



Honey Bees, Bumble Bees, Carpenter Bees and Sweat Bees

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Bees belong to the order of insects called Hymenoptera, which also includes ants, wasps and hornets. There are more than 20,000 known species of bees, but only 5 percent are social bees. Often, social bees occur in large colonies and can be a possible stinging threat. The most common social bees are honey bees and bumble bees. Honey bees are pollinators of many plants and are important in agricultural crop production. Honey bees are raised commercially for honey production and for use in pollination of agricultural crops. Because of their abundance and close proximity to human habitation, they are more of a stinging hazard than other bees. Bees are closely related to wasps, but have many microscopic, feather-like hairs that give them a hairy or fuzzy appearance. These hairs are concentrated on the bee's abdomen and legs, and help them collect pollen. Bees provide their nests with nectar and pollen that is used as food for the young and adults.

Honey Bees (*Apis mellifera*)

The honey bee (Figure 1) is probably the most familiar and well studied social insect. This cosmopolitan species is not native to North America, but was originally imported from Europe. Honey bees are responsible for most human bee stings and approximately half the deaths attributed to bee and wasp stings in the U.S. These incidences are generally associated with anaphylaxis (allergic reaction to the venom). In addition to honey production, the honey bee provides an estimated \$20 billion annually from pollination of 120 cultivated crops. Individ-



Photo provided by Dr. R. Akre, Washington State University.

Figure 1. Honey Bees at Hive Entrance.

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ual commercial beekeepers maintain more than 100 colonies (hives) of honey bees. Honey bees also attract the interest of many amateur beekeepers who may keep only one to 10 hives. Several books have been written concerning the life cycle and social behavior of honey bees and how to raise them. If interested in more details of keeping honey bees and the production of hives, contact one of the authors for a list of books regarding beekeeping.

Honey bees build a large nest (hive) consisting of several wax combs for their brood (young) and pollen and nectar storage. "Wild" honey bee colonies construct nests in cavities such as hollow trees or logs, but may also use attics and wall voids. Some colonies will contain as many as 20,000 to 60,000 bees, but most commercial hives are usually smaller. Usually colonies are able to survive the winter, unlike annual colonies of temperate social wasps. Swarming is more of a population control mechanism than anything that reproduces offspring. When a honey bee hive becomes overcrowded or threatened by starvation, the queen begins laying eggs in queen cells that will develop into new queens. In some cases, drones or male bees are also raised. When new queens are nearly ready to emerge, the old queen will leave the hive with thousands of worker bees. This large mass of bees is called a swarm and their purpose is to look for a new place to form a hive. These swarms often rest in exposed sites such as trees and shrubs (Figure 2) before finding a suitable cavity for building a new nest. Although swarms are less defensive than an established colony, it is best not to disturb them. In Oklahoma, swarms are most common during late April until June. Often, these swarms will develop in one day and may be gone the next.

Honey bees are defensive toward anything approaching their hive. Alarmed honey bee workers release substances from glands in the sting apparatus and mouth parts signaling other



Photo provided by Dr. J. Schmidt, USDA/ARS, Tucson, AZ.

Figure 2. Honey Bee Swarm.

bees to attack, thus, mass stinging incidents can occur. Unlike most other stinging Hymenoptera, a honey bee can only sting once, since it dies from losing the stinger by imbedding it in the victim.

Africanized Honey Bee (*Apis mellifera*)

The Africanized honey bee (AHB), the so-called “killer bee,” is another strain of honey bee. It is difficult to distinguish between the AHB strain and its more common counterpart, the European honey bee. In fact, the AHB is usually slightly smaller than the European honey bee. The venom in the sting of Africanized honey bees is not more potent or powerful than the European honey bee. The major difference between the two strains is that Africanized honey bees are more defensive when their hive is disturbed. Therefore, more bees will attack anyone that disturbs them. They will also chase a person or an animal for a greater distance. It can be called a “honey bee with a bad attitude.”

