



Wild Honey Bees in Community Environments – Identification, Biology, and Reducing Risks

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This publication is designed for Arizona residents and visitors.

The goal of this publication is to provide readers with basic information about wild honey bees in Arizona. The document includes information on identification, biology and behavior of wild honey bees, the risks they pose outdoors, and how to safely deal with bees encountered in the environment.

Introduction

The term ‘**bee**’ refers to insects belonging to seven bee families within the superfamily Apoidea. The bee superfamily is in the insect order Hymenoptera which also includes ants and wasps. Many bees (and some ant and wasp species) produce and store honey-like substances by collecting and ingesting nectar from plants and regurgitating it. However, true **honey** bees belong to the genus *Apis*, in the family Apidae. They are distinguished by their traits of producing and storing honey and constructing perennial nests from wax.

Honey bees represent only a small fraction of bees worldwide. There are approximately 20,000 known species of bees in the world, and more than 4,000 native bee species in North America. Most bees are **pollinators** (Fig. 1) and regarded as beneficial, but **some are feared and can be considered pests in certain situations** because of their painful stings, related allergic reactions, and damage caused by nesting activities. Honey bees are among the most widely studied insects, and the specific branch of study is known as **apiology**. They are held in high regard for their multiple benefits to humankind.

The western honey bee (also known as the European honey bee), *Apis mellifera* (Fig. 2) is the most common and best-known of all bees in the U.S. but is actually native to Europe, the Middle East and Africa. This species was introduced into the Americas by European immigrants around 1622. It is domesticated and maintained by beekeepers for the pollination of crops and production of honey.

Similar to many other social insects, honey bees form colonies containing adult bees including a reproductive



Figure 1. Pollination by honey bees. Note pollen loaded on the hind leg. Photo: Padmanand Nambiar



Figure 2. Western honey bee, *Apis mellifera*. Photo: John Severns

queen, a few hundred drones and thousands of infertile workers with specific colony tasks. Eggs, larvae and pupae in various developmental stages are also present in a colony. Honey bees in a colony communicate with each other using specific chemical and mechanical cues. Workers use patterns of movements known as “dances” to communicate about food sources (Von Frisch and Leigh 1967; Seeley 2009; Tarpy 2016).

Wild honey bees (also called Africanized bees) in Arizona are a hybrid of the western honey bee (*Apis mellifera*), and other bee subspecies including the East African lowland honey bee (*Apis mellifera scutellata*), the Italian honey bee *Apis mellifera ligustica*, and the Iberian honey bee *Apis mellifera iberiensis*. They sometimes establish colonies among tree branches (Fig. 3), but more often utilize human-made or naturally occurring enclosed spaces. The urban built environment offers many opportunities including hollow-block walls, building wall voids, attic and crawl spaces, and in-ground irrigation boxes. Wild bees will colonize vacant hive boxes belonging to beekeepers. Many natural voids are also used including hollow tree trunks and stumps, rock crevices and caves. If a honey bee colony is removed from a void, the interior should be cleaned out completely and entrance points sealed, or new swarms will recolonize the space. Wild honey bees are known to outcompete many native bee species for resources.

It is difficult to distinguish between western honey bees and the Africanized hybrids because many aspects of their behavior and appearance are similar (Fig. 4). All wild



Figure 4. Africanized honey bee (left) and western honey bee (right). Photo: Dennis Riggs

honey bees in Arizona are considered to be ‘Africanized’ to some extent and only genetic testing can reveal the specific lineages in a colony of bees. Africanized bees may have a larger alarm zone around their colony, which they may aggressively and rapidly defend in larger numbers relative to western honey bees. They often chase intruders or perceived threats over longer distances.

Africanized bees exhibit more frequent swarming and migration in response to stress. Sometimes, the entire colony may migrate to a new location in a behavior called ‘absconding’ (Delaplane, 2017).

Africanized bees are less predictable in their behavior.

Identification

Wild honey bee adults are medium to large-sized insects, about ¼ inch to slightly over 1 inch in length depending on the kind of adult or caste.

