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# Beekeeping for Beginners

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Cover picture was used through the courtesy of The American Bee Journal

# *Beekeeping for Beginners*

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There is no doubt that man kept honeybees before there were any written records of the human race. Undoubtedly primitive man discovered that honey was a desirable food long before he conceived the idea of keeping bees in crude hives. Therefore beekeeping is one of the oldest of all agricultural pursuits, practiced more widely in olden times than it is today. Honey was the only known sweet. Beeswax was widely employed in religious ceremonies, in ancient arts and in the burial of the dead. Even taxes have been known to be levied on honey and wax.

Whenever a honeybee is seen noisily busying itself around flowers gathering nectar and pollen it excites some degree of curiosity. Bees would be as common as poultry and livestock around the farm home were it not for their very effective weapon of defense—the sting. However, bees are not kept through interest alone, but primarily for the honey produced. In the more favored beekeeping sections of Texas a few hives of bees properly cared for will not only adequately supply the owner's table with honey but may produce a small surplus for sale as well. In producing this honey a greater service is done by helping to pollinate many plants such as fruits, vegetables, clover and alfalfa. There is no group of insects as efficient as the honeybee in the pollination of plants.

Who should keep bees? Regardless of age, sex, creed, or color anyone may keep bees if the individual is a careful observer, interested in natural history, of an even temperament, and not hypersensitive to bee stings.

Bees may be kept wherever sufficient nectar producing plants are available to support the colonies and provide a surplus of honey. But they should not be placed where they may be a nuisance to passers-by and the neighbors. Often times

their presence is also undesirable around watering troughs of livestock.

Time, work and study is essential to the mastering of any trade or profession. Beekeeping is no exception. One should start with only one or two colonies, and some choice reading material. Then he may expand his operations as he learns, and as the bees pay their way. If, after a year or two, he decides he is no beekeeper after all, or that his location is not suitable, he may dispose of his colonies and equipment with little or no monetary loss.

It is not within the provinces of this bulletin to present more than the briefest discussion of beekeeping. Several choice references are given on page 20 for those who desire detailed information.

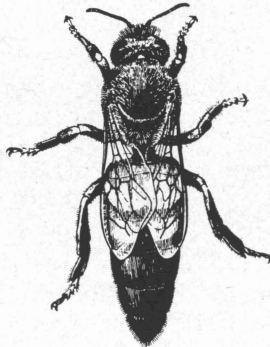
Bees are not domesticated insects. There is no difference in the behavior of a colony in a hollow tree and one in a modern apiary. But if one knows their biology and instincts he can do just about whatever he chooses with them. All beekeeping manipulations are based on this knowledge. The first consideration, therefore, is to learn something of the colony and its way of life.

### The Colony and its Organization

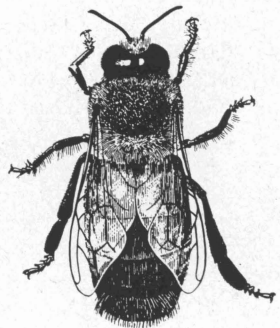
A colony of bees consists of a queen, at least a few drones, with the exception of mid-winter, and a large but variable number of workers. There may be less than 10,000 workers in early spring while exceptionally strong colonies may contain as many as 75,000 at peak strength.



**Worker**



**Queen**



**Drone**

Courtesy of the United States Department of Agriculture

The colony may live in a hollow tree, a cave, within the walls of a building or in a modern hive. Since the habits and

instincts of the bee remain unchanged, regardless of its habitation, the general pattern of the nest is essentially the same. The nest consists of a number of combs about one-half an inch apart, composed of hexagonal cells. The combs are made of wax secreted by young bees from their bodies. Experiments have shown that bees must eat an average of almost ten pounds of honey to produce one pound of comb. Therefore, combs are expensive and every effort must be made to conserve them.

The combs are composed of two principal types of cells, the worker and the drone cells. Respective individuals are reared in these cells and both types are employed for the storage of honey. A third type of cell, the queen cell, is not generally seen as only a small number are constructed. These are destroyed soon after the occupants have emerged. They are found usually along the lower edges of the combs, hanging downward and resemble unshelled peanuts.