Where are Africanized Honey Bees?

Africanized honey bees were first found in southern Texas in 1990. Since then, AHB have established in all the southern and central counties of Texas. However, the AHB has not moved into the eastern and northern Texas counties. Rather, the AHB have moved westward through the southern counties of New Mexico, all of Arizona and 14 counties of southern California. No AHB have been found in Oklahoma. More information on the AHB can be found at the USDA-ARS website (www.wps.ars.usda.gov).

Africanized honey bees were first found in southern Texas in 1990. By 1993, naturally occurring swarms were recovered in Arizona and New Mexico, and the following year, California confirmed arrival of this invasive species. Just prior to swarming activity in 2016, 46 counties in Oklahoma have recovered AHB, representing every quadrant of the state (see; <http://entopl.org>).

okstate.edu/ahb/ahb). More information on AHB can be found at the USDA-ARS website on national invasive species information center (see <http://www.invasivespeciesinfo.gov/animals/afrhonbee.shtml>).

What to Do in Case of Bee Swarms

The best thing to do if a swarm of bees stops in your yard is to simply leave them alone. They are looking for a new place to start a hive and normally will move on in one or two days. Beekeepers sometimes are interested in collecting a new swarm and may be contacted to collect the bees. If the bees do not pose an immediate threat or concern to humans, pets or livestock then locating a swarm collector can be done by accessing a website from the Oklahoma Department of Agriculture Food and Forestry (see; <http://www.oda.state.ok.us/cps-bees.htm>). Click on swarm collectors to locate someone in or near your county. Normally, it is best to leave honey bees alone as they do not bother people unless their hive is threatened or someone happens to squeeze an individual bee.

If a swarm of bees poses a threat and does not move on, they can be eliminated using a spray consisting of one cup of liquid soap in one gallon of water applied with a hand pressurized garden sprayer. Be sure to thoroughly wet the bee swarm. The soap makes the water penetrate the breathing tubes and the bees cannot breathe. It is best not to try to eliminate a bee hive in a house or tree with this spray because of the difficulty in getting all the bees wet. Call a beekeeper or pest control operator to remove honey bee colonies in a wall or attic.

Varroa Mite - An Important Pest of Honey Bee Colonies

The Varroa mite, *Varroa destructor* = (*jacobsoni*) was first discovered in Oklahoma in 1991, and spread in a westerly direction during 1994 and 1995 (Figure 3). This parasitic mite