A wild honey bee colony contains three kinds of adults – the queen and workers (females) and drones (males). The workers are the smallest in size, the most numerous and are the individuals usually seen outside the colony. In general, all adults have robust amber-colored to dark brown bodies covered with dense hair. Light and dark stripes may be seen on the abdomen, which also has a stinger at the rear end in the workers. Mouthparts (called a “proboscis”) may be seen extending below the head. Hind wings are smaller than the front wings. Hind legs are stout and equipped with specialized structures called ‘corbicula’ (pollen baskets) which are used to carry pollen from plants to the colony. Forager workers are often observed with yellow pollen-balls attached to them (Fig. 1). The colony also contains eggs, and brood (larvae and pupae) in various stages of development (Fig. 5).



Figure 3. Wild honey bees with their hive in a tree. Photo: Dennis Riggs

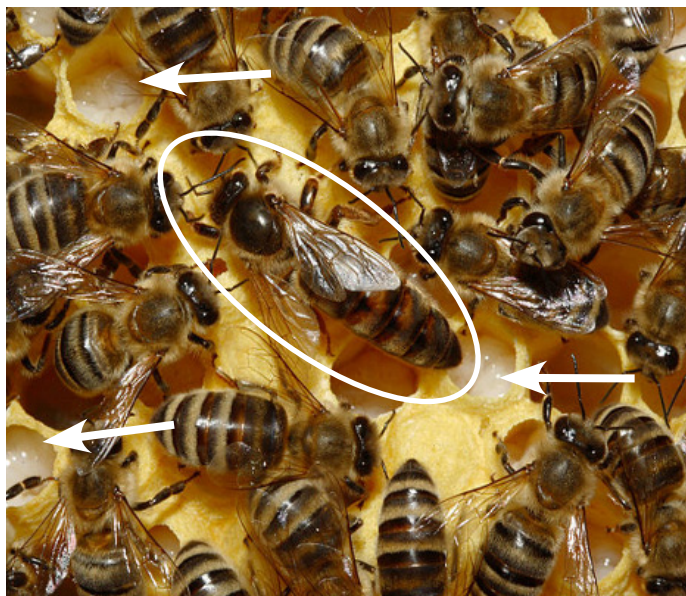


Figure 5. Inside a honey bee colony. Note the queen (circled) and cells with larvae or pupae (arrows). Photo: Waugsberg

Understanding wild honey bees around your home or building

It is natural to find bees in the environment. Most honey bees observed in the landscape are foraging bees from established colonies looking for water, nectar or other sugary, sweet-smelling substances or pollen. Individual honey bees are generally not a cause for concern (unless you are an allergy sufferer), but groups of honey bees can be alarming. There are two situations in which large groups may be seen; a swarm and a colony.

If a cluster of bees suddenly appears on a tree branch (Fig. 6), wall (Fig. 7), or other spot (Fig. 8) this is most likely a resting **swarm**. But if you see many bees passing in and out of a cavity, this indicates the presence of a colony within (Fig. 9).

Wild honey bee swarms

What is honey bee swarming? As spring days lengthen, and temperatures increase, plants generating new sources of pollen and nectar stimulate the rearing of brood and honey bee colonies eventually become overcrowded. This necessitates swarming. Swarming is common during spring and continues throughout the year while pollen and nectar sources support growing colonies. This is greatly influenced by environmental conditions.

How does swarming occur? In an active honey bee colony, there is a single queen. Honey bee queens produce a pheromone that inhibits the production of new queen bees. The queen is rarely seen outside and hardly ever needs to fly. She stays deep inside the comb, cared for



Figure 6. Honey bee swarm on a tree branch. Photo: Mark Osgatharp



Figure 7. Honey bee swarm on external wall of a building. Photo: Ward Upham, Kansas State University, Bugwood.org

by the worker bees, and lays eggs continually. But as the colony become increasingly crowded the pheromone fails to make it to all the bees, or older queens begin to produce lower levels of the pheromone. Uninhibited worker bees create larger elongated rearing cells called queen cups. Once eggs in the queen cups hatch, the larvae are given

special care and are fed with a food called royal jelly. Worker bees tending the existing queen give her less food, and egg production slows as the queen loses bodyweight, which will ultimately help her to fly. When new queens are almost ready to emerge from the queen cups, the old queen takes most of the workers and departs. The traveling mass of bees is called a “swarm”.

