

# Indiana 4-H Entomology

## *Insect Flash Cards*

Flash cards can be an effective tool to help students learn to identify insects and insect facts. Use the following pages to make flash cards by cutting the horizontal lines, gluing one side, then folding each in half. It can be especially effective to have a peer educator (student showing the cards who can see the answers) count to five for each card. If the learner gets it right, it goes in a "know" pile; if it takes a little longer, put the card in an "uncertain" pile; and if the learner doesn't know, put the card in a "don't know" pile.

Concentrate follow-up study efforts on the cards that each learner had the most problems with (the "uncertain" and "don't know" piles). Make this into a game to see who can get the largest "know" pile on the first go-through.

*The insects included in these flash cards are all found in Indiana and used in the Indiana 4-H/FFA Entomology Career Development Event.*

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# All Insects Pictured

## Common Name – Order Name

1. Alfalfa weevil - Coleoptera
2. American cockroach - Dictyoptera
3. Angoumois grain moth - Lepidoptera
4. Annual cicada - Homoptera
5. Antlion - Neuroptera
6. Aphid - Homoptera
7. Apple maggot fly - Diptera
8. Armyworm - Lepidoptera
9. Asparagus beetle - Coleoptera
10. Assassin bug – Hemiptera
11. Bagworm - Lepidoptera
12. Baldfaced hornet - Hymenoptera
13. Bean leaf beetle - Coleoptera
14. Bed bug - Hemiptera
15. Bird louse - Mallophaga
16. Black cutworm - Lepidoptera
17. Blister beetle - Coleoptera
18. Blow fly – Diptera
19. Booklouse – Psocoptera
20. Boxelder bug - Hemiptera
21. Brownbanded cockroach - Dictyoptera
22. Brown lacewing - Neuroptera
23. Bumble bee - Hymenoptera
24. Cabbage butterfly - Lepidoptera
25. Cabbage looper - Lepidoptera
26. Caddisfly - Trichoptera
27. Camel cricket - Orthoptera
28. Carolina grasshopper - Orthoptera
29. Carpenter ant - Hymenoptera
30. Carpenter bee - Hymenoptera
31. Carrion beetle - Coleoptera
32. Cecropia moth – Lepidoptera
33. Chinch bug - Hemiptera
34. Cicada killer wasp - Hymenoptera
35. Click beetle - Coleoptera
36. Clover leaf weevil - Coleoptera
37. Cluster fly – Diptera
38. Codling moth - Lepidoptera
39. Colorado potato beetle - Coleoptera
40. Common stalk borer - Lepidoptera
41. Corn earworm - Lepidoptera
42. Corn flea beetle - Coleoptera
43. Cottony maple scale - Homoptera
44. Crane fly - Diptera
45. Damsel bug - Hemiptera
46. Damselfly - Odonata
47. Deer fly - Diptera
48. Dermestid beetle - Coleoptera
49. Differential grasshopper - Orthoptera
50. Diving beetle – Coleoptera
51. Dobsonfly - Megaloptera
52. Dragonfly - Odonata
53. Earwig – Dermaptera
54. Elm leaf beetle - Coleoptera
55. Emerald ash borer – Coleoptera
56. European corn borer - Lepidoptera
57. Field cricket - Orthoptera
58. Firefly – Coleoptera
59. Flea - Siphonaptera
60. Fungus gnat – Diptera
61. German cockroach - Dictyoptera
62. Giant water bug - Hemiptera
63. Green June beetle - Coleoptera
64. Green lacewing - Neuroptera
65. Ground beetle - Coleoptera
66. Gypsy moth – Lepidoptera
67. Hackberry psyllid - Homoptera
68. Head louse - Anoplura
69. Hessian fly - Diptera
70. Honey bee - Hymenoptera
71. Horntail - Hymenoptera
72. Horse fly - Diptera
73. House fly - Diptera
74. Ichneumon wasp - Hymenoptera
75. Indian meal moth - Lepidoptera
76. Japanese beetle - Coleoptera
77. June beetle - Coleoptera
78. Katydid - Orthoptera
79. Lace bug - Hemiptera
80. Lady beetle - Coleoptera
81. Locust leafminer - Coleoptera
82. Longhorned beetle - Coleoptera
83. Luna moth – Lepidoptera
84. Mayfly - Ephemeroptera
85. Mexican bean beetle - Coleoptera
86. Midge (chironomid) – Diptera
87. Mimosa webworm - Lepidoptera
88. Mole cricket - Orthoptera
89. Monarch butterfly - Lepidoptera
90. Mosquito - Diptera
91. Mud dauber wasp - Hymenoptera
92. Northern corn rootworm - Coleoptera
93. Oriental cockroach - Dictyoptera
94. Oystershell scale - Homoptera
95. Pavement ant – Hymenoptera
96. Peachtree borer - Lepidoptera
97. Periodical cicada - Homoptera
98. Picnic beetle - Coleoptera
99. Pine needle scale - Homoptera
100. Plum curculio - Coleoptera
101. Polistes paper wasp - Hymenoptera
102. Potato leafhopper - Homoptera
103. Praying mantid - Dictyoptera
104. Redlegged grasshopper - Orthoptera
105. Rice weevil - Coleoptera
106. Robber fly - Diptera
107. Rose chafer - Coleoptera
108. Rove beetle – Coleoptera
109. Satyr – Lepidoptera
110. Sawfly - Hymenoptera
111. Sawtoothed grain beetle - Coleoptera
112. Scorpionfly - Mecoptera
113. Seedcorn beetle - Coleoptera
114. Silverfish - Thysanura
115. Sod webworm - Lepidoptera
116. Soldier beetle - Coleoptera
117. Spittlebug - Homoptera
118. Spotted cucumber beetle - Coleoptera
119. Springtail - Collembola
120. Squash bug - Hemiptera
121. Squash vine borer - Lepidoptera
122. Stable fly - Diptera
123. Stag beetle - Coleoptera
124. Stink bug - Hemiptera
125. Stonefly - Plecoptera
126. Strawberry root weevil - Coleoptera
127. Striped cucumber beetle - Coleoptera
128. Swallowtail butterfly - Lepidoptera
129. Sweat bee – Hymenoptera
130. Syrphid fly - Diptera
131. Tarnished plant bug - Hemiptera
132. Termite - Isoptera
133. Thrips - Thysanoptera
134. Tiger beetle - Coleoptera
135. Tiger moth - Lepidoptera
136. Tobacco hornworm - Lepidoptera
137. Tomato hornworm - Lepidoptera
138. Tortoise beetle - Coleoptera
139. Treehopper - Homoptera
140. Tulip tree scale - Homoptera
141. Tussock moth - Lepidoptera
142. Velvet ant - Hymenoptera
143. Viceroy butterfly - Lepidoptera
144. Vinegar fly – Diptera
145. Walkingstick - Dictyoptera
146. Water strider – Hemiptera
147. Western corn rootworm - Coleoptera
148. Whitefly - Homoptera
149. Wood cockroach – Dictyoptera
150. Yellowjacket – Hymenoptera



Photo Credit: University of Kentucky

**Common Name:** Alfalfa weevil

**Order:** Coleoptera

**Family:** Curculionidae

**Pest Status:** The alfalfa weevil is a major pest of alfalfa and often requires chemical treatments to manage.

**Appearance:** An alfalfa weevil is a small, dark-grey or brown beetle (1/4-inch long) with a prominent brown snout and a distinct dark band that extends down the back.

**Life Cycle:** The adults emerge in early spring and each female deposits up to 40 small, yellow, oval eggs into the stem of the alfalfa plant. The larvae hatch, then feed on alfalfa leaves, leaving a skeletonized appearance.

**Where to Collect:** In colder weather, adults can generally be found in the crowns of the alfalfa plants. As temperatures increase, they move upward and begin feeding on the young alfalfa leaves.



Photo Credit: Changlu Wang, Purdue University

**Common Name:** American cockroach

**Order:** Dictyoptera

**Family:** Blattidae

**Pest Status:** The American cockroach is a major pest inside buildings.

**Appearance:** The American cockroach is a distinctive insect with an elliptical-shaped body and thick spines on the tibia. Adults are usually between 1- and 1½-inches long and have long, filamentous antennae. They are generally a red-brown color and have a yellow stripe that extends across the back of the head.