Eggs are deposited singly in the cells by the queen. The egg hatches into the larva, or grub, which later changes into a pupa, or transformation stage, from which the adult emerges. These immature stages are known collectively as brood. At the end of the larval stage they are capped with wax. This capped brood is often mistaken for honey by the beginner.

**The Queen:** In every normal colony is found a mother bee, the queen, which resembles a wasp with short legs and wings. She is not so robust as the drone, but her body is longer and more tapering. Normally only one queen is found in a colony, but occasionally an old queen and a daughter may live together for several weeks.

Sole duty of the queen is to lay eggs. Since she is little more than a slave, she has nothing to do with the governing of the colony. This duty apparently belongs to the workers. At the height of the brood-rearing season in the spring she may lay 2,000 or more eggs in a single day—a weight of eggs greater than her own body. However, this rapid rate of egg production is continued for only a relatively short time. Eggs laid in worker or queen cells are fertile and develop into females, workers or queens; those deposited in drone cells are not fertilized and these develop into drones (males).

Queens may live for as long as five years, but it is advisable to requeen at least every other year as a queen has passed her peak in egg production by this time. Queens are reared in nature under three impulses, queenlessness, supersedure and swarming. Should a queen die or be killed the worker bees will

construct a queen cell around an egg or a newly hatched worker larva and rear another. In supersedure workers rear a young queen to replace the old one that is failing in her duties of egg laying. Swarming is the normal mode of reproduction. At this time a young queen is reared to take the place of the old queen which leaves with the swarm.

Queens are reared from fertile eggs just as the workers are. The queen, unlike the worker, is a sexually developed female. She is reared in a large cell and fed throughout her larval life on a white creamy-like substance known as "royal jelly," a highly nutritious food of glandular origin supplied by the nurse bees. Approximately 16 days are required for development of the queen. Average length of the egg, larva, and pupa, or capped brood, stages are 3, 6, and 7 days respectively, a total of sixteen days. A knowledge of this life cycle is essential in queen rearing, making divisions and other manipulations.

When the young queen is about seven days old she takes her mating flight, mating occurring in the air. This is nature's method of selecting a virile mate to insure vigorous offspring to perpetuate the race. Bee breeding is difficult, as the male cannot be selected. Science has learned to artificially inseminate queens, greatly speeding up bee breeding work. Queens may mate one, two or even three times, and plural matings are about as common as single matings; but all matings occur before egg laying begins. The queen usually begins to lay two days after mating. She never leaves the hive again unless to accompany a swarm.

**The Drone:** Drones are male bees, developing from infertile eggs in drone cells. They are even larger and stouter than the queens, but their bodies are not so long. They have no stings and are physically disqualified for any work. Their sole purpose in nature is to fertilize young queens. Since many stores are consumed in their rearing and upkeep, and as only few are necessary for mating purposes the modern beekeeper tries to eliminate their production as much as possible. This is done best by using full sheets of worker-size foundation in the frames so the bees will construct but few drone cells, and also by continuously culling out undesirable combs.

When the swarming season is over and the honey flow has drawn to a close, the worker bees will not tolerate the presence of these boarders any longer. Then they are starved and driven out of the colonies to die.

**The Worker:** Workers are the smallest and most populous occupants of the hive. They develop in worker-size cells from

fertile eggs. Since development occurs in small cells and the larvae are not fed the same rich nutritious food throughout their larval lives as the larval queens, they develop into sexually undeveloped females. Three weeks are required for development from egg to adult. The average length of egg, larva and pupa stages are 3, 6, and 12 days respectively.

Length of life of the adult worker depends upon the amount of work it does. It may live from fall to spring, but during the honey gathering season it spends its energy and dies in about six weeks. The worker is well named for it does all the work of both the hive and the field with the exception of normal egg laying. Should a colony become hopelessly queenless, certain individuals will assume the duty of egg laying. Since their eggs are infertile, only drones are normally developed which only aggravates an already impossible situation. They are called "laying worker" colonies, and are dealt with best by uniting with a queen-right colony.

Young worker bees feed and care for the queens and brood, polish the cells, clean the hives, change the nectar into honey, secrete wax, build combs, ventilate the hive and act as guards. When about three weeks old they become field bees. Their duties are that of gathering nectar, pollen, propolis, a gum from trees for sealing cracks and crevices, and to supply the colony with water.