Before leaving, the workers fill their stomachs with honey, and this is the only food the swarm has to sustain activity until they find a new home site in which to establish their new colony. The old queen, being a weak flyer will often land suddenly, and often not far from the original location. Resting swarms can be found clustered on the ground, on a fence post, a tree limb, the side of a building (Fig. 7), or other locations (Fig. 8), and workers will quickly surround the queen to regulate her temperature.

Since swarming bees are focused on finding a new home, they are not generally defensive and rarely pose any danger to humans or other animals. While the old queen rests, several hundred scout bees will leave the swarm and explore the surroundings in search of a new colony site. When a scout discovers an appealing location, she communicates about it with the rest of the swarm, and this is followed by multiple site visits. After a consensus is reached and the site is finalized, the scouts then guide the swarm to the chosen site, which can be several miles from the original colony. A swarm needs to build a new nest before the honey reserves in the workers’ stomachs is depleted. If the weather is not favorable and/or food sources are unavailable, the swarm can starve and suffer significant mortality. Once settled, workers will start building a new comb. The queen will start laying eggs, and workers will carry out all other duties for the colony including foraging, cleaning, nest building, guard duty, comb ventilator, and nanny for the brood.

Back in the original colony, the first new queen to emerge will sting and kill other emerging queens. The old colony usually has enough food reserved to last for a while, but it is important to start building up the number of worker bees once more. The new virgin queen will mature after several days and fly out to seek drones in areas called “drone aggregations”. She will mate multiple times with several drones and will store sperm for the remainder of her lifetime. After mating, she will return to the nest and start laying eggs, slowly building up the colony. Sometimes newly emerged virgin queens will leave the nest with a group of workers in another swarm, called an “after swarm”, and this can occur repeatedly until the old nest is depleted and dies off.

How to identify a swarm. Swarming bees will not have yellow or orange pollen evident in pollen baskets on their hind legs (Fig. 1), and swarms will not be seen moving in and out of cavities (Fig. 9).



Figure 8. Swarming honey bees can aggregate in almost any spot, even in the wheel well of a truck. Photo: Alex Hu

What to do when you see a resting swarm. It is best to leave swarms alone if they are in a spot that does not have much human traffic passing close by. It is often prudent to designate the area off-limits using caution tape until the queen is ready to fly again. Swarms usually move within 24-72 hours. However, if a resting swarm is found on public property or around a residence in the way of people it may be necessary to have the swarm removed by professional beekeepers or a pest management professional. Local beekeepers or beekeeping associations may help. Most states have their own beekeepers’ association, and many are active on social media. Some beekeepers will collect swarms and use them to start new hives. Information for the Arizona Beekeepers Association can be found at <https://www.azbeekeepers.org/>. The website provides a list of beekeepers that might be able to assist with bee removal.

If swarms are disturbed, they will disperse within a local area and this can cause people to panic. Workers in a swarm are generally docile but can sting if disturbed.

Wild honey bee colonies

If you see many bees flying in and out of a cavity, this indicates the presence of a colony within (Fig. 9). Once a swarm finds a suitable home site, they start to build comb and rear brood and the workers become more protective. Problems arise when they establish a colony in a place where they pose a risk to people (Fig. 10, 11). **In this situation, wild honey bees can become pests because of sting incidents, defensive bee attacks, and the structural damage and annoyance that their foraging and**



Figure 9. Honey bees flying in and out of a tree cavity which contains their colony. Photo: Jarrah Treest

nest-building activities can cause. The chances of people getting stung in such situations are much higher once brood are being reared.

Pollinators are essential and desirable elements in our natural environment. They should be valued, preserved and protected. However, wild honey bees can sometimes interfere with our activities or interests. When this happens the best course of action is to have an experienced beekeeper remove and relocate the bees or have a pest management professional take an **integrated pest management** approach. Irrespective of which professionals assist ask them how to avoid becoming host to new swarms passing through the area.



