

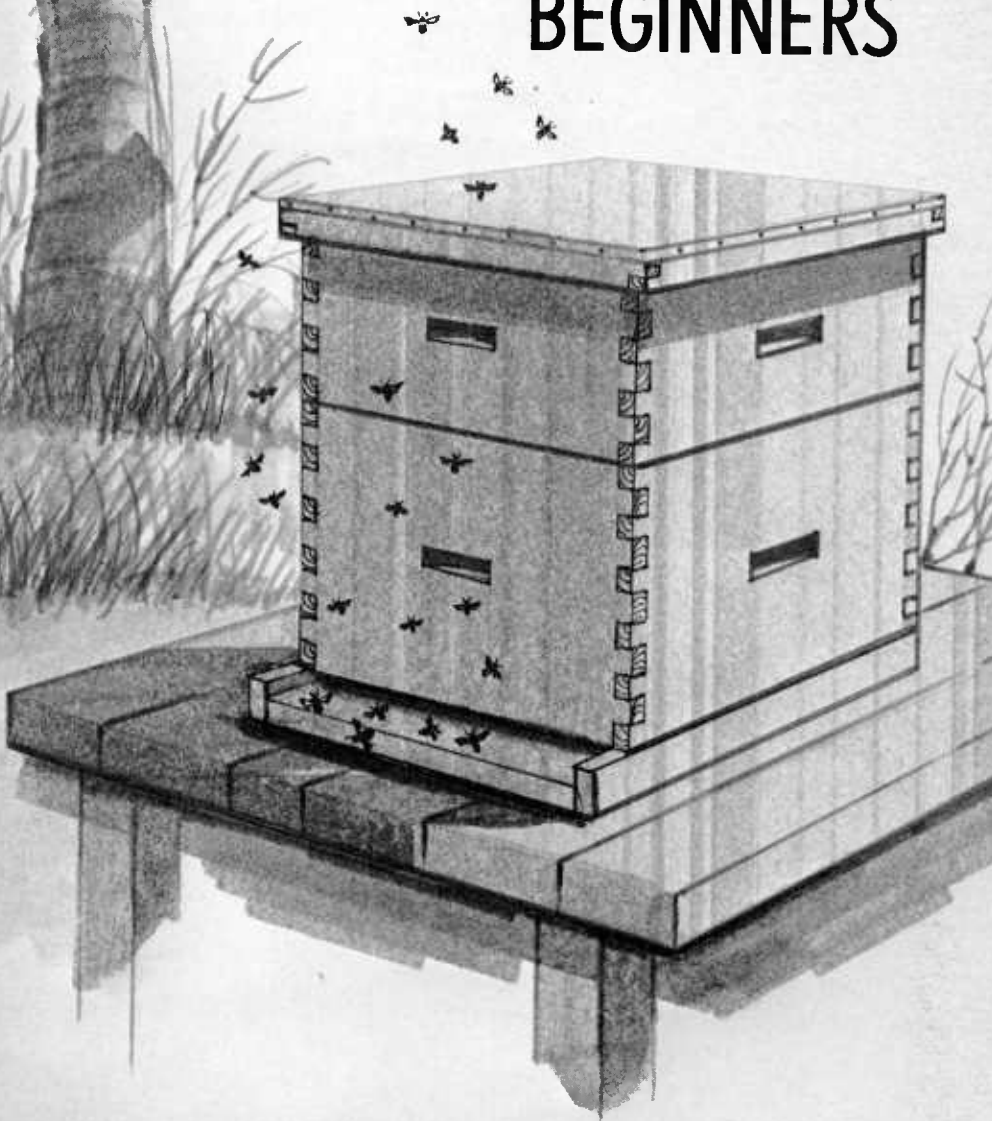
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BEEKEEPING FOR BEGINNERS



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Keeping honey bees is a fascinating and profitable pastime that can be enjoyed in several ways. You may want to keep bees for the delicious fresh honey they produce, for the benefits of their valuable services as pollinators for your crops, or perhaps just for the fun of learning about one of Nature's most interesting insects.

You can keep honey bees successfully almost anywhere in the United States with relatively little trouble and a minimum of expense. This bulletin supplies you with the basic information you should have to get started. As a beginning beekeeper, you will need only—

- A few dollars' investment in materials.
- A suitable location for beehives.
- Elementary knowledge of the habits of honey bees.

