EC3023

Bees and Wasps around the Home and Landscape

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Figure 1. Honey bee pollinating a cucumber blossom.

Figure 2. Larvae of a parasitic wasp emerging from the body of a cabbage looper.

This publication contains information that helps identify common bees and wasps that nest around the home and in the landscape, and brings greater understanding of their biology and the valuable role they play in the environment. In situations where stings are a concern, it also provides guidance for management of bees and wasps and treatment of their stings.

Most species of bees and wasps play a valuable role in our landscapes, vegetable gardens, orchards, field crops, forests, and natural systems. Bees are indispensable as pollinators (Figure 1), and honey bees provide nutritious honey for human consumption and as an ingredient in many food products.

Wasps are important predators or parasites of insect pests (Figure 2), and they help regulate insect pest populations. It is important to conserve or even promote bees and wasps, which are considered to be beneficial unless they are in settings where they pose a direct health hazard to humans, livestock, or pets.

Sooner or later, many of us will have the unpleasant experience of being stung by a bee or wasp. Most stings occur during late summer and autumn when bee and wasp numbers are at their peak. Generally, these insects will not sting unless threatened, mistreated, or when their nests are approached too closely.

Despite their many benefits, stinging insects may at times pose a safety hazard, and it may become necessary to initiate control measures. Insect stings probably injure more people each year than all other venomous animals combined. Fortunately, recovery from most stings is rapid and occurs within a few days.

Only female bees and wasps are capable of stinging because the stinger is actually a modified ovipositor (egg-laying

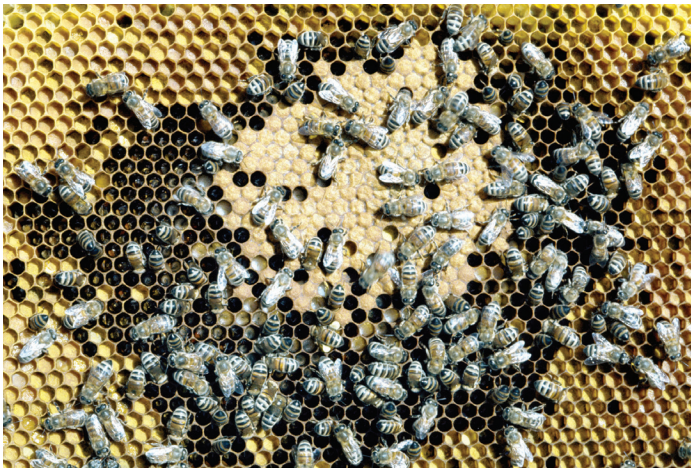

Figure 3. A honey bee colony with workers caring for brood and capping cells of mature larvae.

Figure 4. Eastern yellowjacket workers enlarging the opening to their nest in an embankment.

tube) that is attached to a venom sac. The stinger functions defensively to inflict pain and frighten away intruders. Additionally, wasps use their stinger to paralyze prey and transport it back to a nest or burrow.

Social and Solitary Bees and Wasps

Bees and wasps can be classified either as social or solitary, depending on how they live and raise their young, also called "brood." Among solitary bees, there are species that exhibit various forms of primitive sociality and cooperation. Some live in communities or share a common nest entrance.

Social: In general, the social species live in a colony and have a caste system where nest mates are either nonreproductive female workers, or reproductive queens and drones (males).

Honey bees are social throughout the year, and their perennial colonies consist of a single fertile queen and between 10,000 to 30,000 workers (Figure 3). Other social bees and wasps establish annual colonies having far fewer workers. By the end of the season, new queens and drones evacuate the nest, and remaining workers gradually die out.

Annual colonies begin with a single fertile queen that establishes a nest, lays eggs, and initially cares for her brood. These develop into adult workers, which then care for her and the continually developing brood. Once the workers emerge, the queen remains in the nest to focus on egg-laying, while the workers take over other tasks such as foraging for food, building the nest structure, and defense of the colony. At the end of the season, new queens and drones are produced. They are released and seek mates from other nests. The fertilized queens spend the winter in sheltered locations and emerge the following spring. Social bees and wasps include honey bees, bumble bees, paper wasps, yellowjackets, and hornets. Nests and their entrances are often evident, due to the frequency of workers flying to and from the nest (Figure 4). Nests reach optimal size by the end of the season (Figure 5).

Social bees and wasps use their stingers as defensive weapons, but wasps additionally use them to subdue larger prey insects. When forced to defend their nests, both social bees and wasps aggressively attack an intruder in large numbers.

Solitary: Solitary species do not live in colonies. Instead, single, fertile females make nests by digging burrows into soil or chewing tunnels into wood or hollow stems. Some utilize existing channels (Figure 6), holes, or crevices in structures or rocky surfaces to build their nests. And others build clumps of cells made of mud or some other natural material in protective enclosures.

Solitary bees and wasps are sometimes mistakenly thought to be social, as their nests may coexist as a community or as crowded aggregations in lawns, bare fields, sunny slopes, walls, or other favorable habitats. And some species do in fact express some forms of cooperation, such as brood

Figure 5. Baldfaced hornet nests with the left one cut away to show brood comb.

Figure 6. Leafcutter bee nests in a leafcutter bee board with 3/16-inch holes drilled into it.

Figure 7. Small carpenter bee, *Ceratina* sp., and nest with brood in cells in a hollow stem.

Figure 8. Blue cricket wasp, *Chlorion aerarium*, carrying a field cricket to its burrow.

care, although they are not completely social.

Solitary bees include digger bees, mining bees, sweat bees, plasterer bees, leafcutter bees, mason bees, and small carpenter bees. Large carpenter bees are considered to be semi-social.

Most solitary bee females prepare cells in succession into which they deposit a loaf of pollen mixed with nectar along with their own egg. There is enough food for the larva to develop without additional care (Figure 7).

Among the solitary wasps are cicada killers, spider wasps, cricket wasps, digger wasps, grass-carrier wasps, sand wasps, and mud daubers. They all use their stingers to paralyze insects or spiders, which they carry to a burrow or nest to feed their brood (Figure 8). After provisioning a cell or a chamber with the needed quantity of prey, they deposit a single or several eggs, respectively, into a mass of insects or spiders on which the larvae feed. Larvae fully develop during the remainder of the summer and spend the winter in their nests.

