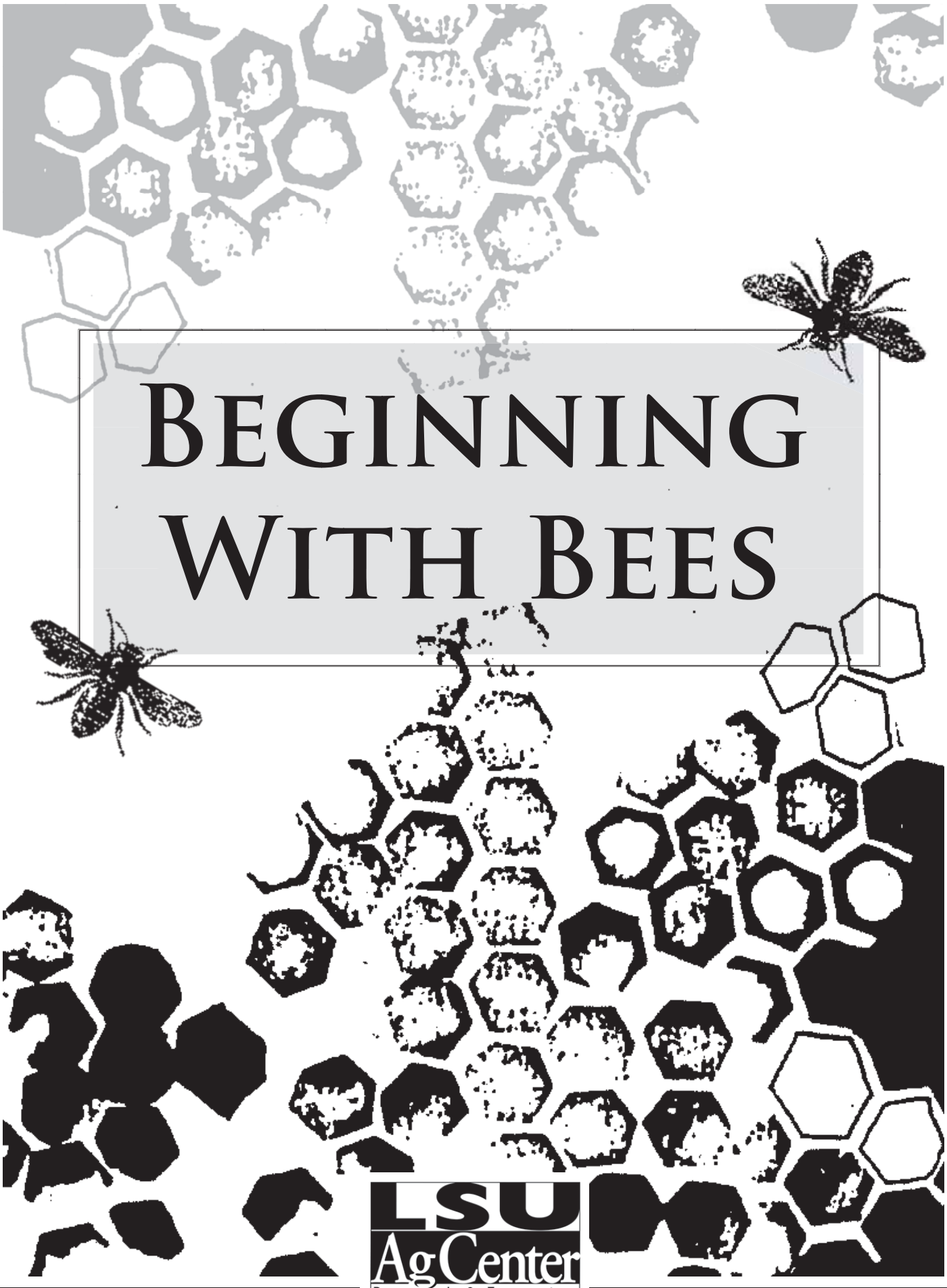

Beginning With Bees

LSU AgCenter
Research & Extension

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Keeping bees can be a fascinating and profitable hobby in Louisiana. Start with one or two colonies and, as you learn the mechanics of beekeeping, establish additional colonies. Two or three colonies of bees in a good location, properly cared for, should provide enough honey for your family and some to give to friends and neighbors.

Beekeeping requires some heavy lifting and constant attention to the needs of the hives. Unless you are physically able to lift heavy supers (hive bodies) and willing to accept occasional stings, you should not attempt to keep honeybees.

The valleys of the Mississippi, Red and Atchafalaya rivers are the most productive honey-producing areas of the state. Bees however, can be kept successfully just about anywhere. Since bees are easily killed by insecticides, locate colonies some distance from crops subject to pesticide application.

Honeybees (Apis mellifera L.) are not native to the Western Hemisphere. Hives of bees were brought to the Virginia Colony from England in 1622 and to Florida, possibly by the Spaniards from Cuba, in the 16th and 17th centuries. How they reached our state—by swarming or in box hives transported by early settlers—is not known, but honey and wax were found in Louisiana in 1804.

SWARMS

Many beginner beekeepers start their first colonies with a captured swarm. A hive containing either combs or frames of foundation must be readied in advance to receive the swarm (see Equipment, p.5). Select a swarm no smaller than a basketball or combine two or more smaller swarms (Fig.1). If you add a small swarm to an established colony, sprinkle peppermint extract and water spray over the bees in the colony and the new swarm. This will cut down fighting. The stronger of the two queens will survive in the colony. The larger the swarm hived, the faster the colony will develop. Feed the new colony sugar syrup for a few days until it establishes itself and the bees can begin to forage for nectar. To obtain swarms from your area call the local county LSU AgCenter Extension office and give them your name and phone number.

Figure 1. A swarm of bees.

ESTABLISHED COLONIES

The quickest and easiest way to begin beekeeping is to buy established colonies. Purchased colonies must be inspected by the state apiary inspector, according to state law, before they can be moved. This protects you from getting diseased or infested colonies. There should be a laying queen, worker brood, several pounds of worker bees and from 10 to 20 pounds of honey plus some pollen in the hive. The combs should be readily movable and consist mostly of worker-sized cells. Wooden equipment should be in good condition. You can usually get good basic information on handling bees from the seller. The price paid for a colony of bees will depend on the current price of honey, bees, and the amount and condition of the equipment.

BEE REMOVAL

If you remove bees from walls and structures, call your local LSU AgCenter Extension office and give your name, phone number and how far you will travel to remove bees from walls or structures.

TRANSFERRING BEES FROM BOX HIVES

If you are a beginner beekeeper, you should not attempt to transfer bees from a box hive (one without movable frames) to a standard hive until you have had some experience in handling bees. If it becomes necessary, ask for help. The procedure is involved, and space does not permit detailed instructions. See pictorial demonstration in "How to Keep Bees and Sell Honey" (book listed on p.23). Spraying the package and the new hive with a peppermint solution will help make the transfer easier.

PACKAGE BEES

The best time to start with package bees in Louisiana is in March or April. You can order a 3- or 4-pound package and a queen bee from any one of several Louisiana producers (Fig.2). You should also indicate the date of desired delivery. Have everything ready before delivery and place two or three combs of disease-free honey and pollen, if available, in the hive with the package. This will help the new colony become established. If only foundation or empty combs are available, make provisions for feeding sugar syrup (see Feeding p.13).

When the bees arrive, put them in a cool, shady place. Feed each package about a cupful of thick sugar syrup by painting or sprinkling the syrup on the screen of the cage. Allow time for the bees to take the syrup, and be careful not to drown them. Feed the bees again about an hour before dark and then take the package to the hive. Remove the feeder can and the queen cage from the package as well as the small piece of cardboard or cork from the candy end of the queen cage. With a small nail make a tiny hole through the candy. Place the queen cage, candy end up, between two frames, and push the frames tightly together to keep the cage upright. Shake all the bees out of the package over the queen cage and install the remaining eight frames. Replace the inner cover and place an inverted friction can top of syrup over the hole in the inner cover. Place an empty hive body over the inner cover. Finally, put on the outer cover or use a top feeder. Make sure the hive entrance is nearly closed to prevent robbing of the bees from another colony. Use green grass or moss to close the entrance. As the grass or moss wilts the entrance will gradually open.

Except for filling the feeder when it becomes empty, do not disturb the colony for about a week after the package is installed. At this time, see if the queen has gotten out, and remove the cage. Two to three days later, examine the combs to see if the eggs and larvae are present. If you do not see eggs or brood, it may be that the queen is dead. In that case, get another queen as soon as possible, or unite the colony with one that has a laying queen. A list of certified packaged bee producers can be obtained from the Louisiana Department of Agriculture & Forestry, Baton Rouge, Louisiana, the LSU AgCenter Web site on bees www.lsuagcenter.com, or the spring issue of the "Bee Ready" newsletter, available from your AgCenter county agent's office.

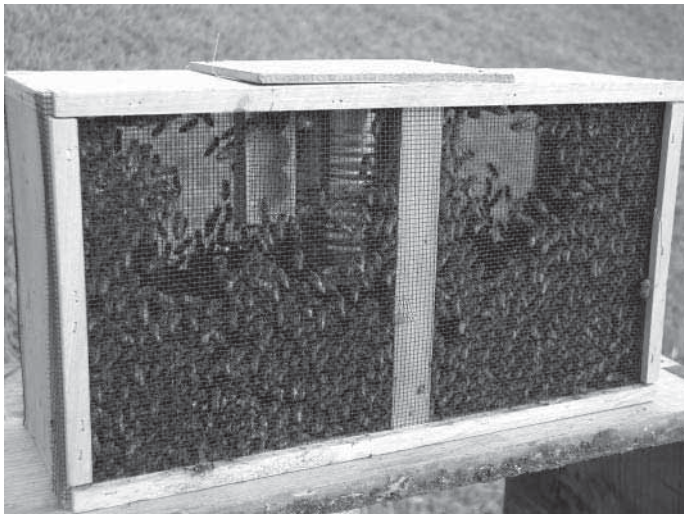


Figure 2. A package of bees.

EQUIPMENT

A hive should consist of a bottom board, an inner cover, an outer cover or telescope cover, two standard 10-frame hive bodies, with 10 frames and 10 sheets of foundation for each body to be used for brood rearing, and two standard hive bodies or supers with frames and foundation to be used for honey storage (Fig. 3). Shallow supers, about half as deep as standards, are recommended for those who cannot lift a super full of honey that weighs from 80 to 90 pounds.

The use of two standard 10-frame brood chambers is recommended. This will provide enough space to produce the worker bees needed. There is also room for the pollen and honey needed for the winter and spring food.

If you are a beginner, purchase your first hive from a bee supplier, since it is designed to allow for "bee space." Later, if you want to make additional hives, you can use the one purchased as a pattern, or obtain blue prints from LSU AgCenter entomology department in Baton Rouge at (225) 578-2180. Bee space is critical in a hive, and measurements of hive parts should be exact to 1/16 inch. The bees will fill the space with comb when too much space is left between parts; the bees will glue the parts together when too little space is left.

Wax foundation for brood rearing combs and for extracting combs is essential; otherwise, much drone comb will be built. Medium brood foundation (8 sheets to the pound), wire reinforced foundation (7 sheets to the pound), Duragilt or Duracomb, or plastic foundation (6 and 8 sheets per pound, respectively — no wiring necessary) is best. Honey to be used as chunk or cut-comb honey should be produced on thin foundation without wires. Wired frames or wired foundation should be used for honey that is to be extracted in an extractor. Wire foundation in the standard frames prevents sagging and buckling of the drawn combs and subsequent formation of drone combs. Wired frames provide greater strength but require more labor. The fine frame wire is threaded through the holes in the end bars of the frames. One end is fastened, and then the wire is stretched tightly back and forth across the frame and the other end fastened. The wire is then embedded in the foundation by use of a spur embedder or by gently heating the wire with a weak electric current so that the hot wire sinks slightly into the wax. The plastic foundation can be used to reduce damage at extraction (Fig. 4-6).