The honey bee (*Apis mellifera* Linnaeus) is man's most useful insect. In the United States alone, honey bees produce about \$50 million worth of honey and beeswax each year, and they pollinate more than \$1 billion worth of valuable agricultural crops.

Beekeeping Equipment

The basic equipment you need for beginning beekeeping should cost no more than about \$25. This equipment should include the following items:

Hive, to house your bees.

Frames, to support the honeycombs in which your bees will store honey and raise young bees.

Smoker, to blow smoke into the hive, to pacify the bees when you want to work with them.

Hive tool, with which to pry frames apart, to examine the hive or harvest the honey.

Veil, to protect your face and neck from bee stings.

Gloves, to protect your hands.

Feeder, to dispense sugar sirup until bees can produce their own food.

Colony Life

Honey bees are social insects. This means that they live together in a colony and depend on each other for survival.

Most of the bees in a colony are workers (sterile females). Some are drones (males), whose only function is to mate with the queen. Usually there is one queen bee (fertile female) in the colony; she lays



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Equipment used in beekeeping.

the eggs that maintain or increase the colony's population.

Worker bees number from 1,000 to about 60,000, depending on the egg-laying ability of the colony queen, the space available in the hive for expansion, and the available or incoming food supply. Worker bees live about 6 weeks. They collect food and water for the entire colony, do the housework, and guard the hive against intruders. They also "air condition" the hive and maintain a constant hive temperature and humidity—whatever the conditions outside. Although worker bees do not mate, they may lay eggs if the colony loses its queen. But their eggs will not keep up the colony population, because they develop only into drones.

The number of *drones* in a colony varies with the season of the year. There may be none during the winter, but several hundred during the summer. They are driven out of the hive in the fall, when worker bees can no longer collect food.

The *queen bee* normally flies from the hive when she is about a week

old and mates in the air with one or more drones. When she returns to the hive, she begins to lay eggs. During her lifetime she lays thousands of eggs—sometimes as many as 1,000 in a day. She puts each egg into a separate cell of the honeycomb.

Three days after an egg is laid, it changes to a *larva*. Worker bee "nursemaids" feed and care for the larva until it changes into a *pupa*. Then they seal the pupa into its honeycomb cell and leave it to finish developing. Twenty-one days from the day the egg was laid, an adult bee emerges.

Bee Strains

The Italian strain of bees is the most common one in the United States. These bees are hardy, industrious, and relatively gentle.

The Caucasian strain is also widely kept. Bees in this strain are more gentle than Italian bees, but the queens are dark colored and are therefore difficult to find in a cluster of bees. (It is important to be able to find your queen bee. You may need to replace her after a year or two, if she doesn't lay enough eggs to keep the colony strong.)



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From left: Worker, queen, and drone bees.

Caucasian bees use an excessive amount of propolis in their hives. They collect this gummy substance from buds and injured tree parts, and they use it as a "cement" in their hives. Frames that become heavily propolized are difficult to remove.

Some specially bred hybrid bees (crosses between two or more bee strains) are available. They are usually more productive than standard strains. But after a year or two, the offspring they produce may bear no resemblance to the original hybrid bees.

If you keep hybrid bees, it is a good idea to replace your queen each year. This should assure a uniformly strong colony.

Getting Started

The best way to get started keeping bees is to buy a bee colony already established in a well-constructed hive that has honeycombs built into removable frames.

If you already have a hive, you can buy a package of 2 or 3 pounds of bees with a queen, from another beekeeper or from a bee supplier, and put them into your hive. *Be sure the bees you buy have a certificate of inspection to indicate that they are free of bee diseases.*

Another way to begin keeping honey bees is to capture a live swarm and establish it in your hive. (Bees are usually gentle when swarming.) Or you might transfer a colony, with its combs, from a cave or tree to the hive. But it's probably best not to try these two methods until you have worked enough with bees to be relaxed around them.

The best time to establish a new honey bee colony is in springtime. Fruit trees and flowers are in bloom then and should supply the colony with sufficient nectar and pollen.

If you begin with a new swarm or package of bees, instead of with an established colony, it is usually a good idea to provide them with sugar sirup that is a mixture of half sugar and half water. You can put this sirup in a feeder in the entrance of the beehive. The sirup will keep the bees from starving until they can make and store their own honey.