Figure 9. Honey bee worker gathering nectar and pollen from a rose blossom.

Figure 10. Barbed stinger of a honey bee.

Figure 11. Honey bee swarm awaiting relocation to a new nesting site soon to be discovered. (Source: Barb Ogg, Nebraska Extension, Lancaster County)

Biology and Management of Specific Stinging Bees and Wasps

Social Bees

Honey Bees (*Apis mellifera*)

Description: Honey bees are native to Europe and Asia and were introduced by colonists early in American history. There actually is only a single species of honey bee, *Apis mellifera*, in the United States. However, there are several variants or subspecies and breeds, collectively referred to as races. The most common race managed by beekeepers in the United States is the Italian honey bee, *A. mellifera ligustica* (Figure 9). It has the familiar black and orange abdomen with bands of white hair. There is some variation in color, and some workers appear to be mostly black. Two races with generally black workers are the Carniolan, *A. mellifera carnica*, and Caucasian, *A. mellifera caucasica*, honey bees.

Honey bees are about 2/3 inch long and fuzzy in appearance with modified, flattened hind legs that carry pollen back to the hive. Colonies are active throughout the year and consist of a single queen, drones, and thousands of workers, which peak in numbers in midsummer. Whether in apiaries or in the wild, honey bees can be defensive against aggressive intruders, and guard workers keep constant watch at nest entrances.

Stings: Unlike many other bees and wasps, a honey bee can sting only once (Figure 10), because its barbed stinger lodges in the skin and tears loose from the abdomen, damaging the bee as it attempts to fly. The bee eventually dies after it stings, but it may continue to fly around the offender and release alarm pheromones. The stinger is attached to a venom gland that continues to pulsate and pump venom into its victim, and it also releases pheromones that induce other guard bees to attack. Therefore, stingers should be removed immediately, and the sting site should be washed to remove remaining pheromones.

Swarms: Honey bees have a tendency to swarm naturally in mid-spring, especially when colonies become overcrowded or have been neglected by the beekeeper. The old queen and a large cohort of workers and drones imbibe honey, leave the nest and fly to a protected location, and settle temporarily until scout bees discover a nearby cavity favorable for nesting (Figure 11). This may be in the hollow of a tree trunk or log, or may be within walls or empty spaces in a structure. Several hours and sometimes days may pass until scout bees succeed in finding a suitable site for the colony.

Honey bees usually are quite docile when swarming. Because they are highly valued, do not treat swarms. Instead, when a swarm is discovered and is accessible, contact a local beekeeper to collect it in a hive box. Your local extension

Figure 12. Beekeeper removing a colony from a home. (Source: mike -thomson.com)

Figure 13. Honey bee colony in a basement beneath main floor joists by a window. (Source: mike-thomson.com)

office or state beekeepers association can assist with locating a beekeeper.

Colonies in Urban Settings: Honey bees may become troublesome when they establish colonies in urban residential areas or landscapes. Large numbers of worker bees from a nearby colony will actively forage on flowers, and there may be an increased risk of stings when people or pets walk into bee flight paths, play in parks, or approach a concealed nest too closely.

Colonies within Structures: Honey bees occasionally invade homes and establish a colony in wall voids, attics, or crawl spaces (Figure 12). They build combs of wax containing honey, pollen, and brood, all of which can eventually become enormous and heavy (Figure 13). If a colony becomes established in the home, a local beekeeper may be contacted to remove it.

Once established in a home, a honey bee colony may be difficult to remove if it is located in an unreachable area. Portions of the structure may need to be detached to allow access. When removing a colony, the wax comb containing honey and brood should be completely removed along with the bees, or the site will remain attractive to other bee swarms. In addition, ants and wasps may raid the site, and other insects such as carpet beetles, flies, and cockroaches may find their way to the comb to feed and become established.

Several methods can be used to manage a honey bee colony once it is established in a building, but prevention is the best way to avoid the difficulty and expense in removing it. Regular maintenance, including caulking, structural repairs, and replacing rotted boards or broken masonry, can prevent a colony from entering and getting started.

There are occasions when a honey bee colony may need to be destroyed because of an immediate stinging hazard, or when extensive disturbance would be needed to access and remove the colony. Under these circumstances, it is best to hire a pest management professional who has the skills and equipment to do the job efficiently. In general, the procedure is to apply an insecticide when all workers have returned to the colony and temperatures are cooler. Pyrethrins or pyrethroid-based products are particularly suitable, because they penetrate well and provide immediate knockdown.

In many cases, it can be difficult to directly treat combs with the insecticide, since the colony may be located some distance away from the bees' point of entry into the structure.

Caution: You should never use honey or wax from honey bee colonies that have been treated with an insecticide. Never attempt to kill bees in buildings unless you are knowledgeable and properly protected. Always use appropriate insecticidal products, and never use any flammable liquids.

Figure 14. Bumble bee worker foraging on a purple coneflower for pollen and nectar.

Figure 15. Bumble bee nest entrance in heavy mulch.

Bumble Bees (*Bombus* spp.)

Description: Bumble bees are robust bees covered with dense black and yellow hairs. They range in size from 1/2 inch to 3/4 inch long (Figure 14). There are over a dozen species in the Great Plains states. Colonies consist of a queen, drones, and about 100–200 workers. The largest species is the American Bumble Bee, *Bombus pensylvanicus*, and the most common species is the Eastern Bumble Bee, *Bombus impatiens*.

Colonies: Unlike honey bees, bumble bees have annual colonies established by a fertile queen each spring. Queens emerge from their overwintering sites and fly around structures, compost piles, or along the ground, looking for a site favorable for establishing a colony. The nest is typically established in the ground (Figure 15) and is insulated with dry grass clippings, or rodent or rabbit fur. Workers build an assemblage of waxy golden pots that are used to hold brood and to store honey and pollen (Figure 16).