A field bee usually visits many flowers to deliver one load of nectar of about 30 milligrams, consisting of about one-half excess water which must be evaporated in the ripening process. Therefore, it actually delivers about 15 milligrams of honey from one field trip. There are 453,592 milligrams in a pound; therefore, about 30,000 trips must be made to collect enough nectar to produce a pound of honey. Assuming each trip covers a distance of two miles, this would mean that bees travel a distance of more than twice the circumference of the earth at the equator and visit hundreds of thousands of flowers for one pound of honey.

Collecting nectar is only part of the work; this nectar must be changed into honey. The principal sugar found in nectar is sucrose or cane sugar. As soon as the honey sac is filled a process known as inversion is begun which changes most of the cane sugar into simple sugars, dextrose and levulose. When the field bee returns to the hive it gives the load of nectar to house bees which manipulate the drops with their mouthparts to expose a thin film to the air as an aid in evaporating the excess water. Following these manipulations the drops of nectar are deposited in the cells. Evaporation is further aided

through ventilation of the hive through fanning. At the end of about three days the nectar has been changed into honey with a sugar content of 80% or more, and the cells are sealed with waxen caps.

Ventilation by fanning is not only for evaporation of excess water in the unripe honey, but also to cool the hive in hot weather. Even water may be brought in and evaporated to reduce the temperature. Here is an insect actually practicing air conditioning.

Almost every country boy has seen bees with loads of pollen on their hind legs. Pollen is used chiefly as a larval food and large quantities are collected. When there is a lack of pollen, substitutes must be fed.

The beekeeper should provide an adequate supply of water for bees near the hives, as they use water especially in the preparation of larval food. Much water is consumed during the height of the brood rearing season.

In collecting pollen and nectar, bees show a remarkable fidelity in working only one kind of a plant at a time. This greatly increases their value as pollinating agents. Bees do not overcrowd the plants they are working, but only enough are present to take care of the available nectar or pollen. This is controlled through a sign language they use.

Bees have an acute sense of smell that also governs their behavior to a considerable extent, and which has its practical applications in beekeeping. Two colonies may be united readily if the queen of one is removed and placed above the other with a double thickness of newspaper between them. By the time the bees have eaten holes through the newspaper and slowly intermingled they will have acquired the common odor of the hive, and will not fight. In queen introduction the new queen is not released immediately, but is kept in the shipping cage long enough to acquire the common odor of the hive and the bees to have become acquainted with her through the screen covering of the cage. Any beekeeper knows he cannot successfully have a swarm of bees until he gets the queen in the hive. Workers do not go indiscriminately from one hive to another. They must have the common odor to be accepted unless they are field bees and have a pay load.

**Swarming:** In nature bees increase the number of colonies or households by swarming. During the spring when the colony becomes overcrowded, the weather warm and some nectar available, swarming impulse is manifested and the colony readies itself for this important event. A number of queen



cells are started, work slackens, and scout bees search out a new habitation. When the queen cells are capped, the swarm, accompanied by the old queen, comes from the hive and clusters on some nearby limb. After a lapse of fifteen minutes to a day or more the cluster is broken and the bees fly away to establish a new colony. Swarms may be readily hived by shaking into a new hive supplied with frames containing full sheets of foundation, or preferably, combs. After most of the bees have entered the new hive it may be picked up and set on its permanent location.

Beekeepers do not desire swarming. This often occurs just as the main honey flow begins, and with a divided force little surplus honey is stored. Bees must be at peak strength to store the greatest honey crop. If more colonies are desired the beekeeper may easily make his increase at a more appropriate time. Methods of making increases are given on page 15.