You will need a good bee veil, a bee smoker with a shield and a hive tool for manipulating the combs and the hive parts (Fig. 7-8). You will also need a bee brush,

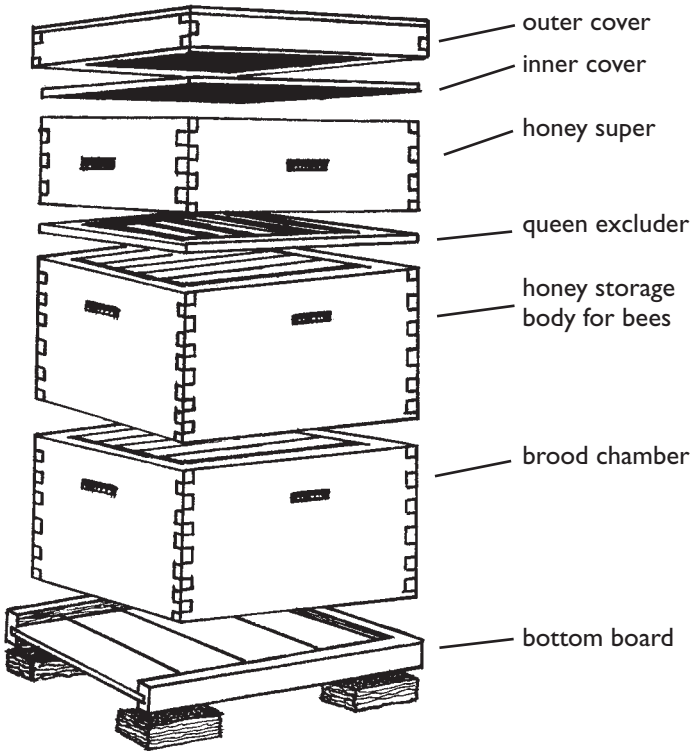


Figure. 3. Parts of a movable frame hive.

a comb and an uncapping knife for uncapping the honey. You should also have or have access to a honey extractor. A spur wire embedder, frame wire and foundation are necessary for assembling and repairing frames. A number of bee supply houses and beekeepers are available from which needed equipment can be purchased. Several supply houses are listed in this bulletin. The beekeepers may be found in the February or March issues of "Bee Ready" or the LSU AgCenter Web site (www. lsuagcenter.com) under Bees.

WORKING THE HIVE

Wear lightweight, light-colored clothes when working with bees. Wear thick, white socks with the trouser legs tucked inside them. Remember that honeybees tend to crawl upward — up the arms and up the legs — and under the bee veil. Instead of heavy, awkward canvas gloves that are shown in bee supply catalogs and often worn by beginners try ordinary rubber kitchen gloves. They can be used until you have acquired confidence and no longer fear being stung. Some stings will penetrate the gloves slightly, but will not be too severe. To reduce chances of being stung, always have your bee smoker burning well before opening a hive. You will find it time well spent, since the smoker is the best means of controlling the bees. When stung, scrape the stinger out immediately using the hive tool or your fingernail. Never attempt to pull the stinger out with the fingers as this will squeeze additional venom from the venom sack into your flesh.

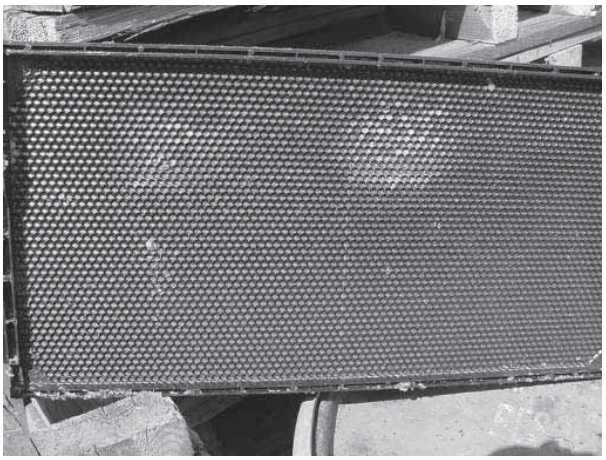


Figure 4. Plastic frame and foundation.

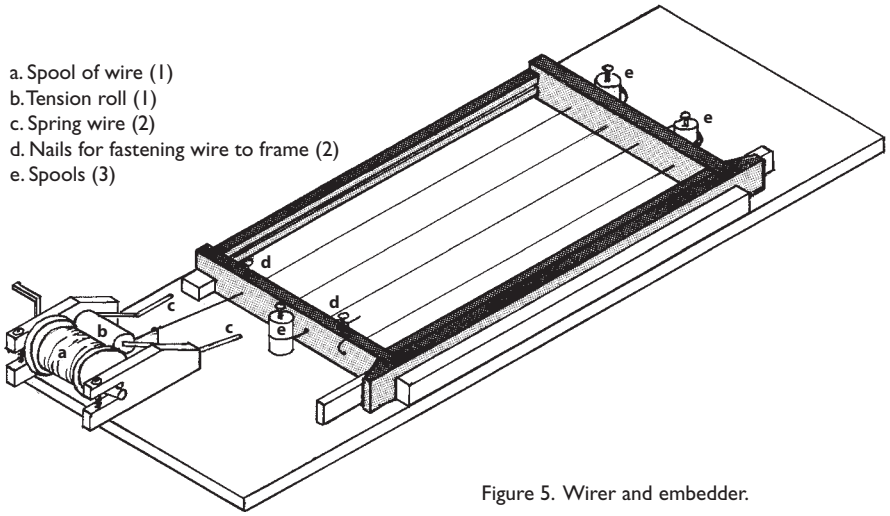
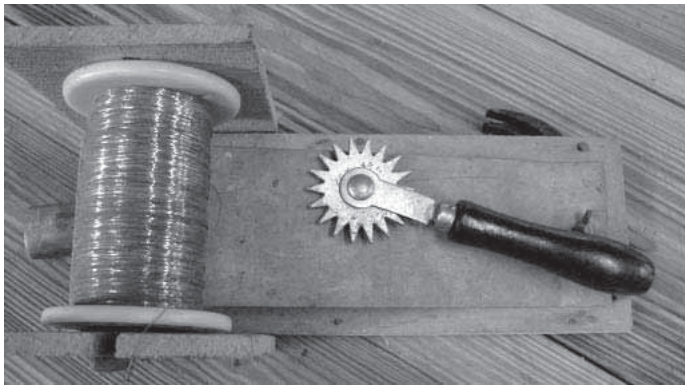


Figure 5. Wirer and embedder.

The bee veil, either cloth or wire screen, must be black so it may be seen through easily (Fig. 9).

Dry rotten wood is best, but also coarse shavings, pine straw, cotton waste or fairly loose rolls of old burlap bags make good smoker fuel. Start a fire in the bottom of the smoker, and get the fuel well lighted and producing a dense smoke before opening the hive.

When working in a hive, stand to the side or to the back of the hive to keep out of the flight path of the foraging bees. Except for feeding colonies or installing packaged bees to prevent chilling of the brood, it is better to open the hives and work with bees during the middle of the day while nectar is being gathered and when the temperature is above 60 degrees and sunny. You have fewer chances of being stung when manipulating hives if the old bees are in the field, since the old field bees are more likely to sting than the young bees. Once you have learned how to handle bees, the time of day the hive is opened will be less important.



Figures 6. Spur wire embedder and roll of frame wire.

Figure 7. Smoker with shield, hat, hive tool, gloves

Although handling the various parts of the hive is not particularly difficult, it would be much easier to do your first bee work under the guidance of an experienced beekeeper. Movements should be slow and deliberate with a definite objective. Avoid jarring actions. After mechanical ability and confidence have become a habit, the work will go faster.

When opening a hive of bees, blow a few puffs of smoke into the entrance, remove the outer cover and lay the cover upside down on the ground near the hive (Fig. 10). Loosen the inner cover and puff enough smoke over the tops of the frames to drive the bees down, and then remove the inner cover (Fig. 11, 12).

The combs of the top super then can be examined or the super can be pried loose and set across the upturned cover to make the frames of the next super available for examination. Use as little smoke as necessary to keep the bees under control. Too much smoke will drive them out of the hive. To inspect the combs, first loosen the frames with the hive tool and then carefully remove the outside frame or the one next to it. After examining the comb, lean the frames against the hive near the entrance on the side opposite from where you are standing. Never leave a comb of unsealed brood for too long in direct sunshine or in a cold wind since the brood might be killed by the exposure. Old, dark combs are fairly tough and are not easily damaged through handling, but a new comb full of honey must be handled in such a way that the wooden frame gives support at all times. When the queen is on

Figure 8. Old and new smoker and hive tool; new smoker showing safety shield and hook for attachment to hive body.

Figure 9. A wire screen veil properly worn.

a comb that is being examined, be careful that she is not lost, injured or killed. Use care at all times so that few or no bees are killed while you are removing or replacing the frames. When you have completed the examination, put the frames back into the hive, preferably in the same order in which they were removed, and replace the supers and cover.

When examining a colony of bees, check for a solid brood pattern (Fig. 13). Also, note the amount of brood and honey present, the general condition of the colony, what work is likely to be needed in the near future and whether the colony is likely to be ready for a honey flow or for wintering. If the queen is laying an irregular pattern or shows other signs of failing, replace her with a younger one.

Foundation in the frames should never be given to a colony when there is no immediate prospect of a good honey flow or when they are being fed. Bees will gnaw and ruin foundation that is given to them at the wrong time. After a colony is established and becomes strong in bees, foundation will be drawn above the brood chamber. When a number of empty drawn combs are available, add only four or five frames of foundation at a time. Put the foundation in the center of the hive body and the drawn combs on the sides.

BIOLOGY OF A HONEYBEE COLONY

During the spring, summer and fall a normal colony or hive of bees may contain from 10 to 20 pounds of workers (about 4,000 bees per pound), a single queen and some drones. In the winter there may be only 2 or 3 pounds of bees plus a queen in a weak hive, or 4 to 8 pounds of bees and a queen in a strong colony. Egg laying usually begins again late in December or early in

Figure 10. A puff of smoke at the entrance.

January, and the old, overwintered workers are gradually replaced by young bees. The normal colony builds up the number of workers to a peak in April or May. Egg laying then decreases slightly, and the colony declines in population. Usually there is another peak in brood rearing in the fall (lower than the spring peak). Egg laying then decreases until it ceases in November. Some colonies, usually those headed by young queens with adequate stores of pollen and honey, will maintain a low level of brood rearing throughout the winter.

The increase in the colony size rapidly depletes the honey stores. During a period of cold weather and no nectar flow, the bees may die of starvation. More colonies die of starvation in the spring than in the winter. You may feed the colony sugar syrup until the nectar flow starts again if the colony is light. The ratio is 2-parts sugar to 1-part water.

Figure 11. A puff of smoke under the outer cover.

Figure 12. Using smoke on top of frame to drive bees down.