**Life cycle:** Female cockroaches carry their eggs in cases (oothecae). White-brown nymphs hatch from the cases and develop a red-brown color, similar to the adults, over time. An immature cockroach can molt as many as 13 times in one year.

**Where to Collect:** American cockroaches prefer warm, dark, moist areas such as home basements and sewers. They usually hide during the day and feed on decaying organic matter at night.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Angoumois grain moth

**Order:** Lepidoptera

**Family:** Gelechiidae

**Pest Status:** This moth is a major pest of stored grain, occasionally a pantry pest.

**Appearance:** Adult moths are a beige, yellow-brown color and about 1/3-inch in length. The wings have rear fringes with the front wing a slightly lighter color than the hind wing.

**Life Cycle:** Female adults deposit approximately 40 white eggs on grain kernels (barley, rye, corn, oats and rice). When the larvae emerge, they eat into the grain and feed on the germ of the seed.

**Where to Collect:** Angoumois grain moths can be found in infested grain bins and sometimes in the pantry or kitchen areas of homes where stored grains are kept. The adults are most often collected as they fly and land on nearby walls.





Photo Credit: Gary Alpert, Harvard University, Bugwood.org

**Common Name:** Annual cicada

**Order:** Homoptera

**Family:** Cicadidae

**Pest Status:** A cicada feeding on tree roots seldom does serious injury, but when a female cuts tender twigs to insert her eggs, she can cause damage to young or tender trees.

**Appearance:** Adult cicadas can be over 2 inches long with very unique green or brown bodies and large eyes. The wings of the adults are clear and are held roof-like over their abdomens.

**Life Cycle:** After the eggs hatch, the nymphs drop to the ground to feed on tree roots. The following summer they climb up on trunks, molt, and then emerge as adults.

**Where to Collect:** During mid- to late-summer when the weather is cold, cicadas can be found in trees or on the ground nearby. They are most often heard rather than seen and are known for their very loud, shrill song.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

**Common Name:** Antlion

**Order:** Neuroptera

**Family:** Myrmeleontidae

**Pest Status:** Antlions are beneficial predators of small insects.

**Appearance:** An antlion adult resembles a damselfly, is 1½-inches long, and has a long, slender abdomen, two pairs of narrow, multi-veined wings, and clubbed antennae.

**Life Cycle:** Immature antlions (doodlebugs), feed on other tiny insects that they capture. One of the most distinctive species creates tiny sand pits that appear as mini volcanoes in the soil. The holes start wide and gradually narrow until they funnel into the tip, under which the antlion hides. This pit is an effective trap; small insects fall into it and slide to the bottom where the gaping jaws of the antlion are waiting.

**Where to Collect:** Antlions are especially prevalent in soft, sandy soils under trees or rocks. Adults can be captured as they fly to lights.



Photo Credit: Extension, Purdue University

**Common Name:** Aphid

**Order:** Homoptera

**Family:** Aphididae

**Pest Status:** Aphids can be serious pests of vegetable and agronomic crops as well as ornamental plants.

**Appearance:** Aphids are small, soft-bodied insects that can be green, yellow, brown, red or black. The body is pear-shaped with long legs and antennae. Most species have a pair of exhaust pipe-like structures called cornicles protruding from the posterior ends of the abdomens.

**Life Cycle:** Aphids have many generations per year. After overwintering, aphid eggs hatch into wingless females. These females reproduce asexually and hold the eggs in their bodies until they give birth to live young. These young usually develop wings.

Aphid nymphs and adults both feed by inserting their mouthparts into plants and sucking out juices.

**Where to Collect:** Aphids can be best collected from the undersides of leaves that have begun to curl due to excessive feeding.



Photo Credit: Extension, Purdue University

**Common Name:** Apple maggot fly

**Order:** Diptera

**Family:** Tephritidae

**Pest Status:** Apple maggots can become pests of apples, plums, pears, and cherries.

**Appearance:** Apple maggot flies are ½-inch long, black and have white bands that run across the abdomen. The distinctive feature of apple maggot flies is their large, clear wings that have four distinct, black bands.

**Life Cycle:** Female flies lay their eggs in the pulp of host fruit. Within five to 10 days, the eggs hatch and the maggots tunnel inside the fruit for two to 10 weeks. When the larvae leave the fruit, they burrow into the soil where they form pupal cells. The pupae overwinter until the adults emerge from the ground during the early summer.

**Where to Collect:** In the summer, apple maggot flies can be found on the leaves or fruit of apple trees and other host plants.



Photo Credit: Doug Richmond, Purdue University

**Common Name:** Armyworm

**Order:** Lepidoptera

**Family:** Noctuidae

**Pest Status:** Armyworms can become major pests as they feed on grasses and small grains.

**Appearance:** The adult armyworm is a light brownish-gray moth with a conspicuous white spot about the size of a pinhead on each front wing. When expanded, the wings measure about 1 inch across.

**Life Cycle:** In the mid-summer, moths lay their eggs on grass or on grain leaves at night. Within six to 10 days, the eggs hatch and the larvae feed on leaves at night. After approximately one month, the larvae form silk cocoons below the soil surface. In late summer, the adults emerge and mate.

**Where to Collect:** During the evening, armyworms often can be found feeding on grass. Adults, often called “millers,” are commonly collected at lights.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Asparagus beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Asparagus beetles can become a damaging pest of asparagus.

**Appearance:** An adult beetle measures about ¼-inch in length and has a bright orange body with blue-black spots on the elytra. The thorax has a red tint and black markings.

**Life Cycle:** Female beetles lay their eggs in the spring on the tips of asparagus buds. The larvae hatch within a week and begin to feed on the spears and ferns of the plants. The larvae eventually enter the soil and pupate. In five to 10 days, they emerge from the soil as adults.

**Where to Collect:** Adults can be found on the tips of new asparagus shoots or among the debris surrounding old asparagus plants.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Assassin bug

**Order:** Hemiptera

**Family:** Reduviidae

**Pest Status:** Assassin bugs are beneficial predatory insects. Caution should be taken in handling them, however, as they can bite people.

**Appearance:** Adults are 1/5- to 1 1/2-inches long depending upon the species. An adult has an elongated head with distinct narrowed thorax, long legs and a prominent, segmented proboscis. Most species are dark in color with hues of brown, black, red, or orange.

**Life Cycle:** Assassin bugs lay their eggs on leaves during the summer and in cracks and crevices during the fall. The eggs hatch either during the summer or the following spring. Nymphs pass through five instars before becoming adults.

**Where to Collect:** Adults are usually the overwintering stage. They can be collected nearly anywhere as they disperse to find prey. Sweeping foliage or collecting them at night are also productive techniques.



Photo Credit: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org

**Common Name:** Bagworm

**Order:** Lepidoptera

**Family:** Psychidae

**Pest Status:** The bagworm can become a serious pest of evergreen trees and shrubs, occasionally of broad leaf trees.

**Appearance:** Bagworms themselves are seldom seen due to the protective, cone-shaped bag that encloses the insect. The bag is approximately 1 1/2-inches long and is composed of silk, leaves, and twigs. Mature male larvae, however, do eventually leave the bag for a short time. They range in color from brown to tan, and are usually mottled with black markings.

**Life Cycle:** Adult moths are active in late summer and early fall. The females remain within the bags to lay the overwintering eggs. The eggs do not hatch until June and the larvae immediately begin to form the silken bag where they remain until August when pupation occurs.

**Where to Collect:** Larvae attach their very conspicuous bags to branches of trees.



Photo Credit: Edward L. Manigault, Clemson University Donated Collection, Bugwood.org

**Common Name:** Bald-faced hornet

**Order:** Hymenoptera

**Family:** Vespidae

**Pest Status:** The bald-faced hornet is seldom a pest, but can sting if their gray paper nest, usually found in trees, is disturbed.

**Appearance:** Adults are at least 1/2-inch long with a black head, thorax, and abdomen, all mottled with white markings.

**Life Cycle:** The queen starts a new nest each spring by laying eggs inside a small nest. When the eggs hatch, the queen feeds the larvae until they pupate. When adults emerge, they work to expand the size of the nest, and take on the foraging/feeding and defense responsibilities of the colony. The nest is created from bark, paper, and saliva and can become as large as a basketball.

