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# Hornet Species that Threaten Honey Bees



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Beekeepers in North America have become alarmed with reports of the presence of invasive hornet species from Asia that feed on honey bees. These species are known to voraciously attack honey bee colonies. Typically, they capture and kill worker honey bees as food, but they also eat honey and brood from hives. These sustained attacks by hornets weaken honey bee colonies.

Unfortunately, the newly introduced species can be confused with various wasp species that already exist in Mississippi. This publication provides comparisons of relative size and appearance among these species to help beekeepers assess a potential threat to their honey bees. Queens of all species are larger and more robust than the workers, but beekeepers are more likely to encounter hornet workers attacking honey bees.

The species are arranged from largest to smallest within two subcategories: Invasive Hornets Not Currently Found in Mississippi and Wasps Already in Mississippi that Do Not Threaten the U.S. Beekeeping Industry.

Instructions for reporting sightings of invasive hornets are at <https://extension.msstate.edu/report-invasive-hornet-sighting>. Because these hornets pose serious threats to our beekeeping industry, it is important to quickly report any sightings of these species to the Mississippi State University Extension Service. When an invasive hornet is positively identified, the Mississippi Department of Agriculture and Commerce (MDAC) and the USDA Animal and Plant Health Inspection Service (APHIS) will be called to control the problem.

# Invasive Hornets Not Currently Found in Mississippi

## Northern Giant Hornet

The **northern giant hornet** (*Vespa mandarinia*), formerly known as the Asian giant hornet, was first discovered in North America in 2019. The first occurrences were in Vancouver, British Columbia, Canada. During the same year and the next two years, the species was found in neighboring Washington state. They nest in the ground or under rotting logs. Their sting can be incredibly painful to a human being. The hornets eat honey. They also eat honey bees, but because of smaller colony sizes (only 150–200 members), this species may be a lesser threat than the yellow-legged hornet or the oriental hornet. There has been no sign of the species since 2022, and they may have been eradicated from the U.S.

### Description

The largest hornet in the world, the northern giant hornet has a similar length and body size to our native cicada killers. The thorax is mostly black, and the abdomen has a striking black-and-yellow-striped pattern. The dark stripes are evenly spaced and appear along the length of the entire abdomen. The head and face are yellow, and the brighter yellow on top of the head helps distinguish this species from the other two invasive hornet species described later in the text.

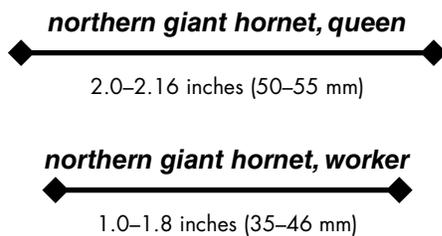


Figure 1. Body lengths of the northern giant hornet queen and worker. This hornet is equal to or slightly larger than our native cicada killers. Each line equals the maximum length for the size range.



Figure 2. Size comparison between the northern giant hornet (left) and the southern yellowjacket queen (right). Photo credit: Hanna Royals, Museum Collections, Hymenoptera, USDA APHIS PPQ, Bugwood.org.



Figure 3. The northern giant hornet is the largest true hornet species in the world. A) Profile showing the hornet's dark thorax and black-and-yellow-striped abdomen; photo credit: Karla Salp, Washington State Department of Agriculture, Bugwood.org. B) Dorsal view showing the black bands alternating with yellow along the full length of the abdomen and an obvious yellow head; photo credit: Karla Salp, Washington State Department of Agriculture, Bugwood.org. C) This hornet's yellow face is similar to the other two invasive hornet species described in the text; however, the color seems brighter and extends onto the top of the head in this species; photo credit: Allan Smith-Pardo, Invasive Hornets, USDA APHIS PPQ, Bugwood.org.

## Oriental Hornet

The **oriental hornet** (*Vespa orientalis*) has not been discovered in the U.S. It is included here because of its potential threat to honey bees. Like the previous species, it attacks and kills large numbers of worker honey bees as food. Additionally, these hornets steal honey from honey bees and eat brood. This species has been devastating to honey bees throughout Europe since its introduction there. The oriental hornet's life cycle is similar to the annual cycle of the yellowjacket species. A single overwintering queen begins a new colony in the spring. She usually burrows underground, and the nest increases in size as the colony size reaches several thousand hornets. Like the yellow-legged hornet, this large colony size makes oriental hornets a significant threat to neighboring honey bee colonies.

