

Stinging or Venomous Insects and Related Pests¹

P. G. Koehler and D. E. Short²

Millions of people in the United States are injured from venoms produced by insects and other arthropods each year. Of these injuries about 25,000 result in severe injuries and about 32 result in deaths (Table 1).

Venoms

Venomous insects and other arthropods produce venoms that can be classified as:

1. Venoms that produce blisters (vesicating toxins) (e.g., blister beetles, certain stinging caterpillars, millipedes).
2. Venoms that attack the central nervous system (neurotoxins) (e.g., black widow spiders, bark scorpions, certain ticks, Hymenoptera, wheel bugs).
3. Venoms that destroy tissue (cytolytic and haemolytic) (e.g., Hymenoptera, fire ants, ground scorpions, mites, chiggers, wheel bugs, brown recluse spider).
4. Toxins that prevent blood from clotting (haemorrhagic) (e.g., lice, fleas, ticks, mites, true bugs, biting flies).

Allergic Reactions

Humans differ greatly in their reaction to arthropod venoms. Allergic reactions are often more important than the toxic effects of arthropod venoms. Of individuals who die from arthropod venoms, 96% had an allergic reaction. Allergic reactions to stings or bites are when something happens to a part of the body other than the immediately affected area. Allergic reactions are classified according to the severity:

1. Slight general reaction—*inflammation, welts, itching, malaise and anxiety.*
2. General reaction—a slight general reaction plus 2 or more of the following symptoms: *swelling, wheezing, abdominal pain, nausea or vomiting.*
3. Severe general reaction—any of the above plus 2 or more of the following: *difficulty in breathing, difficulty in swallowing, hoarseness, confusion or feeling of impending disaster.*
4. Shock reaction—any of the above plus 2 or more of the following: *cyanosis, fall in blood pressure, collapse, unconsciousness or incontinence.*

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Table 1. Deaths from Venomous Pests (from Parrish AJMS, 1963)

Pests	Number of Deaths Per Year	Percent of Total
Snakes	13.8	30
Insects and Related Pests	32.2	66
Bees	12.4	27
Wasps	6.9	15
Spiders	6.5	14.1
Yellow Jackets	2.2	4.8
Hornets	1.0	2.2
Scorpions	1.0	2.2
Ants	0.4	0.8
Others	1.8	4

Insect stings result in rapid progression of toxic effects. Of 208 deaths, 80% occurred less than one hour after being stung by Hymenoptera (bees, wasps, yellow jackets, or hornets). Spider bites, however, have a longer time interval between bite and death with 89% of 54 victims dying more than 12 hours after being bitten. Statistics also reveal that of snakebite victim deaths, 17% died 1 to 12 hours after being bitten and 64% between 12 hours and 2 days.

What to Do

Insect stings require quick, prompt action.

1. The causative organism must be captured, saved and identified.
2. If a general allergic reaction is suspected, or the victim has a history of hay fever, allergy or asthma, a doctor should be contacted immediately. Additional medical information on poisonings can be obtained from the Centers for Disease Control, Atlanta, Georgia (404-633-3311) or the local Poison Control Center.
3. If marked swelling or discoloration occurs at site of bite or sting, the venom is probably haemolytic, haemorrhagic or vesicating. Keep

victim warm and quiet until a physician is reached.

4. If little or no swelling or discoloration occurs at the site of bite or sting, the venom is probably neurotoxic. Apply ice to the site or immerse the affected part of body in ice water until a physician is reached.
5. Persons who have exhibited a severe allergic reaction in the past to arthropod venoms or have a history of asthma, hay fever or allergies should:
 - a. Undergo skin testing to determine hypersensitivity to arthropod venoms.
 - b. Carry identification or tags noting hypersensitivity.
 - c. Consider desensitization (immunization).
 - d. Carry an insect sting kit (available only with a physician's prescription).

Prevention of Stings

Several procedures can be used to minimize the danger of being stung by venomous arthropods.