**Where to Collect:** These hornets can be found in both wooded and urban areas. Hornet nests commonly hang from trees, bushes, low vegetation, and buildings.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Bean leaf beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** This beetle can become a serious agricultural pest of soybeans, occasionally of green beans or corn.

**Appearance:** Adults are approximately ¼-inch long and have oval-shaped abdomens. Most are yellow-green with four prominent black spots on the abdomen and black markings along the outside margins of the wings. All have black triangles at the top of their wing covers.

**Life Cycle:** Adults overwinter to emerge in early summer and mate. Females lay approximately 12 eggs in the soil around the bases of plants where they feed on roots. Pupation occurs in the soil. Adults then emerge at the end of the summer.

**Where to Collect:** Adults can be found at the beginning and the end of summer on the leaves of bean (green bean, soybean, clover) plants.



Photo Credit: Jody Green, Purdue University

**Common Name:** Bed bug

**Order:** Hemiptera

**Family:** Cimicidae

**Pest Status:** The bed bug has returned as a serious urban pest throughout the U.S. Although it does not transmit diseases, it is responsible for considerable physical and emotional irritation due to biting people.

**Appearance:** Bed bugs are red-brown insects that are only ⅓-inch long. A bed bug is flattened, oval, and wingless and the abdomen has a banded appearance.

**Life Cycle:** Female bed bugs can lay up to five eggs in a day. Eggs have a milk-white tone and hatch within two weeks. The newly hatched nymphs grow and molt five times before reaching maturity. Bed bugs can complete their development in a month, so they are capable of producing three or more generations per year.

**Where to Collect:** Bed bugs fit into the small crevices of mattresses, box springs, bed frames and headboards. These areas can be marked by dark spotting and staining.



Photo Credit: Extension, Purdue University

**Common Name:** Bird louse

**Order:** Mallophaga

**Family:** Menoponidae

**Pest Status:** Bird lice can become a pest of poultry, but seldom get on people.

**Appearance:** These are small, wingless insects, whitish in color, head fairly broad. The body is usually flattened. The last tarsal segments bear claws that cling tightly to the feathers or fur of its host. A louse can be up to 2 mm long.

**Life Cycle:** Bird lice feed mainly on particles of skin and feathers. Most are confined to one host or a group of closely related host species. May lay 50-100 eggs, cemented to the feathers of the host. Development from egg to adult stage takes about 3-4 weeks. Lice transfer themselves from the adult birds to the fledglings in the nest.

**Where to Collect:** Bird lice are always found in association with their hosts. They can be collected by extracting them from feathers or fur.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Black cutworm

**Order:** Lepidoptera

**Family:** Noctuidae

**Pest Status:** The black cutworm can become a serious pest of many agricultural crops as well as turfgrass because they cut off plants near the ground.

**Appearance:** The drab-colored moths are similar in size and shape to other species of the cutworm family. The distinguishable marking is a small, black slash near the outer edge of the front wings.

**Life Cycle:** Adults overwinter in the soil in southern states. They arrive in the more northern states each year via southwesterly air currents. In the first generation, eggs hatch within a week and the larvae feed on host plants for about a month. In subsequent generations, these stages can require as much as eight or nine weeks.

**Where to Collect:** Black cutworms are active at night. They are highly attracted to lights.



Photo Credit: Brian Christine, Purdue University

**Common Name:** Blister beetle

**Order:** Coleoptera

**Family:** Meloidae

**Pest Status:** The blister beetle can become a pest when trapped in alfalfa as the hay is put up. Horses are especially susceptible to the toxin (cantharidin) produced by this beetle and may die after consuming only a few beetles.

**Appearance:** Adults have long ( $\frac{3}{4}$  - to  $1\frac{1}{2}$ -inch), narrow bodies and broad heads. They vary in color: gray, black, metallic, yellow-striped, or spotted.

**Life Cycle:** Adult female beetles lay their eggs in clusters in the soil. The first larval stages develop within a month, but the last two larval stages can remain for about 230 days before pupating. Pupating occurs in the spring and the stages last about two weeks, so adults appear in early summer.

**Where to Collect:** Adults usually gather in loose groups or swarms that feed on leaves of certain plants, especially legumes.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Blow fly

**Order:** Diptera

**Family:** Calliphoridae

**Pest status:** Blow flies are beneficial insects in nature where they facilitate the breakdown of dead animal matter.

**Appearance:** Adults are metallic blue, green, copper, or black-colored flies that resemble house flies in appearance. The hair on the terminal antennal segment is feathery.

**Life Cycle:** Female flies lay eggs on or near suitable habitats. Maggots hatch from the eggs within two days and develop through three instars before pupating in the soil. Adult flies emerge 10 to 17 days after the formation of the pupal cell.

**Where to Collect:** Blow flies can be collected around any type of fresh meat or road kill left to rot. They are fast fliers, so using an insect net is the best collection technique.





Photo Credit: Extension, Purdue University

**Common Name:** Booklice

**Order:** Psocoptera

**Family:** Trogiidae

**Pest Status:** Booklice are also called psocids. They are sometimes a nuisance pest in homes and other buildings, but are usually innocuous.

**Appearance:** Psocids are very small, white, soft-bodied insects that may or may not have wings. Their uniquely enlarged clypeus (mouthparts) set them apart from other small insects.

**Life Cycle:** Females deposit egg cases in clusters often inside webbing or in papers or books. They feed on molds, fungi, and sometimes pollen in these areas.

**Where to Collect:** Booklice are usually found in humid environments where molds may grow on old papers or books.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Boxelder bug

**Order:** Hemiptera

**Family:** Rhopalidae

**Pest Status:** The boxelder bug feeds primarily on boxelder trees causing some damage. However, this insect's behavior of entering buildings during the late fall to pass the winter makes it a serious nuisance pest.

**Appearance:** Adult boxelder bugs are flat-backed, elongate, narrow, and about 1/2-inch long. They are brown-black with three lengthwise red stripes on the pronotum. The head is black with a red-orange proboscis and long, thin antennae. There are red veins in the wings and the abdomen is red underneath the wings.

**Life Cycle:** Females lay their eggs in the spring on the trunks and branches of box elder trees and the nymphs emerge within a few days. The nymphs develop into adults during the summer, mate, and lay eggs, which hatch into nymphs of the second generation.

**Where to Collect:** These insects gather in large numbers on the trunks of box elder trees in late summer/early fall.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Brownbanded cockroach

**Order:** Dictyoptera

**Family:** Blattellidae

**Pest Status:** This cockroach is a major pest in homes.

**Appearance:** Adult males are about 1/2-inch long and light brown, with fully developed wings. Females are shorter and wider than males and their wings do not cover the entire abdomen. Adults and nymphs have two broad bands extending across the body at the base of the abdomen and at mid-abdomen.

**Life Cycle:** Females deposit egg cases in clusters in furniture, under tables, on draperies, shelving, and ceilings. The egg capsule contains 14-16 eggs, and a female can produce more than 10 capsules in a lifetime. Eggs hatch in about two months; nymphs take 3-9 months to develop. Adults can live another six months after emergence.

**Where to Collect:** Adults prefer warm, dry areas such as on the upper walls of cabinets or inside pantries, closets, dressers, and furniture. It is more common to find them hiding nearer the ceiling than the floor and away from water sources. Adults are active at night.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Brown lacewing

**Order:** Neuroptera

**Family:** Hemerobiidae

**Pest Status:** This is a very beneficial insect predator and should be protected.

**Appearance:** Adults are red-brown to brown-gray. The fore wings are narrowly oval with a slightly pointed apex.

**Life Cycle:** Females lay their eggs singly on fir needles or between bud scales in early spring. Eggs hatch in approximately 10 days, depending on the temperature. When the larvae reach ¼-inch in length, they spin a silken cocoon and pupate on the underside of a leaf. There are one to 10 generations per year.

**Where to Collect:** Brown lacewings often can be found on the bark or branches of trees, usually in forests or orchards.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Bumble bee

**Order:** Hymenoptera

**Family:** Apidae

**Pest Status:** This is a very beneficial plant pollinator.

**Appearance:** Bumble bees are large (¾-inch to 1½-inch), hairy bees that are generally black and yellow.

**Life Cycle:** The queen lays several eggs in a crevice in the middle of the nest and then seals it with wax. Newly hatched larvae consume part of the nest, but are also fed by the queen through an opening in the cell wall. When the larvae are fully grown, they spin cocoons and eventually emerge as workers that forage for the colony and protect the nest.