## Description

The oriental hornet's mostly reddish-brown body with yellow bands near the tip of the abdomen is not like any other hornet discussed here. There is a distinct yellow band on several of the posterior abdominal segments, and the yellow color completely encircles the abdomen in those areas. The tip of the abdomen is reddish-brown like the thorax and portions of the head.

**oriental hornet, queen**  
  
 1.0–1.4 inches (25–35 mm)

**oriental hornet, worker**  
  
 0.7–0.9 inch (18–23 mm)

Figure 4. Body lengths of the oriental hornet queen and worker. This hornet is equal to or slightly smaller than the European hornet. Each line equals the maximum length for the size range.



Figure 5. Oriental hornet. A) Profile showing a mostly reddish-brown body with a distinct band of yellow on the abdomen. B) Ventral view showing that the tip of the abdomen is reddish-brown like the rest of the body. C) This hornet's yellow face is similar to the other invasive hornet species described here; however, the top of the head is reddish-brown. Photo credit: Alan Smith-Pardo, Invasive Hornets, USDA APHIS PPQ, Bugwood.org.

## Yellow-Legged Hornet

The **yellow-legged hornet** (*Vespa velutina*), formerly known as the Asian hornet, was recently found by a beekeeper near Savannah, Georgia (<https://agr.georgia.gov/yellow-legged-hornet>). It lives in large paper nests with up to 6,000 members. The nests hang in trees or on objects and rocky cliffs. Yellow-legged hornets eat honey. They can

also be voracious eaters of honey bees; they are a major pest of honey bees in Europe. They also capture honey bees in flight, but they capture worker bees by grabbing them from defensive groups on the entrance boards of hives. They will persistently hunt worker bees until the bee population is so depleted that the colony can no longer defend itself.

## Description

The yellow-legged hornet is similar in size to the European hornet. The body is mostly yellow and black with the thorax predominantly blackish, and the abdomen is striped with broad yellow and black bands. The face tends to be mostly yellow. This hornet differs from the other invasive hornets because its legs are mostly yellow.

**yellow-legged hornet, queen**  
  
 0.8–1.3 inches (20–32 mm)

**yellow-legged hornet, worker**  
  
 0.6–1.3 inches (15–32 mm)

Figure 6. Body lengths of the yellow-legged hornet queen and worker. Each line equals the maximum length for each size range.

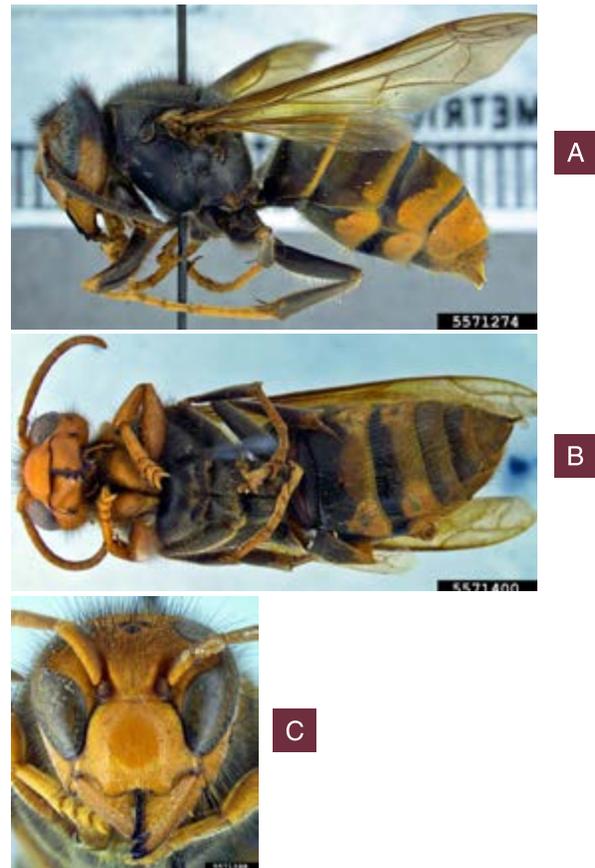


Figure 7. Yellow-legged hornet. A) Profile showing a dark thorax, black-and-yellow-striped abdomen, and yellow legs. B) Ventral view showing the yellow face and yellow legs. C) This hornet's yellow face is similar to the other two invasive hornet species described here. Photo credit: Alan Smith-Pardo, Invasive Hornets, USDA APHIS PPQ, Bugwood.org.