1. Avoid mowing lawns or working with flowering ornamentals when bees and wasps are collecting nectar.

2. Don't walk barefooted in the yard.
3. Sweet items like soft drinks, ripened fruits and watermelons attract bees and wasps. Keep these items covered outdoors. Pick fruit as it ripens and dispose of rotten fruits.
4. If little or no swelling or discoloration occurs at the site of bite or sting, the venom is probably neurotoxic. Apply ice to the site or immerse the affected part of body in ice water until a physician is reached.
5. Persons who have exhibited a severe allergic reaction in the past to arthropod venoms or have a history of asthma, hayfever or allergies should:
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6. Stand still if a stinging insect is near you. If it attacks, brush it off (*don't slap*) to prevent a sting.
7. Control stinging arthropods near heavily used areas.
8. If attacked by a swarm of bees, wasps, yellow jackets or hornets, leave the area immediately using arms to protect your face.

Some Common Venomous Arthropods

Pertinent information on common venomous arthropods is in Table 2.

Bees

Bees are often confused with wasps. Although closely related, they differ in many ways. Bees feed pollen and nectar to their young. They are beneficial insects that pollinate fruits, vegetables and many other plants.

The most common bees are the honey bee



(Figure 1), bumble bee, and carpenter bee. Bees are not commonly serious problems and usually require no control.

When stung by a honey bee, scrape the bee's stinger out of the wound immediately. Be careful not to pull it out. If you do, you will force poison into the wound. If the stinger is not removed, the poison gland attached to the stinger will continue to pump poison into the wound for several minutes. Wasps and other bees do not leave a stinger and are capable of stinging many times.

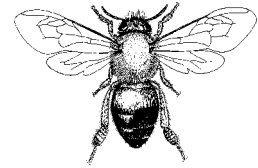


Figure 1. Honey bee.

At certain times of the year (spring and early summer), honey bee colonies divide by swarming. Swarms are not usually a problem unless they land in an inconvenient spot or enter a building. A honey bee colony in a building must be removed after it has been killed to prevent problems from odors of decaying bees, honey and other pests.

If a bee swarm is undesirable in trees, shrubbery or buildings, you may wish to contact a beekeeper, county agent or pest-control company to remove or kill the bees. Insecticide dusts are effective for killing bee colonies in buildings. Dusts may be applied for effective control. To control bees:

1. Locate the colony in the wall at night by tapping and listening for the area of loudest buzzing. Bees keep the nest at 95° so you may be able to feel the heat through the wall.
2. At night, drill a small hole in the wall above the colony and apply dust through it or apply to honey bee entrance to colony.
3. Seal all entrances and exits from the colony.
4. After 2 weeks or when all sound and bee activity has stopped, open the wall and remove dead bees, comb and honey.



5. Bury the colony so valuable honey bee colonies will not be attracted to the residue and be destroyed.

Wasps

Hornets, yellow jackets, *Polistes* (Figure 2), mud daubers and the cicada killers are all wasps. They are generally considered to be beneficial because they attack and destroy many harmful insects found around homes and gardens. Hornets and yellow jackets kill such pests as house flies, blow flies and various caterpillars. *Polistes* are predators of corn earworms, armyworms and many other garden pests.

Though beneficial, wasps also attack people. If disturbed, hornets, yellow jackets and *Polistes* will sting. Mud daubers and cicada killers usually are not as aggressive and will not sting unless touched or accidentally caught in clothing. If wasps build nests on houses or in bushes where children play or living activities are carried on, nest destruction or chemical control is necessary.

Wasps can usually be identified by their nests and their location. Hornets, *Polistes* and mud daubers build nests above the ground. Hornets and *Polistes* nest in trees, shrubbery and under eaves. Mud daubers nest under eaves, porch roofs or similar sheltered areas. Yellow jackets usually build their nests in the ground, but sometimes build them above the ground. Cicada killers nest in the ground.