Stinging Risk: Bumble bees may become a concern when nests are close to sidewalks or near a building foundation. Their busy flights to and from the nest may alarm people, and accidental collisions with humans or pets may result in stings. Bumble bees nesting in the ground can also become defensive when disturbed, as when a lawn mower is passing overhead, but generally, they are not overly aggressive. If concerned or sensitive to bee stings, avoid being near nest

Figure 16. A bumble bee nest under a dog house. (Source: Tiku Rau)

Figure 17. Bumble bee domicile with lid and entrance hole to relocate a bumble bee colony. (Source: Doug Golick, University of Nebraska–Lincoln Entomology)

entrances and be alert around flower patches where workers are foraging for pollen and nectar.

Relocating a Nest: Bumble bee nests should not be treated unless absolutely necessary, as they are valuable pollinators of fruit and vegetable crops.

It sometimes is possible to relocate a bumble bee nest that is in the ground, but much easier to move one under some object on the top of the ground. The key is to move it earlier in the season when it is still small and place it carefully in a domicile, which is its new home for the rest of the season. A domicile is a natural wooden box that has a lid and a 1-inch diameter hole drilled in its side (Figure 17). Dimensions can vary, but the domicile should be large to accommodate a growing colony.

When relocating a nest, wear protective clothing and select a cool evening or early morning when all bees are present. Have the domicile nearby, and gently transfer the nest, including surrounding insulation material, into the box. Close the lid and plug the entrance hole. Place the domicile on the ground beneath dense shrubbery and away from activity by people, pets, and livestock. Then open the entrance hole and allow bees to exit and become accustomed to their new surroundings.

Insecticidal Treatment: Bumble bee nests in the ground can be eliminated by carefully spraying or dusting an insecticide into the nest opening. Wear protective clothing. Treat at night or in the early morning, cover the entrance with a heavy object, and remove it after a few days.

Figure 18. The Eastern Carpenter Bee, *Xylocopa virginica*, is becoming more common across eastern Nebraska.

Figure 19. Carpenter bee holes in the exposed end of a floor joist.

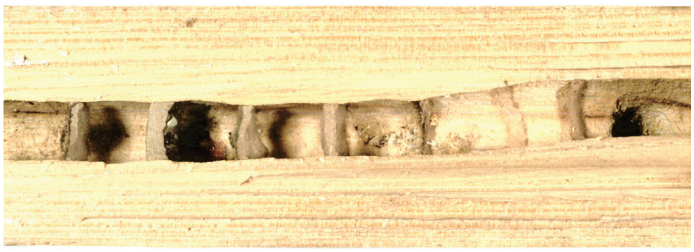

Figure 20. Empty carpenter bee tunnel with cell partitions. (Source: USDA Forest Service)

Carpenter Bees (*Xylocopa* spp.)

Description: These large, stocky bees are similar in appearance to bumble bees, but they have a hairless, metallic abdomen that may be blue-black, deep purple, or dark green (Figure 18). The head is bulky, as contained within it are strong muscles and mandibles for chewing into wood.

Nests: Carpenter bees bore smooth, circular tunnels in dead trees, stumps, logs, beams, posts, poles, deck joists, fence rails, and other wooden structures. Tunnels are a half-inch in diameter and follow the grain of the wood; however, the initial opening is usually oriented perpendicular to the grain (Figure 19). New tunnels may be 6 to 12 inches long. Older tunnels are often reoccupied and expanded, and over many years they may reach a length of 2 to 6 feet or more. Several females may bore into the same piece of wood, and even share a common entrance. Such a situation perforates the wood so badly that it may lose structural strength.

Life Cycle: A fertile female establishes a nest in the spring. She creates cells by separating them with walls of wood pulp (Figure 20) and successively provisions each cell with bee bread made of pollen mixed with nectar, and then an egg. The larvae complete development, and the following generation of females and drones remain together in the same nest through the season. They overwinter in the nest, then in the spring, females establish their own nests.

Management: Carpenter bees are docile, but the stingless males may "buzz" intruders during mating flights to protect their territories. Although tunneling can cause some damage to timbers, in many cases, control is not necessary. Woodpeckers may be attracted to brood cells beneath wood surfaces and damage wood by their pecking, so controlling bees may be needed to curtail cosmetic damage. In locations where carpenter bee activity is heavy, coat surfaces of wood with exterior durable paint to reduce attractiveness. Remember that carpenter bees are valuable pollinators, but if necessary, apply an insecticide carefully to tunnels and adjacent surfaces to prevent further damage. Seal holes with wood putty to prevent tunnels from being reused.

Ground-Nesting Bees

Kinds of Bees: Among the solitary ground-nesting bees are several groups of bees, including digger bees, longhorned bees, mining bees, sweat bees, and plasterer bees. They dig burrows and heap up mounds in bare soils, and in crevices in pavement or retaining walls (Figure 21). They often nest so closely together that on warm, sunny days there may be a flurry of bees flying about.

Several species of attractive metallic-green sweat bees (Figure 22) are common in summer. And a number of longhorned bees in the genus *Melissodes* forage on sunflower-related plants in mid- to-late summer (Figure 23). Plasterer bees in the genus *Colletes* are also called "cellophane bees" because they line their burrows with a thin, waterproof, cellophane-like material.

Sting Risks: Encountering nest aggregations of ground-nesting bees may raise concern about potential stings, but fortunately, these bees are not aggressive. Some exceptions would be when peak burrowing activities in parks or playing fields coincide with humans running, sliding, or falling on the ground.

Some small species in the sweat bee family (Halictidae) are attracted to human perspiration. They may hover about and try to land on the skin to lap up sweat, which provides needed salts and minerals. If this occurs, back off without slapping the bees, and quickly retreat from the area.

Management: In many cases, ground-nesting bees are active at specific periods during the growing season. The bees nest in bare fields, eroded slopes, and bare patches in landscapes. These areas provide sanctuary for them, and we all benefit by their pollination activities. If stinging is a concern, avoid these sites. To reduce the occurrence of ground-nesting bees, renovate affected areas by planting turfgrass or a dense groundcover to discourage nesting.

Treatment: Insecticidal treatment is rarely justified unless nesting activities interfere with imminent use of an area, such as sports events, fairs, bazaars, flea markets, outdoor weddings, or other special occasions. A few days prior to planned activities, apply an appropriate liquid, dust or granular insecticide in the evening. Water the granular insecticide for activation.