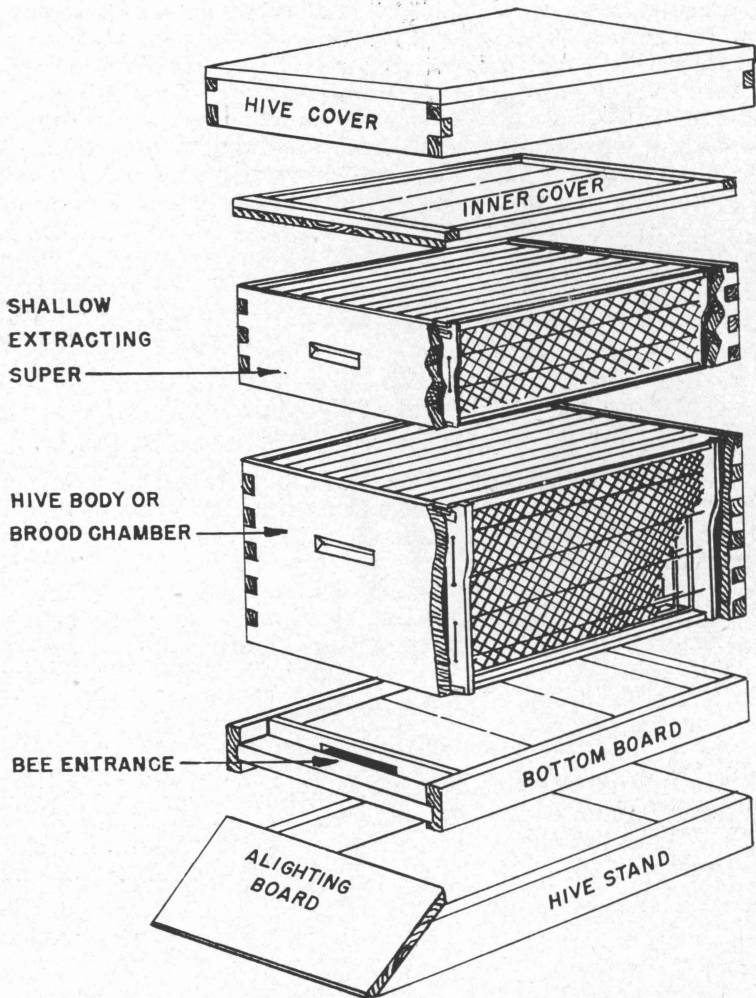
The most important factor underlying swarming is congestion of the brood nest. Adequate room in the form of hive bodies or supers must be added in the spring as the colony increases in numbers. Frames of brood should be placed in the super above and frames of empty combs or foundation substituted, thus scattering the brood and preventing congestion. Since bees usually swarm with old queens, requeening is a considerable aid. There are several specialized control measures which are discussed at length in the references cited.

### **Beekeeping Equipment**

A study of one or more bee supply catalogs of reputable concerns is one of the best methods of becoming acquainted with beekeeping equipment and its use. However, a beginner does not need all of the equipment advertised for sale by any means.

A smoker is a prerequisite. Smoke is repellent to bees. It causes them to rush to cells and fill their honey sacs preparatory to swarming out, thus resulting in their being less apt to sting. Rotten wood, cedar bark, burlap or similar material make good fuel.

A veil is another essential. The beginner may easily make his own after seeing a picture of one. Coveralls should be worn and the cuffs stuffed in the tops of boots or snugly tied around the shoe tops. The beginner should wear gloves equipped with gauntlets reaching to the elbows. With this protective equipment the beginner should receive few stings. Another article almost indispensable is a hive tool. It is a flat piece of steel with one end straight for prying supers apart and the other



end bent at a right angle for separating the frames. Both ends may be used for scraping the comb and propolis from the hive parts and cleaning the bottom boards and covers. If one is handy at making things he may make one with a piece of automobile spring.

Bees must be kept in standard hives with movable frames. For each colony one should provide a bottom board, a cover, two 10-frame standard hive bodies and one shallow super, and frames for both hive bodies and shallow super. Factory made equipment is preferred for the cover, bottom board,

hive bodies, and the shallow super, and is mandatory for the frames. Purchase of an inner cover and a queen excluder is optional. Additional equipment consists of sheets of medium brood foundation for the hive bodies and the shallow super, a half-pound spool of No. 28 or 30 tinned wire for wiring the frames, and a spur embedder for embedding the wires in the waxen foundation. Bee equipment is purchased knocked down, but is easily assembled by following enclosed instructions.



Equipment for working bees: veil, smoker, hive tool, gloves.

Hive bodies and the shallow super, the cover and bottom board should be given two coats of white paint, the frames wired and the foundation put in.

If the beginner has only a hive or two he may not care to invest in a honey extractor, but harvest his crop by cutting out the comb honey in the shallow super. If he has more colonies he should purchase a two frame extractor, extract the honey from the combs and return them to the hive, or store them for future use.

