
  - Making splits & nucs
  - Change position of the strong colony with a weak one
- **Provide ample storage space for nectar/honey by**:
  - Adding your supers to your hives BEFORE THEY NEED IT! (on April 15th, or when dandelions are blooming)
- **Make sure queen has strong amounts of queen pheromone by**:
  - Requeening annually (I prefer to requeen in the fall)

Urge Prevention Gotcha's

- Be careful when you are reversing. You don't want to break the cluster!
- Be careful of how you use your queen excluder (if you use one)
- Foundation is not the same thing as drawn comb. Don't think that you can provide ample storage space by giving them frames of foundation. If you use foundation, you can be making the situation worse!

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Swarm Control

- **Yea!** We've got a great buster colony. The queen is laying eggs at an enormous rate.

- **Oh No!** The queen is laying eggs in several queen cups located at the bottom of the frames.

How do bees prepare for swarming?

- Queen begins reducing in weight in order to be light enough to fly when the swarm leaves. This reduces her abdomen (the heaviest part of her body); which in turn drastically slows the pace at which she is laying.

- Young bees continue to emerge from the other cells.

    - The first bees that emerge are the one's that were laid before the swarm urge was developed when the queen was laying at lightning speed.

    - These young bees would normally feed the larva, but because the queen production had dropped, there are more young bees than there are larvae to feed. The young bees start hanging around the hive wherever they find room without a task to do.

- On the 10th day after the egg is laid, the queen cell is capped over. At any time between when the queen cell is capped on the 10th day but before the new queen emerges on the 16th day, the swarm leaves.

- The swarm can contains all age of bees, but the population is primarily made up of young bees. Younger bees have a higher probability of issuing with the swarm than older bees. Studies have shown that up to 70% of worker bees less than 10 days old leave with the swarm.

How do I know to move from Urge Prevention to Swarm Control?

- Do you see queen cups with eggs or larvae in them?
- Do you see a lot of bees acting "lazy" at the hive entrance?
- Do you see a drastic reduction in brood in the hive?

Help! The urge to swarm is present. What do I do now?

There are several things you can do. Although they differ in technique, the basic tenet remains the same: isolate the queen and older bees from the young bees and larvae. Here is what you do:

- Resolve the reason that the urge developed. Is there congestion in the brood nest? If so – resolve it. Is there adequate storage space for nectar storage? If not – resolve it. Find out whatever the reason is and resolve it!
- Go through the hive and cut out EVERY queen cup that has and egg or larva in it. You need to cut out every last one! They can be hard to find. It might be easier to shake the bees off the frame before you look at it.
    - **DO NOT CUT OUT **CAPPED** QUEEN CELLS!!!** Only cut out uncapped queen cells. If the queen cell is capped, the swarm may already have left! If you remove the capped queen cells, you might be leaving your hive queenless!
    - If you are making nucs, you can remove the frames with queen cells and the bees clinging to the frame (but not the queen!) and use these frames to start nucs. You will still need to isolate the remaining brood and young bees from the queen and older bees in the original hive (see below)
- Isolate the young bees and brood from the queen and old bees by:
    - **Shook Swarm Method** - see my other handout
    - **DeMaree Method –** see The Beekeeper Handbook by Sammataro and Avitable (page 107)

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Here are some things that DO NOT WORK!

- **Clipping the queen's wings**: The old queen will try to leave anyway and will later be found dead on the ground in front of the hive. The swarm will eventually leave with one of the virgin queens anyway.

- **Putting a queen excluder under the hive so the queen can't escape:** The queen excluder will get clogged with drones. This will slow down and eventually stop foraging because the foragers can't make it through the clogged excluder.

- **Cutting out capped queen cells.** You don't know if the swarm has gone out yet or not. If the swarm has already left, you may be leaving your hive queenless. Yikes!!!!!

- **Removing or caging the queen.** This will slow down the queen's production and thereby reduce congestion, but it comes a terrible price. Every day that the queen is caged or removed from the hive, there is a loss of 1500 to 2000 eggs that she would have laid. Eventually, the hive will be so weakened that it is not worth it – there won't be enough bees to collect nectar in May when you need them.

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Shook Swarm Method

STEP 1: Take off all brood chambers off the bottom board and put aside for a moment

STEP 2: On the empty bottom board, place the new hive bodies containing FOUNDATION. It is important that this hive body contain foundation instead of drawn comb because we want to slow down the rate at which the queen is laying. By adding foundation, the queen will have to wait for the bees to draw out the foundation into drawn comb before she can resume laying eggs again.

EQUIPMENT YOU NEED

- One empty hive body for a new brood nest (if you are using deeps), or 2 empty hive bodies (if you are using mediums) for the new brood nest.
- The frames in the new brood hive bodies will need to be FOUNDATION, not drawn comb.
- At least one super of drawn comb (preferably two or three). This can be the supers that are already on the hive.
- An empty brood box (containing no frames)
- A queen excluder.

STEP 3: Put a queen excluder over the new hive bodies. This step is very important!

STEP 4: Put another hive body over the queen excluder. This hive body should be empty (no frames in it).

STEP 5: One by one, take every frame from the original brood hive bodies (that you set aside in step 1) and shake the bees on the ground in front of the hive. They will walk back into the hive. (You may need a spare piece of plywood as a ramp to help them get into the hive if your hives are elevated)

STEP 6: After you shake the bees off, check each frame for queen cells. If you find any, destroy the queen cells. Be careful to make sure the queen cells are not capped. If they are capped, it will be important to find the original queen because the hive may have already swarmed. If the hive has already swarmed, leave the queen cells alone. (Note: If they already swarmed, why are we talking about this anyway?)