Figure 21. Ground-nesting halictid bee burrows in gaps among pavement brick.

Figure 22. Halictid female bee, *Agapostemon* sp.

Figure 23. Longhorned bee, *Melissodes* sp., gathering nectar and pollen from sunflower. (Source: Tom Weissling, University of Nebraska–Lincoln Entomology)

Figure 24. Leafcutter bee foraging on pink aster.

Figure 25. Leafcutter bee damage to rose leaves.

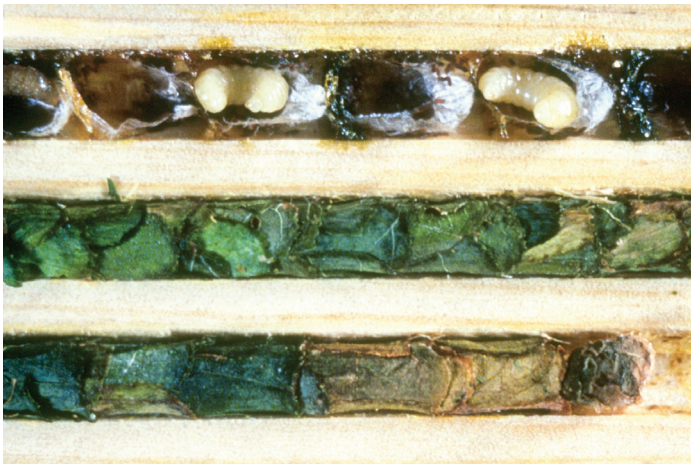

Figure 26. Cells of larvae separated by leaf partitions.

Leafcutter Bees (*Megachile* spp.)

The leafcutter bee family is highly diverse, but emphasis will be placed here on those species that may nest in or around homes and other structures occupied by humans.

Description: Leafcutter bees are mostly small, hairy, and black and have flattened abdomens that are broad at the base and pointed at the tip (Figure 24). They have long, dense hairs on the underside of the abdomen that are used to collect and carry pollen back to the nest. The head is broad with large mandibles that are used to cut into leaves and enlarge nests.

Nests: Leafcutter bees utilize any tube-like channel or crevice along building exteriors in which to build nests. These include old drill holes, gaps in brick mortar and retaining walls, rough-cut cedar shingles, and imperfections in siding. In the landscape, they use hollow stems, old wood borer tunnels in trees, old paper wasp nests, etc.

Life Cycle: Mature larvae overwinter within cells in the nest. In late spring, adults emerge from nests, and fertile females select nest sites. They create a nest made up of a succession of cells separated by leaf disks they cut from smooth leaves of various plants (Figure 25). Each cell is provisioned with bee bread (a mixture of pollen and nectar) as well as a single egg. The cell is then sealed with a wall of leaf disks. When the channel is filled with cells (Figure 26), the female closes the nest opening with more leaf disks. Larvae feed and develop until mature, then pupate. Most adults emerge in summer and then complete at least another generation before the chills of autumn arrive. The last generation remains in its cells as mature larvae.

Sting Risks: Leafcutter bees, even though they are quite active, pose very little stinging risk.

Management: Leafcutter bees are highly valued as pollinators of field and horticultural crops and forage crops such as alfalfa. In fact, they are managed by commercial horticulturalists and farmers who use drilled bee blocks to attract the bees for nesting and to perform pollination services for their crops. If nesting activity around the home is a concern, seal any evident channels, drilled holes, or openings along the home exterior during winter or early spring.

Giant Resin Bees (*Megachile sculpturalis*)

Description: Giant resin bees originated from eastern Asia and spread naturally into our region about 2010. They are up to an inch long and have an appearance similar to a bumble bee, but the body is more elongated and black with a roughly pitted surface. Reddish-yellow hairs cover the thorax and the front part of the abdomen. The head is large and blocky, and the large mandibles are used to gather resin (Figure 27).

Nests: Giant resin bees nest in vacant carpenter bee tunnels and cavities or channels about a half-inch wide. There have been reports of these bees forcibly evicting carpenter bees from their nests. Nest openings are usually sealed with resin. Nesting activity is most evident in mid- to-late summer.

Life Cycle: As a member of the leafcutter bee family, the giant resin bee has a similar biology, life cycle, and habits. What sets it apart is its large size and the fact that females collect resin from trees, fine bits of wood, and mud to create brood cells and walls separating them.

Sting Risk: This bee is docile and is not inclined to sting, but rather, it flies away when disturbed.

Management: Resin bees don't need to be managed or controlled since they cause no damage and are very passive. They are beneficial pollinators as well.

Figure 27. Giant resin bee, *Megachile sculpturalis*.

Figure 28. Blue orchard bee female, *Osmia lignaria*. (Source: Jack Dykinga, USDA-ARS)

Mason Bees (*Osmia* spp.)

Species in this group are in the same family as leafcutter bees and have similar nesting habits. But instead of using leaf disks to line and partition their cells, they use mud collected from wet soil.

Blue Orchard Bee: The blue orchard bee, *Osmia lignaria*, is native to the Pacific Northwest and is an excellent pollinator favored for use in commercial orchards in temperate zones (Figure 28). It is active earlier in the season than the honey bee and is beneficial in pollinating blossoms of pome and stone fruits, as well as berry crops. The bees are metallic blue or green, and they are smaller than a honey bee. Blue orchard bees have become established across the continent due to shipment of transportable nest tubes that contain larvae. Tubes are purchased by gardeners and fruit growers wishing to establish their own bee nests.

Blue orchard bees are maintained in protected and elevated shelters that hold drilled nesting blocks or clusters of hollow cardboard tubes. There is one generation per season. Mature larvae spend the winter in their cells and emerge as adults in the spring (Figure 29).

Sting Risks: On occasion, blue orchard bees and other mason bee species will nest in crevices in external walls of homes or offices. These bees may accidentally enter interior spaces and cause alarm as they fly about bright windows. Fortunately, the bees are greatly distracted and will not sting unless handled.