# Wasps Already in Mississippi that Do Not Threaten the U.S. Beekeeping Industry

## Cicada Killer

The **cicada killer** (*Sphecius speciosus*) is the largest wasp native to Mississippi. Unfortunately, it is easily confused with hornets because of its large size, and is often mistakenly reported as an invasive hornet. Cicada killers are solitary wasps that nest in burrows underground. Although they are solitary, these wasps can be somewhat social, and nesting sites for several females can be found close together. They are called cicada killers because the females hunt and paralyze cicadas, drag them into their burrows, and lay their eggs in the prey. The immature wasp larvae will eat the cicada and eventually grow to be adult wasps within the burrow. Females can sting, but they tend to avoid people and do not pose a real threat. Male cicada killers are often more visible and cause concern to people as they hover and dart to defend their mating territories. However, the males do not have stingers.

### Description

Cicada killer females are usually longer than males. Additionally, females are bulkier than males and weigh more than twice the body weight of the males. Males and females look similar. The head and thorax tend to have a yellow-orange appearance that is enhanced by their amber-colored wings. The abdomen is mostly black with three light-yellow or whitish, irregularly shaped bands. The best way to distinguish these from invasive hornets is to remember that any extremely large wasp with bold white spots on a mostly black abdomen is likely a cicada killer, not an invasive hornet.

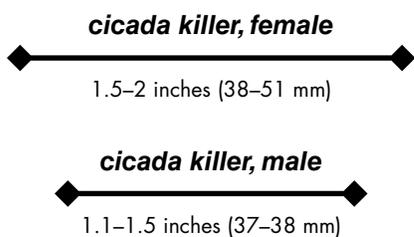


Figure 8. Body lengths of the cicada killer. Females are longer and heavier than males. Each line equals the maximum length for each size range.



Figure 9. Cicada killer. A) A female showing the overall yellow-orange appearance of the front end of the wasp versus the black abdomen with light yellow stripes; photo credit: Gerald J. Lenhard, Louisiana State University, Bugwood.org. Any wasp that is 2 inches long with white spots on a black abdomen is most likely a cicada killer. B) Staged photograph showing how a female carries the large cicada prey during flight to her burrow; photo credit: Ronald F. Billings, Texas A&M Forest Service, Bugwood.org.

## European Hornet

The **European hornet** (*Vespa crabro*) was introduced into the U.S. as early as 1840. Until the recent introductions of the northern giant hornet and the yellow-legged hornet, it was the only true hornet species in the U.S. There have been scattered sightings in all parts of Mississippi; however, the species is mostly located in the extreme northern to northeastern corner of the state. European hornets will occasionally attack honey bees, but generally, they are not a major threat to our beekeeping industry. They rarely sting humans unless protecting their nests. They live in colonies of 200–400 members in paper nests. Their nests are usually constructed in dark cavities such as hollows in trees or within dark barns or other outbuildings.

### Description

The European hornet is a large hornet with a mostly yellow abdomen and darker thorax. It has black bands regularly spaced along the dorsal surface of the abdomen, which is like the banding of other hornets. A unique feature to the black bands of this species is the teardrop-shaped extensions on the bands. None of the other hornets or wasps described here have this feature.

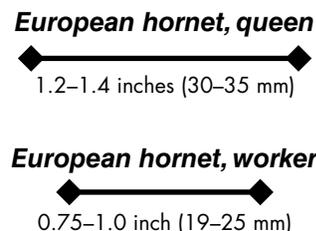


Figure 10. Body lengths of the European hornet queen and worker. The hornet is similar in size to the yellow-legged hornet and the oriental hornet. Each line equals the maximum length for the size range.



A



B



C

Figure 11. European hornet. A) Profile showing the mostly yellow body with a relatively dark thorax. B) Dorsal view of the abdomen showing irregularly shaped black bands with teardrop extensions. C) This hornet's yellow face is similar to the other invasive hornet species described here. Photo credit: Alan Smith-Pardo, Invasive Hornets, USDA APHIS PPQ, Bugwood.org.