Hornets and yellow jackets build football-shaped paper-like nests. *Polistes* build paper-like nests that resemble a honeycomb. Mud daubers build clay or mud-cell nests. Cicada killers dig homes about one half inch across and pile the excavated soil around the opening.

Hornets, yellow jackets and *Polistes* are social insects and their colonies develop in a similar way. Adult females make up two castes—queen or fertile

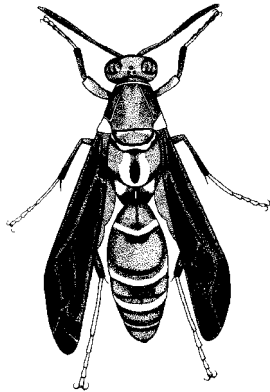


Figure 2. *Polistes* wasp.

females which lay eggs; workers or sterile females which feed larva and may lay eggs without mating if the queen dies during the season. In the fall, queens and males leave the nest and mate. The male dies and the surviving queens hibernate in cracks of rocks, under bark of trees, in buildings, or in the ground. In the spring the queen comes out of hibernation and builds a nest with a few shallow cells. An egg is laid in each cell and these hatch into worker larvae in 2 to 3 days. The queen feeds these larvae which develop in 12 to 18 days and spin cocoon caps over the cells and change into pupae. After the first brood emerges the queen resumes egg laying. The workers take charge of the nest, enlarging it and caring for the new larvae.

Mud daubers are solitary wasps. Each female constructs a clump of mud cells. There is no worker case. In the spring young adults come out of their nests and mate. The females then build mud-cell nests. After they complete the nest they capture about 20 spiders, paralyzing each with her sting as she catches it. These are stored in the cell and she lays an egg on one of the spiders and caps the cell with clay. This is repeated until she has built one nest containing 6 to 20 cells. She may then build other nests in other locations. Once a nest is finished, she leaves it and never returns. The larvae hatch from the eggs and feed on the paralyzed spiders. Complete development takes place in the cell. One to three generations can develop in a year.

The cicada killer is also a solitary wasp. Its habits are similar to the mud dauber except it constructs its cells in the soil and provisions the cells with cicadas.

When a wasp stings it injects a venomous fluid under the skin. The venom causes a painful swelling that may last several days. In some cases a wasp sting may cause severe illness or even death.

Control

Wasps can be easily controlled by applying insecticides to the nest. However, there is usually a certain amount of risk. Nests should be treated at night to minimize the danger of being stung or protective clothing should be worn. Generally, sprays are more effective for aerial nests and dusts are more effective for below ground nests. Residual sprays can be applied for aerial wasp control. Whatever spray is

used, it should have a quick knockdown agent such as synergized pyrethrum or pyrethroids mixed with it. Dusts can be applied for control of below ground wasp nests.

Control Procedures

For below ground nests, locate nest and mark area so it is easy to find after dark. Use a flashlight covered with a red cellophane paper so wasps stay in their nest. At night, puff dusts into nest entrance and immediately throw a shovelful of moist soil over entrance. *Be careful not to step into the nest.*

For aerial nests, spray nests with pressurized containers with a pin-stream spray from a distance (20 ft.).

Indoor wasp nests should be controlled as honey bee colonies.

Scorpions

Scorpions (Figure 3) are flattened, crab-like animals having ten legs and a flesh tail, ending in an enlarged upturned tip which bears a stinger. They vary in size from one to four inches long. They normally live outdoors, though they will invade homes and buildings.



Figure 3. Scorpion.

Scorpions will sting, but usually only when provoked or disturbed. Scorpion venom is a neurotoxin, but the dose injected usually is insufficient to prove fatal to an adult human. None of the several species of scorpions which occur in Florida is capable of inflicting a lethal sting; however, the site of the sting may be sore and swollen for some time.