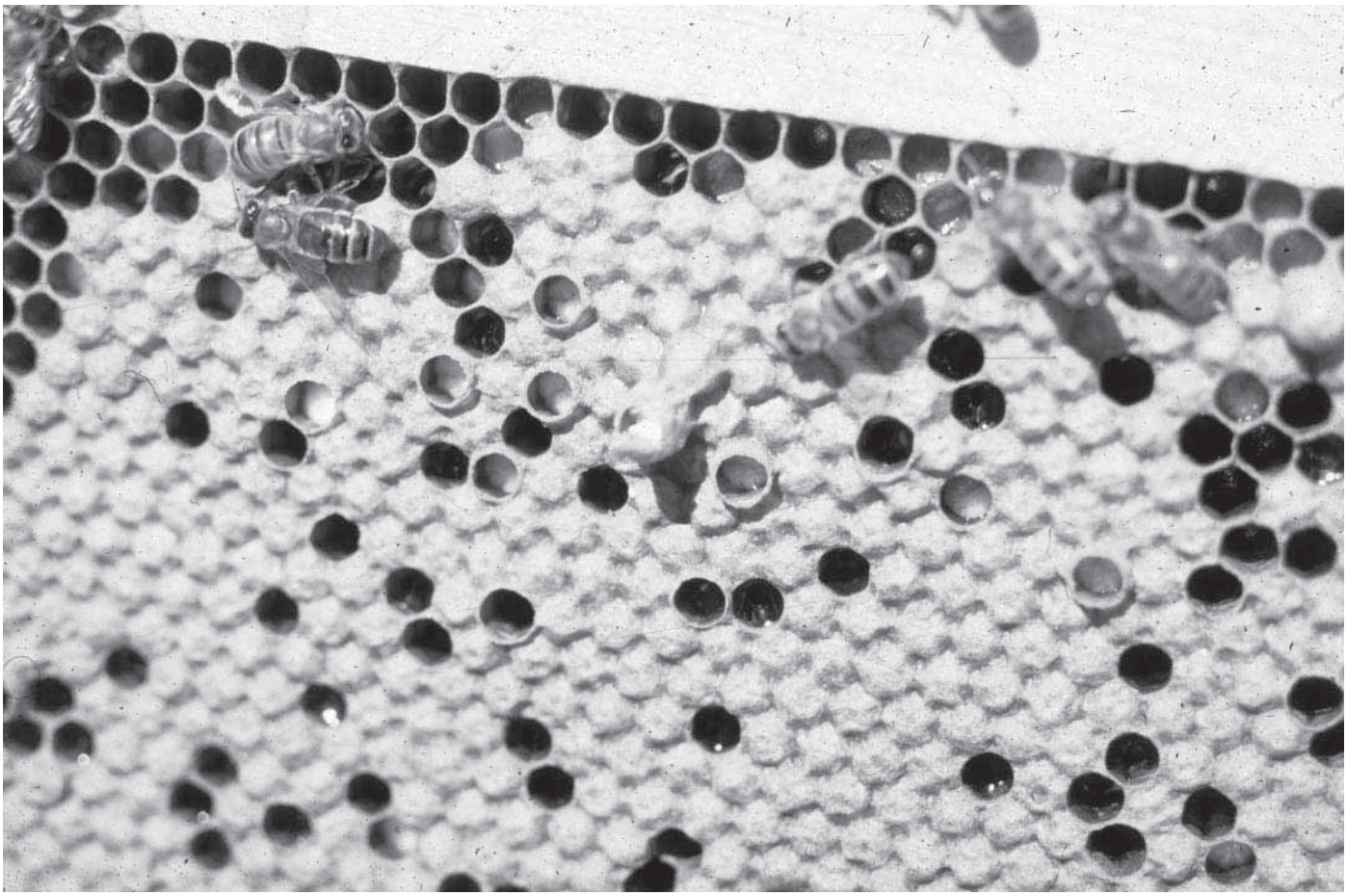


Figure 13. A solid brood pattern.

Table 1. Life cycle (in days) - average developmental stages for the different castes.

Caste	Egg	Larva	Pupa	Total
Queen bee	3	5.5	7.5	16
Worker	3	6.0	12.0	21
Drone	3	6.5	14.5	24

These figures are important and should be remembered. They have a big influence upon management. For example, if a laying queen is removed, 12 days are required for the colony to rear a young queen from a tiny worker larva. When the young virgin queen is from 6 to 8 days old, she flies out of the hive and mates. She begins to lay eggs 2 days after mating. Thus, about 3 weeks elapse before a colony can rear its own laying queen. As a result, there will be a subsequent 3-week period when no young workers emerge to maintain the population of the colony. Also, when a swarm is hived, at least 3 weeks will go by before young workers will emerge to take the place of the old bees that died during those 3 weeks. It is especially important to have the queen laying at full capacity 6 to 8 weeks prior to the beginning of the main honey flow so that large numbers of young bees will be present to gather the available nectar. Additional information on the life cycle of the honeybee can be found in the books recommended for additional reading. (See Table 1 and reference list at the end of this publication.)

The Queen Bee

A queen bee and a worker bee look considerably different (Fig. 14), even though workers and queens develop from the same type of egg. The differences are brought about in the development of the larvae. Any larvae that would have otherwise grown into a worker can produce a queen provided the larva is young enough (1 to 2 days old) and is fed royal jelly, a nutrient-rich food concentrate throughout its larval period.

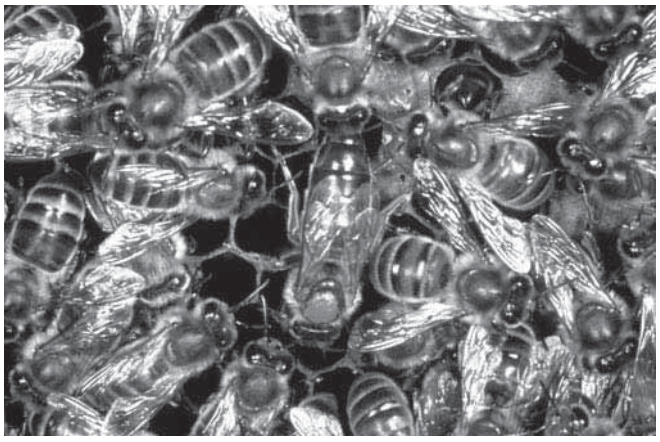


Figure 14. Queen bee with workers.

The queen cell is much larger than other cells and hangs down from its attachment to the comb (Fig. 15). When the virgin queen is about 1 week old, she flies out and mates with from five to eight drones. If the weather is not suited for flight, the mating is delayed. Two days after mating, the queen begins to lay eggs. After egg laying begins, the queen never mates again.

Early and late in the season the queen may lay only a few hundred eggs per day, but at the height of the spring season she may lay 1,500 to 2,000 eggs per day. When a queen begins to lay many drone eggs, she should be replaced at once or the colony should be united with a normal colony.

Finding the old queen before introducing the new one can be a time-consuming, frustrating experience. Essentially, the hive must be taken apart and the combs examined until the queen is found.

In hunting the queen, follow these steps — take the hive apart down to the bottom brood chamber covering each hive body, since robbing is likely to take place. Use minimal smoke to disturb the bees as little as possible. Then examine each comb in the brood nest looking at the bottom of the frame as you turn it over. Pay particular attention to combs that contain eggs and empty cells. Be sure to leave at least one frame outside the hive body while you are working. This will make manipulating the other brood frames easier and prevent crushing the bees. If the queen is not found after examining each brood comb twice, close the hive, and try again another day (Fig. 16).

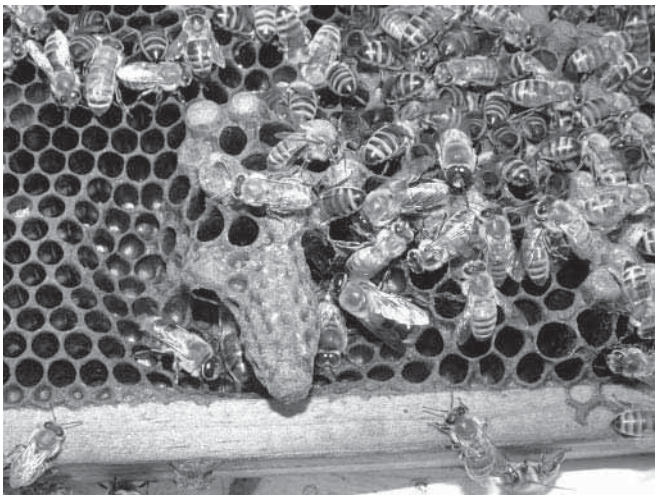


Figure 15. Queen cell.

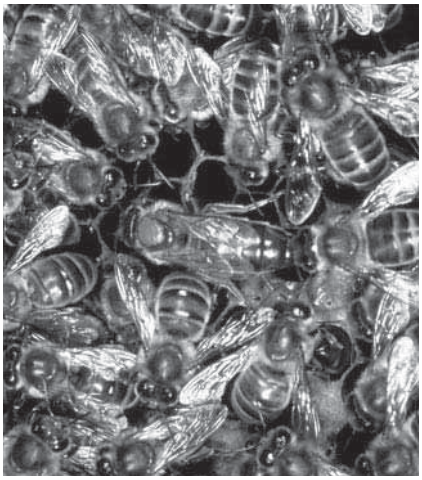


Figure 16. Queen on brood comb.

The Worker Bee

The worker bee, a female, does all the work in a colony except laying fertile eggs. The worker bee feeds the young larvae until they are sealed within the cells (Fig.17). The worker bee also feeds the queen and drones, performs housecleaning duties, secretes wax and builds honeycomb, gathers propolis, water, pollen and nectar, guards the entrance of the hive and performs any other needed work. Worker bees present in the hive during the active season have a short life span estimated from 4 to 6 weeks. Those reared in the fall usually live through the winter and spring possibly for 5 to 6 months.

If the queen in the colony dies and for some reason the colony does not rear a queen, one or more workers begin to lay eggs. Such bees are called "laying workers." The presence of several eggs scattered about within a cell is a fairly certain signal that laying workers are in the colony. Those workers do not mate with drones, so the eggs are unfertilized and produce only drones. A colony of bees containing laying workers is not worth requeening; it should be united with a strong colony with a good queen. Several weeks later that colony can be divided and a laying queen given to the queenless colony.

Figure 17. Worker bee.

Figure 18. Drone bee.

The Drone Bee

The drone, or male bee, is much larger than a worker. His abdomen is round, thick and blunt, and without a stinger (Fig. 18,19). The only useful purpose of drones is to mate with virgin queens. A good beekeeper tries to keep the drones in the colony down to a very small number. This is done by sorting out and melting combs that contain a large number of drone cells.

Figure 19. Drone comb and worker comb.

SEASONAL MANAGEMENT

In Louisiana, the beginner should start with bees in March or April, but it is best to prepare for the next year's honey crop during the previous fall. Certain chores must be done each year in fall, winter and spring.

Queen Introduction

A young queen from a high-producing strain should be given to a colony every year preferably in August or September. This is one of the cheapest and best means of insuring a strong colony and a good crop of honey the next year.

In successful queen introduction, it is important there not be a laying queen or a live queen cell in the colony to be requeened. Find the old queen, and destroy any queen cells. Remove the cardboard or cork covering the candy at the end of the cage. Place the cage with the young queen between the top bars of two combs of brood, candy end up. Examine the colony 3-5 days later to see if the queen is released. Two days later, if there are no eggs in the brood cells send for another queen immediately or unite the colony with another queen-right colony (Fig. 20-22).

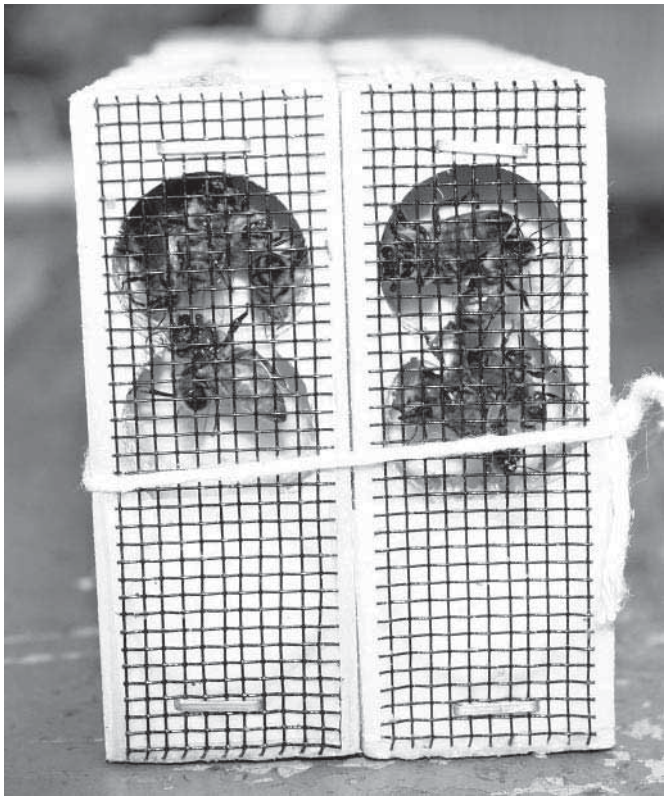


Figure 20. Queen cage with queen and attendant bees.