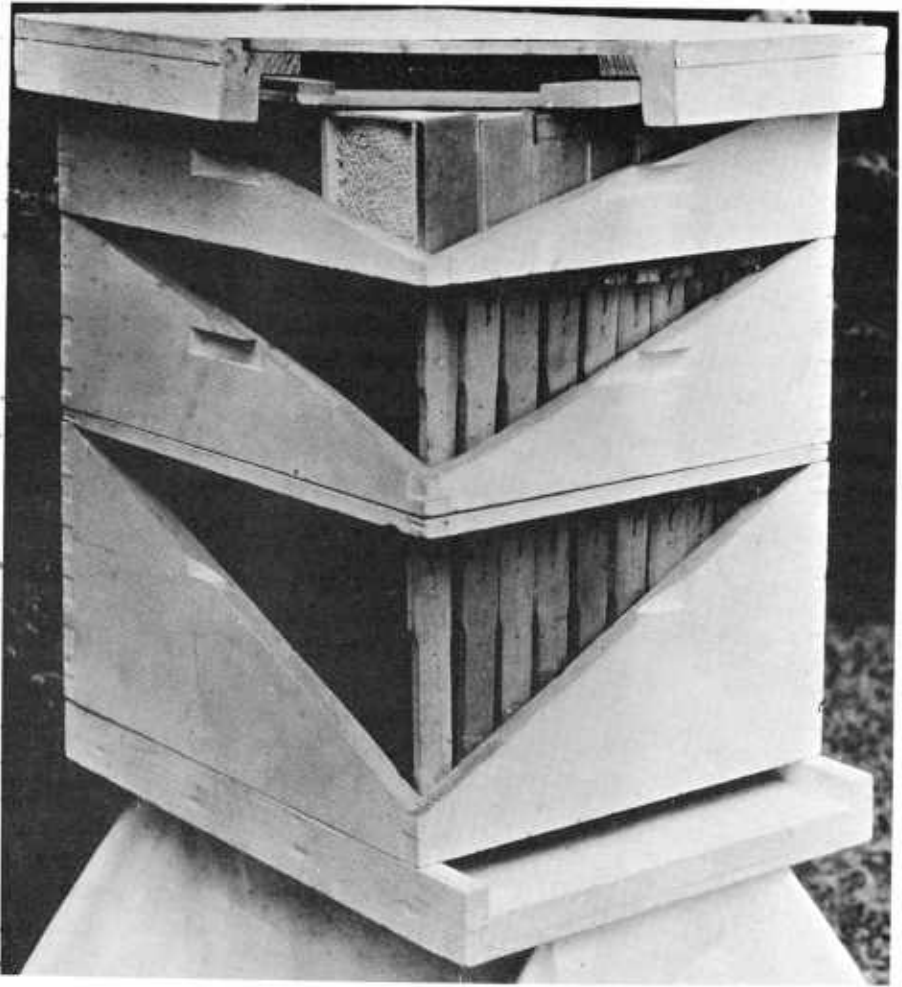
How To Build a Beehive

Factory-made beehives and frames are best. Their parts are of standard size and are interchangeable.

If you prefer to build your own beehive, use a factory-made hive as a model. Reproduce all parts exactly and keep all dimensions the same, so that the parts will fit together well and be interchangeable with corresponding parts in other hives.

Of special importance is the space you leave between frames in your hive. It should be about one-fourth inch. If the space is less, it will be too small for the bees to pass through, and they will seal it off with propolis. If the space between frames is more than one-fourth inch, it will be too wide and your bees will build honeycomb in it. Neither of these is desirable.

The diagram on page 6 gives plans and dimensions for constructing a 10-frame beehive—the most common hive size.



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Beehive cutaway to show interior and placement of movable frames: Bottom, full-depth hive body; middle and top, shallow hive bodies.

Where To Keep Beehives

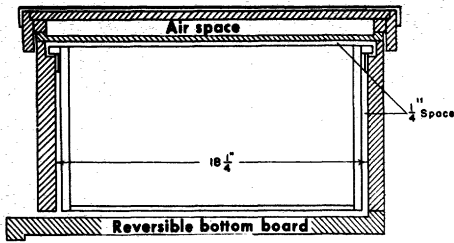
When your hive is stocked with a bee colony, put it where the bees are unlikely to sting anyone.