## Making a Start with Bees

**Kind of Bees to Keep:** There are many races of bees, but only three are mentioned here. The black or German bee is difficult to manage, cross, not very prolific, and should not be considered. The Caucasian is a desirable race. It is the gentlest bee we have, winters well and is prolific. Some beekeepers prefer it to all others. Its chief objections are it propolizes hives excessively, and being dark in color, the queens are somewhat difficult to find. The Italian bee is accepted by the American public, as a whole, as the most desirable bee; whenever bees in general are mentioned, reference is to this race. However, it does not winter well as the Caucasian and it is hardly any better as a honey gatherer. It is more prone to sting, but it is considered a gentle race. With due consideration to all factors this race is recommended to the beginner.

**Securing Bees:** The most convenient way of securing bees is to purchase packages from a reliable dealer. The three pound package with the queen is most desirable. The bees are shipped in a cage with screened sides and are fed in transit from a can of sugar syrup inserted through a hole in the top. Bees should be procured in the spring when the first honey flow begins, and installed in hives containing frames of foundation or combs according to instructions accompanying the shipment.

One may find a farmer with box gums and have him hive swarms for a nominal price. If it is made known in a community that bees are desired, someone likely will report the presence of an escaped swarm. Buying box hives or cutting bee trees, and transferring the bees to modern equipment is rather unsatisfactory. There are several methods of transferring, but the most common is to cut the combs containing the brood, and fit and tie them in empty frames with cotton strings. Bees are drummed or smoked out of the old hive and allowed to run into the new one. If the bees are black or cross a new queen may be introduced, and in a short time an entirely new population will be in the hive.

**Location of the Apiary:** The first consideration is having the bees near the main honey plants. Hives should be located where they are readily reached in a truck or car, but not where they may be a nuisance or subject to thievery. A moderate amount of shade is desirable especially for the afternoons. The south side of brush or a thicket on a sloping hillside is an

ideal site, as such a location affords protection from winter winds. The hives should slope slightly forward and be set on brick, tile or wooden hive stands. They are arranged usually in orderly rows with ample space between them for working.

**Working A Hive:** The beginner tends to work his bees too often. Certain essentials should be taken care of and then the hive should be left alone. A periodical check is necessary. Ample space should be provided, but not more than can be utilized. Congestion of the brood nest should be relieved; stores and brood may be equalized. Performance of the queen should be checked, and combs and excess propolis should be removed from the bottom boards, covers and frames. A sharp lookout should be kept for disease and wax moth injury.

Colonies are worked most satisfactorily in the warm sunny part of the day when the field bees are flying freely. If there is no nectar flow essential work may be done in the late afternoons to prevent robbing. The operator should work the hive from the side and stay out of the line of flight of the bees. A few puffs of smoke should be blown into the entrance and the cover carefully pried loose with the hive tool. As the cover is removed the bees should be smoked gently. The outer frame should be removed and leaned against the opposite side of the hive and the other frames then loosened and examined. The work must be done slowly and deliberately. Sudden movements, jerking and jarring the hive usually leads to trouble. Nervousness probably contributes to skin secretions, an odor which bees seem to resent. This may help explain why some individuals are stung more than others. If suitably clothed and properly equipped there is little to fear from bee stings. If the operator is stung, he should scrape off the sting with the fingernail or the hive tool as quickly as possible to prevent more poison from being pumped into the wound. Do not pick off a sting as this squeezes in more poison. Do not rub the area of the sting as this will cause more pain or swelling. Application of cold cloths seems to be the best treatment. In time the average individual develops an immunity to swelling though not to the initial pain. Rarely will an individual be found allergic to stings. Such an individual should receive medical treatment and leave bees alone in the future.

### Seasonal Management

**Wintering:** The beekeeper should prepare his bees for winter in the fall. In South Texas the desired increase may be made in early fall if there is a honey flow. Stores should be equalized and each colony should begin the winter with about 50 pounds of honey. If the bees do not have sufficient

stores, sugar syrup must be fed. The hive should consist of two hive bodies or one hive body and a shallow super. Bottom boards are reversible and they should be turned over providing the shallow entrance for winter use. The entrance may be further reduced with a contracting cleat or a piece of board with a V-shaped hole cut in it. Every colony should be strong with a good queen. Extremely weak colonies are poor risks and may be united with strong colonies. Never unite two weak colonies. Winter packing is not necessary in the South.