STEP 7: As you finish each frame, place it in the empty brood chamber you added in Step 4.

STEP 8: When you finish the first original brood chamber, place the now empty chamber on top of the hive. Repeat steps 6 through 8 for each brood chamber until you have gone through all the brood chambers from the original hive.

STEP 9: If you had any honey supers from the original hive, you can add them on top of the new hive (over the frames containing the brood). It is unlikely the queen is in the honey supers, but it is not impossible. If you are a gambling person, you can trust that the queen isn't in there. If you are more conservative, you can shake all the bees off the honey supers on the ground in front of the hive like you did in step 6 before you add the supers on top of the hive.

STEP 10: Close up the hive and let it sit for an hour or two. This will allow the young bees to go back up to the empty brood chambers above where the brood is.

STEP 11: When you return to the hive, check to make sure that the bees have repopulated the brood hive bodies. If they haven't, close up the hive and wait another hour. The chances are pretty good that the bees repopulated this box even before you closed the hive in step 10. We gave an extra hour just to be sure.

STEP 12: Once the young nurse bees have returned to the hive bodies containing the brood, take all the hive bodies that are above the queen excluder and set them aside. (This includes the hive bodies containing the brood and the honey supers from step 9)

STEP 13: Put the honey supers above the queen excluder. I recommend at least 2 supers above the queen excluder.

STEP 14: Put the "old" brood chambers above the honey supers.

STEP 15: Close up the hive and return in 7 to 10 days. Check the upper brood nest area to ensure the bees haven't started rearing new emergency queen cells. If they have, cut them out.

From bottom to top, the hive should now consist of:

- the bottom board
- a hive body of FOUNDATION containing the queen and the older forage bees
- the queen excluder
- the honey super(s),
- the original hive bodies containing the old brood and the younger nurse bees
- the inner cover
- the outer cover
- your lucky brick to hold the outer cover from blowing away

Since all the brood is at the top of the hive, all the young nurse bees will be hanging out at the top of the hive tending to the brood. As the older forager bees go out to collect nectar and pollen, they will return to the entrance at the low end of the hive. The end result of this is that we have the queen and the older bees located at the lower portion of the hive and the young bees and the brood at the top of the hive. Thus, we have succeeded in separating the queen and the older bees from the younger bees and brood.

One of the major benefits of this method is that it does not require that we locate the queen, which can be extremely difficult in populous hives. In addition, we are automatically practicing "urge prevention" because we have completely removed the congestion in the brood nest – we have slowed the queen down and provided fresh new space for the queen to continue laying eggs. Another benefit of this approach is that we get the bees to draw out new comb for us, which can be used to replace some older, worn out frames.

A Short List of Bee Diseases

March 2011

Being able to recognize different bee diseases is a necessary skill for any successful beekeeper. The faster you can identify a problem, the quicker you can fix it. I hope you never have to experience any of the problems I list in this article, but the longer you are a beekeeper, the more likely you will encounter one of these.

Before we dive into this topic, let's define a few terms. A **bee disease** is defined as a pathological condition of a honey bee that is characterized by a set of symptoms. By "pathological condition", we mean a condition that is not the normal condition. The **causative agent** of a disease is the entity that causes a disease to occur in the host. When the causative agent is a biological agent, the agent is said to be a **pathogen** (a.k.a. **infectious agent** or **germ**). The term "disease" generally implies that the causative agent is a pathogen. This is why CCD is not considered a disease. Since we don't know what is causing CCD yet, we obviously can't say for sure that a pathogen is causing CCD – for instance, it might be caused by pesticide or it might be caused by a parasite (either known or yet to be identified).

The diseases listed in this article fall under one of the following three categories based on the causative agent of the disease: **bacteria**, **viruses** and **fungi**. The list of diseases below is by no means complete. It is really just a short listing of the better known honey bee diseases in our area.

Bacteria Diseases

A **bacteria** (singular: **bacterium**) is a group of unicellular microorganisms. A **spore** is a small, single cell reproductive entity that is highly resistant to decay and heat. Spores are formed by bacteria, fungi, algae and non-flowering plants (like ferns). Spores provide a way for the bacteria to lay dormant for some time. When the spore awakens, it will reproduce the bacteria.

AMERICAN FOULBROOD (AFB) — *Paenibacillus Larvae*

Bee Castes Affects: Larva (under 53 hours old) – all castes
Causative Agent: Bacterium called *Paenibacillus larvae*
Infectious Stage: Spore stage of the bacteria

Description

Honey bees are the only animals susceptible to AFB. AFB can infect a colony at any time of year.

The spores survive for years and years in the dead larva scales. A single scale may contain about 2.5 billion spores. Research has show that a single spore is enough to infect a one day old larva. A dosage of 35 spores is a lethal dose of 50% of the samples of day old larva. As the larva ages, it is less susceptible to the disease – it takes more and more spores to infect the larva. At 53 hours of age, the larva is virtually immune to the disease.

Method of Infection

Spores remain viable for 70+ years. Spores are transmitted colony to colony when infected bees drift into non-infected colony. Another method of infection occurs when a robber bee from a non-infected colony robs tainted honey from an infected colony.

Spores are transmitted to larva through feeding. The spores germinate one day after it is ingested by the larva, multiplying in the larva's midgut. Eventually, the spores pass through the midgut wall and continue to multiply in the bee's hemolymph (blood).

Although the disease infects bees in the larval stage, the infected bee normally dies in the pupal stage after the cell has been capped and the larva has spun its cocoon. The pupa turns brown and a foul odor develops. Eventually, the pupa completely dries out and forms a rigid and brittle scale that is attached to the cell wall. A single scale can contain 2.5 billion spores, yet the lethal dosage to kill 50% of the larva with the disease is as few as 35 spores. With the sheer quantity of spores, and the fact that the spores can remain viable for over 70 years, you can see why AFB is so infectious.