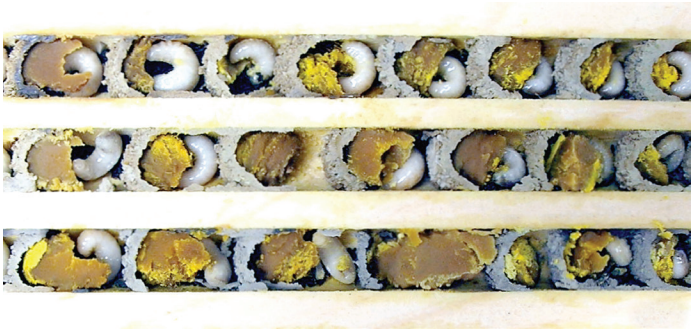

Figure 29. Blue orchard bee larvae feeding on bee bread in their cells. (Source: University of Toronto)

Management: Seal crevices around home and building exteriors to deter mason bees from nesting. Offer an alternative by promoting mason bees in your area by installing mason bee houses in the landscape and stocking them with empty nesting tubes.

Figure 30. Yellowjacket nest with papery covering.

Figure 31. Baldfaced hornet, *Dolichovespula maculata*, stripping fibers from wood.

Social Wasps

Social wasps belong in the family Vespidae, which consists of yellowjackets, paper wasps, and hornets. All prey on other insects, but on occasion, they scavenge for sweets and meats. Like honey bees, social wasps have a single queen that produces female workers through most of the season. Later, new queens and drones develop and are released from the colony in early autumn. The wasps mate, and the fertile queens find shelter to spend the winter. In early spring, queens emerge and seek sites for constructing nests.

Social wasps construct papery nests made from wood fibers stripped from trees, fences, decks, wood mulches, and other weathered wood (Figures 30 and 31). Workers also pull fibers from paper or cardboard. The brood comb is strong and flat.

Yellowjackets and hornets build their brood comb into several connected tiers that as a whole are protected by a multilayered, papery covering. Paper wasp nests have only a single tier of brood comb. Nests may be exposed, but all are attached to a sturdy substrate, or they may be protected and enclosed within a cavity. In northern temperate zones, nests are abandoned at the end of the year.

Yellowjackets (*Vespula* spp.) and Hornets (*Dolichovespula* spp.)

Description: Yellowjackets are about the same size as honey bees but are more slender and nearly hairless. They have bright yellow and black patterns on their bodies that are helpful in identifying each species (Figure 32). An exception is the Baldfaced Hornet, *Dolichovespula maculata*, which is large and has ivory and black markings on its body (Figure 31). The legs of yellowjackets and hornets are cylindrical and completely bare. When at rest, their dark wings fold lengthwise over the body.

Examples of common yellowjackets are the German Yellowjacket, *Vespula germanica*, the Eastern Yellowjacket, *V. maculifrons*, and the Western Yellowjacket, *V. pensylvanica*.

Feeding Habits: Yellowjackets feed primarily on soft-bodied insects and spiders, but also scavenge on dead animals, fallen orchard fruits, meats, garbage, and a variety of other food items (Figure 33). On occasion, swarms of wasps may plunder weak honey bee hives, killing workers and feeding on brood and honey.

Nests: Yellowjackets construct globular paper nests, usually in underground cavities. Favorite nesting sites include rodent burrows, compost piles, wood piles, and wall voids. Occasionally, these wasps build aerial nests in garages, sheds, crawl spaces, dense shrubs, or other enclosed areas (Figure 34). Nests located in lawns have large openings that are stripped of grass and kept free of debris (Figure 35).

Sting Risks: When a nest is accidentally encountered, yellowjackets can become quite agitated. Since a colony can consist of several thousand wasps, yellowjackets can inflict serious —even life-threatening —injuries from multiple stings. If yellowjackets are becoming excited and appear to be poised to attack, do not panic. Make no sudden movements, and back away slowly and calmly from the area.

When yellowjackets are foraging for insects among garden or ornamental plants, or around grills or garbage receptacles, they are much less defensive, but can still be quite persistent in taking over a food source.

Management: Yellowjackets are scavengers and are frequently observed foraging in compost piles, around garbage receptacles, and in picnic areas where food is exposed. Their activities can be reduced by covering all food containers and disposing of food wastes in covered receptacles or bags placed some distance away. Turning compost piles regularly and placing insecticide-impregnated resin strips in the lids of garbage cans and dumpsters will also help reduce their numbers. Yellowjackets are highly attracted to overripe fruit,

Figure 32. Eastern yellowjacket worker, *Vespula maculifrons*.

Figure 33. Eastern yellowjacket worker, *Vespula maculifrons*, on raw meat on a grill.

Figure 34. Yellowjacket nest in a barn.

Figure 35. Yellowjacket nest opening in a lawn.

especially in late summer. Prompt removal of fallen fruit in the early morning should help reduce attractiveness. Even while foraging on spoiling fruit in the tree or on the ground, yellowjackets are rarely aggressive.

Trapping: One strategy to reduce numbers of yellowjackets in an area is to set out baited traps (Figure 36). These can be purchased at a local hardware store.

An economical option is to make disposable traps. The trap design utilizes a clear plastic bottle and a fragrant bait at the bottom. Small perforations in the sides of the bottle help the bait odor to spread into the air, and some drilled holes in the bottom assure drainage during rainfall. A funnel, inverted and stapled to the top, allows yellowjackets to easily enter, but makes it difficult for them to leave. Over time, the wasps accumulate and die from heat or suffocation. Baits consist of canned meat, fish, or pet food. In late summer, use cut sweet fruit sections as bait. Hang several traps in sunny locations outside the area to be protected. Plug the opening in the trap to remove and dispose of it.

Management: In the spring, develop a routine to detect yellowjacket nests and treat or remove them in locations where it is clear that they will later pose a serious risk to people or pets. Otherwise, avoid areas where nests occur and flag the locations as a warning to keep clear of them.

Treatment: Control strategies for yellowjacket colonies depend on accessibility of the nests. For those deep within voids in structures, it is probably best to hire a pest management professional who has the expertise and specialized equipment to safely and efficiently treat and remove the nest.

Aerial nests: From a safe distance and after dark or in the early morning, spray the nest thoroughly with a liquid or aerosol insecticide. Aerosol formulations discharge a long, narrow spray and cause immediate knockdown of wasps. Some also enclose wasps with foam on contact and prevent flight. Remove and dispose of the nest a few days later, wrapping it in a plastic trash bag.