**Where to Collect:** Bumble bees are often encountered foraging at flowers. Wooden sheds and barns are favorite nesting place of bumble bees, but they may nest nearly anywhere.



Photo Credit: David Cappaert, Michigan State University, Bugwood.org

**Common Name:** Cabbage butterfly

**Order:** Lepidoptera

**Family:** Pieridae

**Pest Status:** Cabbage butterfly caterpillars can cause damage to garden vegetables.

**Appearance:** The wings of cabbage butterflies are white-green with black tips. There are two submarginal black spots in females, and one in males.

**Life Cycle:** Adults lay eggs on the undersides of leaves, where the larvae also feed. The butterflies overwinter as pupae and emerge in early spring.

**Where to Collect:** Eggs are laid on the plants of the mustard family (crucifers), particularly cabbage and broccoli plants. They also are attracted to dandelions and *Luminaria* flowers.





Photo Credit: Keith Naylor, Bugwood.org

**Common Name:** Cabbage looper

**Order:** Lepidoptera

**Family:** Noctuidae

**Pest Status:** The cabbage looper feeds on a variety of crops, consuming foliage, and is one of the most destructive insect pests of vegetables.

**Appearance:** Cabbage loopers are a light-green color with light stripes extending down the back. They reach approximately 1½-inches long.

**Life Cycle:** Adults emerge in the spring, mate, and fly to a host plant. The eggs are smooth and light green, and within three days, larvae hatch from the eggs. The larvae develop over a month before spinning a silk cocoon in which they form a green-brown pupal case. Adults emerge in about 13 days. They feed on the undersides of leaves between the veins, skeletonizing plants.

**Where to Collect:** Loopers are present from early spring to late fall, usually close to where the immatures feed.

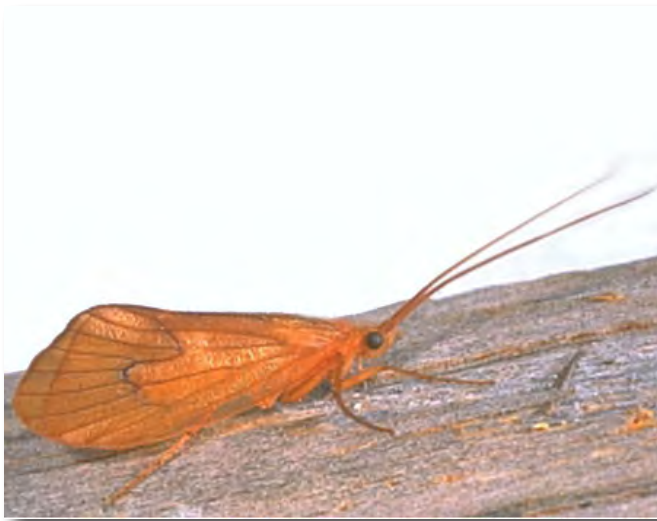


Photo Credit: Extension, Purdue University

**Common Name:** Caddisfly

**Order:** Trichoptera

**Family:** Limnephilidae

**Pest Status:** Caddisflies spend the majority of their life as immatures in aquatic habitats where they are an important source of food for fish.

**Appearance:** Adults are small (¼-inch or less), dull-colored and have long hair-like antennae. Caddisflies hold their wings tent-like over their back when at rest.

**Life Cycle:** A female lays her eggs on the edge of a body of water. Larvae develop over several months. Some species form and live in cases of sticks, sand grains, twigs, or other materials.

**Where to Collect:** Caddisflies are abundant near cool, fresh water habitats. Adults are usually nocturnal.



Photo Credit: Extension, Purdue University

**Common Name:** Camel cricket

**Order:** Orthoptera

**Family:** Gryllidae

**Pest Status:** Camel crickets are usually only nuisance pests when they occur in homes.

**Appearance:** Camel crickets are wingless and have a hump-backed appearance. They have long hind legs and are excellent jumpers.

**Life Cycle:** Females lay their eggs in the soil. The nymphs hatch from eggs and resemble small, wingless adults. Crickets shed their skins as they grow, molting several times before emerging as winged adults.

**Where to Collect:** These crickets live in cool, damp areas such as wells, rotten logs, stumps, and hollow trees. They can also occasionally reside in the basements of homes.



Photo Credit: Edward L. Manigault, Clemson University Donated Collection, Bugwood.org

**Common Name:** Carolina grasshopper

**Order:** Orthoptera

**Family:** Acrididae

**Pest Status:** Grasshoppers are known to occur in high numbers following very dry conditions. When in large numbers, serious damage to plants, including crops, can occur.

**Appearance:** Carolina grasshoppers have tan, brown, or gray bodies that are faintly speckled. The hind wing is black with a pale yellow margin.

**Life Cycle:** In late summer, females lay large clusters of eggs in the soil at a depth of 1½ inches. The eggs hatch and nymphs develop over a period of at least two weeks in a habitat of grass and weeds.

**Where to Collect:** In the morning, Carolina grasshoppers can be found sunning themselves on bare ground or dirt paths. As temperatures increase, the grasshoppers climb on vegetation, most often one to three inches above ground.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Carpenter ant

**Order:** Hymenoptera

**Family:** Formicidae

**Pest Status:** Carpenter ants have a much bigger reputation as a pest than they deserve. They can damage a home only when they hollow out nests areas inside key wooden structural areas. They most often nest out-of-doors where they are beneficial insects.

**Appearance:** Carpenter ants range in size from ¼ to ¾ inch, depending on whether the insect is a queen or a worker. Workers are brown, have large heads and small thoraxes.

**Life Cycle:** The queen establishes a nesting site in a wood cavity. The queen rears her first brood of workers, feeding them salivary secretions. The workers then gather food to feed more generations of larvae.

**Where to Collect:** Carpenter ants nest in moist wood, including rotting trees, tree roots, tree stumps, and logs or boards lying on or buried in the ground.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Carpenter bee

**Order:** Hymenoptera

**Family:** Apidae

**Pest Status:** Carpenter bees nest in a wide range of woods. They bore large tunnels into the wood in which they deposit their young. When they choose siding or soffits on homes, fences, utility poles, decks, or lawn furniture to bore into, they can create unsightly damage.

**Appearance:** Carpenter bees are large insects that resemble bumble bees. The upper surface of their abdomen is characteristically bare and shiny black, lacking the yellow hair that is so distinctive in bumble bees.

**Life Cycle:** Carpenter bees overwinter as adults in wood nests. They emerge in the spring and mate. Females excavate tunnels in wood and lay their eggs within a series of small cells.

**Where to Collect:** They are found foraging for pollen in flowers or near their nests.





Photo Credit: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org

**Common Name:** Carrion beetle

**Order:** Coleoptera

**Family:** Silphida

**Pest Status:** Carrion beetles are beneficial insects that help break down and decompose dead animal carcasses.

**Appearance:** Adults are black and orange, stout-bodied, and ½ to 1 inch in length.

**Life Cycle:** A female lays eggs on the body of a dead host. When the eggs hatch, the larvae feed on the carcass.

**Where to Collect:** Adults can be found wandering around or underneath dead animal carcasses.



Photo Credit: Pennsylvania Department of Conservation and Natural Resources, Forestry Archive, Bugwood.org

**Common Name:** Cecropia moth

**Order:** Lepidoptera

**Family:** Saturniidae

**Pest Status:** Cecropia moth caterpillars are very large, but seldom cause significant damage to trees because they occur singly rather than in large groups.

**Appearance:** Cecropia moths are conspicuous due to their large size (wings may span 4–6 inches). The body is red with a white collar and white bands on the abdomen. The wings are dark brown with white, hair-like scales giving a frosted appearance.

**Life Cycle:** Females lay their eggs on the leaves of host plants. When the eggs hatch, the larvae emerge and eat their eggshells. The newly hatched caterpillars molt four times before they spin cocoons of brown silk. They overwinter as pupae and emerge in the spring.