Symptoms and Identification

- Spotty brood pattern
- Foul smelling odor
- Dark black scales adhering tightly to cell wall
- Ropy condition of brood
- Brood cappings are sunken, greasy and punctured
- Dead larva with tongues extended
- Brood is dark brown color (instead of pearly white)
- Brood dies head up in cell, lying on their backs

Treatment

IF YOU SUSPECT THAT YOU HAVE A COLONY WITH AMERICAN FOUL, CONTACT THE BEE INSPECTOR IMMEDIATELY. American Foulbrood has no cure. The colony will need to be killed and all woodenware will need to be burned. A sample of your comb should be sent to the Beltsville Bee Lab for analysis.

Apiary inspection services in most states started as a way of controlling the spread of AFB. Although this disease has been identified as a major issue as far back as the early 1900's, there is still no treatment for this disease. There are currently no strains of bees that are immune to AFB, although some strains have been shown to be more resistant than others.

When AFB is detected in a colony, the suggested treatment is normally to kill the colony and then burn all the combs and woodenware that were used in the colony. Beekeeper tools can also be unsuspecting carriers of the spores. Although the spores cannot penetrate metal of your hive tool, it can cling to wax, propolis and honey buildup that may be stuck to your hive tool. Spores can also accumulate on bee brushes and beekeeper gloves. As a result, a beekeeper should be careful with the tools and equipment used when managing a colony infected with AFB.

Terramycin (Oxytetracycline) is currently the only drug approved by the USDA for the treatment of hives infected with AFB. Terramycin is an antibiotic (that makes sense since *Paenibacillus Larvae* is bacteria). **Terramycin does not cure AFB, it only masks the symptoms.** Although the colony survives, the AFB spores remain and will reinfect the colony if treatment is ever stopped. This is why you should never feed bees honey from an outside source. The honey very well could have come from a colony that was infected with AFB, and you would be infecting your colony with AFB if you fed that honey to your colony.

Terramycin is offered in different formulations, and each formulation carries its own set of instructions for applying it to the colony. As with any medication or chemical that you apply to your colony, you should read, understand and follow all the instructions on the label, including any instructions regarding safety equipment. In a nutshell, the medication can be applied by adding it to powdered sugar and dusting the colony, by adding it to extender patties and applying it in the colony, or by mixing it with sugar syrup and feeding it to the colony. Terramycin is less stable in syrup, so it is the least ideal method of application.

Terramycin is not the ultimate solution for AFB. Since Terramycin does not kill the spores of the colony and the spores can remain viable for over 70 years, AFB could reappear if treatment is ever stopped. Another drawback is that in the mid 1990's it was discovered that some strains of the bacterium *Paenibacillus Larvae* were becoming resistant to Terramycin.

One advantage of using Terramycin is that it is also an approved method of treating European Foulbrood (EFB).

EUROPEAN FOULBROOD (EFB) *Melissococcus Pluton*

Bee Castes Affects: Larva less than 48 hours old (all castes)
Causative Agent: Bacterium called *Melissococcus pluton*
Infectious Stage: Bacteria in dead honey bee larvae and in larval defecation remains in cell and infects next larvae that grows in the cell

Description

Honey bees are the only animals susceptible to EFB. EFB has been found everywhere honey European or Africanized bees are kept, with one notable exception – EFB has not been found in New Zealand. EFB is not considered a serious disease but the disease weakens the colony, making it more susceptible to other diseases.

EFB normally infects a colony right before the major nectar flow in mid to late spring. It occasionally appears in colonies in the fall.

Method of Infection

Honey bee larvae are fed when the nurse bees deposit food into the cells containing the larva. If bacteria is present in the cell, the food source can become tainted. In the case of EFB, the larval food is tainted with bacteria named *Melissococcus pluton* (*M.Pluton*). When the bees ingest M. Pluton, they become infected with European Foulbrood. Although larva of any age may become infected with EFB, only larvae under 48 hours old actually die of

the disease. Infected larvae that are not killed by the disease have poorly developed silk glands and their cocoons are not fully developed.

As noted, *M. pluton* is transmitted to larva through feeding. Once the bacteria is ingested by a larva of appropriate age (less than 48 hours), the bacteria multiplies in the midgut of the bee and eventually destroys the stomach lining (peritrophic membrane). Once past the stomach lining, the bacterium continues to multiply in the digestive tract (epithelium). By the time the larva is five days old, the bacteria completely fills up the midgut, occupying the space where food normally would be. The bacterium competes for food with the larva, making the larva need more and more food. This prompts the nurse bees to feed it more. Nurse bees soon recognize larvae that require excessive amounts of food. They pull up and remove infected larva, causing the brood pattern to have a shotgun appearance.

As part of their development process, honey bee larvae defecate in their cells. If the larva is infected with M. Pluton, the bacteria will be present in the defecation and will infect the next larva that develops in the same cell.

Varroa mites have also been shown to be a vector of this disease.

Although M. Pluton bacteria does not form spores, the bacteria can remain viable for up to 3 years. Contaminated combs can reinfect honey bees in future years or if swapped into another colony.

Symptoms and Identification

- Shotgun brood pattern
- Sour smelling odor
- Scales are rubbery and easily removed from the cells
- Usually occurs just before major nectar flow (in mid to late spring)
- Brood cappings are concave and may be punctured
- Dead brood first turns yellow and then brown in color
- Tracheal system becomes visible in dead brood that turned brown in color
- Dead larva are twisted with their heads raised
- "Ropiness" test does not produce stringy material like AFB

Treatment

EFB is not considered a serious disease by most beekeepers. No treatment is necessary when infection levels are low. EFB normally affects colonies just before a major nectar flow. Once the nectar flow arrives, incidents of EFB appear to reduce.