Figure 36. Yellowjacket dome trap (left) and a disposable beverage bottle trap (right).

Figure 37. Yellowjacket nest in a garage being treated by a pest management professional.

Nests in the ground or retaining walls: Treat the nest with a dust or liquid insecticide after dark or in the early morning. Be careful, as a number of yellowjackets will typically be guarding the nest entrance. Apply an insecticide quickly and carefully, then immediately seal the nest opening with a shovelful of dirt, a piece of plywood or board, or a flat rock. Insecticide dust formulations are preferred because workers at the nest opening will track dust farther into the nest and contaminate the brood and other colony members. Retreatment may be necessary after a few days if yellowjacket activity continues.

Nests within cavities of structures: Yellowjackets also may build their nests in wall voids, attics, crawl spaces, or other cavities within buildings (Figure 37). In such cases, do not seal the entrance hole following insecticide application, because wasps attempting to escape may under duress enter the building interior through other openings. Insecticidal dust formulations when applied carefully are effective by being carried by agitated workers retreating into the nest.

Figure 38. Paper wasp, *Polistes parametricus*.

Figure 39. European paper wasp nest, *Polistes dominula*, beneath a fire escape platform.

Paper or Umbrella Wasps (*Polistes* spp.)

Description: Several species of paper wasps are common. They generally are about 1 inch long, have a hairless, spindle-shaped body, and a narrow, pointed abdomen. The wings are dark and fold lengthwise when at rest over the body. Color patterns vary from black to brown to reddish-brown —all contrasted by yellow or ivory markings. Patterns and the presence of certain spots help to identify each species (Figure 38). A recent newcomer is the European Paper Wasp, *Polistes dominula*, which is the smallest of paper wasps. It resembles a yellowjacket with its bright black and yellow markings.

Nests: Paper wasps construct umbrella-shaped, single-layered nests with exposed brood cells (Figure 39). Nests may be built in trees and shrubs, but they frequently occur under building overhangs, decks, and fire escapes, and in attics, barns, garages, and sheds. Unusual nesting locations include the interiors of horizontal pipes, bird houses, utility boxes, grills, and under patio furniture, etc.

Colony Development: Paper wasp nests are initiated in the spring by an overwintered fertile queen called a foundress (Figure 40). She establishes a small nest, and for over a month, she nurtures her brood until they develop to the adult stage. These adult females then resume foraging duties and care for the brood. Colonies produce up to a few hundred individuals by summer's end, including unfertilized queens and drones, which disperse and mate with their counterparts elsewhere. Males have yellowish faces and do not possess a stinger. They perish before winter.

Sting Risks: Paper wasps are constantly alert to approaching intruders, but most species are not easily agitated. However, if a nest is suddenly approached too closely, wasps become alarmed and may fiercely attack the face and arms,

Figure 40. Early nest of a European paper wasp, *Polistes dominula*, with foundress queen.

stinging multiple times. This may occur when re-roofing, painting or making repairs on the home exterior. Be aware of nests, especially in late summer.

Wasps that are foraging in the vegetable garden for caterpillars (Figure 41), on flowers for nectar, or on fallen fruits are not at all defensive, even when they are present in large numbers. Wasps returning to the nest with their payload often fly in zig-zag fashion as they approach their nest. This behavior can cause some anxiety in people caught in the flight path. Fortunately, these wasps are not inclined to sting, either. Simply step aside calmly to avoid an encounter.

Management: To prevent problems arising later in the summer, be proactive and examine building exteriors and potential nesting sites in the spring for early nests, and scrape them off. Wash area surfaces with a concentrated soap solution to remove odors the wasps use to locate their nests. If

Figure 41. Paper wasp, *Polistes fuscatus*, chewing a cabbage looper into a portable ball.

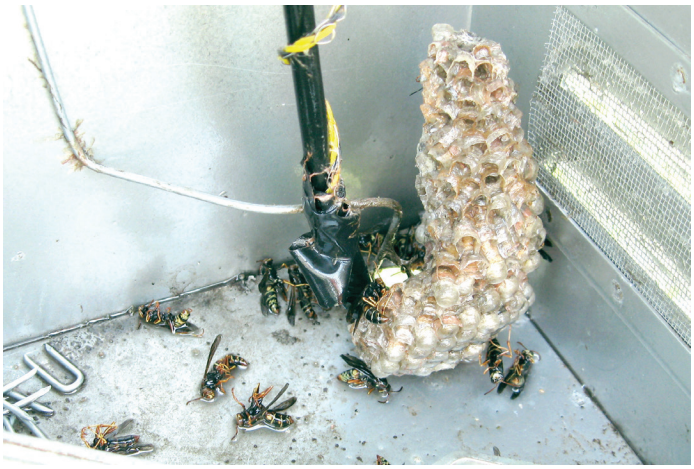

Figure 42. Paper wasp nest in a utility box shortly after treatment with an aerosol spray.

necessary, treat surfaces with an appropriate residual (long-lasting) insecticide to deter wasps from rebuilding nests. In most cases, foundress queens will seek nesting sites elsewhere.

For an existing nest, consider erecting a temporary barrier to prevent people being too close. It also may alter the flight path of workers so that encounters are reduced.

Also, when nesting occurs each year along a home or building exterior, especially in sunny exposures, consider making structural changes to make nesting less attractive to paper wasps. Creating shade by planting shrubs alongside a home may also be effective.

Treatment: Because paper wasps are valuable beneficial insects in helping to control caterpillar pests, it is important to evaluate whether insecticidal treatment is truly needed.

The best approach for controlling paper wasps is to spray nests with a liquid or aerosol "wasp killer" insecticide that has quick knockdown action (Figure 42). Aerosols normally discharge a concentrated stream of insecticide for a long distance, thereby maintaining a safe distance during treatment. Treat nests after dark or in the early morning when all wasps are present. After a few days, scrape off the nests and dispose of them in a garbage bag.

Solitary Wasps

Solitary wasps, like solitary bees, have no social structure, and they may have nest aggregations in the same areas of the landscape or in buildings that have conditions favorable for developing brood. While females may be quite active, they are not very defensive of their nesting locations. Females do not actually raise their brood, but essentially launch another generation of the species that culminates in adults emerging the next year. The larval brood they initiate feed and develop on their own through the summer in their protected cells that have been provisioned with paralyzed prey.