**Where to Collect:** Cecropia moths are especially prevalent in wooded areas, but can usually be seen flying at night.



Photo Credit: Extension, Purdue University

**Common Name:** Chinch bug

**Order:** Hemiptera

**Family:** Blissidae

**Pest Status:** Chinch bugs can cause economic damage to cereal crops and turfgrass.

**Appearance:** Chinch bugs are approximately ⅓-inch long. The head, pronotum and abdomen are gray-black in color and the wings are white with a black front-wing edge. The legs have a dark orange tint.

**Life Cycle:** Females lay their eggs on roots, stems, and leaves. After hatching, the nymphs feed by sucking juices from roots near or at the ground surface, but feed on upper plant parts as they mature. Chinch bugs seem to be most prevalent during drought conditions or in areas that are perpetually dry.

**Where to Collect:** Since chinch bugs are often turf pests, they can be found by parting the grass around expanding, irregular patches of dead or yellowing turf.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Cicada killer wasp

**Order:** Hymenoptera

**Family:** Sphecidae

**Pest Status:** Cicada killer wasps appear menacing, but they rarely ever sting people and should be considered a beneficial insect because they kill cicadas.

**Appearance:** The cicada killer wasp is large (approximately 1½ inches long) with a black body marked with yellow across the thorax and on the first three abdominal segments. The head and thorax are red and the wings are yellow.

**Life Cycle:** Cicada killer wasps dig burrows in sandy, bare, well-drained soil. They paralyze and drag a cicada into the hole upon which they lay their eggs. After hatching, the larvae feed on the cicada carcass inside the hole. Adult wasps emerge throughout the summer months.

**Where to Collect:** Cicada killers can be collected near where they nest in the ground.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Click beetle

**Order:** Coleoptera

**Family:** Elateridae

**Pest Status:** Click beetles are sometimes pests when the immatures (wireworms) eat the roots and tubers of plants.

**Appearance:** Click beetles are flattened, elongated, brown beetles that are about ½-inch long. They usually have distinctive backward-projecting points on the side corners of the pronotum.

**Life Cycle:** Adults and larvae overwinter in the ground, becoming active in the spring. Females dig burrows and lay their eggs around the bases of host plants. The eggs hatch within a few weeks and larvae develop through several molts over a few months. They pupate in the cells within the soil in late summer or fall and emerge as adults a few weeks later.

**Where to Collect:** Since adults are nocturnal, click beetles can be found congregating around lights at night.



Photo Credit: Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org

**Common Name:** Clover leaf weevil

**Order:** Coleoptera

**Family:** Curculionidae

**Pest Status:** Clover leaf weevils can damage alfalfa in much the same way as alfalfa weevil.

**Appearance:** Adults are brown with yellow scales, giving them a mottled appearance. They are up to four times larger than alfalfa weevils and lack any distinctive stripe down the back.

**Life Cycle:** Females lay their eggs in stems or stalks of host plants in late summer/early fall. The larvae hatch in the fall and spend the winter in the soil.

**Where to Collect:** Clover leaf weevils can be found in the crowns of plants or on host plant leaves.





Photo Credit: Extension, Purdue University

**Common Name:** Cluster fly

**Order:** Diptera

**Family:** Calliphoridae

**Pest Status:** Cluster flies can become nuisance pests in homes when they seek out sheltered places to pass the winter.

**Appearance:** Adults resemble house flies, but are slightly larger ( $\frac{5}{16}$ -inch long), narrower, and non-metallic gray. The thorax is without distinct stripes and contains yellow-golden hairs. The abdomen is hairy with light and dark patches of color.

**Life Cycle:** Females lay their eggs in the soil. Eggs hatch in three days and the larvae feed on earthworms for three weeks before pupating for two weeks. There are approximately four generations during the summer. Cluster flies overwinter as adults.

**Where to Collect:** Cluster flies sun themselves during the day on warm sides of buildings in late summer. As the sun goes down, the flies crawl into the buildings through cracks or small openings such as utility ports. They are easy to collect during the winter or early spring when they emerge inside buildings.



Photo Credit: Extension, Purdue University

**Common Name:** Codling moth

**Order:** Lepidoptera

**Family:** Tortricidae

**Pest Status:** Codling moth is the most serious pest of apples, but can damage other fruits and nuts as well. The immature stage bores into the center of the fruit creating “wormy apples.”

**Appearance:** Codling moth adults are approximately  $\frac{1}{2}$ -inch long with mottled gray wings that are held tent-like over their bodies. They can be distinguished from other moths by a dark, coppery-brown band at the tips of their wings.

**Life Cycle:** Adults emerge in late spring and lay eggs on fruit, nuts, leaves, and spurs. The eggs hatch within two weeks and larvae feed on the fruit of their host tree. After they complete development, the larvae drop from the trees to find pupation sites in the soil.

**Where to Collect:** Codling moths are often found in areas that contain fruit-bearing trees, such as an orchard.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Colorado potato beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** The Colorado potato beetle is a serious pest of potatoes, but it can also damage tomato, tobacco, eggplant, and other crops.

**Appearance:** Adults are approximately  $\frac{1}{2}$ -inch long with rounded outer wings marked with black and yellow-white stripes. The head is tan-orange with black markings.

**Life Cycle:** The Colorado potato beetle overwinters as an adult in the soil or under litter in gardens or fields. Adults become active in late spring/early summer. The larvae hatch from the eggs within two weeks and take an additional two weeks to reach the pupal stage. Larvae burrow into the ground to pupate and in five to ten days, the adult beetle emerges.

**Where to Collect:** Larvae and adults can be found feeding on the foliage of host plants.



Photo Credit: Brian Christine, Purdue University

**Common Name:** Common stalk borer

**Order:** Lepidoptera

**Family:** Noctuidae

**Pest Status:** Common stalk borers are notorious pests of corn, but can also damage other crops and ornamental plants such as tomatoes and certain flowers.

**Appearance:** Adult moths are gray-brown in color with small, white spots along the front edges and along the tips of the forewings. The hind wings are pale gray-brown.

**Life Cycle:** Females lay their eggs singly or in groups on grasses in late summer/early fall. The eggs overwinter and hatch in late spring when the larvae bore into the stalks of grasses and begin feeding. The adult moths emerge in early fall.

**Where to Collect:** Adults can be found near damaged host plants such as grasses, vegetables, fruits, and flowers. Larvae can be found by unrolling curled, damaged leaves of host plants.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Corn earworm

**Order:** Lepidoptera

**Family:** Noctuidae

**Pest Status:** Corn earworm caterpillars are responsible for most of the damage done to tip of the ear in sweet corn, but they can damage many other plants as well and are called tomato fruitworm or cotton bollworm depending upon where they are feeding.

**Appearance:** Adults are medium-sized, light-yellowish moths and have distinctively different color patterns in the underwings.

**Life Cycle:** Eggs are deposited on leaves and hatch within three to four days. Larvae find a suitable feeding site where they stay until larval development is complete. Mature larvae drop to the ground to pupate and adults emerge in late summer or early fall.

**Where to Collect:** Adults are nocturnal, so they are easiest to collect at night using a light trap.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Corn flea beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Corn flea beetles may become a pest in very young corn when they strip off the outer leaf layer.

**Appearance:** Corn flea beetles are oval-shaped, black insects that can be tinged with bronze or blue-green. They have yellow markings on the legs and are very small ( $\frac{1}{16}$ -inch long).

**Life Cycle:** Adults become active in the spring when soil temperatures reach 65°F. Females lay their eggs at the bases of host plants. The beetle overwinters as an adult in the soil.

**Where to Collect:** Adults are most active on sunny, warm, windless days. They hide in cracks in the soil during windy, cool, or cloudy periods. They are generally present in areas near cornfields, in fencerows, near roadsides and woods.





Photo Credit: Extension, Purdue University

**Common Name:** Cottony maple scale

**Order:** Homoptera

**Family:** Coccidae

**Pest Status:** The cottony maple scale only becomes a pest in prized ornamentals or when population numbers become very high.

**Appearance:** Scales are usually noticed when the females produce an egg sac that appears as a ¼ inch long ball of cotton. Heavy infestations can result in branches being turned completely white with egg sacs.

**Life Cycle:** Eggs are laid in late spring/early summer. Male scales complete development by fall and mate with immature females. The female scales migrate to stems and twigs to overwinter. In spring, the female reaches maturity and lays an egg sac.