Requeening is a useful approach when infection levels are higher. Requeening will cause a break in the brood pattern, giving the house bees time to clear away infected brood.

Terramycin is another method used for controlling EFB, but one should be careful in the mode of application. Terramycin treatments in extender patties do not appear to be effective in treating EFB.

Maintaining low varroa mite levels, requeening with hygienic bees and reducing colony stress are the methods that would best reduce the chances of infection from EFB. In addition, cycling out old combs and not sharing combs between colonies would be another method to minimize the likelihood of EFB infections.

OTHER BACTERIA DISEASES

- Septicemia
- Powdery Scale Disease
- Spiroplasmas
- Rickettsial Disease (a.k.a. filamentous virus)

Virus Diseases

A **virus** is a submicroscopic, disease causing agent that is unable to grow or reproduce outside of the cell that hosts it. Viruses are made of pieces of RNA or DNA that are surrounded by protein. Since viruses need a host to reproduce, they are not considered living organisms themselves.

SACBROOD

Bee Castes Affects: All castes, all ages (although adult bees do not die of the disease). Two day old larvae are most susceptible. Infected larvae die as they attempt to pupate. Virus grows in infected adults but the adult bees do not show obvious symptoms. Infected drones appear unaffected by the virus.

Causative Agent: Virus

Description

Sacbrood virus is transmitted to larvae through feeding from infected nurse bees. Larvae are most susceptible to the disease at two days old. Once infected, the virus multiplies in the larval tissues. Infected larvae appear normal at first. Once the cell is capped over, infected larvae are unable to pupate because they are unable to dissolve their final larval skin. The infected larva then turns pale yellow. The virus collects in the ecdysial fluid in the space between the larva body and the unshed larval skin. The ecdysial fluid may contain millions of virus particles. The larva then dies and turns dark brown. This leaves a tough skinned outer layer (a sac) filled with a fluid containing the decomposed larval remains.

Adult bees can become infected too, although the adult bees do not show obvious symptoms of the disease. It is believed that the adult bees become infected when they are young nurse bees cleaning out cells of infected larvae. Although the adult bees do not show obvious signs of disease, the disease still has an effect on them. Infected adult workers have shorter life spans, cease eating pollen, start foraging at an earlier age, and collect much less pollen than uninfected workers.

Drones appear unaffected by the virus when infected, although the virus may collect in large quantities in their brain.

The virus in dead larvae rapidly loses its ability to infect. It is believed that the virus survives during times of low brood or no brood (e.g. winter months) in the infected adults. These infected adults infect the next generation when the queen ramps up in the spring.

Method of Infection

Sacbrood is transmitted to larva through feeding by infected nurse bees or by consuming pollen that contain the virus. The larvae of all three bee castes are fed royal jelly for the first 3 days of life. Queen larvae continue to be fed royal jelly until the cell is capped (and adult queens are fed royal jelly their entire lives). Worker larvae and drone larvae are fed worker jelly and "bee bread" (a mixture of pollen and honey).

The hypopharangeal glands of the nurse bees secrete royal jelly and worker jelly. When the nurse bee is infected with the Sacbrood virus, the glandular secretions may contain virus particles which can infect larvae. Worker and drone larvae may also become infected when they ingest tainted bee bread.

It is believed that adult bees become infected by either working with or ingesting infected pollen, or when they are cleaning out cells that housed infected larva. Pollen may contain virus particles when infected workers add saliva to the pollen (saliva is added to the pollen to make the pollen easier to manage, to prevent the pollen from germinating and to begin the process of digestion). When the pollen is being managed by an infected worker, the saliva added to the pollen may contain virus particles. This tainted pollen could then infect other adult worker bees when they ingest the pollen.

Varroa mites have also been shown to be a vector of this virus.

Symptoms and Identification

- Spotty brood pattern
- Larva can be removed in one piece (not a soupy mess), but the larva looks like a sac filled with fluid
- Dead brood lying lengthwise in cell with head slightly raised towards center of cell. (head is darkened in color)
- Infected brood is yellowish, it turns to brown when the larva is dead

Treatment

As with all bee viruses, there are no chemical cures. Requeening the colony with a queen from a different stock that is more likely to control the virus would be helpful. Requeening will also cause a break in the brood pattern, giving the house bees time to clear away infected brood.

Maintaining low varroa mite levels, requeening with hygienic bees and reducing colony stress are the methods that would best reduce the chances of infection from Sacbrood.

OTHER VIRUS DISEASES

- Invertebrate Iridescent Virus 6 (IIV-6)
- Deformed Wing Virus
- Paralysis
- Cloudy Wing Virus
- Filamentous Virus
- Paralysis
- Acute Paralysis
- Kashmir Bee Virus
- Y Virus

Fungal Diseases

A **fungus** is a living organism of the kingdom *Fungi*. There are over 80,000 known species of fungi. Some fungi feed on organic material by secreting enzymes to help them break down their food. They can reproduce sexually or asexually (without sex). Some fungi produce spores as offspring, while others produce buds containing a clone of their genetic material.

A **mycelium** (plural: mycelia) is the vegetative state of the fungus, meaning it is the state of sexual reproduction. Whereas spores are the dormant state of fungus, mycelium is the active state of the fungus. Typically, a single spore germinates into a homokaryotic mycelium, which is a type of mycelium that requires another (different type) of mycelium in order to reproduce sexually. When two compatible homokaryotic mycelium join, they form a dikaryotic mycelium. Dikaryotic mycelium may form fruiting bodies.