When cold weather sets in leave the bees alone except for an occasional inspection trip to see that the hives have not been molested. Bees consume little honey in mid-winter when there is no or little brood rearing. It is late winter and early spring when brood rearing begins on a large scale that heavy inroads are made in the winter stores. At this time the colonies should be checked briefly. If stores are low they must be fed until a honey flow starts. Colonies do not freeze in our climate if sufficiently large to cluster and fan to keep warm; nor do they usually starve until considerable brood rearing begins. This is the critical period in wintering. Winter losses in the South must be laid to poor beekeeping.

**Feeding:** A good beekeeper rarely should have to feed his bees. He should always leave enough honey to take care of all needs. Bees are fed usually in the fall in preparation for winter and in late winter or early spring to tide the colony over until a honey flow begins.

Unless a beekeeper has honey of his own he should feed sugar syrup. He should never feed honey from an unknown source; this is the surest way to get disease. Bees have a specialized digestive tract and can utilize only sugar syrup or honey. Never use ordinary syrup. The sugar syrup is prepared by dissolving sugar in an equal volume of water. A colony may be fed by removing the cover, setting on an empty hive body and inverting a five or ten pound friction top bucket filled with sugar syrup and with several nail holes in the lid over the frames, replacing the cover. Another satisfactory method is that of placing in the empty super an ordinary wash pan filled with feed. To prevent bees from drowning spread a thin cloth over the food. If honey is fed, it should be diluted with equal parts of water. From 10 to 20 pounds of feed is generally sufficient. All feeding should be done in late afternoons to prevent robbing.

**Spring Management:** Bees should be worked little in the spring until a honey flow starts. Usually more harm than good is done through starting robbing. When the first honey

flow begins the bees should be given a thorough working and ample additional space provided in the form of supers. Brood may be equalized to strengthen weak colonies, and help prevent congestion and swarming in strong colonies. Congestion in the brood nest must be relieved as discussed under swarming. The important things in spring management is to prevent swarming and build up the colony to peak strength for the main honey flow. Destruction of queen cells is a poor swarm control measure as it is difficult to find and destroy all cells. The basic thing in swarm control is to prevent the impulse from developing.

**Increase:** Increase may be made at any time that is most advantageous to the beekeeper; this is usually in the spring or fall, depending on the locality and the honey flow. It is desirable to make increase at a time when the colonies can build up in strength for the main honey flow and thus not lose a crop of honey. At least a light honey flow must be on when divisions are made.

A simple way to make increase is to remove three or more frames of brood and adhering bees from a strong colony and place in an empty hive body, which is moved to a new location and tightly closed with grass or weeds for two or three days to prevent field bees from drifting back to the old hives. They may rear their own queen, but preferably should be given one.

Another easy method is to divide a colony consisting of two hive bodies with brood in each and place the two divisions side by side on the old stand. The field bees will be divided between the two. The division without a queen should be provided with one or allowed to rear its own.

A third plan is to transfer from a colony several frames of brood to a new hive and shake most of the bees into it. Set the old colony with the queen on the stand of another hive which is moved to a new location. Bees shaken from the first colony are set on the original stand and provided with a queen or allowed to rear one. In this way a third colony is made from the two. There are other methods of increase but they are all fundamentally the same.

**Management During the Honey Flow:** As bees bring in nectar, ample space must be provided for its storage, ripening, and storage for the ripe honey. If the beginner is short of equipment, supers of honey may be removed, extracted and returned to the hives. The operator should watch the honey flow carefully and not add more supers than are needed toward the end of the flow, so as not to have too many combs incom-

pletely filled. When two-thirds of the cells are capped, the honey is sufficiently ripened for removal. The beekeeper removes only the surplus honey and ample stores must be left for the bees. If the beekeeper removes more than his share he will have to feed his bees later.

**Wax Rendering:** Since wax has a commercial value all cappings, brace combs, burr combs, and discarded combs should be saved and rendered. Principal uses of wax are the making of cosmetics, candles, foundation for the beekeepers and polishes of various kinds. The beekeeper may sell his wax or exchange it for beekeeping supplies.