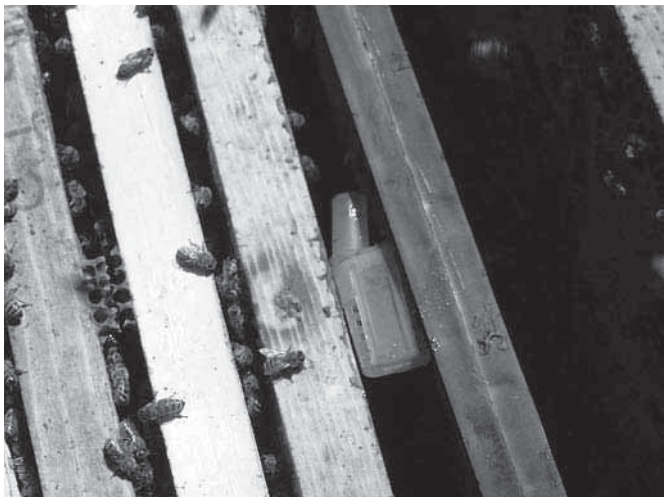


Figure 21. Proper placement of queen cage in colony.

Fall Period

This period covers September and October. The honey flow is likely to be finished by October 1 in north Louisiana and by October 25 in south Louisiana. From 40 to 60 pounds of honey should be in each colony—the equivalent of from eight to 13 full combs—so the colony will have plenty of stores for winter and spring. If the amount of stores is not up to the required standard, you must feed sugar syrup. Always remember that a colony of bees uses only what it requires; it does not waste honey. Queenless or weak colonies should be united with a strong queen-right colony.

This period is the best time to introduce a young laying queen into a colony so the colony will build up fast the following spring. If the colony is in the proper condition in the fall, it is almost certain to be in fine shape the following spring. It is important that each colony have a young vigorous queen, plenty of bees and honey and room for brood rearing during the fall.

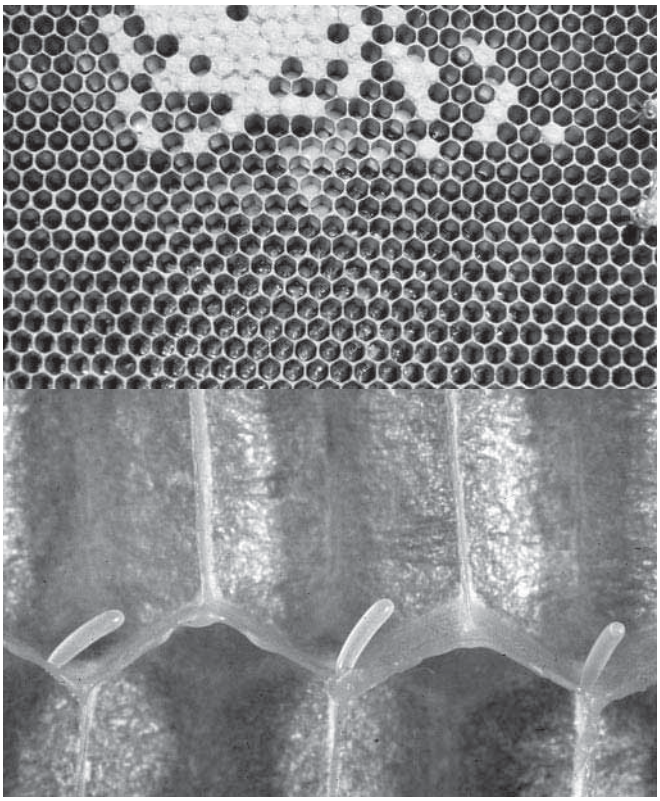


Figure 22. Eggs and larvae in cells on frame (above) and close-up (below).

Winter Period

This period covers November through February. The main requirements of bees during the winter are plenty of honey, sufficient workers and protection from cold winds and predators. Good upper ventilation is essential to remove excess moisture and CO2 when bees are clustered and not fanning.

Reduce the hive entrance early in November. The smaller opening will protect the colony from cold winter winds and prevent mice from entering and skunks or raccoons from damaging the hive.

Queens that stop laying late in the fall will begin laying again in January or February. Those that continue laying during the winter increase egg laying in the spring. This is the time to check the hive for honey. If there is none, the colony should be fed sugar syrup. This is also the time to medicate the hive and protect it from disease and mites.

Spring Period

This period lasts about 3 months, beginning early in March in south Louisiana and a couple of weeks later in the north Louisiana. When plenty of pollen and honey are present with a young vigorous queen, colonies will build rapidly, requiring more room be provided for brood rearing and nectar storage (Fig. 23-24). The queen may be laying 1,500 to 2,000 eggs per day. She will need from 12 to 18 combs just for brood. Examine your colonies early in the season on a warm, sunny day, checking for a laying queen and adequate stores. At this time, clean the bottom boards of burr comb and accumulated trash. On warm days, if bees are seen hanging out at the hive entrance, more room is needed at once. An additional super provides room for incoming nectar and gives room into which the bees can move, thus preventing swarming. It is very important that additional supers of drawn combs or foundation be given at the beginning of, or just before, the honey flow.

During favorable years at a good location, a colony will store from 75 to 200 pounds of honey in April, May and early June. Since a colony needs considerable space for ripening nectar before it is ready to be capped, a new super of empty combs or foundation may need to be added before the combs already on the hive are full. The main needs of a colony in the spring are a vigorous queen bee, plenty of room for brood rearing and nectar storage and enough honey and pollen. In a normal season, new, light-hued honey should be taken from the hive before dark, thin summer honey is mixed with it. This procedure is usually done in early June.

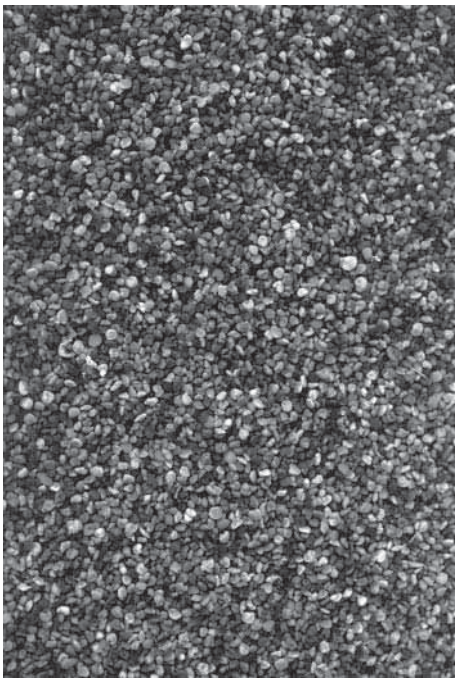


Figure 23. Collected pollen.

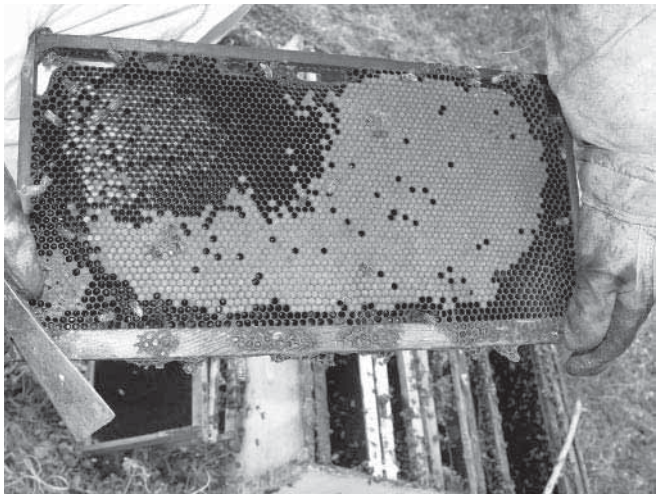


Figure 24. Comb with sealed brood and pollen.

Summer Period

This period covers July and August. During the months, examine the colony at about 3- or 4-week intervals to learn what is needed. In areas where peppervine, vervain or eardrop vine furnish nectar, weight gain may continue. Normal colonies however, probably will have reduced brood rearing so the number of field bees also will be reduced. Sometimes peppervine honey ferments in the combs during periods of wet weather. Such honey should be left in the hive for 2 or 3 months or for winter feed. Requeen weak colonies or unite them with strong colonies, otherwise, wax worms are likely to ruin the combs. Replace 1- or 2-year-old queens with young ones. In some parts of the state, colonies may use from 10 to 20 pounds of stored honey because there is practically no nectar to be found. Pollen also may be scarce at this time of year.

SWARMING

Colonies of bees normally increase in strength in the spring. When the colony increases in numbers, the combs are filled with brood, nectar, honey and pollen. Crowding occurs,which will cause queen cells to be started as the bees prepare to swarm. Swarming is a process of natural colony division, stimulated by crowding of the colony in its hive area. When the first queen cells are sealed, the swarm will leave the hive. The main swarming period is between mid-March and mid-April. Swarming occurs earlier in south Louisiana than in north Louisiana. A swarm consists of drones, field bees, young hive bees and the old queen. Prior to the invention of the movable frame hive, swarm control was nearly impossible, but now beekeepers can prevent swarming and keep a large force of bees working within the hive by adding hive bodies. One strong colony can produce more honey than two mediocre ones.

Swarm Prevention

There is an easy and generally effective method of swarm prevention. The colony likely to swarm is usually a strong one in two brood chambers with plenty of honey for spring. To prevent a colony from swarming just before or soon after the honey flow begins, open the hive and place the combs of sealed or mostly sealed brood into one hive body, and place the queen, unsealed brood and pollen combs in what is now the bottom brood chamber. Place a super of empty combs or combs plus some frames of foundation on top of the bottom chamber, and then place the hive body containing the sealed brood over this super. A queen excluder can be placed over the bottom brood chamber for a week or two, but then it must be removed because the bees may not carry much nectar through it to the super above (Fig. 25). The brood in the top super will gradually emerge, leaving room for nectar and honey storage. When the top super is fairly well filled and the second one is partly full, place another super of empty combs plus a few frames of foundation under the second super if the flow seems likely to continue.

Figure 25. Hive with queen excluder.

Swarm prevention is accomplished by giving the bees room at the proper time so the young bees can move up out of the brood nest and relieve congestion. Examine the colonies every 10 days or 2 weeks during the spring season to determine what needs to be done. Between 8 and 9 days after the brood has been put into the top super, examine the combs, and remove all queen cells that may have been started.

FEEDING

Sooner or later a beekeeper has to feed a colony of bees. Honey free of foulbrood disease spores can be fed by replacing empty combs with combs of honey. Thick sugar syrup, 2 parts sugar to 1 part water, is another method of feeding. Feeding sugar syrup will not spread disease among the colonies and robbing is less likely to occur. Remember that 10 pounds of sugar syrup will not provide 10 pounds of stores, because there is a loss to evaporation and also to feeding by the bees while they are moving the syrup from the feeder to the combs.

You can make feeders from either 1/2- or 1-gallon syrup pails that have tight-fitting, friction-top covers. Make several small holes in each cover to allow the workers to get to the syrup. Place the tightly covered pail of feed, bottom up, over the frames or over the hole in the inner cover. Then put an empty hive body and the cover on the hive to cover the feeder to prevent robber bees from getting to the feed. In warm weather the pail of feed will be emptied in a day or two, and the pail can then be refilled if necessary. Start feeding late in the afternoon to reduce the chances of robbing. Top and internal feeders also can be used to provide the bees with enough food (Fig. 26-28). They are easier to use, check and refill.

Figure 26. External Borgman feeder.