If you live in a warm area, put the hive in the shade. If you live in an area that has extended periods of freezing temperatures, expose it to the sun and protect it from pre-

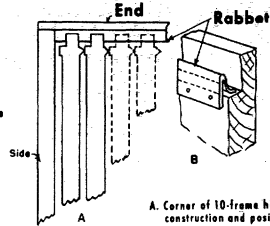
vailing winds—particularly in winter.

Be sure there is a constant supply of fresh, cool water nearby.

For more information, write for Leaflet No. 530, "Shade and Water for the Honey Bee Colony," available free from the Office of Information, U.S. Department of Agriculture, Washington, D.C. 20250.

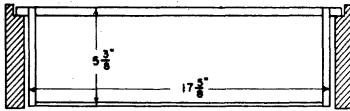


CROSS SECTION OF HIVE BODY AND FRAME

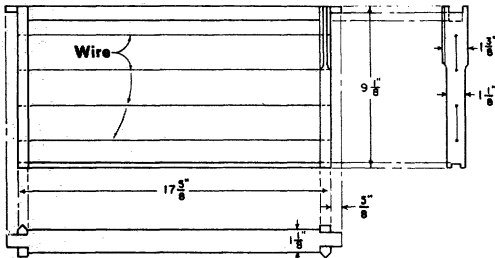


A. Corner of 10-frame hive body, showing construction and position of frames.

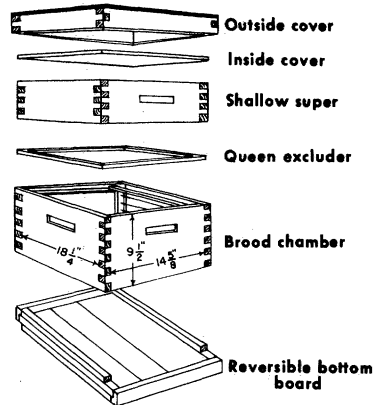
B. Part of end of hive body, showing rabbit, which should be made of tin or galvanized iron.



CROSS SECTION OF SHALLOW SUPER



SIDE, END, AND TOP ELEVATION OF FRAME



Plans and dimensions for a 10-frame beehive.

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What Bees Need

Bees need four basic materials: Nectar, pollen, propolis, and water. They make honey out of nectar. They make pollen into beebread (food for young bees). They use propolis to seal cracks and waterproof their hive. They dilute honey with water before eating it, and they use water in their hive "air conditioning system."

Nectar

Bees can't make honey without nectar, a liquid sugary substance

produced by flowers. It is the raw material of honey and the bees' main source of food.

Several hundred kinds of plants produce nectar, but only a few kinds are common enough, or produce enough nectar, to be considered major sources.

The best sources of nectar for producing surplus honey vary from place to place. As a beekeeper you will want to learn the plants in your area that are best for honey production. Here are some of the plants that are major nectar sources in the United States—

alfalfa	locust
aster	mesquite
buckwheat	palmetto
catchaw	tuliptree
citrus fruit	tupelo
clover	sage
cotton	sourwood
fireweed	star thistle
goldenrod	sweetclover
holly	sumac
horsemint	willow

aster	grasses
corn	maple
dandelion	oak
fruit blossoms	poplar
goldenrod	willow

How Bees Make Honey

The nectar that bees collect is generally half to three-fourths water. After nectar is carried into the hive, the bees evaporate most of the water from it. While evaporating the water, they change the nectar into honey. Then the bees seal the honey into cells of the honeycomb.

Beeswax begins as a liquid made by glands on the underside of the worker bee's abdomen. As it is produced, it hardens into tiny wax scales. Worker bees then use this wax to build honeycomb.

Beekeepers often provide their bees with honeycomb foundation made of sheets of beeswax. This foundation fits into hive frames and becomes the base of the honeycomb. It enables bees to speed up comb construction, and it provides a pattern for building a straight and easy-to-remove honeycomb.

How To Move a Colony

If you need to move your bee colony, remember that you must get the bees oriented to the new location. Otherwise, unless you move the colony at least several miles, the bees will find their way back to their old location.