A **fruiting body** is a multi-cellular structure where spores are created. A commonly known example of a fruiting body in a (although not bee related) fungus is a mushroom. The fruiting body is the structure that is used to eject and disperse spores.

CHALKBROOD *Ascosphaera Apis*

Bee Castes Affects Larvae of all castes, approximately 3-4 days old are most susceptible
Causative Agent: Fungus
Infectious stage: Spore stage of fungus

Description

Chalkbrood is caused by the fungus *Ascophaera Apis (A. Apis),* a spore forming fungus. Larvae that become infected become mummified, chalky and white. If a large number of fruiting bodies are formed (see definition above), the mummies become gray and blackish.

Honey bee larvae are fed when the nurse bees deposit food into the cells containing the larva. If the A. Apis fungus is present in the cell, the food source can become tainted. In the case of Chalkbrood, the larval food is tainted with the fungus *Ascophaera Apis (A. Apis),* a spore forming fungus.

Although larva of any age may become infected with Chalkbrood, larvae under 3-4 days old are most susceptible, even more so if the brood is slightly chilled shortly after the brood is sealed in the cell. Because of the additional susceptibility Chalkbrood on chilled brood, you will tend to see more cases of brood with Chalkbrood on the outside edges of the brood area, where the cluster could not keep adequately warm. Since drone brood is typically located

on the periphery of the brood area, it was once believed (incorrectly) that Chalkbrood was limited only to drone brood.

Larvae become infected when they ingest contaminated food. Food can become contaminated by using tainted comb, or by feeding the larvae from honey or pollen tainted with A. Apis spores. Spores in comb can remain viable for up to 15 years. Pollen can be a carrier for A. Apis spores, and it can be viable in pollen for up to 12 months. A. Apis can also survive in soil and honey. Beekeepers can transfer spores into a colony inadvertently by using comb from a tainted colony or from spores adhering to the hive tool and/or gloves after inspecting an infecting colony.

Other factors include genetics of the queen and/or drone fathers, environmental conditions (moist air with poor air flow), and drifting bees from infected colonies.

Method of Infection

The A. Apis spores germinate in the hind gut of the larvae that ingested the spore or are in direct contact with the spores. Once the spore is germinated, it is called a mycelium (plural: mycelia). When the larva is sealed in the cell, the mycelium reproduces rapidly in the abdomen and eventually kills the developing bee. Eventually, the mycelia work their way to the outside of the larva. The dead larva then becomes covered in a fluffy substance containing mycelia of the fungus and becomes swollen to the point where it occupies the entire space of the cell. Later, the corpse dries out into a hard, chalklike lump.

The color of the killed larva could either be white or black. Most are white. If a significant number of fruiting bodies (see definition above) are present, the corpse will be gray or black in color.

Adult bees remove the dead mummies and eject them out the front of the hive, leaving the corpses on the bottom board of the colony and a shotgun brood pattern in the brood nest.

Symptoms and Identification

- Mummified larva located on bottom board
- Spotty brood pattern.
- Presence of mummified larvae in cells
- Usually occurs in early spring, before major nectar flow when the temperature gets cold enough to chill the brood
- Usually occurs in hive locations that are poorly ventilated

Treatment

Chalkbrood is not considered a serious disease by most beekeepers. It normally clears itself up once the nectar flow is underway or by relocating the colony to a location with more sunlight and with better air flow.

Requeening with a hygienic strain of honey bees is another useful approach when infection levels are higher. Requeening will cause a break in the brood pattern, giving the house bees time to clear away infected brood.

You can reduce the likelihood of getting Chalkbrood by requeening with a hygienic stock, by locating your colonies in a location that gets better air flow and adequate light, by keeping colony stresses at a low level, by periodically cycling out old combs (every 5 years or so) and by not sharing combs between colonies.

OTHER FUNGAL DISEASES

- Stonebrood
- Yeasts
- Bettsia Alvae (Pollen Mold)
- Melanosis

NOTE: A wide range of fungi are routinely found inside a beehive. Under normal conditions, the presence of these fungi won't pose any real threat to the colony. The honey bees normally keep the levels of fungi in check. Once a colony dies (from other causes, hopefully not from disease), the honey bees are no longer present to retard the development of the fungi. With the lack of honey bees to keep them in check, the fungi can germinate and bloom on unused comb, especially if the unused comb is kept in a dark, moist location. Brood comb is particularly susceptible to fungal growth. When this happens, don't be alarmed. You can give that frame to another colony and they will clean up the cells.

Microsporidia Diseases

Microsoporidia are spore forming, single cell microorganisms that are classified as fungi. Microsporidia spores germinate in the gut of infected hosts. The rigid walls of the spores rupture and form needle like structures called filaments that then inject the remaining microorganism into the walls of the host gut (called the *epithelium*). Once inside the host cell, the sporoplasm divides rapidly, forming new spores.

Nosema Apis
Nosema Ceranae

Bee Castes Affects Adult bees of all castes
Causative Agent: Microsporidia
Infectious stage: Spore stage

Description

Until recently, Nosema was classified as a protozoan (a single cell, parasitic microorganism). More recently, Nosema is classified as a **microsporidia**, which is an organism classified under the group fungi. It is important to keep in mind that this is only a change in how we group the disease, not in the microorganism itself. When you read older beekeeping books and references, they will refer to Nosema as a protozoan but our classification of this organism has changed.

Nosema Apis (N. Apis) has been a known disease of honey bees since 1909. It typically infects colonies that have been confined for an extended period of time. Confinement like this might occur during the winter months when it is too cold for the bees to go on their cleansing flights, or when purchasing bees in packages. In established colonies, N. Apis is typically found during the late winter and early spring.