**Where to Collect:** Scales are present on most hardwood trees, especially on the leaves and branches.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Crane fly

**Order:** Diptera

**Family:** Tipulidae

**Pest Status:** Crane flies are seldom a pest except when they develop very high populations in turfgrasses or pastures.

**Appearance:** Crane flies are large, tan-colored flies with very long delicate legs. They are often mistaken for large mosquitoes, but fortunately, these do not bite.

**Life Cycle:** Females lay their eggs in masses over open water or attach them to vegetation. Within three days, the eggs hatch and the larvae drop into the water to feed on organic debris. The larval stage lasts about four weeks followed by pupation lasting usually two days. Adults have a short, non-feeding, life span of five to ten days.

**Where to Collect:** Crane flies occur chiefly in damp situations with abundant vegetation.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Damsel bug

**Order:** Hemiptera

**Family:** Nabidae

**Pest Status:** Damsel bugs are beneficial predators on other small insects.

**Appearance:** Adults are tan or gray with piercing-sucking mouthparts and enlarged front legs for grasping prey. They have slender bodies that are approximately ½-inch long.

**Life Cycle:** Adults overwinter in the soil and in winter crops such as winter grain and alfalfa. Nymphs hatching from eggs develop through five instar stages in about two months. They are most abundant from mid-June through mid-August.

**Where to Collect:** Damsel bugs are abundant in gardens, orchards, and field crops such as cotton and soybeans.



Photo Credit: David Cappaert, Michigan State University, Bugwood.org

### **Common Name:** Damselfly

**Order:** Odonata

**Family:** Calopterygidae

**Pest Status:** Damselfly larvae live in water and are an important component in the food web.

**Appearance:** Damselflies have extremely large compound eyes that fill most of the head. They have two pairs of transparent membranous wings, a long, slender abdomen and jaws that extend underneath their heads.

**Life Cycle:** Females crawl down shoreline vegetation into the water to lay their eggs on the submerged portions of plants. Damselfly nymphs are predacious and must proceed through 10-12 instars before becoming fully developed. Thus, the life cycle of a damselfly can last one to two years.

**Where to Collect:** Damselflies are fast fliers, but can be collected by netting them as they fly near water or land on shoreline vegetation.



Photo Credit: Drees, University of Texas

### **Common Name:** Deer fly

**Order:** Diptera

**Family:** Tabanidae

**Pest Status:** Deer flies are fast fliers and vicious biters of people and livestock. They can also transmit diseases.

**Appearance:** Deer flies are slightly larger than house flies and are mostly yellow or black with darker stripes on the abdomen and dark markings or patterns on the wings. They have bright green or gold eyes with zigzag stripes.

**Life Cycle:** Females lay their eggs in clusters on vegetation near standing water or wet sites. The larvae hatch from the eggs and fall to the ground to feed upon decaying organic matter. Larvae may persist up to three years, depending on the species.

**Where to Collect:** Deer flies most often occur in damp environments, such as wetlands or forests. They will usually find the collector – not the other way around.



Photo Credit: Daniel R. Suiter, University of Georgia, Bugwood.org

### **Common Name:** Dermestid beetle

**Order:** Coleoptera

**Family:** Dermestidae

**Pest Status:** Dermestid beetles are very valuable in nature, because they help decompose dead carcasses and decaying organic matter. However, when they get into foods or inside homes, they can become serious pests.

**Appearance:** Adults are about ¼-inch long and are covered with hairs or scales that are usually brown or black, or patterned, and they vary in shape from elongated to oval.

**Life Cycle:** Eggs hatch within two weeks; larvae develop over five or six instars before pupating. The pupal stage usually lasts less than two weeks.

**Where to Collect:** Dermestid beetles are scavengers, so they can be found wherever there is rotting animal matter. However, dermestids can also be found in pantries feeding on cereal products, pet food, spices, and other dried foods.



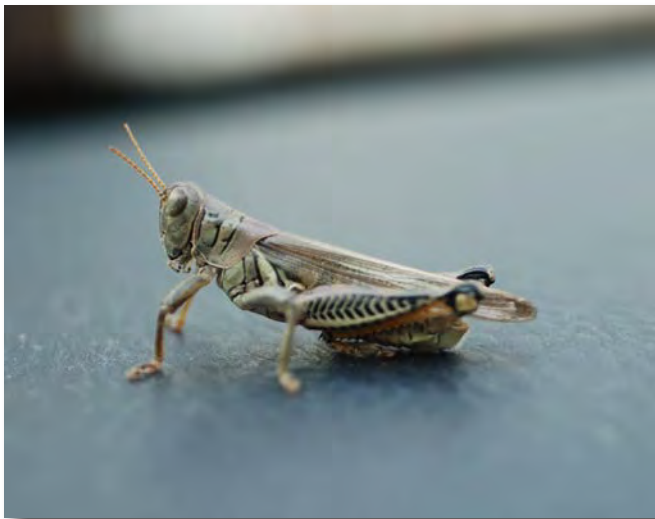


Photo Credit: Tim Gibb, Purdue University

**Common Name:** Differential grasshopper

**Order:** Orthoptera

**Family:** Acrididae

**Pest Status:** Grasshoppers can occur in large groups and can cause significant defoliation and crop damage when weather conditions are dry.

**Appearance:** Adults can grow up to 1¾-inches long. They have a shiny brown-yellow body with yellow or red antennae. The hind legs are yellow with characteristic black v-shaped markings.

**Life Cycle:** Eggs generally overwinter after they are deposited two inches deep in the soil. Nymphs hatch from the eggs in the spring and develop through five or six instars. Nymphs become adults within two months.

**Where to Collect:** Differential grasshoppers live in fields, open woods, and edges of ponds, streams, and lakes. They can best be collected with a net after they fly or jump.



Photo Credit: Drees Tamu

**Common Name:** Diving beetle

**Order:** Coleoptera

**Family:** Dytiscidae

**Pest Status:** Diving beetles are effective aquatic predators and are an important part of the food web.

**Appearance:** Diving beetles are dark green, brown, or black; smooth; and oval. They have a very hard shell. They vary in size depending upon the species but usually range between ¼ and 1½ inches. They have flattened, hairy hind legs adapted for swimming.

**Life Cycle:** Both adult and immature stages are aquatic insects and both are highly predacious. They mostly feed on other invertebrates, but sometimes on tiny fish.

**Where to Collect:** Diving beetles are common in brackish waters and slow-flowing streams and rivers. They can best be collected with water nets or in screens.



Photo Credit: Extension, Purdue University

**Common Name:** Dobsonfly

**Order:** Megaloptera

**Family:** Corydalidae

**Pest Status:** Dobsonflies are not pests.

**Appearance:** Dobsonflies are large (as long as 2 inches) and have long antennae. Their large, many veined forewings are often mottled. When at rest, wings are held flat over the back and extend beyond the abdomen. Both males and females have remarkable mandibles, but in males they are very long and curved.

**Life Cycle:** After hatching from eggs, the larvae live underwater for several years before coming to land to pupate. The pupal stage lasts for the winter and spring, after which the winged adults emerge. The adults typically live for only a few days, just long enough to mate and lay eggs.

**Where to Collect:** Adults are attracted to lights at night, but are strong fliers and can often be found considerable distances from water.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Dragonfly

**Order:** Odonata

**Family:** Aeshnidae

**Pest Status:** Dragonflies are beneficial predatory insects both in the adult and immature stages.

**Appearance:** Dragonfly adults are often brightly colored and have long, slender abdomens. They also have two pairs of long, slender wings with net-like veins. The wings do not fold and are held outstretched when at rest. Both pairs of wings usually have a stigma (colored patch) near the middle of the leading edge.

**Life Cycle:** Eggs can be laid inside plants, in water, or along the shorelines of a bodies of water. Within a week the eggs hatch, and larvae go through 12 to 15 instars in as little as two months. After emerging, most dragonflies leave the water and go through a month-long period of maturation during which the body color brightens.

**Where to Collect:** Dragonflies are often found near lakes, streams, and ponds.



Photo Credit: Extension, Purdue University

**Common Name:** Earwig

**Order:** Dermaptera

**Family:** Forficulidae

**Pest Status:** Earwigs are considered nuisance pests in most situations. They are attracted to and occur in great numbers in and around areas where people live.