### Bald-Faced Hornet

The **bald-faced hornet** (*Dolichovespula maculate*) is not a true hornet (i.e., a member of the genus *Vespa*); it is an aerial yellowjacket. These wasps reside in large conical paper nests that most often hang in trees or tall shrubs. Behaviorally, they are similar to yellowjackets because they eat a variety of insects and soft-bodied arthropods. They will also visit flowers for nectar and pollen. They are hostile defenders of their nest when it is disturbed, and they are known to swarm and chase intruders, delivering painful stings. Their colony size is 400–700 members. Colonies begin each year when a queen establishes the nest. As the colony grows, the paper nest increases to a large size; however, these nests are often hidden by leaves and vegetation and may not be noticed. Colonies break apart in the autumn after new queens and males have been produced. Newly mated queens hide in overwintering sites beneath the ground or inside rotting logs to wait for the spring thaw when they will seek out new nest sites.

### Description

This black and white wasp is a uniquely colored species. The thorax and abdomen appear mostly black, but the tip of the abdomen has a black and white area that appears mainly white. The face and parts of the anterior thorax are primarily white.

**bald-faced hornet, queen**

0.7–0.8 inch (18–20 mm)

**bald-faced hornet, worker**

0.5–0.6 inch (12–15 mm)

Figure 12. Body lengths of the bald-faced hornet queen and worker. This wasp is smaller than any of the true hornets. It is more similar in size to yellowjackets. Each line equals the maximum length for the size range.



A



B

Figure 13. Bald-faced hornet. A) A typical worker showing the unique black and white coloration of this wasp species; photo credit: David Cappaert, Bugwood.org. B) A conically shaped paper nest of bald-faced hornets hanging from a tree limb; photo credit: Richard Gardner, Bugwood.org.

### Southern Yellowjacket

The **southern yellowjacket** (*Vespula squamosa*) is one of two yellowjacket species commonly found in Mississippi. This species tends to build paper nests in disturbed areas, and although many nests are subterranean, some nests can be found in hay bales, the

walls of homes and outbuildings, and other aboveground nesting sites. This species can have either annual or perennial nests. Annual nests occur when a new queen begins a nest in the early spring, and the colony size grows to include tiers of combs that contain up to a few thousand cells for raising brood. Annual nests break apart in the autumn after new males and queens have been produced. The southern yellowjacket queens often begin their colony by invading eastern yellowjacket nests and making the nests their own.

Sometimes southern yellowjacket nests have multiple queens and become perennial, which means the nests do not shut down for the winter. Consequently, these nests grow extremely large with 9,000–450,000 cells. This species is recognized as an urban pest because large numbers of attackers are prone to sting when the nest is disturbed. In terms of beekeeping, the species will try to enter honey bee colonies in the autumn to steal honey or eat brood, but strong honey bee colonies can easily repel these attackers.

### Description

Yellowjackets are much smaller than cicada killers and true hornets. The southern yellowjacket is a small wasp with predominantly yellow and black coloration on the body. Queens are larger than the workers, and they tend to be bulkier and show much more orange color in the abdomen. Additionally, the queen of this species is bigger than eastern yellowjacket queens. The workers of this species have many black bands on a yellow abdomen. The workers also show distinct longitudinal black and yellow bands on the thorax, while workers of the eastern yellowjacket have a mostly black thorax.

#### southern yellowjacket, queen

0.6–0.75 inch (15–19 mm)

#### southern yellowjacket, worker

0.38–0.5 inch (9.6–13 mm)

Figure 14. Body lengths of the southern yellowjacket queen and worker. Yellowjackets are the smallest wasps discussed in this publication.