Figure 10. Honey bees established inside the siding of a home, after entering through a crack in the wall. Photo: Timothy Haley, USDA Forest Service, Bugwood.org



Figure 11. Honey bees starting to establish a colony inside an irrigation box, after entering through the hole in the lid. Photo: Dawn H. Gouge

Wild honey bee risk assessment around homes and buildings

Identify the insect. The Sonoran desert region is home to more than 1000 bee species, and areas around Tucson are assumed to host a greater diversity of species than anywhere else in the world. Arizona bees include the world's smallest bee *Perdita minima* which is a diminutive 2 mm in size, and the gentle giant valley carpenter bee *Xylocopa varipuncta* that can be a little over an inch in length (26 mm). If you are bee-watching in Arizona, prepare to "bee" amazed. There are many kinds of bees and bee-look-alikes, some of which belong to other insect orders, such as the hover fly (Fig. 12, Table 1). Most bees and bee-look-alikes are beneficial or benign and do not necessitate action, bumble bees and leaf-cutter bees for example (Table 1). Some can pose risks including paper wasps and yellowjackets (Fig. 13, Table 1).

Some of our native bees belong to the same family as honey bees (Apidae), including bumble bees (Fig. 14, Table 1), carpenter bees, and digger bees to name a few. Other commonly encountered native bees include those in other families, for example, leafcutter bees (Fig. 15, Table 1) (Family Megachilidae), sweat bees (Family Halictidae) and yellow-faced bees (Family Colletidae). Native bees are also valuable crop pollinators, and in many cases provide pollination under inclement weather conditions when honey bees are not active. Native bees also pollinate wild plants and thus sustain our native ecosystems.

Before deciding if an insect is a problem and engaging in control actions, it must be correctly identified (Buchmann

Table 1. How to differentiate between bees and bee-look-alikes

Character	Honey bee	Leaf-cutter bee	Bumble bee	Yellowjacket	Paper wasp	Syrphid fly
Body	<p>Small to medium black or dark brown bodies, ½ - ¾ inch in length, mouthparts extend below the head. Hind pair of wings smaller than front pair.</p>	<p>Small to medium-sized black, gray and yellow, about ½ - ¾ inch in length. Carry pollen on the underside of the abdomen.</p>	<p>Medium to large ¾ - 1 inch in length, black, rounded, fuzzy appearance, often have bands of yellow, orange or white on thorax and abdomen.</p>	<p>Medium, robust body, ½ to 1 inch in length. Smooth body, with jagged yellow and black patterns. Dark wings held folded on back.</p>	<p>Medium to large, around 1-1 ¼ inch in length. Long, slender body, distinct, slender waist, long antennae. Dark wings, held folded on back.</p>	<p>Small to medium-sized flies, ½ - ¾ inch in length vary widely in size, shape and colors. Single pair of wings, short, stiff antennae, no waist.</p>
Hair	<p>Body covered with dense hair.</p>	<p>Sparse hair.</p>	<p>Body covered with dense, long hair.</p>	<p>Body is smooth, not hairy.</p>	<p>Body is smooth, not hairy.</p>	<p>Body is smooth, not hairy.</p>
Legs	<p>Hind legs are stout and equipped to gather pollen, and often have yellow pollen-balls.</p>	<p>Dark, uniform sized legs, proportionate to body.</p>	<p>Stout legs, carry pollen on hind legs.</p>	<p>Medium length, slender, yellow legs can be seen under the body.</p>	<p>Long, slender, yellow legs can be seen under the body.</p>	<p>Slender legs, not visible during flight.</p>
Flight	<p>Hovering flight, legs held close to body.</p>	<p>Hovering flight.</p>	<p>Slow and clumsy flight, often bumping into objects.</p>	<p>Range of flight movements, legs are held up, but not too close to body. Side-to-side movement in preparation to land.</p>	<p>Slow relaxed flight with legs dangling beneath the body.</p>	<p>Hovering flight, sometimes stop in mid-air.</p>
Sting	<p>Worker bees will sting in defense when disturbed or attacked. Each bee can sting only once, leave the stinger in host skin, resulting in death of the bee.</p>	<p>May sting multiple times if handled or trapped in clothing. Stings are mild.</p>	<p>Only sting if trapped in clothing or their colony is disturbed. Can sting multiple times.</p>	<p>Usually sting when they are disturbed while foraging. Can sting multiple times.</p>	<p>Normally docile but can sting multiple times if threat is perceived. Can sting multiple times.</p>	<p>Do not sting.</p>