Nosema Ceranae (N. Ceranae) was originally thought to be a disease only of the Asian honey bee, called *Apis Cerana*. It was first found in European honey bees (Apis Mellifera) in 2004, but researchers at the Beltsville Bee Lab have shown that it's been widespread in the United States at least since 1995. N. Ceranae has been linked to Colony Collapse Disorder (CCD) by several researchers.

Nosema Apis and Nosema Ceranae have very similar life cycles and methods of infection, but they differ in how the spores replicate. While N. Apis infected colonies show signs of dysentery both inside and outside the colony, N. Ceranae does not always. In addition, N. Apis is typically found in established colonies in the winter and early spring, whereas N. Ceranae can occur anytime throughout the year. Current research indicates that Nosema Ceranae is outplacing Nosema Apis within European honey bee colonies.

Although Nosema can be identified with a microscope under 400x magnification, the only way to differentiate the specific strain of Nosema (Nosema Apis or Nosema Ceranae) is through special tests which identify the molecules in the Nosema DNA.

Queens infected with Nosema have damage to their ovaries, which have a direct impact on colony populations (keeping them low). This leads to increased supercedure of infected queens, which reduces the productivity of the colony. Although Nosema can infect drones and workers, the workers are infected in greater proportion. It is believed that this happens because the workers engage in cleaning activities whereas drones do not.

Researchers have observed Nosema in the hypopharangeal glands of infected workers, which is the gland that is used to feed larvae. Infected workers resulted in a reduced amount of royal jelly from the hypopharangeal glands, leading to less food available to feed the larvae. Honey bees that are infected shortly after emerging from the cell can have their hypopharangeal gland fail to develop. (NOTE: Nosema does not infect developmental stages of honey bees. It only affects the adult bees.)

Other strains of Nosema have been known to infect other hosts, including bumble bees (*Nosema Bombus*), Mosquitos (*Nosema Algerae*), wasps (*Nosema Vespula*) and humans (*Nosema Corneum*).

Method of Infection

Nosema spores are spread to new hosts by ingestion. This happens either when the bee eats tainted food (honey or pollen), or when the bee is cleaning an area containing fecal matter from an infected bee. Once infected, the spores germinate in the bee's midgut, which is the area of the bee's digestive tract that processes food. Once in the midgut, the spore germinates and forms a rigid, needle like structure called a filament. The filament punctures the midgut lining (epithelial wall) and inject the remaining matter of the spore (called the *sporoplasm*), which then multiplies into more and more spores. Some of these spores may enter the ventriculus and eventually lead to the

rectum, where the collect until they come out in the bee feces. A single infected honey bee can contain 30 to 50 million Nosema spores within just a few weeks. Eventually, this buildup Once ejected from the bee's body in the feces, the spores can remain viable for more than a year.

As the spores multiply, they take up more and more space in the bee's expanding rectum. Eventually, the bee loses its ability to hold the matter, and releases it inside the colony. The defecation contains Nosema spores, which then will infect bees that try to clean up the mess.

Symptoms and Indentification

The only reliable way of identifying Nosema in a colony is by a microscope to look at the bee's midgut. However, here are some helpful ways to help you identify if you have Nosema in your colony:

- Dysentery (diarrhea) inside colony
- Streaks of fecal matter on the outside of the colony
- Weak or dwindling colony
- Smaller cluster in winter
- Reduced lifespan of infected bees

Although heavy infestations of Nosema normally result in dysentery, dysentery can be caused by other means, such as by feeding poor quality sugar syrup. Dysentery inside a colony (related to Nosema or not) can lead to an infestation of Nosema because it will infect the house bees cleaning the fecal matter, leading the Nosema spores to multiply.

Treatment

The only effective medication licensed in the United States for Nosema is an antibiotic named Fumagillan (sold in bee supply stores as Fumagillan-B). Fumagillan is an effective antibiotic to combat both Nosema Apis and Nosema Ceranae. It has no effect on the spores itself, but is very effective on the ability of the spore to grow.

Fumagillan is fed to the bees by mixing it in sugar syrup and feeding the medicated sugar syrup to the bees. As with all medications, be sure the read, understand and follow all instructions when using this medication. Care should be taken when using Fumagillan. It needs t be mixed into the sugar syrup only after the syrup has cooled down. This is because it breaks down when it gets hot – you do not want to apply it to hot sugar syrup. In addition, Fumagillan is light sensitive, so any unused medication should be stored in a cool, dark location.

In the past (when we were dealing only with Nosema Apis), the common advice was to feed Fumagillan into a 2:1 sugar syrup mixture when feeding the bees in the fall. This was done indiscriminately, and without testing whether the bees actually had Nosema. The assumption was that all colonies had Nosema, whether they actually did or not. By feeding the medicated heavy syrup to the bees in the fall, they will store it in cells instead of consuming it immediately. This will allow them to consume it later in the winter and early spring, when Nosema was more probable.

I no longer subscribe to the old advice about feeding Fumagillan in the fall without knowing if the bees have Nosema. Although it is an effective method of controlling Nosema (both N. Ceranae and N. Apis), it is still an antibiotic. It is possible for the Nosema microsporidian to develop a resistance to the antibiotic if it is overused. Beekeepers have already seen medications to other bee problems be rendered ineffective in this manner (such as Coumaphos and Fluvalinate on Varroa, and we are also seeing strains of AFB that are resistant to Terramycin)

As a result, I only feed this medication to the bees when dysentery is observed. Although it can be challenging in winter months to get bees to break cluster to consume the medication, there are normally very few extended periods of time when the bees are completely confined to the cluster. There are normally a few days in the midst when the weather warms just enough to allow the bees to break cluster to consume the medication. Although there may be a few days that go by without observing bees at the feeder, I generally have observed bees in my hive top feeder throughout the winter. This gives enough time to feed medicated sugar syrup if the need arises. I also do not feed Fumagillan to package bees. Dysentery in package bees could be attributed to the food stores they have consumed and not Nosema.