UNITING COLONIES

Uniting weak or queenless colonies with strong, queen-right colonies is an approved and sometimes necessary practice. During a honey flow you can unite colonies by simply removing the weak or queenless colony from its bottom board and placing it upon the strong colony, after first removing the cover of the strong colony. When there is no honey flow, spread two thicknesses of newspaper over the top super of the strong colony, remove the weak colony from its bottom board, place it on the paper and replace the cover. Cut two or three small slits in the paper to make it easier for the bees to start tearing out and removing the paper. By the time the holes are fairly large, the bees above and below the paper will have the same odor and will unite without fighting. If the weak colony has a poor queen, find and kill her before the colonies are united. If two queens are allowed to fight

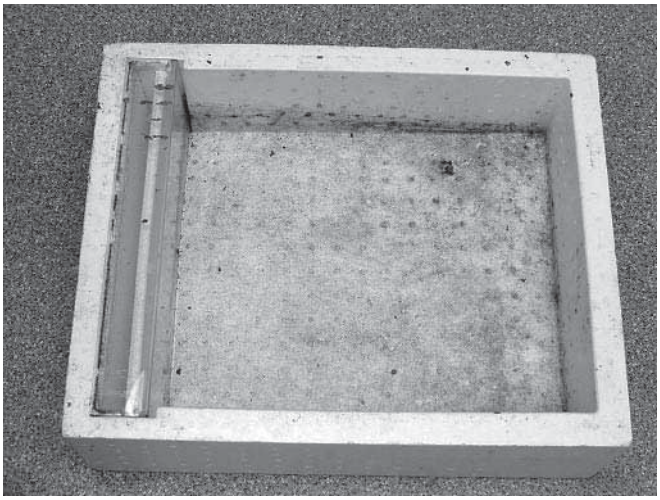


Figure 27. Top feeder.

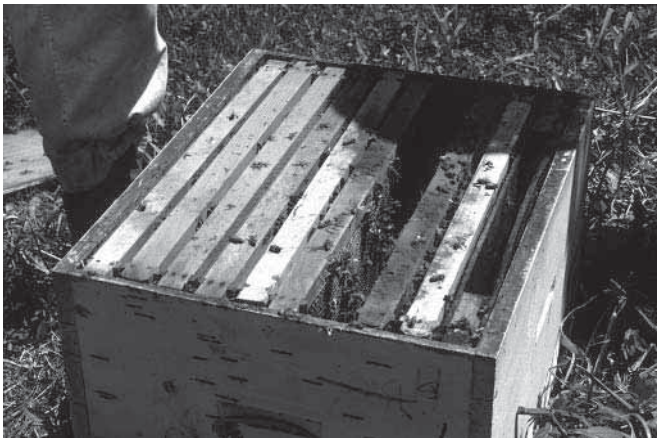


Figure 28. Inside feeder.

for survival, it is generally believed that the better queen will kill the poorer one. Check weak colonies to be sure they are not diseased or infested before combining with a strong colony. Combining could weaken or kill both colonies if pests or disease exist.

HONEY REMOVAL AND CARE

Honey may be defined as the "nectar and saccharine exudations of plants that are collected, inverted and stored by honeybees." Top quality honey is that which is well-ripened, has the proper moisture content and is free of extraneous materials such as excessive pollen, dust, insect parts, wax and sugar. It must be of excellent flavor and aroma, characteristic of the particular honey type. Different types have different flavors, colors and propensities to granulate. Generally, honey contains about 40 percent levulose, 34 percent dextrose, 7 percent maltose, 1 to 2 percent sucrose, 1 to 2 percent dextrins and 18 percent water.

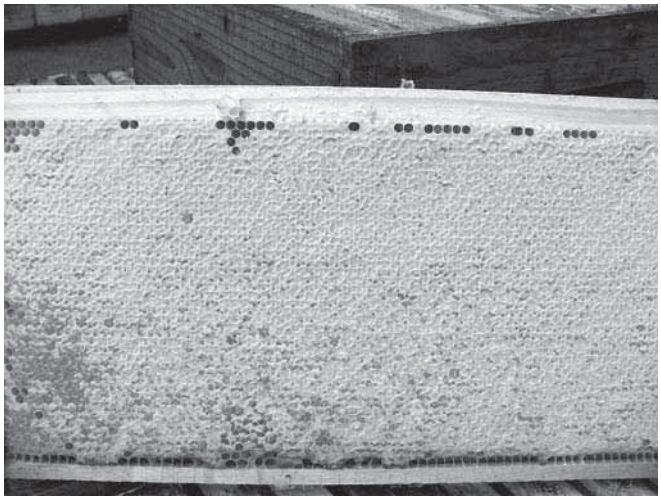


Figure 29. A well capped comb of honey

Honey is not ready to be taken from the hive until two-thirds or more of the cells on the comb are capped (Fig. 29). Extraction occurs about the end of May in South Louisiana or about June 15 in North Louisiana. Honey that is not capped may ferment after it has been extracted.

Frequently, summer honeys ferment in the combs in the colony; they should never be taken for table use.

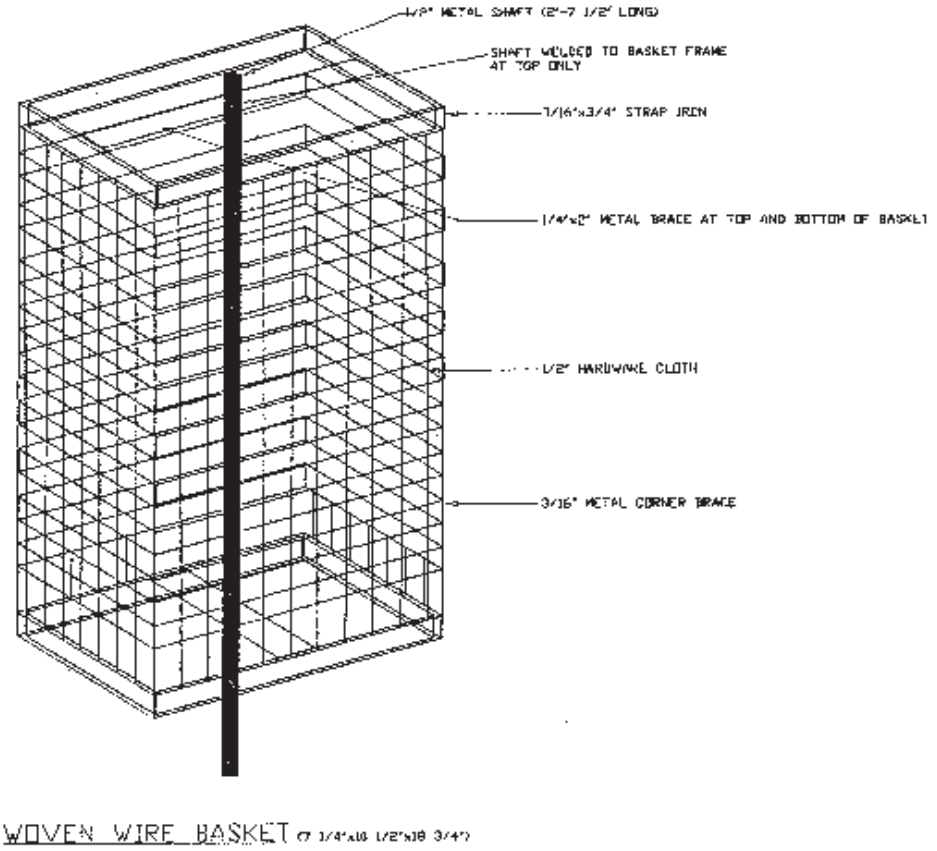
To extract honey, you will need an uncapping knife, a container to hold the cappings, a small extractor,* a filter and a container for the honey (Fig. 30-31).

Shake or brush the honeycombs free of bees, place in an empty super or other box and carry to a closed room. Never remove all of the honey from a hive; leave 50 to 60 pounds for use by the bees in case there is no late flow.

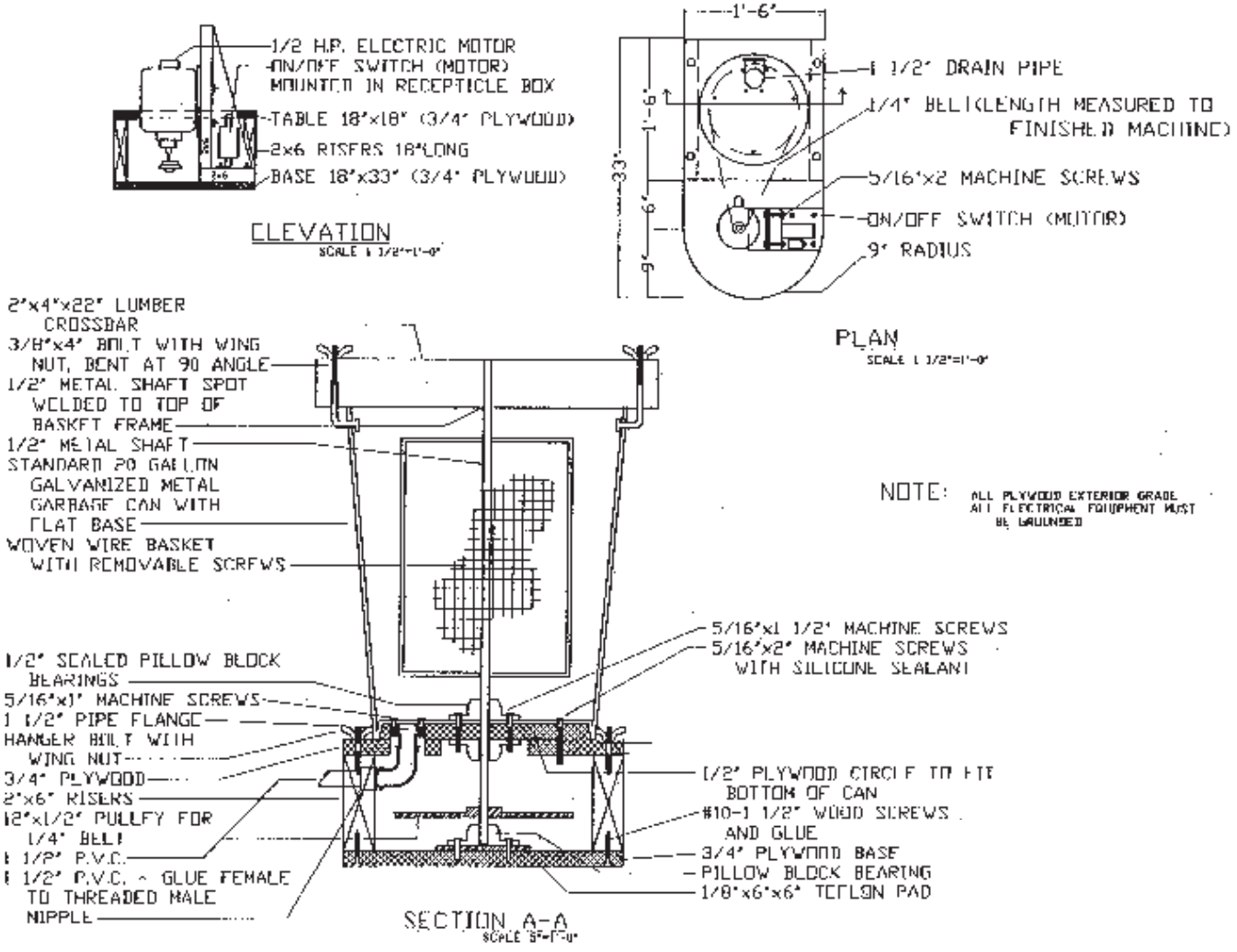
New honeycombs used for the first time to store honey should be handled very carefully. They are easily damaged by the extractor. Turn the extractor very slowly at first so the weight of the honey will not tear the comb. Where a new foundation has been used for honey production, it is better when extracting to do it in steps. Once the frames are placed in the extractor, remove about half of the honey from one side. Turn the frames and remove all honey from the other side and then remove the remainder from the first side. Although this procedure is a little more time consuming, it saves the comb. Newly drawn comb can be easily broken or torn. Extracting by this technique can save you and your bees a lot of work. After extraction, place the empty combs back on the hives.

* A copy of the illustrated blueprints may be obtained from the Louisiana Cooperative Extension Service, Department of Entomology, 404 Life Sciences Building, Baton Rouge, Louisiana 70803, (225) 578-2180.

Figure 30.
Honey extractor blueprint, front and back



WOVEN WIRE BASKET



If possible, allow the honey to remain in the container for two or three days before bottling it. This will allow air bubbles and small pieces of wax to rise to the top. Great care must be taken to keep honey that has been removed from the hive in a closed container. Honey will absorb moisture from the air, becoming thinner and more apt to ferment.