**Appearance:** Earwigs are approximately 1 inch long and are easily recognized by their red-brown color, short wings, and prominent forceps-like appendages at the tip of the abdomen.

**Life Cycle:** During the spring and fall, females lay their eggs 2 inches deep in the soil. Females move, clean, and provide protection for the eggs until the first molt. The larvae leave the nest and mature in one season. Both eggs and adults overwinter.

**Where to Collect:** Earwigs require moist, cool places and are found in damp crawl spaces, flower gardens, compost piles, and trash and under boards in wood piles. Because they are attracted to lights, they may be collected in light traps.

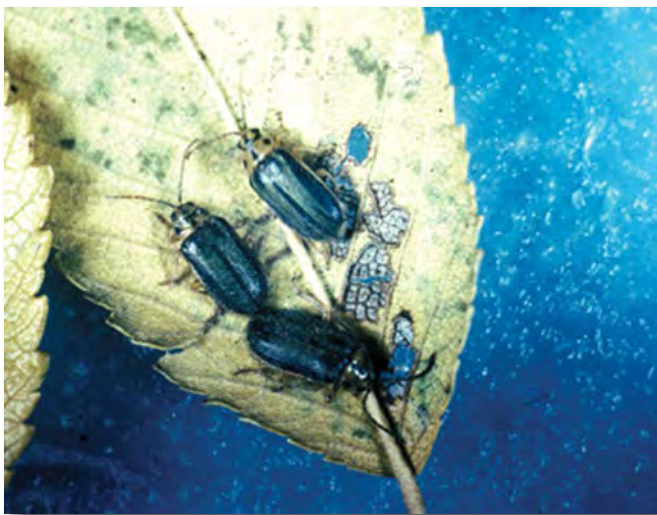


Photo Credit: Extension, Purdue University

**Common Name:** Elm leaf beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Elm leaf beetles can defoliate elm trees when populations are high. They are also attracted to homes in late fall where they can become nuisance pests when they occur in great numbers.

**Appearance:** Adults are about 1/4-inch long and elongated in shape. They vary from yellow when young to olive green when mature, with a black stripe along the outer edge of the wing covers. There are four black spots on the thorax.

**Life Cycle:** Adults overwinter and lay yellow eggs on elm leaves in the spring. After feeding in the canopy for several weeks, the larvae crawl down the tree trunk and develop into pupae.

**Where to Collect:** Adults overwinter in bark, litter, and woodpiles or in buildings. In the spring and summer, they can be found feeding on the leaves of elm trees.





Photo Credit: David Cappaert, Michigan State University, Bugwood.org

**Common Name:** Emerald ash borer

**Order:** Coleoptera

**Family:** Buprestidae

**Pest Status:** Emerald ash borers are a very serious, introduced pest that kills ash trees.

**Appearance:** Adults are flat-headed and bullet-shaped beetles with large black eyes. The adult's body is dark metallic green, 1/2-inch in length, and 1/8-inch wide.

**Life Cycle:** Adults emerge in early to mid-summer. Females begin laying eggs about two weeks after emergence. Eggs hatch in one to two weeks. The larvae bore through the bark of ash trees and feed for several weeks, leaving characteristic, S-shaped tunnels. This kills the tree. Pupation occurs in the spring. Emerald ash borers leave a D-shaped exit hole in the bark when they emerge in the spring. Emerald ash borers often are artificially spread by people who unwittingly move firewood that contains borers from infested areas to un-infested areas.

**Where to Collect:** Collect ash borers from ash trees in infested areas.

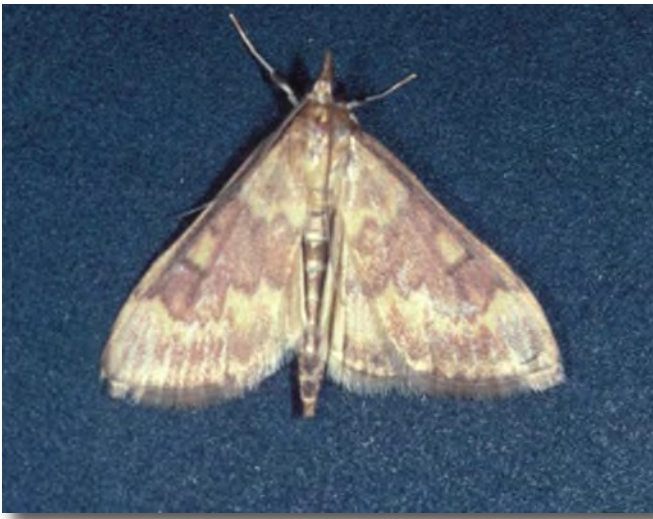


Photo Credit: Frank Peairs, Colorado State University, Bugwood.org

**Common Name:** European corn borer

**Order:** Lepidoptera

**Family:** Pyralidae

**Pest Status:** European corn borers are serious annual pests of both sweet, seed, and field corn.

**Appearance:** Adults are small, tan, and about 1/2-inch long. They hold their wings in a delta shape at rest. Females have a thick body and light-colored wings, whereas the males have darker tan wings and a thinner body.

**Life Cycle:** European corn borers overwinter as larvae in corn stalks left from the previous growing season. As temperatures increase, the larvae enter the pupal stages for two weeks before developing into adults. The adults generally emerge in late summer.

**Where to Collect:** Moths aggregate in weedy or grassy areas, normally along field margins. They may also be collected at lights.



Photo Credit: Extension, Purdue University

**Common Name:** Field cricket

**Order:** Orthoptera

**Family:** Gryllidae

**Pest Status:** Field crickets are considered nuisance pests in most situations. They can cause injury to plants but normally do very little damage.

**Appearance:** Field crickets are dark brown to black insects that are over 1 inch long. They have long antennae and long, well-developed hind legs for jumping.

**Life Cycle:** Crickets spend the winter as eggs that usually hatch in late spring, though temperature and rainfall can affect the time of hatching. Newly emerged crickets can walk and jump immediately after hatching. They pass through approximately eight nymphal instars before becoming adults. Adults emerge in late summer and die in early fall.

**Where to Collect:** Crickets spend the day in warm, dark cracks and emerge at night to feed. They are most active at night and can sometimes be located by their distinctive chirping.



Photo Credit: Tim Gibb, Purdue University

**Common Name:** Firefly/Lightning beetle

**Order:** Coleoptera

**Family:** Lampyridae

**Pest Status:** Lightning beetles are not pests.

**Appearance:** Most adult lightning beetles are long (½-inch) and narrow, with a black head; a red section behind the head with dark markings; and flexible, dark-brown wing covers edged with yellow. Their most notable feature is the underside of the abdomen: the last few segments are colored green-yellow, forming a “tail light.”

**Life Cycle:** Winter is spent in the larval stage in chambers formed in the soil. They pupate in the spring and emerge as adults in late spring or early summer. The life cycle of most species extends for two years. Lightning beetles are predators.

**Where to Collect:** Many species can be found in marshes or in wet, wooded areas where their larvae have abundant sources of food. Adults are active at night and can easily be collected with a net following their distinctive flash.



Photo Credit: Extension, Purdue University

**Common Name:** Flea

**Order:** Siphonaptera

**Family:** Pulicidae

**Pest Status:** Fleas are external parasites of vertebrates. The cat flea is a particularly annoying pest of dogs and cats.

**Appearance:** Fleas are small (¼-inch long), agile, dark-colored, wingless insects with tube-like mouthparts that are adapted to feeding on the blood of hosts. Their bodies are laterally compressed, and they have long legs that are well-adapted for jumping.

**Life Cycle:** After a blood meal, females lay their eggs in the hair coat of a host. The eggs fall from the hair and hatch in a few days. The larvae take a few weeks to develop; they hide in floor cracks, under rug edges, and in furniture. The pupae mature to adulthood in a silken cocoon in about two weeks.

**Where to Collect:** Fleas may be found on pets throughout the year, but numbers increase dramatically during spring and early summer.



Photo Credit: Johnny N. Dell, Bugwood.org

**Common Name:** Fungus gnat

**Order:** Diptera

**Family:** Sciaridae

**Pest Status:** Normally fungus gnats are nuisance pests, but when their populations become great, they can be pests in sensitive environments such as hospitals or food plants. In homes fungus gnats are usually associated with over-watered plants. When the potting soils are allowed to dry out, fungus growth ceases and fungus gnats disappear.