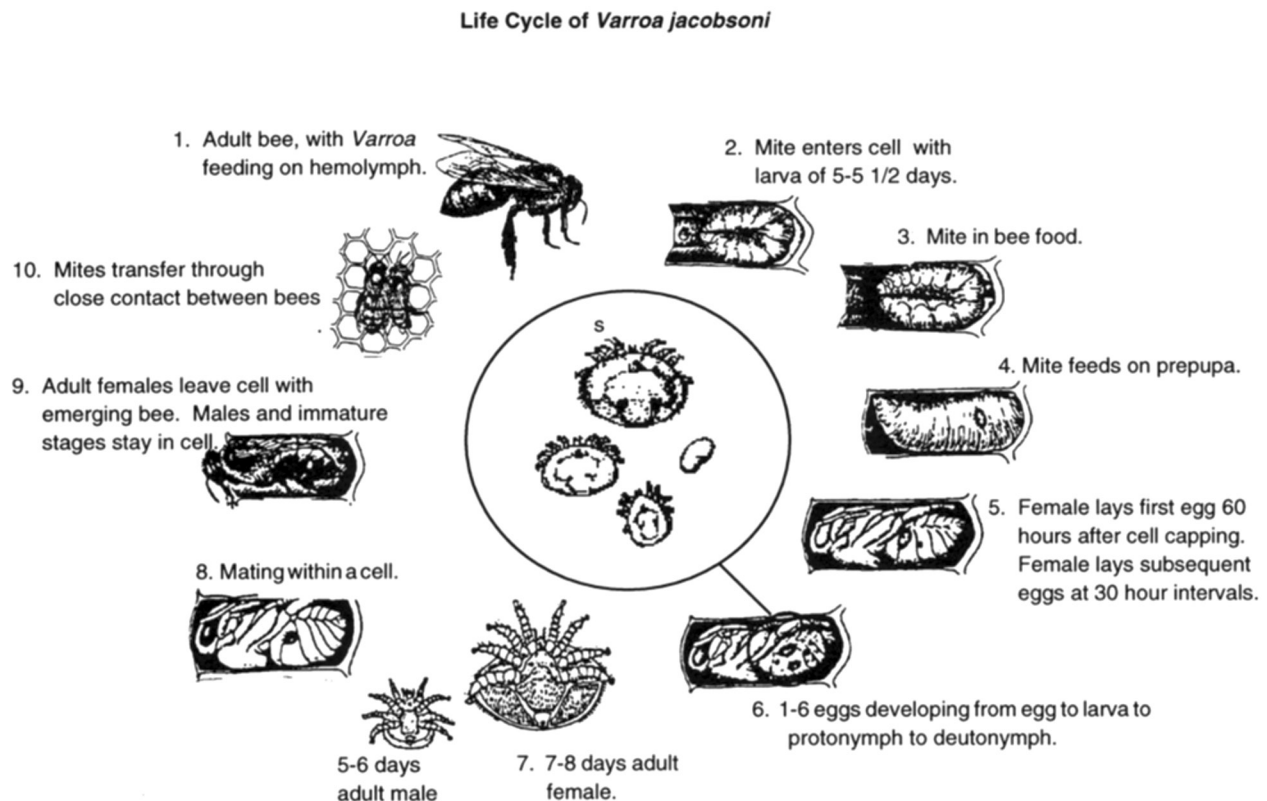


Figure 3. Life cycle of *Varroa destructor* = (*jacobsoni*). (Courtesy of Roger A. Morse) Prepared by Carol Henderson and illustrated by Byron Alexander.

damages honey bee colonies by reducing vigor of individual bees. This external parasite sucks body fluids from its host while wound sites may provide entry points for disease organisms. Research has determined that these two factors (varroa mites and disease) are likely the most contributing agents leading to colony collapse disorder (CCD). Bees parasitized during the larval stage may live as adults for shorter periods, die before emergence, weigh less, appear deformed or seldom leave the colony to forage. As the colony collapses from heavy infestation of this pest, bees that abandon the hive may carry mites to additional nests. Total colony collapse can occur in as little as two weeks.

Beekeepers must try to control Varroa mites if they expect to maintain colonies. A variety of treatments (pesticides) as well as screens, and other recommendations are available for beekeepers. These include products like: Apigard®, Apivar®, Check Mite+™, Apistan®, and Mite-Away quick strips®. Anyone using these products should always follow label instructions and safety precautions to avoid killing bees, poisoning the applicator (beekeeper) or contaminating the environment.

Many beekeepers avoid traditional use of pesticides in managing mite and beetle infestations by using several different strategies including: essential oils; screened bottom boards and mite trays; and solar powered ventilators. Commonly used essential oils include: wintergreen oil, spearmint oil, lemongrass oil, tea tree oil, thyme oil and patchouli oil. Specific recipes and dosages for these essential oils should be obtained from beekeepers who have a long history of success with these products.

Carpenter Bees

Carpenter bees get their name from their habit of boring into wood to make galleries for rearing their young. They are often referred to as “wood bees.” Although several species are found in the U.S., the most common carpenter bee, *Xylocopa virginica* (L.), in Oklahoma is black and yellow and about one inch long (Figure 4). They resemble bumble bees, but the abdomen (rear body segment) is black and shiny and lacks the extensive yellow hairs found on bumble bee abdomens. Male carpenter bees have a yellow face, whereas, the female’s is black.