Scorpions are most active at night. They hide under boards, rubbish, or similar debris which provide shelter and protection. Places commonly infested in a home are under the house or in the attic. They feed on insects, spiders, or similar small animal life.

Scorpions have a long life cycle. Three to five years may be normal. Males and females go through a

courtship ritual prior to mating. Scorpions do not lay eggs and the young are born alive. After birth the young scorpions climb on the back of the mother and remain there until after their first molt. Scorpions are cannibalistic and will readily eat their own species. Females will often eat their own young.

Control

Mechanically destroy any scorpions found indoors by swatting or crushing. Clean out all possible hiding places. Treat hiding or breeding areas with sprays. See Table 3 and Table 4.

Ducks and chickens will eliminate most scorpions from around a building. During dry weather scorpions can be attracted and trapped by spreading moist burlap on the ground around infested areas.

Spiders

Almost all spiders in Florida are harmless to man. Most species do not bite unless provoked to attack. The widow spiders, primarily the southern black widow (Figure 4) and northern black widow, are the most frequently found venomous spiders. The brown recluse spider is not considered to be established in Florida although physicians have diagnosed its bites on patients.

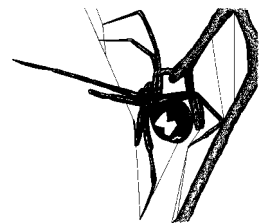


Figure 4. Black widow spider.

Fire Ants

Fire ants (Figure 5) look like ordinary house ants; however, they are an aggressive ant capable of inflicting a painful sting. The colony of imported fire ant is a mound sometimes 3 feet across.



Figure 5. Fire ant.

Wheel Bug

The wheel bug (Figure 6) is a predacious bug with a cog-like crest on its thorax. They feed on insects; however, humans are bitten by accidental contact. The bug penetrates the skin with its beak and injects a salivary fluid used to kill its prey. The fluid causes an immediate intense pain which lasts 3-6 hours. The best way to prevent wheel bug bites is to avoid the insect.



Figure 6. Wheel bug.

Blister Beetles

Blister beetles (Figure 7) are narrow beetles with a neck which is slenderer than the head and wings. Adult beetles can release a fluid which causes blisters on human skin. The larvae of blister beetles are harmless to man and are predaceous on other insects. The adult beetles feed on foliage, and persons often come into contact when moving through infested vegetation.

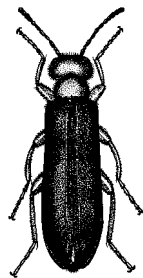


Figure 7. Blister beetle.

The only suitable control of blister beetles is avoidance of individual beetles or chemical application to crop plants. It is necessary to check recommendations for the crop to determine the chemical to be used.

Stinging Caterpillars

Stinging caterpillars frequently found in Florida are the puss caterpillar, saddleback caterpillar, IO moth caterpillar, and the hag moth caterpillar. These caterpillars feed on vegetation and have spines which can break off in the skin. When the spines break, a toxin flows from the spines onto the skin, causing a burning sensation.

When working in an infested area, wear protective clothing.

Saddleback Caterpillar

This is a very unusual and striking insect (Figure 8). It is brown with a green back and flanks on which is a conspicuous, brown, oval-shaped central area usually bordered with white.

The brown spot gives the appearance of a saddle and the green area appears to be a saddle blanket; hence, the common name. It may exceed an inch in length and is stout bodied. The primary nettling hairs are borne on the back of paired fleshy protuberances toward the front and hind ends of the body. There is also a row of smaller stinging organs on each side. This caterpillar feeds on many plants including hibiscus and palms, but appears to show little host preference.

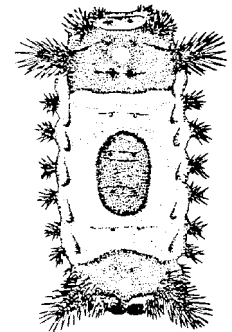


Figure 8. Saddleback caterpillar.