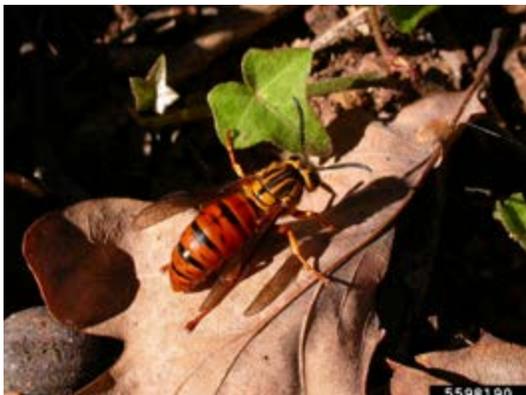


Figure 15. Southern yellowjacket. A) Queens are longer and bulkier than the workers, and they tend to have much more orange coloration in the abdomen; photo credit: Lisa Ames, University of Georgia, Bugwood.org. B) A worker showing a mostly yellow abdomen with many black bands and a yellow-and-black-striped thorax; photo credit: Jerry A. Payne, USDA, ARS, Bugwood.org.

### Eastern Yellowjacket

The eastern yellowjacket (*Vespula maculifrons*) is similar to the southern yellowjacket, but their paper nests are mostly subterranean. Nest sizes vary from 850 to 9,700 cells in the combs. The queen is yellow and black like the workers, although she is larger than the workers. Like the southern yellowjacket, this species is considered an urban pest because it is prone to sting people when nests are disturbed. Eastern yellowjackets try to enter honey bee colonies to steal honey or eat brood, but strong colonies can easily defend their nests against intrusion by the yellowjackets.

### Description

Eastern yellowjacket workers and queens are mostly black and yellow. Queens are larger than workers but are considerably smaller than the southern yellowjacket queen. The abdomen of workers is mostly yellow with distinct black bands spaced evenly along the length of the abdomen. The thorax is primarily black with some yellow on the margins, but the thorax does not have the longitudinal yellow and black stripes that occur in the southern yellowjacket.

#### eastern yellowjacket, queen

0.55–0.63 inch (14–16 mm)

#### eastern yellowjacket, worker

0.5–0.55 inch (13–14 mm)

Figure 17. Body lengths of the eastern yellowjacket queen and worker. Workers are similar in size to the workers of the southern yellowjacket, but the queens are much smaller than southern yellowjacket queens.



Figure 18. Eastern yellowjacket. A) A worker showing the distinct black and yellow coloring that typifies the species; photo credit: Johnny N. Dell, Bugwood.org. B) A pinned worker showing the mostly black thorax that lacks the pattern of longitudinal stripes that is found on workers of the southern yellowjacket; photo credit: Gary Alpert, Harvard University, Bugwood.org.

anyone upon first encounter. However, despite the size, these wasps are not a threat to humans. Only females can sting, and they will only sting in response to being held or otherwise pinned when being captured. When left alone, they almost never sting people. They only prey on cicadas and will not harm honey bees. There is no need to report them. They are quite distinct from true hornets—an extremely large wasp with bold, whitish spots on a primarily black abdomen is most likely a cicada killer.

The three invasive species of hornets (northern giant hornet, yellow-legged hornet, and oriental hornet) are the only ones that need to be reported. If you have a dead specimen, please keep it in your freezer until we pick it up or you mail it. If you have identified a specimen as an invasive hornet, please submit an online report at <https://extension.msstate.edu/report-invasive-hornet-sighting>.

If you have any questions, please contact Dr. Jeff Harris at [JHarris@entomology.msstate.edu](mailto:JHarris@entomology.msstate.edu).

## Report Sightings of All Invasive Hornet Species

The stings from many of these species are extremely painful, and some of these hornets and wasps will attack an intruder near their nests with swarms of stinging insects. Therefore, it is important to fully protect yourself with beekeeping gear before trying to capture or photograph a specimen. If you are not protected with a quality bee suit and gloves, it would be dangerous to approach nests of many of these species. Rather than risk injury, try to at least photograph the nest from a distance (if it is a paper nest found above the ground) to submit with a sighting report.

Please carefully compare your dead specimen or a digital photograph of your specimen to all the species descriptions provided in this publication. Use the printed lines of body length with each species description. Lay the dead specimen on the various lines to find the closest matches, and then carefully compare your specimen to species photos to find the best match.

If it is identified as an invasive hornet, store the specimen in a ziplock bag or sealed jar in your freezer until it can be picked up by MSU Extension personnel. Alternatively, Extension personnel may contact you with directions on how to mail the specimen to the university.

One critical issue to avoid is the unnecessary reporting of cicada killers. The large size of this species can startle



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