Figure 12. Syrphid (also called hover fly). Photo: Joseph Berger, Bugwood.org



Figure 13. German yellowjacket. Photo: Whitney Cranshaw



Figure 14. Western bumblebee. Photo: Stephen Ausmus

et al., 2015). The information in Table 1 will help you differentiate between honey bees and some common bee-look-alikes, although there are many more that could be added. From a safe vantage point try to identify bees and wasps in outdoor spaces using Table 1. Use close focus binoculars to see details that are not visible to the naked eye. The best close focus binoculars have a close focus distance of less than 6.5 feet (2 meters).



Figure 15. Leafcutter bee. Photo: Bernhard Plank

Inspect and monitor your home or building surroundings regularly for signs of honey bee activity. Be on the lookout for swarms during spring and summer months in particular. Encourage building users and/or occupants to report swarm and colony sightings.

Be aware of potential health risks and injury. It is important to be aware of stinging insect activity in an area before engaging in outdoor activities, particularly if individuals sensitive to stings are involved. Avoid contact with these insects as much as possible and teach children to do the same. Tragic loss of life has occurred when people intentionally or unintentionally threaten a honey bee colony. Wild honey bee colonies may react defensively to disturbance, and a number of “irritants” are well known to honey bee experts. Honey bees can be provoked by the sounds and vibrations made by landscaping equipment, being physically disturbed, doused with water, and even by certain smells. For example, petroleum products like kerosene or petrol, some pesticides, paint thinners, and even some hair spray can irritate honey bees. In general, honey bees are more “irritable” on cloudy, overcast days, and during cool mornings if they are disturbed before they are warm enough to fly. Established colonies may be highly defensive and may respond in large numbers if provoked.

Landscapers and groundskeepers should be aware that loud noises, vibrations, blowing dust, and physical disturbance of managed hives or wild honey bee colonies is threatening to bees, who can be highly protective of their brood.

Respond appropriately to honey bees around you. If you encounter bees buzzing around your head, place your hands over your face and look through the gaps between your fingers (Fig. 16). Look around for signs a colony is close by and walk briskly away from the area. If it is not easy to determine where the bees are coming from, walk briskly into the wind.



Figure 16. If surrounded by bees, cover face with hands and try to look through gaps between fingers and move away quickly! Photo: Shaku Nair



Figure 17. Honey bee stinger lodged in the victim's skin. Photo: Waugsberg, Wikimedia Commons

Do not flap or swat at the bees. This is the worst thing to do, because honey bees are very sensitive to movements in their alarm zone!

If you are stung or the bees bump you, cover your head and face with clothing or your hands and run to the nearest building, car or shelter, go inside and close the doors. If you are outdoors and not close to shelter, run or walk briskly for at least 240 yards (the length of two football fields) or as far as you can go until the bees have abandoned you. If you cannot move from where you are, cover your face with clothing, crouch down to make yourself as small as possible protecting your head and face, and remain as still and calm as you can.

Never dive into a swimming pool or river; the bees will wait for you far longer than you can hold your breath!

After a sting, the honey bee's barbed stinger gets lodged in the victim's skin and pulls the venom sac and venom pump out of the bee's body as it struggles to fly off (Fig. 17). This results in the death of the bee, and the stinger continues to release venom for several minutes after being separated from the bee's body. It is important to scrape off the stinger (or at least the venom sac) as soon as possible, to reduce the amount of venom entering the skin. Prompt removal using any available means can greatly reduce the severity of the sting reaction. But avoid using your fingers to pinch off the stinger, as you might squeeze the attached venom gland increasing the amount of venom injected into your body.

Most healthy adults can withstand several hundred bee stings, so fatalities due to toxic levels of venom are extremely rare. Panic responses to bees and other flying insects cause more loss of life than sting incidents each year.