Research performed in 1989 suggests that feeding pollen or a pollen substitute can reduce the chances of infection.

Nosema spores can remain viable in infected combs. Swapping infected combs into an otherwise healthy colony will spread Nosema to the healthy colony.

Dysentery can make a Nosema infestation to arise (or make it worse). Conditions that can cause dysentery, such as feeding spoiled sugar syrup, or long periods of confinement should be avoided if at all possible.

MARYLAND DEPARTMENT OF AGRICULTURE

PLANT PROTECTION SECTION
APIARY INSPECTION
50 Harry S Truman Parkway, Annapolis, Maryland 21401

APPLICATION FOR REGISTRATION OF HONEY BEE COLONIES FOR _____

If blank, print Name and Address Below

PHONE NO. (H) _____ (W) _____ IDENTIFICATION NO. _____

By law, all honey bee colonies in the State of Maryland must be registered with the Maryland Department of Agriculture.
Will you be keeping bees on another persons property this year? _____ Yes _____ No

If yes, at least one colony in apiary must be identified as to ownership with an approved name or number.
If an ID number has not been assigned, check 1 or 2 below.

1. Assign me an ID number or
2. Assign me the following name or number ID _____

PLEASE NOTE THE SPECIFIC LOCATION OF EACH APIARY BELOW

YARD	LOCATION (Street address, road name, town, etc.)	COUNTY	NUMBER OF COLONIES
No. 1			
No. 2			
No. 3			
No. 4			
No. 5			
No. 6			

Total colonies _____

_____ _____

SIGNATURE **DATE** **SEE BACK**

BEE-APL.WPD:August 11, 1998

Mandatory information - Please fill out

Have you purchased queens, packaged bees, nucs of colonies form out-of-state during the previous year?

Yes _____ No _____

If yes the MDA may examine your bees for mites. Please answer the following:

Date of Purchase _____ State of Purchase _____ Items Purchased _____

Do you employ one or more persons in beekeeping?

Yes _____ No _____

If yes, you must file with the Department a Certificate of Compliance with the State Workmen's Compensation Laws, or you may provide the Department, as evidence of insurance, a workmen's compensation policy number or binder number.
POLICY NUMBER/BINDER NUMBER, EXPIRATION DATE: _____

Optional information - You are not required to complete this section

Honey For Sale, Collecting Bee Swarms, Stinging Insect Removal

The Maryland Department of Agriculture (MDA) and the University of Maryland Cooperative Extension Offices (CES) receive calls from the public requesting sources of local honey, and reporting honey bee swarms during the spring swarming season. Occasionally a local beekeeper cannot be found that has honey for sale or to collect these bees (usually collected free of charge). Calls are also received regarding honey bee nests in the walls of houses, and yellow jacket and hornet's nests that homeowners would like someone to come and remove (usually removed for a fee).

If you plan on having honey for sale and you would like your name, town and telephone number included on a list that will be distributed to the public, please indicate this below. If you are seriously interested in collection honey bee swarms and/or removing honey bee, yellow jacket or hornet nests, and you would like to have your name included on a list that will be used by the MDA and CES, indicate this below. Your name will be given out to the public when calls that pertain to the categories you have checked are received.

Please note: If you use any insecticides when collecting stinging insects, Maryland Law requires that you be licensed and certified to use pesticides by the MDA or be employed by a licensed pest control company. Collecting stinging insects without using an insecticide does not require any license.

Check Appropriate Boxes. I want to be included on your list and receive calls for:

- ☐ 1. Honey for sale
- ☐ 2. Removing honey bee swarms
- ☐ 3. Removing honey bee nests in walls of buildings, etc.
- ☐ 4. Removing yellow jacket and hornet nests

County or counties in which I am interested in collecting/removing stinging insects:

_____

O. Apiaries *[Council Bill 55-2010 (ZRA-117)]*

1. Apiaries are permitted as an accessory use on lots containing community gardens, sites where apiaries will form part of an educational program, and on single-family residential lots; and

2. An apiary that is a permitted accessory use under this subsection shall meet the following requirements:

   a. The minimum side and rear setbacks are 25 feet from the lot line, except that the minimum setbacks are 10 feet if the apiary is located as to direct the entrances away from neighboring properties and located:

      (1) At least 6 feet above the ground; or
      (2) Behind a solid fence, hedge, or other barrier that is at least 6 feet in height and runs parallel to the property line, and extends 10 feet beyond the apiary in each direction.

   b. Bee flyways shall be at least 6 feet above any deck or other open outdoor structure that is located on an adjoining property within 25 feet of the apiary;

   c. The minimum front setback is 50 feet from the front lot line;

   d. A water supply shall be provided to minimize honeybees from seeking water off-site; and

   e. Apiaries shall comply with Maryland Department of Agriculture Regulations as they pertain to beekeeping, and be operated and maintained in accordance with Best Management Practices; and

3. An apiary use may not unreasonably interfere with the proper enjoyment of the property of others, with the comfort of the public, or with the use of any public right-of-way.