When honey is extracted, caps of cells of combs are shaved off with a sharp, hot uncapping knife. After these cappings are drained or pressed to remove the honey they should be melted and allowed to harden into a cake of wax. Any foreign material will settle to the bottom and may be scraped from the cake. Old combs contain foreign material and cannot be handled this way. They are rendered most satisfactorily in a wax press but the beginner would not need one. Placing the combs in a sack and boiling in water will remove most of the wax which may be skimmed off or left to solidify when the water cools.

A solar wax-extractor, excellent for a small beekeeper, is an oblong box with a glass top. Inside it is a metal sheet on which the combs are placed. It is set facing the south and tilted to permit melted wax to run into a pan. Anyone can make this type of extractor.

**Care of Combs:** After the honey flow, all surplus equipment should be removed from hives and only enough combs left for which bees can satisfactorily care. Supers or hive bodies of combs from which honey is extracted may be returned to the hives to be cleaned and later taken off, or stored wet with the honey. Good combs may be used time and again. If not properly cared for, they are soon destroyed by the larvae of the wax moth. The simplest method of caring for them is to stack the hive bodies and seal the cracks with gummed paper or mud. Bottoms of the stacks should be tightly closed and a tight fitting cover placed on top. For each super, place two tablespoonfuls of paradichlorobenzene crystals in the top of the stack. This fumigant is efficient, and is non-poisonous to man, non-explosive, and non-inflammable. It cannot be used in fumigating comb honey as it imparts an objectionable taste. Supers should be checked every few weeks and more crystals added as needed.

Carbon disulfide, sulfur fumes, hydrocyanic acid gas and methyl bromide may be employed for fumigating combs but



are not recommended for the beginner. Large beekeepers have air tight fumigation rooms constructed for fumigating their supers or hive bodies of combs.

### Queen-Rearing

Queen-rearing is an art within itself. Though the principal is simple, beginners should not attempt to rear queens until they have had several years of experience and made considerable study.

A few queen cells may be reared by the Miller method. Bees prefer to build queen cells along lower edges of a new tender comb. Partly built combs may be secured by fastening strips of foundation in frames and placing in colonies during a honey flow. A frame containing such a comb is placed in the middle of the brood nest of the colony selected to furnish larvae from which young queens are to be reared. After four or five days this comb will be filled with eggs and young larvae. The frame is then transferred to the brood nest of a strong well fed colony from which the queen is removed. A variable number of queen cells will be made on this new comb. On the ninth day after the frame is placed in the queenless colony, the colonies to be requeened have the queens removed; or if increase is desired the divisions are made. The following day the frame should be removed and the queen cells are cut out with a square of the comb around each. The piece of comb with the attached queen cell is fitted carefully in a square hole made in a comb of emerging brood of the colony to be requeened, or carefully fastened between two frames of brood. Because young queens are delicate, extreme care must be exercised in transferring the cells.

Most commercial queen breeders rear queens by some modification of the Doolittle method. Artificial queen cells are made of wax and stuck on bars fitted in empty frames. Each cell is provided with a drop of royal jelly. Then a newly hatched larva is transferred to each cell. This process is called "grafting." A frame containing two and even more bars of these cells are put in a strong well-fed colony, called the cell-starting colony, from which the queen has been removed. The bars of cells are transferred 24 hours later to a cell-finishing colony. This colony must be very strong, occupying two hive bodies. The queen is confined to the lower hive body by means of a queen excluder. Frames of uncapped brood are transferred to the upper hive body and the frame containing the cells is placed between frames of this brood. Nine or ten days later individual queen cells may be used for requeening or placed

in small colonies, called nuclei. Here the queens emerge, mate and start laying. Then they are caged and used for requeening or sold.

### Pollination of Plants

Some plants are wind pollinated, others self-pollinated, and still other kinds depend upon insects to perform this important function. Many insects of various kinds are involved in this work but none are as efficient and dependable as the honeybee. When certain fruits, truck crops, and seed crops of clovers, alfalfa, vetches and others are produced bees are much more valuable as pollinators than as honey producers.