Adult carpenter bees overwinter in abandoned nest tunnels. In the spring, the survivors emerge, usually in late April or early May, and feed on nectar. Mating occurs a few weeks later and newly fertilized females may either reuse old galleries, construct a new one by lengthening old galleries or bore entirely new ones. The female bores a circular hole (about the size of her body) straight into the wood, across the grain, for a distance of about one inch. Then, the gallery takes a right-angle turn, usually with the grain of the wood and parallel to the outer surface. The entrance and tunnel are clean and sharp. They may appear like they were made with a brace and bit. New galleries average 4



Figure 4. Carpenter Bee.

to 6 inches long, but those developed or used by several bees or past generations may extend up to 10 feet.

When the nest is complete, females place a mixture of nectar and pollen at the end of the gallery and lay eggs on the material. This portion of the gallery is then sealed off with a plug of chewed wood pulp. This process is repeated about one cell per day until a linear series of five to eight cells is completed. Larval development can take five to six weeks with new adults emerging during summer and fall. These adults store pollen in preparation for overwintering, but do not mate until emerging from the gallery the following spring.

Female carpenter bees nest in a wide range of woods, but prefer weathered and unpainted wood. In Oklahoma, structural woods or sidings of redwood, cypress, cedar or white pine are common nesting sites for carpenter bees.

Female carpenter bees can sting but rarely do so unless handled. Males tend to be territorial and often demonstrate aggressive behavior when humans approach, sometimes hovering a short distance in front of the face or buzzing over head. Males lack stingers, so the aggressive behavior is for show or bluff.

Control. The best results will be realized if individual galleries are treated with an appropriately labeled pesticide. When possible, treat the galleries after dark when bees are calm. Dust formulations of insecticides can be blown into the galleries (e.g., Sevin® or Pyrethrin dusts). Also, pressurized aerosol sprays or aerosols with injectable applicators can be used to direct chemicals into galleries (e.g., those containing dursban, Sevin®, pyrethrin or resmethrin). A day or two following treatment, fill the entrance holes with caulking compound, plastic wood or a tight-fitting wooden dowel glued in place. Remember, unpainted wood is preferred by the bees, so consider painting the nesting areas to help deter future infestations.

Bumble Bees

These large, robust bees resemble carpenter bees; however, bumble bees have yellow and black hairs on their abdomen (Figure 5). Carpenter bees have smooth, shiny black rear body segments (Figure 4).

Bumble bees are social insects that generally nest underground (in soil and/or under debris, refuse dumps, etc.). They obtain their food almost exclusively from flowers. Although they make honey, they usually store it in such small quantities as to be impractical for commercial purposes. They are, however, very beneficial as pollinators of several plant species, but are not as important to commercial crops as are honey bees. Only a few crop systems in cooler temperate areas rely on bumble bees for effective pollination.

Their underground colonies are small, compared to honey bee hives and contain only a few hundred bees by late summer. Their nests are composed of wax posts provisioned with nectar



Figure 5. Bumble Bee.

and pollen for feeding the brood housed in clumps of cells. They often nest in loose, fibrous habitats such as mouse nests, insulation or grass clippings. The colonies are annual, with only fertilized queens overwintering. The queens start new nests in the spring or early summer. Eggs laid by the queen usually hatch in three or four days. Larvae grow rapidly and, about seven days after hatching, are ready to spin their cocoon and change into pupae. It takes about 12 days for them to go from larvae to full-grown worker bees. While the first workers are still in their cocoons, the queen lays additional eggs. Young from the first batch are generally rather small. Each succeeding batch of worker bees during the summer is gradually a little larger. Workers usually live about a month. Males and new queens are generally produced in late summer.

Bumble bees are not as defensive or as numerous as honey bees; however, the females are capable of stinging repeatedly. They are similar to other species of social bees and wasps because they normally attack and sting only when their nest is disturbed. Although their sting can be painful, they are not normally dangerous except for stings around the head and neck, or to individuals that experience allergic reactions to bee/wasp venom.