If you want to move your bees only a few hundred yards, first take them several miles away and leave them for about a week. When they

The color and flavor of honey depend on the kinds of plants that bees collect nectar from. Honey may be clear, amber, or even reddish; its flavor can range from mild to strong. Try to put your beehive where the bees can collect the kind of nectar that will make the honey you like best.

Pollen

As worker bees gather nectar from flowers, tiny particles of pollen stick to their bodies and are carried back to the hive. The bees store this pollen as "beebread" in cells of the honeycomb. Later they feed it to young bees that are developing into workers and drones. (The few young larvae selected by the workers to become new queens are fed a special food—royal jelly—made by the workers in their own bodies.) Pollen, then, is necessary for producing the new bees that become new honey-makers.

An average-size colony of bees uses about 100 pounds of pollen each year. That is why you need to locate your colonies near good sources of pollen. Many wild flowers, ornamentals, weeds, shrubs, and trees will provide pollen. Some especially good sources are:

are oriented to the new location, move them to the site you originally intended, and let them get oriented there.

Or, move the colony a few feet each day, until you have moved it to the location you want.

It is not advisable to move bees during the period of honey production. The honey already stored will add extra weight; new honeycomb may break loose; or you may disturb your bees and cause a slowdown in honey storage.

Night is the best time to move a colony. All the bees are inside then. If the weather is cold, you can completely close the hive entrance.

If the weather is unseasonably warm and the colony strong, do not seal the hive entrance. You might suffocate your bees, even if you seal them in for only an hour. Instead, cover the entrance and top of the hive with a fine screen.

Staple, crate, or tie the hive so that parts cannot shift during the move.

How To Manage a Colony

As your bee colony grows, it will need more room. If the bees become too crowded and there isn't enough room for expansion of the brood-rearing area, they will swarm (fly off in large numbers, along with the queen, to start a new colony). You should prevent this, if possible. Loss of a swarm of bees may leave the remaining colony too weak to store surplus honey.

To make more room for your bees, add extra boxes of combs (supers)

to the hive, or onto the supers already in place.

Always leave plenty of honey for the bees. Remove only the amount that you estimate to be more than they can use. *Be sure there are at least 50 pounds of honey in the hive when winter begins*; otherwise, your bees might starve before springtime.

Since one frame holds 3 to 5 pounds of honey, an average size colony needs about 10 to 15 frames of honey to get through a winter.

Honey Production

Beekeepers usually measure honey production in pounds. The average yearly production of surplus honey from a colony is about 50 pounds, though a properly managed hive can produce several times that amount.

Liquid honey

Probably the most efficient way to get honey out of the comb is to uncap the honey cells with a warm knife and spin the liquid honey out of the cells in a honey extractor. The honey is poured off; the emptied comb is returned to the hive, to be refilled with honey.

It may not pay, however, to buy an extractor for the amount of honey yielded by only one or two colonies. You may, instead, be able to rent or borrow an extractor from a bee dealer, a neighbor, or a local beekeeper association. But using borrowed equipment sometimes spreads bee diseases.

The least expensive (but also the least desirable) way to harvest liquid honey is to cut out the entire comb, squeeze the honey from it,

and then strain the honey through a coarse cloth to remove wax particles. Although the crushed comb cannot be used again by the bees, you can melt it and sell the beeswax that you salvage.

Comb honey

Some beekeepers produce comb honey by cutting out pieces of honeycomb, putting them in glass containers, and pouring liquid honey around them.

Another popular method of producing comb honey is to place small wooden boxes or "sections" in the top of the hive just before the honey flow begins (illustration, p. 5). Bees will neatly fill the sections with honey—about a pound in each section. If you remove the sections as soon as they are filled, you will have no problem with honey dripping or leaking, and no further handling or processing will be necessary.

Granulated honey

Honey tastes best when it is fresh, whether in the comb or in liquid form. But some honeys, even when fresh, granulate or become sugary—and most honeys will granulate sooner or later. The size of granules that form, their appearance and flavor, depend on the kinds of plants that the bees collected nectar from.

Granulated honey is good food. In fact, some people prefer it to either liquid or comb honey. But if your honey granulates and you do not prefer it this way, liquefy it by this method:

- Place jars of granulated honey in a container with enough water to reach to the level of honey in the

jars. Support the jars so they do not rest directly on the bottom of the container, and so water can circulate beneath them.