Puss Caterpillar

It is a convex, stout bodied larva, almost 1" long when mature and completely covered with gray to brown hairs. Under the soft hairs are stiff spines that are attached to poison glands. When touched, these

poisonous spines break off in the skin and cause severe pain. Puss caterpillars (Figure 9) feed on a variety of broadleaf trees and shrubs, but prefer oaks and citrus. In Florida, there appear to be two generations per year, one in spring and the other in the fall. Natural enemies keep these caterpillars at low numbers during most years; however, they periodically become numerous.



Figure 10. Puss caterpillar.

Hag Moth Caterpillar

This caterpillar is light to dark brown in color. It has nine pairs of variable length lateral processes that bear the stinging hairs. These processes are curved and twisted and likened by some to the disheveled hair of a hag, for which it is aptly named. It is found on various forest trees and ornamental shrubs, but is not as common as the other stinging species.

IO Moth Caterpillar

This is a pale green caterpillar (Figure 10) with yellow and red stripes. It often exceeds 2" in length and is fairly stout bodied. The nettling organs are

borne on fleshy tubercles, and the spines are usually yellow with black tips. They feed on a wide range of plants; however ixora and roses are favorite hosts.



Figure 9. IO moth caterpillar.

Velvet Ant

Velvet ants (Figure 11) belong to a large family of stingless, ant-like wasps.

The females are solitary, parasitic wasps with an efficient, large stinger. Most species are parasitic on solitary bees and wasp species.

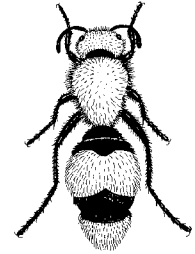


Figure 11. Velvet ant.

Humans are usually stung by velvet ants when the female wasp is accidentally stepped on with bare feet or trapped against the body in clothing or bedding. Since the wasp is solitary and roaming, control is difficult.

Table 2. Summary of Important Stinging Arthropods.

Pest	Description	Nest	Biting or Stinging Ability
Honey Bee	2/3 in., yellow and black or brown, body covered with hairs.	Made of wax cells, found in wall voids or under slab foundations.	Yes
Bumble Bee	1 in., black and yellow body covered with hair.	Made of wax cells, below ground, under slabs, in wall voids.	Yes
Hornets and Yellow Jackets	3/4 in., black with yellow or white markings.	Made of papery material. Nests either aerial or below ground or both. Nests large and globular.	Yes
<i>Polistes</i>	3/4-1 in., black or brown with red and a few small yellow markings.	Made of papery material. One circular comb of cells opening downward commonly under eaves or window ledges.	Yes
Mud Daubers	3/4-1 in., black and yellow, or metallic blue, or shiny black.	Made of clay or mud. Usually along eaves or in garages.	Rarely sting.
Cicada-killer	1½ in., black with yellow markings.	Solitary, digs in soil.	Females sting only when handled.
Scorpion	1-4 in., have 10 legs with tail which bears a stinger.	Hide under boards, rubbish, and debris, solitary.	Yes -- Florida species do not have a lethal sting.
Spiders	Depend on species, 8 legs, 2 body regions.	Widespread and solitary	Brown recluse and widow spiders are the only dangerous species. Other species are not considered dangerous.
Brown Recluse	Brown with fiddle-like mark on cephalothorax, 6 eyes.		Yes
Black Widow	Black with red hourglass mark on underside of abdomen, 8 eyes.		Yes
Fire Ants	1/16-1/4 in., yellowish to dark red with stinger on end of abdomen.	Mounds 3-36 in. high with surrounding vegetation undisturbed.	Yes
Wheel Bug	1-1½ in., cog-like wheel on top of thorax.	Solitary, occur in vegetation and debris.	Bite only when handled.
Blister Beetle	1/2-3/4 in. beetle with thorax narrower than head or wings.	Solitary.	Secrete an irritating substance when disturbed.

Table 2. Summary of Important Stinging Arthropods.