Apples, cherries, plums, pears, and certain varieties of peaches, blackberries, and strawberries are some of the fruits honeybees aid in pollination. Bees are important in the pollination of watermelons, muskmelon and cantaloupes as well as other truck crops. The presence of bees is necessary to produce satisfactory crops of seed of alfalfa, white Dutch, alsike and red clover. Repeated observations have clearly shown that the services of bees result in greater crops of seed of hubam, white sweet and yellow sweet clovers also.

### Honey Plants

Many plants yield nectar and are visited by bees, but only a few produce enough to be considered major sources of honey. In this brief discussion of the most important honey plants, it is realized that there are plants locally important which are omitted in this bulletin.

In the lower Rio Grande Valley citrus is an important source of fine honey. Catsclaw, guajillo, and mesquite are the chief honey plants of southwest Texas. However, mesquite, as a nectar producer, is most uncertain and is not a dependable source of honey.

The most widely distributed major honey plant in the state is horsemint of various kinds. Large yields are made frequently from this plant but the honey is strong and not too desirable. Cotton is another widely distributed source of honey. It is a good producer in black lands and river bottoms. However, the dusting of cotton with poisons for control of boll weevil and other pests prohibits the practice of keeping bees around cotton fields during the dusting season.

Clovers of various kinds are considered the world's greatest honey plants. These plants are not only producers of large amounts of nectar but the honey is most desirable. Hubam clover is an important source of honey, particularly in north

central Texas and where seed are produced. White Dutch clover is a source of fine honey in east and southeast Texas. Alfalfa is a valuable honey plant where it is grown for seed and at relatively high altitudes. Sumac is a source of a surplus in some sections. Rattan is a good honey plant in southeast Texas. Eardrop vine and cow itch vine are the major sources of honey in many sections of East Texas.

### **Granulated Honey**

Most honeys will granulate, especially in cool weather. Honey should be kept in a warm place. Granulated honey may be readily liquified by setting the container in a pan of warm water with temperature no higher than 160° F. as above this may result in the loss of flavor and darkening of the product.

Some people prefer granulated honey and use it as a spread. Creamed honey, a commercial product, is granulated honey with a soft creamy texture, the granules being very small. Products known as honey butter, a mixture of honey and butter, and honey cream, composed of honey and cream, are also made and sold.

### **Poisoning of Bees by Insecticides**

Poisoning of bees by insecticides, particularly arsenicals, is the greatest beekeeping problem in Texas. When poisoning of plants for insect control begins, bees must be removed at least three and preferably four miles from the nearest treated fields and left there until the poisoning season is over.

### **Pests and Diseases**

**Wax Moth:** The wax moth is also known commonly as the wax worm and the web worm. This is by far the greatest pest with which the beekeeper has to contend. Larva of the wax moth is ever present and whenever a colony becomes weak or a few combs are left lying around they soon become infested and are destroyed. Greatest damage occurs in the summer and fall.

A strong colony will successfully defend itself against this pest if it does not have more combs than it can efficiently care for. If a colony becomes weak, the cause, which is usually lack of food or queenlessness, should be corrected. All surplus combs must be stored and fumigated as previously described. Wax moth control resolves itself into good beekeeping.

**Foulbrood:** The American foulbrood is the only disease of the honeybee the Texas beekeeper needs to fear. It is an infectious disease affecting the immature stages of bees. The

causative organism is a bacterium and is disseminated through honey and the use of infected equipment. Infected colonies become so weakened that they are robbed by stronger colonies or they die. Presence of spores of this disease does not affect honey for human consumption.

Dead capped brood should be regarded with suspicion. Beekeepers finding this should write the State Entomologist, College Station, Texas and send samples of the infected brood. A state apiary inspection service is maintained and is administered by the State Entomologist. Purpose of this service is to aid beekeepers in controlling and eradicating this highly infectious disease.

### **Where To Find Out More About Bees**

The Hive and the Honeybee, by Roy A. Grout, Dadant and Sons, Hamilton, Illinois. ABC and XYZ of Bee Culture, by A. I. and E. R. Root, A. I. Root and Company, Medina, Ohio. Practical Queen-Rearing, by Frank C. Pellett, Dadant and Sons, Hamilton, Illinois. The American Bee Journal, Hamilton, Illinois. Gleanings in Bee Culture, Medina, Ohio.