Heating liquid honey at 140 degrees for 22 minutes will kill the yeasts that are present and delay fermentation. This also will prevent granulation. Straining the heated honey through several thicknesses of cheese cloth will remove the extraneous materials.

Tested recipes for the use of honey in cooking can be obtained from the LSU AgCenter parish offices of the Louisiana Cooperative Extension Service, the Louisiana Department of Agriculture and Forestry and the National Honey Board, as well as any of the bee clubs around the state.

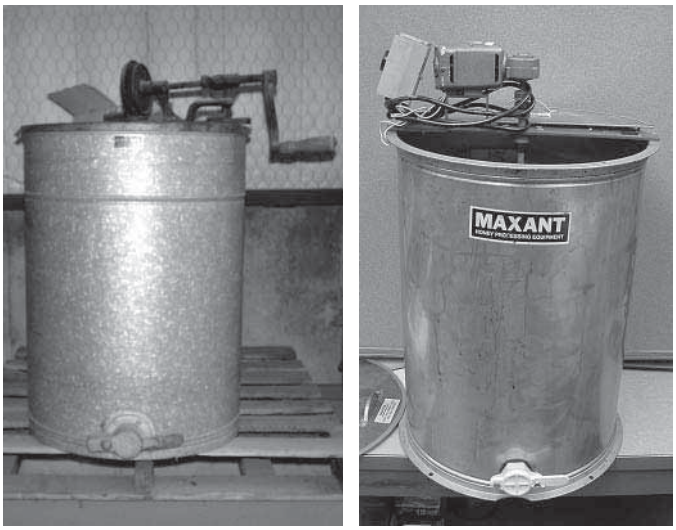


Figure 31. Old two-frame hand cranked honey extractor (left) and new three-frame electric honey extractor (right).

BEESWAX

Under the most favorable conditions of a good honey flow in Louisiana, a strong colony of bees will draw out and build 10 combs from foundation in 3 or 4 days. The wax is produced from wax glands located on the underside of the abdomen of the worker bees. When there is no need for comb building, little or no wax is secreted. It is not known how bees control the secretion of wax. Wax secretion and comb building proceed best during the spring honey flow or when sugar syrup is fed in liberal amounts, especially if honeycomb is needed.

Old combs, cappings, burr combs and the like can be easily melted and reduced to clean beeswax in a solar wax melter during the hot summer months. Essentially, a solar wax melter consists of an open wooden box lined with metal with a removable piece of glass on top. Raise one end of the melter slightly so the melted wax will run into a container with a small amount of water. The water prevents the wax from sticking to the bottom of the container. Another method of reclaiming beeswax is by boiling the old combs and cappings in water. Allow the wax and water to cool slowly so dirt and refuse can settle out. Use extreme care when heating wax over an open flame. It is a flammable material.

Beeswax is used for comb foundation, candles, cosmetics, polishes, waterproofing compounds and many other products.

NECTAR AND POLLEN SOURCES

Many species of plants yield both nectar and pollen while some yield only nectar or only pollen. Keep a record of the blossoming period of the more important species in your area that yield nectar or pollen so you can perform needed hive manipulations at the proper time. Some of the major sources of nectar for the state as a whole are willow, white Dutch clover, blackberry, rattan, vervain, peppervine, eardrop vine, Tupelo gum, Chinese tallow and goldenrod. Some minor sources are thistle, maple, elm, dewberry, yellow top, holly, Persian clover, wild grape, morning glory, cotton and aster (Table 2).

Pollen, called beebread when it has been gathered by the worker bees and stored in the combs, is an essential food for the developing larvae. Brood rearing ceases if pollen is not available. Large quantities of pollen, possibly 60 pounds or more, are needed during the year by a colony. Some of the major sources of pollen for Louisiana are elm, maple, conifers, willow, corn, some of the grasses, partridge pea, boneset, ragweed, smartweed, goldenrod and aster.

A considerable number of the plant species that provide nectar and pollen to the honeybee will bloom prior to June. In the Baton Rouge area, observations during a 40-year period have shown the main honey flow to be in April and May. During the rest of the year, the colonies either lose weight or make only slight gains. This disparity is why it is important to have colonies with large worker populations at the beginning of the spring honey flow. Planting of nectar sources can enhance production and help to maintain strong colonies.

POLLINATION

Honeybees are our most beneficial insect and are of considerable value as pollinators. More than 70 percent of the food we eat requires honeybees for pollination. They are more valuable for pollination than for the honey produced. They carry the pollen grains by means of their hairy bodies from the stamens to the pistils of blossoms of the same species thus starting seed formation. In Louisiana, crops such as cucumbers, watermelons, strawberries, blueberries and white clover are benefited by the presence of hives of bees nearby. The total value of honeybee production to Louisiana exceeds $400,000,000 annually.

Some beekeepers will lease hives for pollination. It usually requires two colonies per acre of commodity. Production increases depend on the crop and weather conditions. Some increases can range from 10 percent to 30 percent.

HONEYBEE DISEASES

Bee colonies can be attacked by several diseases. The two most serious brood diseases in Louisiana are American foulbrood, caused by *Bacillus larvae*, and European foulbrood, caused by *Streptococcus pluton*. For details about bee diseases, consult the books listed later in this bulletin. If you suspect that disease is present in your colonies, contact the state entomologist with the Louisiana Department of Agriculture and Forestry. The officer will inspect your colonies and make a positive identification.

Adult bees are attacked by three diseases: Nosema disease, caused by the protozoan *Nosema apis*; bee paralysis, caused by an unnamed virus; and chalk brood, caused by a fungus. Again, consult the listed books and bulletins for details of these adult diseases (see p. 23).

Table 2. The approximate blossoming time for widely distributed nectar and pollen plants in Louisiana.

Plant species (N and/or P)*	*Time of blossoming* South Louisiana	North Louisiana
Maple (*Acer* spp.) N P	January, February	February
Elm (*Ulmus* spp.) P	January, February	February, March
Tree fruit bloom N P	February, March	March, April
Willow (*Salix* spp.) N P	February, March	March, April
Tupelo (*Nyussa* spp.) N	March	April
Blackberry (*Rubus* spp.) N P	February, March	April
White Dutch clover (*Trifolium* sp.) N P	April, May	April, May, June
Persian clover (*Trifolium* sp.) N P	April, May	April, May
Rattan vine (*Berchemia* sp.) N	April, May	April, May
Chinese tallow (*Sapium sebiferum* Roxb.)	May, June	June, July
Corn (*Zea mays*) P	June, July	June, July
Peppervine (*Ampelopsis* sp.) N	May, June, July	July, August
Vervain (*Verbena* spp.) N	June, July, August	July, August
Boneset (*Eupatorium* sp.) N P	September, October	September
Wild sunflower (*Helianthus* spp.) N P	September, October	August, September
Goldenrod (*Solidago* spp.) N P	October	September, October
Aster (*Aster* spp.) N P	October to frost	September to frost

***N—Nectar, P—Pollen**

HONEYBEE ENEMIES

Wax Moth

The wax moth or wax worm *(Galleria mellonella)* is a serious and widespread honeybee enemy in Louisiana (Fig. 32-34). It is always present in or near colonies. Stored combs or combs in weak or dead colonies are soon ruined by wax worms if nothing is done to prevent the damage. Damage to the honeycombs is done by the larvae of the wax moth as the larvae eat and tunnel through the combs spinning their webs as they go. The eggs and just-hatched larvae are so small the beekeeper is not likely to see them. A strong colony in a standard hive is seldom bothered by wax worms, but weak colonies cannot keep the moth out nor clean out the larvae. This inability is one important reason why it is essential to maintain strong colonies or to unite weak colonies with strong ones as soon as weak ones are detected.

Keeping the bottom boards clean of burr combs and other refuse eliminates places where the moths might lay their eggs. Wax moths may be killed in stored combs and then kept out of the combs by the use of paradichlorobenzene (PDB). Use 1 level cupful of this material scattered on the top bars for each super of combs. Repeat the dose about 10 days after the first treatment. Give subsequent treatments every 5 or 6 weeks. Keep the supers covered tightly and tape all cracks or holes if supers of combs are piled upon each other. Be sure to air the treated combs for 2 or 3 days before returning them to colonies. PDB is recommended because it is inexpensive, safe and effective when used properly.

Other Moths

The lesser wax moth, the Indian meal moth and the Mediterranean flour moth can also infest and damage hives or hive products. The lesser wax moth causes similar damage since lesser wax moth populations may be found in conjunction with greater wax moth infestations. The Indian meal moth and the Mediterranean flour moth are more of a problem when pollen is collected. These larvae will infest and feed on and web the collected pollen, making it unsaleable.

Where only one or two colonies are infested, supers may be placed in a freezer for 24 hours to kill all eggs, larva and pupa and then stored in cold storage or treated with PDB to keep wax moths out of the stored combs.

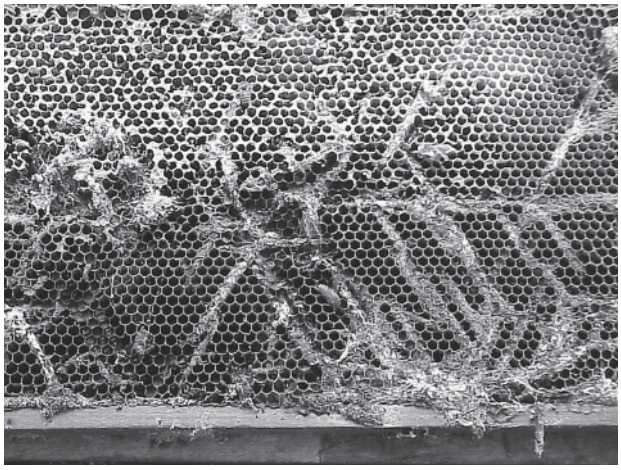


Figure 32. Greater wax moth larval damage.

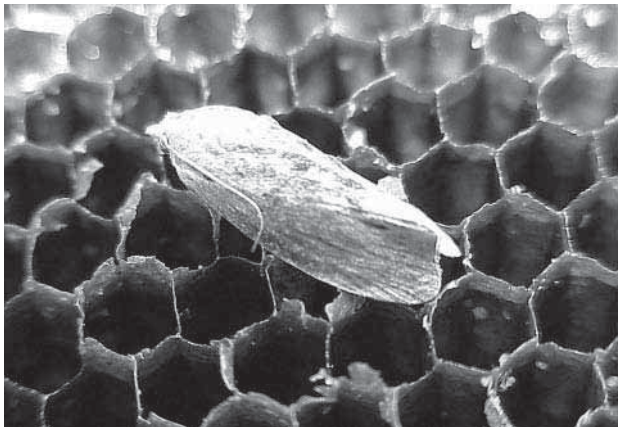


Figure 33. Greater wax moth adult.

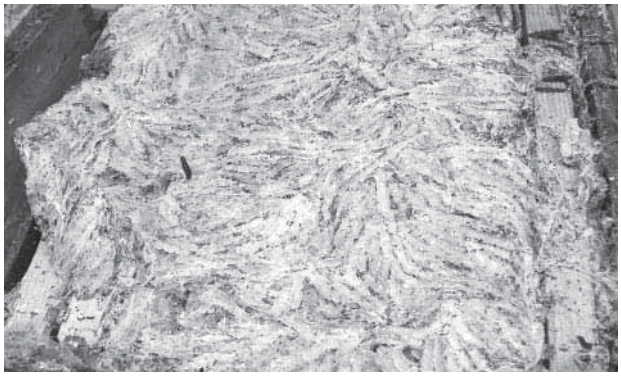


Figure 34. Greater wax moth damaged pupa.

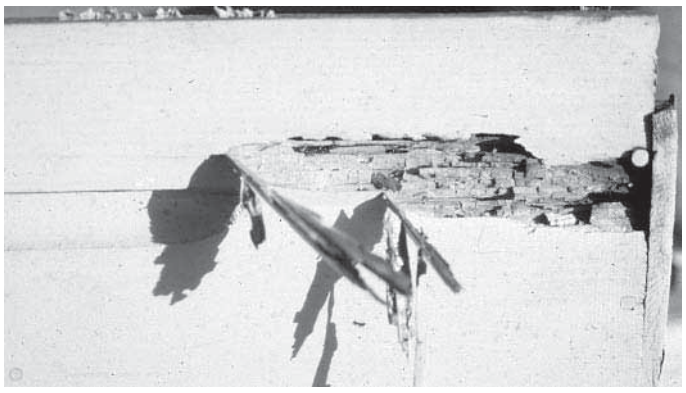


Figure 35. Carpenter ant damage to super.