Pest	Description	Nest	Biting or Stinging Ability
Stinging Caterpillars IO Moth Buck Moth Puss Moth Saddleback Slug Moth	Depend on species, usually have long and short hairs.	Solitary, occur in vegetation and debris.	Hollow hairs with poison sac. Sharp hairs penetrate skin.
Velvet Ant	½-1 in,m wingless and ant-like, covered with hair, bright red, orange, or yellow.	Solitary on ground.	Sting only when handled or trapped.

Table 3. Recommended Insecticides for Household Pest Control(Homeowner Use)

MATERIAL	FORMULATION	AREA OF USE
BEEES		
chlorpyrifos (Dursban)	spray	indoor, outdoor
SPIDERS		
diazinon	dust	outdoor
malathion	spray	indoor, outdoor
WASPS		
(Residuals)		
chlorpyrifos (Dursban)	spray	outdoor
diazinon	spray	outdoor
(Aerosols)		
d-trans-allethrin	spray	indoor
pyrethrins	spray	indoor
resmethrin	spray	indoor
s-bioallethrin	spray	indoor
SCORPIONS		
chlorpyrifos	spray	outdoor
diazinon	spray	indoor, outdoor
malathion	spray	indoor, outdoor
BLISTER BEETLES		
carbaryl (Sevin)	dust	outdoor

Table 4. Recommended Insecticides for Household Pest Control (**Pest Control Company Use**)

CHEMICAL NAME	TRADE NAME	FORMULATION
BEEES		
bendiocarb	Ficam	spray
chlorpyrifos	Dursban	spray
cyfluthrin	Tempo	spray
lambdacyhalothrin	Commodore	spray
micro-encapsulated chlorpyrifos	Empire	spray
permethrin	Dragnet, Flee	spray
tralomethrin	Saga	spray
SPIDERS		
bendiocarb	Ficam	dust or spray
chlorpyrifos	Dursban	dust or spray
cyfluthrin	Tempo	spray
cypermethrin	Demon, Cynoff	spray
diazinon	---	dust or spray
esfenvalerate	Conquer	spray
lambdacyhalothrin	Commodore	spray
malathion	---	spray
micro-encapsulated chlorpyrifos	Empire	spray
micro-encapsulated cyfluthrin	Optem	spray
micro-encapsulated diazinon	Knox-Out	spray
micro-encapsulated pyrethrins	X-Clude	spray
permethrins	Flee	spray
propetamphos	Safrotin	spray
propoxur	Baygon	spray
silica gel	Tri-Die	dust
tralomethrin	Saga	spray
WASPS (Residuals)		
acephate	Orthene	spray
bendiocarb	Ficam	dust or spray
chlorpyrifos	Dursban	dust or spray
cyfluthrin	Tempo	spray
cypermethrin	Cynoff, Demon	spray
diazinon	---	spray
lambdacyhalothrin	Commodore	spray
micro-encapsulated chlorpyrifos	Empire	spray
permethrin	Flee	spray
propoxur	Baygon	spray
tralomethrin	Saga	spray
(Aerosols)		
d-trans-allethrin	PT576	spray
pyrethrins	---	spray
resmethrin	SBP1382	spray
s-bio-allethrin	Misticide	spray

Table 4. Recommended Insecticides for Household Pest Control (**Pest Control Company Use**)

CHEMICAL NAME	TRADE NAME	FORMULATION
SCORPIONS		
bendiocarb	Ficam	spray, dust or granules
chlorpyrifos	Dursban	spray
cyfluthrin	Tempo	spray
diazinon	---	spray
lambdacyhalothrin	Commodore	spray
malathion	---	spray
micro-encapsulated chlorpyrifos	Empire	spray
micro-encapsulated diazinon	Knox-Out	spray
permethrin	Flee	spray
propoxur	Baygon	spray
tralomethrin	Saga	spray
BLISTER BEETLES		
carbaryl	Sevin	dust