- Heat gently, until granules have disappeared. (The time required will vary, depending on the size of the jars of honey, and the temperature to which you heat them. DO NOT heat water above 160° F.; excessive heating will darken your honey and lower its quality.)

- Stir occasionally, to distribute heat evenly throughout the honey, and to determine when the granules have disappeared.

What's In a Sting?

As a beginning beekeeper, you'll want to know what happens when a bee stings you.

A bee's stinger is barbed and has a poison sac attached to it. When the bee stings you, the barb and sac usually tear out of the bee's body. Convulsive movements in the sting muscle then push the stinger deeper into your flesh and pump venom into the wound.

If you are stung, remove the stinger immediately by scraping it off with your fingernail or a knife blade. Do not try to pull it out, because this will force more venom into your skin.

Stings are intensely painful when first inflicted. The pain is followed by reddening and swelling near the sting. Normally pain will subside after a few minutes, but the swelling may persist a day or more.

Usually you develop a resistance or immunity to stings after you've been stung a few times. But some

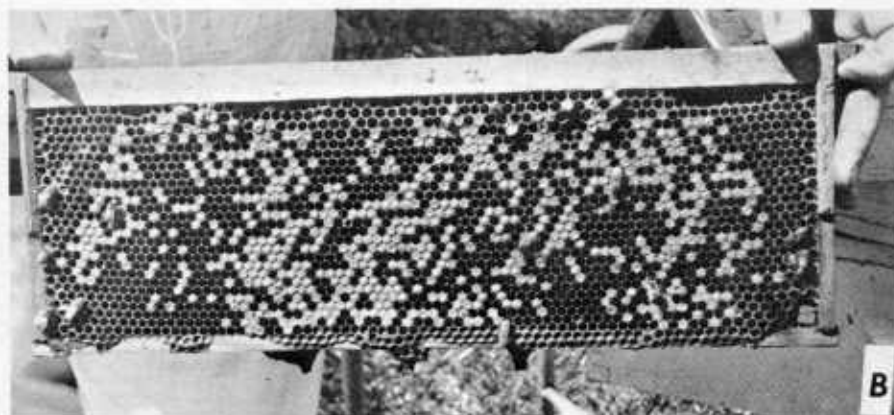
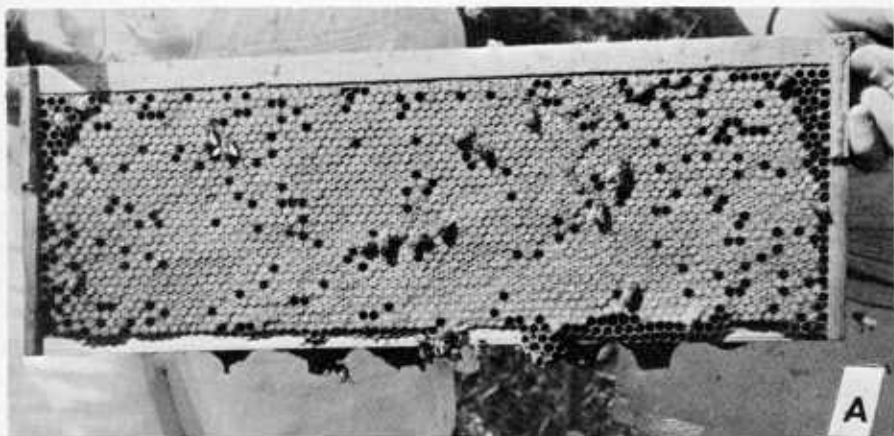
people become allergic to bee stings and develop a severe reaction to them. Such persons should consult an allergy specialist if they plan to work with bees.

Avoiding Stings

Smoke pacifies bees. Always use a smoker when you are working with them. *But use only enough smoke to keep the bees from sting-*

