

Colorado Insect of Interest

Cicada Killers

Scientific Name: *Sphecius grandis* (Say) (**western cicada killer**), *Sphecius speciosus* (Drury) (**eastern cicada killer**), *Sphecius convallis* (Patton) (**Pacific cicada killer**)

Order: Hymenoptera (Wasps, Bees, Ants, Sawflies, Horntails)

Family: Crabronidae

Identification and Descriptive Features:

Cicada killers are very large wasps, ranging 3-5 cm in length and somewhat resemble an immense yellowjacket wasp. (Males are much smaller than females.) Three species of cicada killers occur in Colorado (Figure 2). Most commonly encountered is the eastern cicada killer, which is marked with reddish and black areas on the thorax with black and yellow markings on the abdomen. The other two species are generally lighter colored with more amber and yellow and a reddish-brown abdomen.



Figure 1. Eastern cicada killer. Photograph by Howard Ensign Evans.

A key to the cicada killers prepared by Holiday and Coelho (2006) is accessible at:
<http://docserversa.catchword.org/deliver/cw/pdf/esa/freepdfs/00138746/v99n5s6.pdf>

Distribution in Colorado: Cicada killers have only been collected in eastern Colorado. They are found in areas associated with their prey, large “dog-day” cicadas (*Tibicen* species) that develop on the roots of trees and shrubs, particularly cottonwoods. All three species occur in southeastern Colorado. Only the eastern cicada killer has been collected from the South Platte River Valley.

Life History and Habits: Cicada killers are hunting wasps that develop on large cicadas that they capture and cache in an underground nest. Adults begin to emerge in late June and early July, with males present about two weeks before females emerge. Male cicada killers remain in the near vicinity of nests from which they emerged and establish territories that they will patrol and defend from other males. Male cicada killers typically live only a couple of weeks after they have emerged and feed on nectar.

When females emerge they mate with one of the males then usually move to a new location to establish a nest. Nest sites used by cicadas typically are located in an area that receives full sun, is sparsely vegetated, and is near vegetation that supports dog-day cicadas. Soil type, slope and drainage are also factors in selection of nest sites.

Nests are dug out of the soil and the main tunnel may extend 50 cm below ground. The jaws are used to dig and the soil is pushed backwards out of the tunnel, often spread in a fan-shaped mound at the surface. At the end of the tunnel a series of side chambers are later excavated that serve as a nest cells.

Once an individual nest cell is constructed the cicada killer female seeks cicada prey. When located, the cicada is paralyzed with a well-placed sting and the cicada killer carries it back to the nest site. Often they will fly with their prey, but the cicada may well outweigh the wasp and the cicadas may also be dragged. When returned to the nest the wasp drags the prey into the nest and stores it in the prepared nest cell.

If an egg producing a male cicada killer is to be laid a single cicada is used for provision of the cell. If a female egg is laid, then a second cicada is acquired and the nest cell provisioned with both. (Male eggs are unfertilized; female eggs are fertilized.) The cicada killer lays its egg on the underside of the cicada's thorax then seals the cell.

A new cell is then prepared. A half dozen or more nest cells may be sequentially prepared, extending from the end of the tunnel. Each will be provisioned with one or two cicadas, an egg will be laid, and then the cell sealed. Over a period of four to six weeks, a female cicada killer will typically prepare multiple tunnels and about five dozen nest cells will be completed. Cicada killer nest building peaks in midsummer and is usually over by early September.

The egg hatches about two days after it is laid and the young wasp feeds on the paralyzed, but living, cicada. The wasp larva grows rapidly and usually are full grown in about eight days, entirely consuming the cicada prey. The wasp larva then spins a cocoon and goes into a dormant condition. Pupation occurs the following spring. One generation is produced annually.

Cicada Killers and Stings. Despite their large size and rather fearsome appearance, cicada killers pose very little risk of stinging. Females only sting if they are held or confined against the skin; they will not land on humans to sting and do not defend nests. Accidental stings do occur and the pain is can be moderately painful, but considerably less than a yellowjacket or honey bee



Figure 2. The three species of cicada killers known from eastern Colorado. Top to bottom: eastern cicada killer (*Sphecius speciosus*), western cicada killer (*S. grandis*) and Pacific cicada killer (*S. convallis*). Female is on the left, male on the right.



Figure 3. Cicada killer stinging cicada prey.
Photograph by Howard Ensign Evans.

sting. (The venom is also quite different, so cross-allergic reactions are unlikely.) Temporary swelling may occur in sensitive individuals, but many people report very mild reactions to the sting and little pain.

Male cicada killers lack a sting, although they do have a spine at the tip of the abdomen that superficially resembles a stinger. While defending territories they may fly to inspect intruders, including humans, and this behavior may be perceived as being aggressive. However, male cicada killers are harmless.

Control of Cicada Killers. Control of cicada killers is rarely recommended and can be difficult to achieve. The insects are not aggressive and have a beneficial role in managing cicada populations. The best course is almost always to leave the nesting insects alone - or spend some time watching their interesting activities.

Occasionally nesting occurs in a site (e.g., playground) where they may be considered intolerable. A mixture of short term and long term controls may be attempted to limit nesting at these sites.

Short term controls involve treating individual tunnels of cicada killers to kill the nesting adult females. This involves use of insecticides applied into the tunnels. Dust formulations are particularly useful, as they are tracked by the wasps, and most pyrethroid insecticides (e.g., permethrin, deltamethrin, lambda-cyhalothrin, bifenthrin, cyfluthrin) are effective. (*Note:* Make sure the formulation of insecticide used specifies on the label instructions that it can be used for control of ground nesting wasps.)

Anecdotally other treatments have been reported as being effective at deterring nesting. One such treatment is a dilute mixture of vegetable oil and vinegar that is poured into the tunnel.

Adult male cicada killers are best controlled by swatting with a tennis racquet or similar device.

However, no treatments of individual tunnels will kill the developing larvae already secured within nest cells and individual nest treatments will not deter future nesting. Therefore, modifications of the surface of the site where they are nesting is needed to prevent future nesting. Persistent watering of the site can be useful in the short-term and may cause the wasp to move to new areas to establish nests. Tilling the surface and modifying its texture by incorporating soil amendments such as compost may permanently alter the suitability of the site. Establishing grass or thick ground cover may also be useful.

Primary Reference: An excellent resource on cicada killer biology is Prof. Chuck Holliday's www page at Lafayette College: <http://sites.lafayette.edu/hollidac/research/biology-of-cicada-killer-wasps/>