Cicada Killer (*Sphecius speciosus*)

Description: The cicada killer is the largest species of wasp in Nebraska (Figure 43). The females are up to 2 inches long. Their bodies are boldly marked with rust-red and black, with three ivory bands across the abdomen. The wings are tinted a light orange-brown, and their eyes are large. Cicada killers are mistakenly referred to as "hornets" in some localities.

Burrows: Cicada killer females live on their own and excavate a tunnel-like burrow in the soil for their offspring. Sometimes many burrows are found in the same location, called a nesting aggregation, but only one female occupies each burrow. Burrows are created in well-drained, light-textured soil in areas where there is full sunlight. Cicada killers prefer areas with sparse vegetation and little mulch. They often dig along edges of sidewalks, driveways, patios, golf greens, and garden beds. They also burrow in retaining walls (Figure 44), sunny slopes, garden planters, and under decks or along home foundations.

Life Cycle: Cicada killer wasps become active about midsummer, after the large, green annual cicadas emerge. Only female wasps possess a stinger, which is used to paralyze their prey. Once the cicada is incapacitated by the wasp, she flies or drags it back to her burrow (Figure 45), where she then deposits an egg on it so the larva that hatches has a food

Figure 43. Cicada killer male, *Sphecius speciosus*.

Figure 44. Stone retaining wall with cicada killer burrows. (Source: Jody Green, Nebraska Extension)

source. One burrow may be provisioned with several cicadas to assure that a single larva will have an ample food supply to grow and emerge as an adult the following summer.

Sting Risks: Cicada killer wasps are very docile and preoccupied with mating and digging burrows. Females are not aggressive toward humans and rarely defend their nests, but may sting if stepped on or handled. Male wasps are smaller than the females, but they often fly erratically and hover about as they engage in territorial defense against other males during mating rituals. They do not live long after mating. Males have no stinger, and therefore, are harmless. To prevent any potential of being stung by female cicada killers, avoid areas that have nesting aggregations.

Management: Cicada killers are considered beneficial insects and usually disappear in late summer. To prevent or disrupt burrowing activities in specific areas, try keeping the soil moist with frequent, light irrigation. In lawns, try to assure a dense stand of turfgrass with timely cultural practices. When renovation is planned for non-turf areas, consider applying a thick layer of a rock or pebble mulch, or burying quarter-inch galvanized hardware cloth an inch deep in the soil. For retaining walls, seal crevices and gaps, or plant Sempervivum ("hens and chicks") as a natural, living sealant.

Treatment: If wasp activities in the nesting area become a concern and disrupt normal human routines, the infested area can be treated with an insecticide labeled for use against wasps. Always read the label directions for correct application, and follow any safety precautions. Be sure to treat the area in the evening when wasps are not active, and wear appropriate protective clothing. After several days of inactivity, rake the area and fill in the burrows with soil.

Figure 45. Cicada being carried to a nearby burrow. (Source: Lowell Washburn, Iowa Wildlife Federation)

Figure 46. Black-and-yellow mud dauber, *Sceliphron caementarium*.

Figure 47. Blue mud dauber, *Chalybion californicum*.

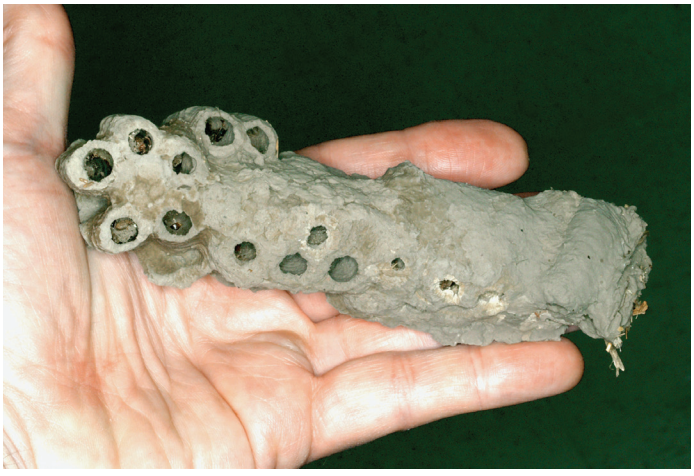

Figure 48. Large black-and-yellow mud dauber nest.

Mud Daubers (*Sceliphron caementarium*, *Chalybion californicum*)

Description: Mud daubers are medium-sized (1 to 1½ inches) wasps with a narrow, stalked abdomen. Two common species are the black-and-yellow mud dauber, *Sceliphron caementarium* (Figure 46) and the blue mud dauber, *Chalybion californicum* (Figure 47).

Nests: Mud dauber nests are constructed of mud or clay and are often found attached to walls or under eaves of buildings (Figure 48).

Life Cycle: During late spring through summer, the black-and-yellow mud dauber makes her nests, and provisions each cell with several paralyzed orb-weaver spiders and a single egg. The larva hatches and feeds until it reaches maturity in the autumn. It spends the winter in its cell, then pupates and emerges the following spring as an adult.

The blue mud dauber has a similar life cycle, but renovates and uses empty black-and-yellow mud dauber nests and provisions its cells with cobweb-weaver spiders.

Sting Risks: Mud daubers are not defensive and do not attack people unless provoked. They can be annoying when nests are located where people are active, such as in a building, barn, or garage.

Management: Active or empty nests should simply be removed and discarded. If desired, nests could be reattached with plaster to another surface in a location where they will not be bothersome. There is no need to treat mud daubers or their nests with an insecticide.

Sand-Loving Wasps (*Tachytes* spp.)

Sand-loving wasps are in the same family as cicada killers. As their name suggests, they live in sandy regions of North America. The green-eyed, sand-loving wasp, *Tachytes distinctus*, is a common species that feeds almost exclusively on short-horned grasshopper nymphs, thereby serving a beneficial role in controlling grasshopper populations (Figure 49).

Description: Green-eyed, sand-loving wasps are 3/4 inch long and have a body that is robust in front and tapering toward the rear. The eyes are large and yellow-green. The body is fuzzy and mostly orange and black, with three white bands extending across the abdomen.