Ants

The Argentine ant may cause bee colony loss in some areas. These ants can be controlled by the careful use of an insecticide (granules or liquids only) applied to the nest and trails. Remember that honeybees are very sensitive to insecticides, so use them with care. Insecticidal dust can be accidentally picked up by bees. Fire ants build mounds close to hives and inconvenience the beekeeper, but they are not known to attack colonies unless weak. Carpenter ants can cause structural problems in hive bodies. They usually infest wood that is water-damaged, so good care of hive bodies will prevent carpenter ant damage.

Varroa Mite

The mite, *Varroa jacobsoni,* is an external parasite of the Asian honeybee *(Apis cerana)* (Fig. 36,37). Movement of the European honeybee *(Apis mellifera)* into varroa-infested areas allowed the parasitic mite to transfer to a less resistant host. The mite was detected in North America in 1987 and has since spread throughout the honeybee population. It all but eliminated the feral honeybee colonies from several southern states, including Louisiana, where nearly 99 percent of the feral colonies were lost in some areas. They have since begun to reestablish in the wild.

Control of the varroa mite has been moderate at best, and alternate controls (other than pesticides) are being evaluated. Control tends to be expensive and time consuming for the beekeeper, because multiple treatments must be made at specific times to give adequate control. The use of a single control method over any extended period will allow for the development of resistance or tolerance of the mite to that control. The development of other controls—chemical, genetic or biological—is necessary if we are to live with this pest in the hive.

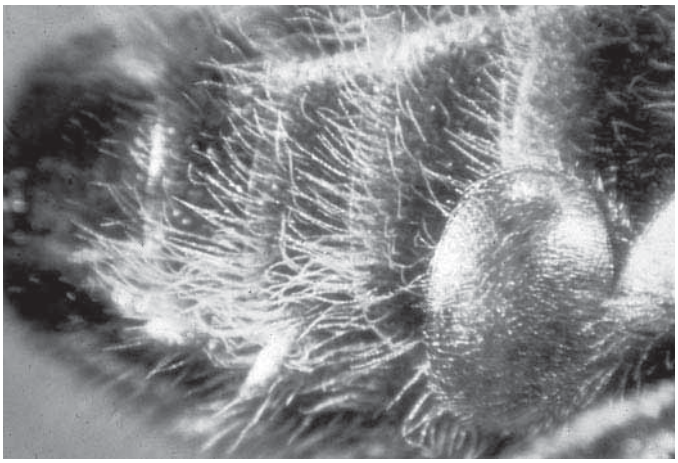
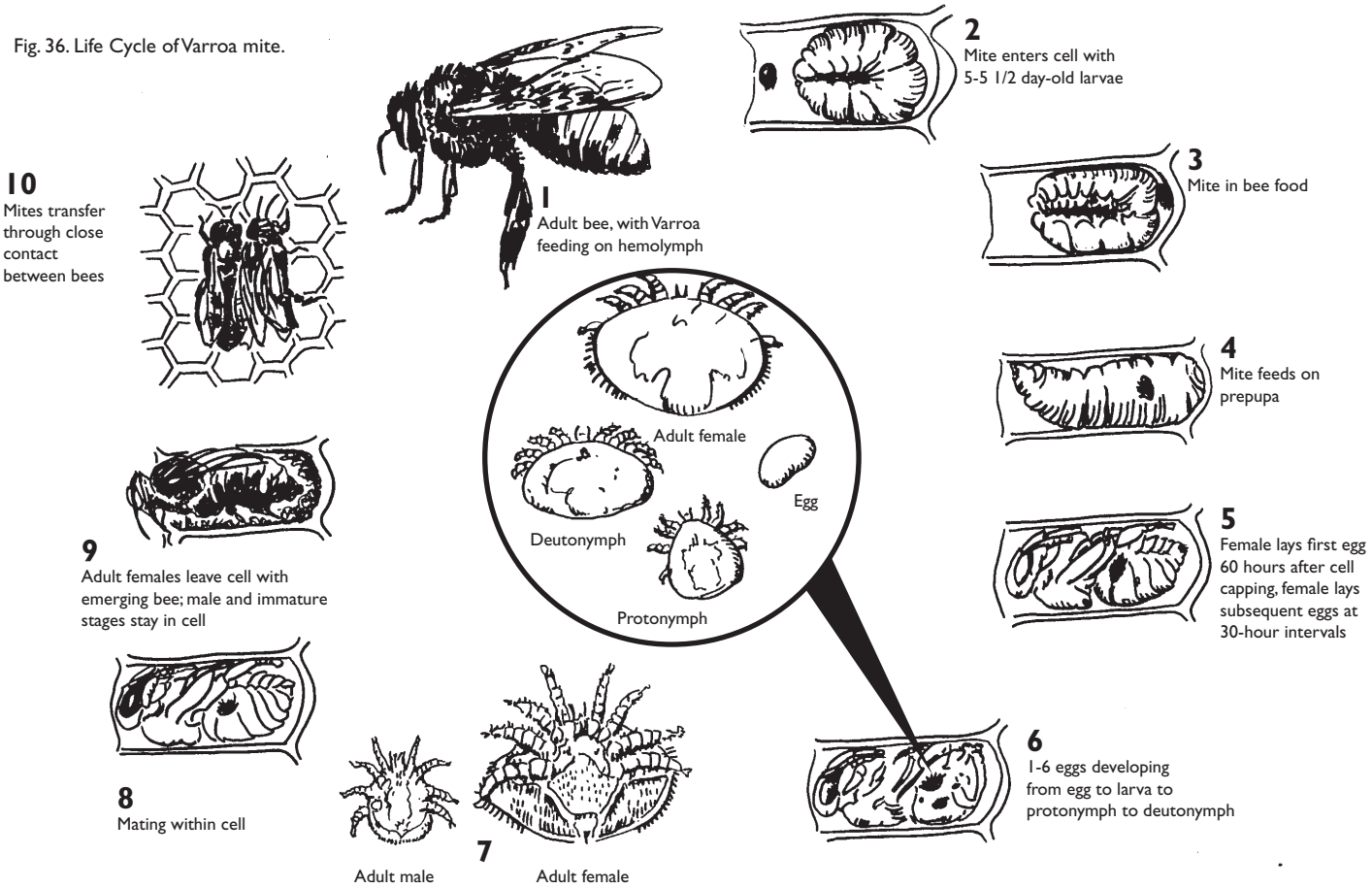


Figure 37. Varroa mite on honeybee.

Fig. 36. Life Cycle of Varroa mite.



The adult varroa mite female is a large, flattened, reddish-brown external parasite of all castes of honeybees. It is about the size of the tip of the head of a safety match. Adult mites feed on the haemolymph of the adult bees by forcing themselves between the abdominal segments and piercing the soft intersegmental tissue. The adult mites can live on the adult bees throughout the life of the bee.

Most mites enter the brood cells for reproduction a few days after entering a colony with hatching bees. Mite reproduction can take place only when the colony produces brood. The adult female mite enters the brood cells just before capping. Both worker and drone brood may be used for reproduction, although drone brood is preferred because it has a two-day nymph cycle development. This cycle allows time for the female mites to mature and mate.

Egg deposition begins about 60 hours after the cells are capped. The mites develop from egg to adult through two nymphal stages: protonymphs and deutonymphs. The time required to develop from egg to mature adult female is 6.0-6.2 days and 6.8-6.9 days for the male, although recent research indicates it may be shorter for both sexes.

Bee injuries vary from some bees being lighter in weight to others being deformed or killed. Infested colonies initially have low populations and without control can be killed within 4 to 6 months. Infested colonies may appear normal as long as no additional stress occurs and treatments are applied as directed. Mite infestation coupled with secondary stress such as viruses, chemicals and other arthropod problems can be too much for a hive to overcome.

The Tracheal Mite

The tracheal mite, *Acarapis woodi,* is an internal parasite of the respiratory system of the adult honeybee (Fig. 38-39). It infests only three species of honeybee: the western honeybee, *Apis mellifera;* the African honeybee, *Apis mellifera scutellata;* and the eastern honeybee, *Apis cerana.* The mite was found in North America in 1980 about 200 miles south of Texas. In 1984, mites were detected in a commercial apiary in Weslaco, Texas. Since that time the mite has spread rapidly throughout the beekeeping system primarily through the movements of migratory beekeepers and the sale of queens, packages and nucs.

Figure 39. Tracheal mites inside of honeybee.

The mites are whitish and microscopic. The body is oval and widest between the second and third legs. The cuticle is smooth and shiny with a few long, fine hairs on the body and legs. It has elongated beak-like mouth parts for feeding on the host. The entire life cycle is spent within the trachea or respiratory tube of the bees except for brief migratory periods. The feeding of the mites inside the trachea causes the normally clear, colorless trachea to begin to deteriorate and show patchy discoloration, growing worse as

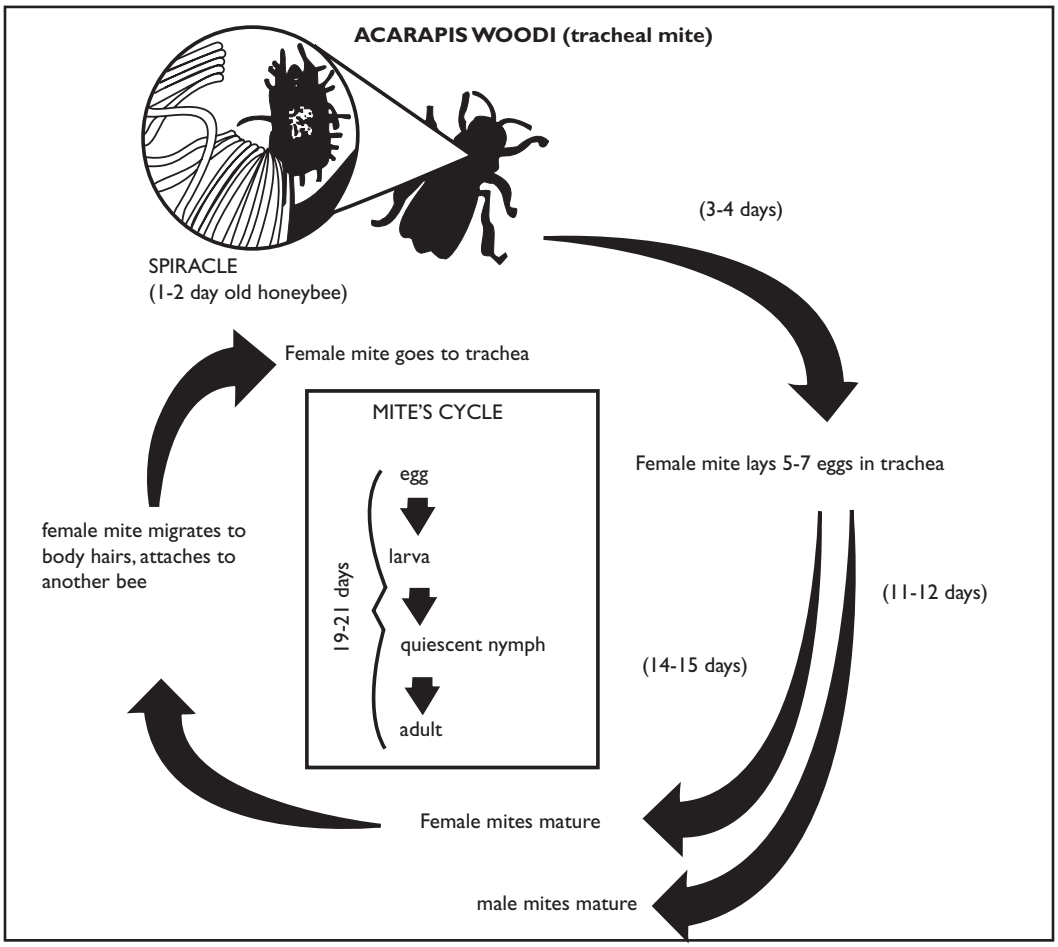


Figure 38. Life cycle of tracheal mite.

the infestation increases. In the feeding process, the beak-like mouth parts puncture the trachea to feed on the bee's blood. These punctures deteriorate the trachea, reducing the bee's capability to transfer oxygen to the blood and weakening the flight muscles. This loss of flight reduces the ability of the honeybees to forage, and the colony will gradually weaken and die out. As mite reproduction begins within the trachea, additional injury is caused by the increase in the population and the fecal deposits. The severe injury causes the normally flexible trachea to become brittle. The trachea becomes brown or appears to have crusty patches and eventually turns black from obstructions and mites in various stages of development.