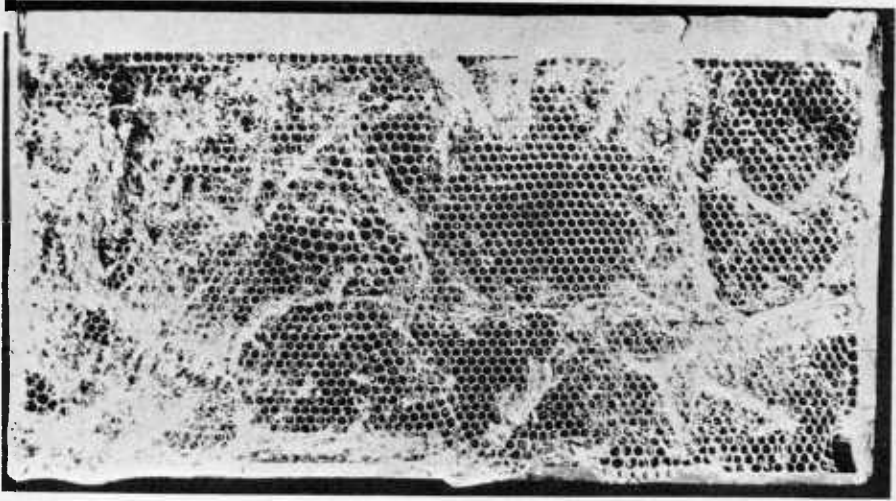
ing you. This amount will vary, depending chiefly on the strain of bees and the weather. (Bees are more irritable in cool, cloudy weather than they are when it is warm and sunny.) Direct smoke into the hive entrance before you disturb the bees. When you remove the hive cover or a super, apply smoke to the bees as you expose them.

Wear protective clothing: A veil over your head and face; thin rub-



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Brood combs showing (A) healthy brood necessary for high-honey production and (B) diseased brood, which results in weakened colonies and low-honey production.



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Brood comb infested with greater wax moth larvae.

ber gloves; and close-woven, light-colored overalls sealed at the ankles, wrists, and neck.

Bee Diseases and Pests

Several diseases attack honey bees. None of them are dangerous to humans.

Nevertheless, most States have laws to control bee diseases and to prevent their spread. In many States it is illegal to offer for sale bee colonies and equipment that are not accompanied by a certificate to indicate that they are free of disease. Before you buy or sell bees, notify your State or local bee inspector.

If you need more specific information on bee diseases, consult your county agricultural agent. Or write for a copy of AIB 313, "Diagnosing Bee Diseases in the Apiary," available for 15 cents from the Superintendent of Documents, U.S.

Government Printing Office, Washington, D.C. 20402.

Keep your colonies strong. This is good beekeeping practice. It is also your best protection against wax moth larvae, the serious insect pests that invade unprotected honeycombs. To learn more about the wax moth, write for FB 2217, "Controlling the Greater Wax Moth," available for 10 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Include your return address and ZIP code.

Learn More About Beekeeping

A good way to get information on keeping bees in your area is to talk with a local beekeeper. He will be glad to show you how to open a hive and handle the bees, how to reduce

the likelihood of your being stung, and how to get honey out of the hive.

Your county agricultural agent should be able to supply you with pamphlets or direct you to other information sources. Or you may find that you can take a course in beekeeping at your State agricultural college.

You might also find it useful and enjoyable to join a beekeepers organization; most States have one or more. And you can subscribe to bee journals, or borrow beekeeping magazines or textbooks from your public library.

More complete information on all phases of beekeeping is available in Agriculture Handbook No. 335, "Beekeeping in the United States." It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price, \$1.

USDA Bee Laboratories

Department of Agriculture work on bee culture and insect pollination is directed by the Apiculture Research Branch of Entomology Research Division, Agricultural Research Service, Beltsville, Md. Most bee research, however, is conducted

in laboratories across the country, usually in cooperation with State agricultural experiment stations or universities. Here is a list of USDA bee research laboratories:

Arizona—Honey Bee Pollination Investigations Laboratory, 2000 East Allen Road, Tucson, Ariz. 85721.

Louisiana—Bee Breeding Investigations Laboratory, Room 240, Agricultural Center, LSU, Baton Rouge, La. 70803.

Maryland—Bee Disease Investigations Laboratory, Building A, Agricultural Research Center, Beltsville, Md. 20705.

Utah—Wild Bee Pollination Investigations Laboratory, Room 261, F. & B.S. Building, Utah State University, Logan, Utah 84321.

Wisconsin—Bee Management Investigations Laboratory, Room 436, Russell Laboratories, University of Wisconsin, Madison, Wis. 53706.

Wyoming—Bee Disease Investigations Laboratory, University Station, Post Office Box 3168, Laramie, Wyo. 82071.

You may address questions to these laboratories. Or, if you wish, you may visit the laboratory nearest your home.

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