Life Cycle: Wasps emerge from the soil in midsummer and are active into September. After mating, females prepare burrows in well-drained, sandy soils (Figure 50). Burrows are low and conical in form with a central hole, and may occur in clusters. Females search for grasshoppers, sting them, and carry them to their burrows. Once several nymphs are gathered in a burrow, an egg is deposited and the burrow is sealed with soil. Larvae feed on their hosts and mature by autumn. They spend the winter in the burrow and emerge as adults the following summer.

Sting Risks: Stinging incidents are rare. Keep people and animals away from aggregations of burrows in midsummer.

Treatment: To minimize the stinging risk to people and animals active on lawns or playgrounds, treat the soil with an appropriate soil insecticide.

Figure 49. Green-eyed sand wasp, *Tachytes distinctus*. (Source: Arizona State University)

Figure 50. Sand wasp nest in a weedy, bare lawn.

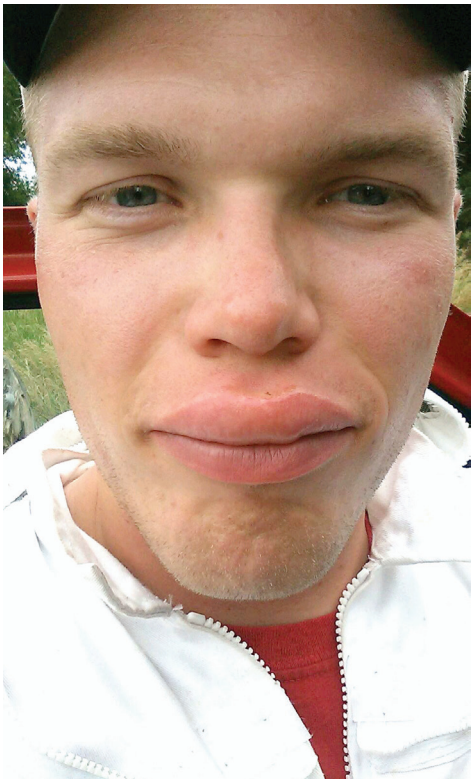

Figure 51. Nonallergic reaction to a honey bee sting on the lip. (Source: Sheldon Brummel)

Figure 52. Swelling and inflammation from a sting on a hand.

Sting Symptoms and Treatment

General Reactions: Bee and wasp stings are normally characterized by moderate to severe pain, localized reddening and swelling (Figures 51 and 52), and occasionally even a mild headache and fever. Treatment involves disinfecting the wounded area with soap and water. Meat tenderizer, which contains an enzyme that breaks down the venom, and/or a baking soda paste also may be applied to the sting site to help relieve pain. Several over-the-counter remedies are available for relieving pain, reducing swelling, and sterilizing wounds.

Sting Allergies: In allergic individuals, stings may cause a life-threatening systemic reaction that can rapidly lead to anaphylactic shock. Symptoms in these individuals usually appear within minutes after the sting. Localized swelling can be extensive with a hives-like condition occurring over the body. There also may be a choking sensation accompanied by difficulty in breathing and blueness in the lips and extremities. This may be followed by nausea, vomiting, and loss of consciousness.

Preparation for Emergencies: People with a known allergic reaction to stings should carry an epinephrine injector pen or an orally disintegrating tablet with them, or have immediate access to an emergency center. A physician should supervise prevention and care of patients who have acute reactions to bee or wasp stings. Since there is no way to completely avoid stinging insects, such individuals should consider a desensitization program conducted by an allergy specialist.

General Bee and Wasp Management Strategies

Reducing Attractiveness: Many bee and wasp species are scavengers and forage for a wide variety of foods, including fruit, ice cream, soda pop, jelly, sweet salads, and meat products. In areas where these insects are active, do not leave foods in open containers. Placing food scraps in sealed trash receptacles also will help discourage scavenging activities. Home fruit growers should remove fallen fruit, as these are highly attractive to many stinging insect species. Avoid wearing brightly colored clothing or fragrant perfumes when wasps and bees are abundant.

Locating Nesting Sites: When stinging insects are observed around buildings, lawns, shrubs, or gardens, do not panic; it is likely that they are simply searching for food. But it also may be possible that one or more nests are nearby. From a safe distance, try to locate nest or burrow entrances during the day by observing bees or wasps flying in and out of the area. Mark the location and wait for nightfall.

Timing of Control: The best time to control stinging insects is after dark when foraging adults have returned to their nests. Late evening or early morning treatments are preferred, since these insects are generally less likely to sting at cooler temperatures.

Protective Equipment: When preparing to treat nests of bees or wasps, always wear a white or light-colored, long-sleeved shirt, long pants tied at the ankles, socks, and shoes. A hat covered with netting to protect the face and gloves also are recommended. If a flashlight is used, keep it at lower brightness, or cover the lens with a red filter. Bright light directed at a nest will cause alarm.

Intruders in Homes and Automobiles: Occasionally, wasps and bees enter homes through open doors and windows. These insects are looking for a way out and often fly about at windows or glass doors. While resting, they can be easily eliminated with a fly swatter.

Do not panic if a wasp or bee enters your automobile while you are driving. The best approach is to stay calm and leave the insect alone. Never attempt to kill the intruder while driving. Reduce your speed and try opening a window to let it escape. Better yet, wait until it is safe, then stop the automobile, open all windows, and chase away your uninvited guest.

In certain situations, a 5–10 percent solution of a liquid dishwashing detergent in water can be used to kill unwanted stinging insects. When insects are coated with soapy water, it enters their tracheal system and they suffocate. To be effective, the insects must be thoroughly wetted. Soapy water spray is especially useful for killing bees and wasps that accidentally get into homes, but it is ineffective when applied to a nest that is indoors or outdoors.

Chemical Control: If needed, you can apply an insecticide for the control of most stinging insects, but individuals who are allergic or fearful of these insects should consider hiring a pest management professional. Numerous insecticidal products are available under a variety of brand names for control of stinging wasps and bees. Check with your local supplier, or purchase a product online that is legal for use in your state.

University of Nebraska Lincoln

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