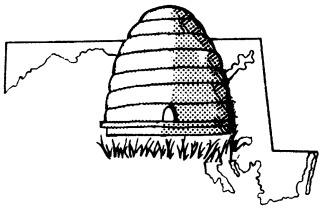
P. Farm Winery – Class 1A *[Council Bill 9-2011 (ZRA-130) Effective 7/4/11]*

1. A Farm Winery – Class 1A is permitted as an accessory use to farming in the RC and RR Districts, provided that it complies with the following criteria:

   a. The use is located on a lot or parcel of at least 5 acres. This use is permitted on any such parcel, including parcels with agricultural preservation easements and preservation parcels, excluding cluster preservation parcels in the RR District existing on the effective date of CB 9-2011(7/4/11) for which easements have not been donated to the Agricultural Land Preservation Program.

   b. The lot or parcel upon which the farm winery is located shall have frontage on and direct access to:

      (1) A road classified as an arterial or collector public road; or



Maryland State Beekeepers Assoc, Inc.

Dedicated to beekeeping in Maryland since 1908

Recommended Management Practices for Maintaining Honey Bee Colonies in Maryland

The Maryland State Beekeepers Association (MSBA) provides the following recommended reasonable and responsible beekeeping practices and behavior in pursuing the keeping of honey bees, and in respecting the rights, safety, and well-being of neighbors and the local environment.

Managed honey bees provide pollination services to improve commercial agricultural production and the health of our ecosystems, honey, and other significant economic benefits to the citizens of Maryland. Honey bees are valuable in education, sustainable private and community agriculture, research, and for family enjoyment. Well-managed colonies may be kept safely in virtually all locations of Maryland regardless of housing density. Maintaining a vigorous and responsible body of skilled beekeepers and their population of European honey bees throughout Maryland is the best possible deterrent to colonization by the Africanized Honey Bee (AHB), and in dealing with any inadvertent incursions of AHB's.

The Maryland Department of Agriculture (MDA) has regulatory authority over beekeeping and maintains a Best Management Practices that must be followed by beekeepers moving colonies into and out of Maryland for commercial purposes, in order to maintain healthy and safe pollination services for Maryland agriculture. The MDA BMP does not apply to beekeepers who maintain their colonies only within the state. MSBA has no regulatory authority, and adherence to these MSBA recommendations is voluntary. MSBA will support the rights of beekeepers who follow these recommendations.

I. General beekeeping practices

The responsible beekeeper:
1. will abide by and remain in compliance with Maryland laws and local ordinances as they pertain to honey bees.
2. will have sound knowledge of honey bee behavior and beekeeping and are encouraged to complete an Introductory Beekeeping course at a college or university, or offered by a beekeeping association or Master Beekeeper (often called a Short Course), and stay current on issues of colony health and management.
3. when maintaining colonies within 200 feet of the property line, will provide and maintain a water source close to the hives (less than 200 feet),
4. will maintain a distance of at least 50 feet between the apiary and any tethered or kenneled animal,
5. will practice swarm prevention, retrieve swarms as promptly as possible, and be responsive to calls regarding honey bee activity in the neighborhood.

II. Special considerations in residential areas

1. Beekeepers will be considerate of neighbors and discuss their intentions with adjacent neighbors before establishing an apiary.
2. Beekeepers shall limit ready access to the apiary to minimize disturbance of hives by people.
3. The location and flight paths of the colony should be arranged carefully, and colonies (and buffers and barriers if needed) should be located and oriented so that flyways are above head level when the honey bees cross adjacent property lines,
4. Make allowance for nearby activities in deciding when to open colonies, if neighbors or the general public are participating in outside activities or using heavy machinery within 75 feet of the apiary.

III. To help prevent the spread of Africanized Honey Bees

The responsible beekeeper will:
1. maintain colonies only of the European Honey Bee (EHB).
2. promptly report all highly defensive colonies, and/or colonies suspected of being non-EHB, to the State Apiary Inspector, and collect and submit samples of these to the Inspector at his request.
3. dequeen all colonies which are highly defensive as soon as possible but no later than 7 days.
4. requeen and destroy all reproductive brood (queen and drone cells) in colonies found to be "not EHB" as determined by the MDA, as soon as possible but no later than 7 days of notification.
5. kill all colonies determined to be a pure or a hybrid race other than EHB (with 95% certainty) as determined by the MDA, within 7 days of notification.
6. ensure that all queens purchased from "AHB suspect or detected areas" are produced in compliance with Queen Producer Best Management Practices. The MDA maintains a list of queen breeders who are in compliance.(1)
7. maintain a healthy population of EHB drones by keeping an equivalent of a full deep frame of drone comb for drone production, not Varroa trapping, in at least one colony, or in 10% of all colonies for apiaries with 10 or more colonies .

IV. Africanized Honey Bee Areas

In the event that any county is declared an Africanized Honey Bee (AHB) suspect or detected area by the MDA, the responsible beekeeper shall:
1. Annually requeen and maintain all colonies with marked queens produced in compliance with Queen Producer Best Management Practices (1);
2. Inspect hives for the presence of a laying marked queen every two months between March 1st and October 31st and maintain written records of inspections;
3. Provide the name and contact information of all suppliers from which queens have been purchased to the State Apiary Inspector and keep receipts of purchase and any certificates of origin for those queens for two years;
4. Maintain only marked queens, and promptly replace any unmarked queens with marked queens produced in compliance with the Queen Producer Best Management Practices (1);
5. Kill all swarms caught or trapped, or replace within 7 days the queens of swarms caught or trapped with marked queens produced in compliance with the Queen Producer Best Management Practices (1);
6. Maintain at least one bait trap/hive in each apiary.

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(1) All queens produced outside of AHB suspect or declared areas are considered in compliance with the Queen Producer Best Management Practices. A listing of queen producers inside AHB suspect or declared areas who are in compliance with the recognized Queen Producer Best Management Practices, and a listing of counties inside suspect or declared areas are both available from MDA.

Revised and adopted by MSBA Board January 22, 2010
Accepted by the general membership Feb. 20, 2010