Control. Properly labeled products containing pyrethrins, resmethrins or “Wasp Freeze” aerosols can be used as a knock-down measure if necessary. Properly labeled products containing carbaryl (Sevin®) as spray or dust can be applied just at dark or at night to the entrance area of their nest. Immediately after treatment, the ground opening should be closed with soil.

Sweat Bees

Sweat bees are a few species in the family Halictidae (also called halictid bees). This family contains bees that are relatively small and metallic (often shiny green) (Figure 6).

Adult sweat bees feed on nectar and pollen and during the summer and may be seen with impressive pollen loads on their hind legs as they return to their nest with food for immatures (larvae). Founding females dig branching burrows in bare soil (on flat surfaces to vertical banks). The female provisions cells at the end of each branch of tunnels with pollen balls and nectar. She lays her eggs in the ends of the provisioned tunnels and the developing larvae feed on the balls of pollen and nectar. Sweat bees usually overwinter as larvae or pupae in burrows in the soil.

Some species of halictid bees that are called “sweat” bees, are frequently bothersome to humans because they are attracted to perspiration. Females can sting, but the sting is considered



Photo provided by Dr. R. Akre, Washington State University.

Figure 6. Halictid “Sweat” Bee.

by most people to be mildly painful. Stings commonly occur when one tries to brush them off their body.

Medical Importance and Treatment

The venom of social bees contains active compounds that cause intense pain along with swelling and redness. Consequently, stings around the head, eyes and neck are especially serious. Of even greater importance, however, is the possibility of allergic reactions to the venom from just one sting. Such reactions may range from a large local reaction to a very serious, sometimes fatal, anaphylactic shock response. A severe (i.e., systemic) reaction can result in hives and itching throughout the body, nausea, vomiting, asthma, dizziness, confusion, slurred speech, drop in blood pressure, unconsciousness and can even cause death. These complications in allergic individuals can happen very quickly, within 10 to 30 minutes of a sting, and most deaths occur within one hour. Estimates of deaths in the U.S. due to insect stings range from 50 to 100 people annually, but it is likely that many additional fatalities are not recorded, since symptoms are similar to those of heart attacks. Although stinging deaths from insects constitute a minor health problem, it is estimated that at least 2.5 million Americans have some degree of increased sensitivity to Hymenoptera stings. Unfortunately, medical allergists cannot accurately predict who among this hypersensitive population may have a life-threatening reaction upon the next sting.

If you are stung, wash the actual sting site with soap and water to minimize the possibility of secondary infection and apply ice packs or a baking soda or meat tenderizer in a water paste to reduce the amount of venom uptake, pain and local swelling. Antihistamines, such as Benadryl®, can be helpful to lessen the swelling in mildly allergic reactions. If serious systemic reactions occur, seek a physician’s help immediately. Immediate injection of epinephrine is the initial step in combating a life-threatening anaphylactic reaction. Allergists and physicians can verify a patient’s hypersensitivity by performing a scratch skin test or intradermal skin test. Most physicians recommend that persons with demonstrated hypersensitivity wear an identification tag and carry a small sting emergency kit containing antihistamines and a syringe of epinephrine. Such kits are relatively inexpensive and are available with a doctor’s prescription (e.g., Ana-kit from Hollister-Stier Laboratories and Epi-Pen from Center Laboratories). People at especially high risk of a fatal reaction should consult their physician to consider desensitization procedures that allow for gradually building up a tolerance to venom, thereby reducing the likelihood of a serious systemic reaction.

What to Do When Stung

- Wash sting site and apply ice pack to minimize swelling.
- Apply baking soda and meat tenderizer in a water paste to reduce venom spread and swelling.
- Take antihistamine to lessen swelling and mild allergic responses.
- If serious reactions (i.e., dizziness, asthma, nausea, blood pressure drop, etc.) occur, seek a doctor IMMEDIATELY. Only the immediate injection of epinephrine will combat this life threatening reaction.

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