Each female may lay five to seven eggs within the first few days of infesting a host honeybee. Egg laying continues throughout the mite life span or until the host dies. The eggs require 3 to 4 days to hatch. (The tracheal mite life cycle consists of the egg, larva, resting and adult stages. Females require 14 to 15 days to mature and the males 11 to 12.) Mites spread by bee-to-bee contact. Mated females leave the trachea, climb on the body hairs of the host, and as contact is made with another bee, they transfer and enter the trachea. If no contact is made within 24 hours, the mite normally dies. Honeybee drifting habits make distribution easy from one colony to another, within and between apiaries.

Tracheal mites shorten the lives of adult bees by affecting flight efficiency, causing large numbers of bees not to fly. With heavy mite infestation, colony populations dwindle and die. In many cases, severely infested colonies appear normal until their decline during winter. (Honeybees are most affected during winter confinement as with most stress diseases.) Infested honeybees generally die in winter.

Detecting infestations is difficult because no outward signs of a problem occur. Diagnosis can be made only by examining the trachea. This requires equipment for dissection and proper magnification.

Small Hive Beetle

The small hive beetle was first identified in Florida in 1998. Prior to this, it was a pest in tropical Africa. Since the adults feed on fruits, it is possible that the small hive beetle was introduced in a shipment of fruit from Africa. The beetle is not a pest in Africa but has caused quick and heavy losses to strong colonies in Florida and other areas where infestations have been found. It was first found in Louisiana in 2000.

The adult beetle is small about 1/3 the size of a honeybee, is reddish-brown or black in and is covered with fine

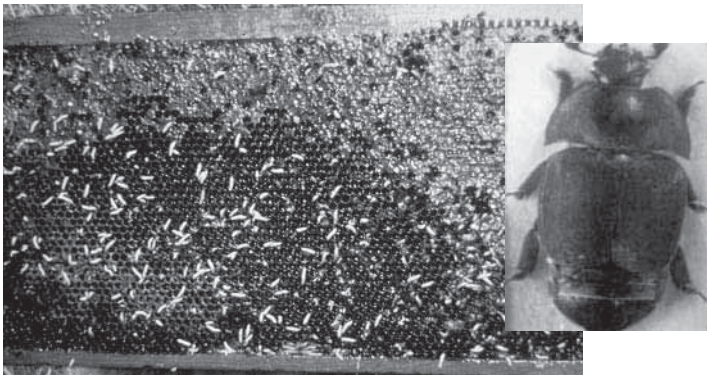


Fig. 40. Small Hive Beetle larvae on a frame, (left) and small hive beetle adult.

hairs. The larvae are small, cream colored and similar in appearance to young wax moth larvae. You can differentiate the beetle larvae by examining their legs. Beetle larvae have three pairs of legs just behind the head. Wax moth larvae have three pairs of legs just behind the head, but also have four pairs of pseudo legs on the abdomen. The beetle larvae have no abdominal legs (Fig. 40).

Adult females lay their eggs in large masses on or near beeswax combs. After hatching, the larva consumes pollen and wax, but also eats honey, bee eggs and larvae. They complete the larval development in 10-16 days and then drop to the ground to pupate in the soil. Adults emerge in 3-4 weeks. The adult female is capable of laying eggs 1 week after emerging from the soil. These beetles are good fliers and easily disperse to adjacent colonies to begin a new generation. Georgia has shown that reproduction is completely shut down during winter.

Although a minor pest in South Africa, the U.S. experience suggests that it could be a significant economic pest in some areas. Successful establishment in temperate regions or in areas without sandy soil is unknown.

In North America the beetles are capable of readily taking over strong colonies with little resistance from the bees. Just a few beetles can produce massive numbers of larvae. Besides feeding on the honey, defecation in the honey promotes fermentation and causes the honey to run out of the combs. When small hive beetle infestations are heavy queens will stop laying eggs even in strong colonies, and the bees may abscond.

All inspections should be done with an eye open for this pest. When opening a hive with beetles, the beetles can be seen running across the combs to find hiding places. Adults may be detected under top covers or on bottom boards. If the infestation is heavy, adults and masses of larvae may be seen on the combs and bottom boards. They do not make silken tunnels, webbing or cocoons in the hive.

Corrugated cardboard with the paper removed from one side and placed on the bottom board at the rear of the hive has been successfully used in detecting adult beetles.

Fermented honey exuding from full supers in storage,waiting to be extracted or on active colonies is a sign that hive beetles may be present. A "decaying orange" odor may be given off by the fermented honey.

Bayer's Check-Mite+ (active ingredient is coumaphos) has an established tolerance for honey and beeswax. The establishment of tolerances will allow the sale of honey that has picked up minute amounts of coumaphos from the use of Check-Mite used to manage varroa mite and the SHB. It is permissible to sell comb honey from hives treated with Check-Mite+; however, all surplus honey supers must be removed before treatment, and they cannot be replaced until 14 days after treatment has been removed.

Coumaphos has no general use label and is usable through a section 18 registration by the Louisiana Department of Agriculture and Forestry. It is imperative that label directions are followed, since any misuse could jeopardize availability.

Y-Tex Gardstar (40%EC Livestock and Premise Insecticide) is approved for aid in control of the small hive beetles around honey bee colonies. Small hive beetles pupate in the soil. A pesticide used as a soil drench allows treatment of the beetles while minimizing contact with the bees, and honey. Follow label directions. Permethrin, the active ingredient in Gardstar, is highly toxic to bees, and extreme caution must be taken to avoid contact by spray or spray drift with the bees, hive or any surface the bees may contact. When hives are present, applications may be made only with a sprinkler can.

The best beetle control is good varroa mite control. There have been no reports of anyone having beetle problems of freshly extracted combs if extracted within 48 hours of removal of bees (24 hours in hot weather). Also, beetles have not been observed laying eggs in wet combs unless there is brood or pollen present. Queen excluders are the best beetle control in this regard. A good storage hive can tolerate several thousand beetles until it is disoriented. A good strong hive can remove very small larvae if any should be in the combs. These larvae are not mature enough to survive outside the hive, so treatment is not necessary. During the day, beetles tend to go to the top of the hive to avoid the light from a screen bottom. Strong, stress-free hives should not have major problems with beetles. Cold storage is excellent and can be used for super of honey and cut combs (void of pollen and brood).

Dragonflies

Dragonflies are graceful, quick and beautiful aerial insects, but they can be very damaging to honeybees (Fig. 41). They are excellent predators and eat only live food they catch in flight, which, unfortunately, includes honeybees. Therefore, when colonies are located near aquatic areas, high populations of the larger forms of dragonflies, or mosquito hawks as they are sometimes called, can greatly deplete a honeybee colony of the foraging population. In extreme cases bee yards have been moved because of this pressure. Although the dragonflies are beneficial in feeding on numerous other winged insects like mosquitoes, flies and moths, they can at times cause losses for the beekeeper.

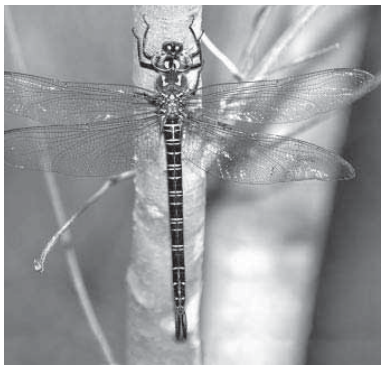


Fig. 41. Dragonfly
(photo courtesy of Gayle Strickland)

Mice

Mice can do considerable damage to honeycombs if they get into hives or stored combs during the winter. During cold weather, while bees tend to be clustered or quiet, mice may enter the hive and build nests, gnawing large holes in the combs that become worthless (Fig. 42).

Prevent mice from entering hives by tacking strips of coarse wire mesh (three meshes per inch) across the entrances late in the fall. Bees can pass through the wire cloth, but small animals cannot. Remove the wire cloth early in the spring so the bees will not be hindered in their housecleaning work.

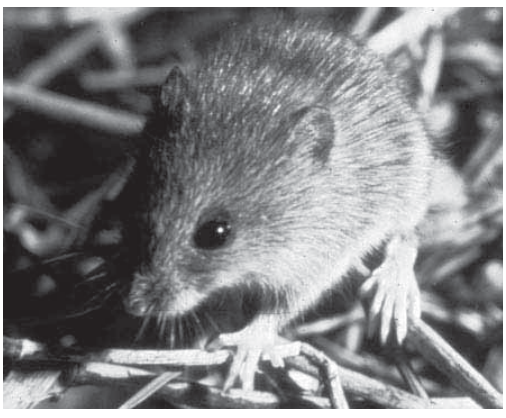


Figure 42. Field mouse.

Skunks

Skunks sometimes annoy colonies of bees if their natural food is scarce because of cold weather. The skunks scratch at the entrances of the hives, catching and eating the bees that appear (Fig. 43). Typically, a skunk makes paw marks on the bottom board at the entrance and the grass in front of the hive. Control can be accomplished by traps or poison. Exercise caution if poison is used.

Figure 43. Skunk.

HONEY BEE COLONY REGISTRATION

It is difficult for the Department of Agriculture and Forestry and the LSU AgCenter to get accurate annual counts on honey production figures and on the number of colonies in the state. Accurate figures justify the time and effort put into the apiary program by both organizations and allow assistance to beekeepers when needed.

Problems associated with honeybee diseases and pests, nuisance bees, spray programs, migratory movement, theft, etc., often have been avoided because of apiary registration records. Assistance with a honeybee-related problem is free to beekeepers and should be requested when it occurs. Annual colony registration costs are low with no cost to hobby beekeepers with 10 of fewer colonies.

Honeybee colony registration forms can be obtained from the Louisiana Department of Agriculture and Forestry, Office of Horticulture and Quarantine Programs, (225) 952-8100.

BEE BOOKS, BEE JOURNALS, AND NEWSLETTER

For your convenience the following partial list is included:

Books

"ABC and XYZ of Bee Culture" — A.I. Root Company, Medina, Ohio 44256
"The Hive and the Honeybee" — Dadant and Sons, Hamilton, Illinois 62341
"How to Keep Bees & Sell Honey" — Kelly Company, Clarkson, Kentucky 42726

Additional books and videos are available through Apiculture Library:
Dr. Dale Pollet (225) 578-2180.

Bee Journals

"American Bee Journal," Hamilton, Illinois 62341
"Gleanings in Bee Culture," Medina, Ohio 44256
"The Speedy Bee," Box G-27, Jesup, Georgia 31545

Newsletter

"Bee Ready," (published quarterly) can be obtained from your LSU AgCenter parish agent; send your name and address to your parish office to receive. It may also be found on the LSU Web site: www.lsuagcenter.com. Click on Environment & Natural Resources, Insects and Related Arthropods, and Bees and Wasps.

Bee Clubs

Louisiana Beekeepers Association Inc. — location rotates around the state.
Acadiana — Scott, Lafayette Parish
Hill Country —West Monroe, Ouachita Parish
Ark-La-Tex — Bossier City, Caddo Parish
River Region — New Orleans, Orleans Parish
Capital Area — Baton Rouge, East Baton Rouge Parish
Tangi-Tammington — Mandeville, St. Tammany Parish

BEGINNING WITH BEES

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