Bee stings are painful, and the discomfort and swelling can last 2-3 days. Prolonged or severe reactions may occur in

sensitive people or people with bee allergy, and this is the most significant problem. Communicate with those around you if you have severe sensitivities and always carry an epinephrine autoinjector or alternative emergency treatment for anaphylaxis.

Discourage bees from nesting in and around your home or building

Not everyone wants to discourage honey bees around their property, but for those managing locations with vulnerable people (e.g., childcare facility), or residents living with bee allergies it can be advisable. Honey bees need food, water and shelter to survive. Restricting access to suitable nesting sites will encourage them to go elsewhere to live (O'Malley et al. 2007). Moving resources away from buildings will further reduce encounters.

Eliminate favorable nest sites

- Do not attempt to seal holes or fill voids if bees are actively moving in and out of it (Fig. 18).
- Fill holes $\frac{1}{8}$ inch or larger in walls, and structures with voids inside. Use a good quality sealant to fill all cracks or gaps in walls, rooflines and around foundations.
- DO NOT fill tree holes with concrete, gravel or sand. These materials can cause tree damage and become a safety issue if the tree is cut down. Tree voids may be filled with expanding foam used for home insulation projects and mesh screen used to block entrance opportunities.
- Fill in rodent or animal burrows in the ground.
- Remove backyard items that might serve as a shelter, such as overturned clay pots.
- Put mesh screening over rainspouts, chimneys and water meter boxes.



Figure 18. Tree crevice with actively moving honey bees. Photo: JMK, Wikimedia Commons



Figure 19. Honey bees drinking from a bird bath. Photo: Cornelia Moore

- Ensure that window and door frames fit tightly.
- Ensure that outbuildings or external sheds are kept well maintained and in good repair, and that doors close tightly. Exercise caution when entering buildings that are not used frequently.
- Ground-nesting bees including digger bees, sweat bees, and mining bees can be discouraged by mulching or planting a ground cover over large patches of bare ground, or soaking with water.

Eliminate water sources

- Promptly repair leaks in outdoor water taps and irrigation systems.
- Educate children to avoid handling bees around or caught in swimming pools.
- Monitor bird baths, pet water bowls (Fig. 19), and water features. If bees are using these as a water source, sometimes moving them to other locations can be helpful.

Eliminate food sources

- Understand and select landscape plants appropriately. If your aim is to discourage honey bees from around your property or certain areas of it, avoid plants, shrubs, and trees known to be highly attractive to honey bees.
- Gather and discard fruit dropped from trees regularly.
- Cover food when eating outdoors, especially sugary, sweet-smelling foods and drinks. Honey bees often enter open soda cans (Fig. 20) and cause stings in and around your mouth!
- Clean up food and drink spills promptly.
- Keep trash receptacles closed, and away from building entrances. Placing open topped trash



Figure 20. Honey bee on open soda can. Photo: Shaku Nair

receptacles next to doorways may be practical from one perspective, but encourages honey bees and wasps to forage near to doorways, and some will gain access to building interiors as a result.

- Use strong liners for trash receptacles, which do not rip easily and spill inside the receptacle.
- Empty outdoor trash cans frequently to avoid overflow.
- Place dumpsters and outdoor trash cans away from building entrances.
- Cover hummingbird feeding points with coarse mesh to allow hummingbird feeding but exclude bees.

We do not recommend the use of pesticide sprays on bee swarms or colonies.

If you are planning on using pesticides to remediate a colony, please read and understand all parts of the product label before use. Accidental or intentional misuse

can lead to far more significant problems. If you plan to apply pesticides to control weeds and pest insects around your property consider researching different management options online before making a purchase. Look for options that have the least impact on pollinators and other non-target organisms.

Pesticide labels contain information on safety to pollinators.

Read the label. The label is the law!

Conclusion

Improved awareness and understanding of wild honey bees and other pollinators adds to the enjoyment of the outdoors. Pollinator protection is a national priority, and various federal and regional organizations actively engage in the effort. Numerous resources are available, some of which are listed under references.

Bee smart!

Do not try to remove honey bee colonies yourself!

NEVER shoot at, throw water, rocks, gasoline or other chemicals, burn or otherwise threaten honey bee colonies.

Honey bees should be removed by experienced professionals.

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