**Appearance:** Fungus gnats are normally quite small and have one pair of long, delicate wings and long legs.

**Life Cycle:** Eggs are often laid in moist soils or other organic matter. When the eggs hatch, the larvae feed on the mold and fungi that develop.

**Where to Collect:** Fungus gnats are very common near mulched flowerbeds in the early spring. They may be easily collected from windows close by as they are attracted to lights.





Photo Credit: Extension, Purdue University

**Common Name:** German cockroach

**Order:** Dictyoptera

**Family:** Blatellidae

**Pest Status:** German cockroaches are the most common kitchen insect pests in most areas of the world.

**Appearance:** The German cockroach is about ½-inch long. It is tan to light brown and has two dark, parallel streaks running from the head to the base of the wings. Although it has wings, it is unable to sustain flight.

**Life Cycle:** Eggs are carried by the female in an external egg case until just before hatching occurs. The nymphal stage begins when the eggs hatch and nymphs must pass through approximately six instars within two months to complete development.

**Where to Collect:** German cockroaches need moisture and can be found in kitchens, bathrooms, and utility rooms. They can also be found hiding in cracks around cabinets, closets, pantries, stoves, refrigerators, and dishwashers.



Photo Credit: Edward L. Manigault, Clemson University Donated Collection, Bugwood.org

**Common Name:** Giant water bug

**Order:** Hemiptera

**Family:** Belostomatidae

**Pest Status:** Water bugs are not pests but may deliver a painful bite if mishandled.

**Appearance:** Giant water bugs are 2½-inches long and brown in color. Their bodies are flat, elongated ovals in shape, but pointed at both ends. The front legs are enlarged and pincer-like. A short beak is visible on the front of the underside of the head.

**Life Cycle:** During warm months, females attach eggs to underwater vegetation. After hatching, the wingless nymphs resemble small adults. They molt several times before becoming full-sized, winged adults. Adults usually overwinter.

**Where to Collect:** Water bugs prefer clear, freshwater streams and ponds, especially those with aquatic vegetation. When they complete their development, the adult forms leave the water for a short time to mate. In so doing they are highly attracted to lights to find mates and may be collected under street and porch lights during late summer.



Photo Credit: Extension, Purdue University

**Common Name:** Green June beetle

**Order:** Coleoptera

**Family:** Scarabaeidae

**Pest Status:** The green June beetle grub can become a pest of turfgrass when thatch is very thick. Sometimes adults are pests in ripe fruits or vegetables.

**Appearance:** Adults are usually 1-inch long and ½-inch wide. The body is green, with or without lengthwise tan stripes on the wings. The underside is metallic green or gold, bearing legs with stout spines to aid in digging.

**Life Cycle:** Green June beetles overwinter as mature grubs and resume feeding in the spring. The third instar larvae form protective cases composed of soil particles for pupation, which occurs in mid-summer. Adult development usually requires two to three weeks. The adults then emerge from the soil to mate.

**Where to Collect:** Green June beetles are abundant in areas that are rich in organic matter. Manure, rotting hay, and stable manure all encourage green June beetle infestation.



Photo Credit: Brian Christine, Purdue University

**Common Name:** Green lacewing

**Order:** Neuroptera

**Family:** Chrysopidae

**Pest Status:** Green lacewings are very beneficial insect predators and are often propagated by organic landscapers and gardeners. They should always be conserved when possible.

**Appearance:** Adults are soft-bodied insects with four membranous wings, golden eyes, and green bodies.

**Life Cycle:** Females lay their eggs on silken stalks attached to plant tissues. The eggs hatch about four days after being laid and the larvae develop through three instars before pupating. Pupation occurs in loosely woven cocoons that are attached to plants or under loose bark. All stages of lacewings can overwinter.

**Where to Collect:** Green lacewings are generalist predators and are commonly found in agricultural, landscape, and garden habitats. Adults often fly at night and are seen when drawn to lights.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Ground beetle

**Order:** Coleoptera

**Family:** Carabidae

**Pest Status:** Ground beetles are very common and are often mistaken as pests. In truth, these are predators on other potential pests that occur in or on the soil.

**Appearance:** Although there is some variation in body shape and coloring, most ground beetles are shiny, black, and have ridged wing covers. They range from 1/2- to 1 1/2-inches long, are somewhat flattened, and have narrow heads.

**Life Cycle:** Females lay their eggs in the soil. After hatching, the larvae feed and grow for one to two years and pupate in small chambers made of soil. Many species spend the winter in these chambers and the adults emerge in the spring.

**Where to Collect:** Ground beetles normally live outdoors under stones, logs and boards. They can be attracted to light and occasionally crawl into houses through cracks in windows and doors.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Gypsy moth

**Order:** Lepidoptera

**Family:** Lymantriidae

**Pest Status:** Gypsy moths have killed thousands of acres of hardwood forests throughout the Northeast and into the Midwest.

**Appearance:** Gypsy moths have wings with variable patterns or black spots and bands. Male have brown functional wings and feathery antennae. Females are cream-colored, have thread-like antennae and cannot fly.

**Life Cycle:** Caterpillars prefer oaks, but may feed on several hundred different species of trees. Female moths lay egg masses indiscriminately on trees, houses, and other structures in late summer. Often campers unknowingly spread this pest when egg masses are attached to recreational vehicles. Gypsy moths survive the winter in the egg stage and hatch in the spring when temperatures are above 60°F. Eggs are laid in mid- to late-summer.

**Where to Collect:** Gypsy moths are easily found in infested forests.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Hackberry psyllid

**Order:** Hemiptera

**Family:** Psyllidae

**Pest Status:** Hackberry psyllids are so small that they can become a nuisance pest by crawling through the screens of windows. They are the cause of hackberry nipple galls on leaves. Even though the gall does not damage the health of the tree, it does make the leaves unsightly.

**Appearance:** Adults are about 1/8-inch long, black-and-white mottled with dark spots on the wings. Their wedge-shape bodies and clear membranous wings cause them to resemble tiny cicadas.

**Life Cycle:** In spring, the adults emerge from leaf litter to mate and deposit their eggs. The nymphs feed on leaves and remain there throughout the summer. Adults emerge in early fall.

**Where to Collect:** Adults can be found in crevices of bark, in buildings at window and door ledges and in vegetation.



Photo Credit: Extension, Purdue University

**Common Name:** Head louse

**Order:** Anoplura

**Family:** Pediculidae

**Pest Status:** Head lice are external parasites of people and are considered pests. They have increased in importance in recent years, due to the development of resistance to insecticides.

**Appearance:** Head lice are small, wingless insects that feed by sucking blood. They are normally cream colored but after a blood meal the mid gut area may appear dark red or black. They have unique legs, designed specifically for holding onto hair.

**Life Cycle:** Eggs are attached with a glue-like substance to the lower shaft of a hair. They require about one week to hatch and a month to complete development. Head lice are almost always found on the head and are particularly common in school age children. They are transmitted by sharing hats, brushes or simply head to head contact. Head lice are so closely adapted to their host that they cannot survive long way from their host.

**Where to Collect:** Head lice can only be found on people.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Hessian fly

**Order:** Diptera

**Family:** Cecidomyiidae

**Pest Status:** Hessian flies are important pests of cereal crops. Their management has dictated cropping practices such as the “fly-free date” for wheat throughout much of the country.

**Appearance:** Hessian fly adults are small, delicate, dark, long-legged, two-winged insects that somewhat resemble mosquitoes. Females are slightly larger than males (1/8-inch long) and their bodies have a red tint. Males are smaller and have two pairs of abdominal claspers.

**Life Cycle:** Adults emerge in mid-fall to mate and lay eggs. The larvae are present through late-fall and feed on juices that they extract from the base of nearby plants. They overwinter in the pupal stage and adults emerge in the spring.

**Where to Collect:** Hessian flies can be found in crop fields, particularly wheat, barley, and rye.



Photo Credit: D. Ditchburn

**Common Name:** Honey bee

**Order:** Hymenoptera

**Family:** Apidae

**Pest Status:** Honey bees are an extremely valuable insect, not only because they have been domesticated and produce honey and wax, but also because they are efficient plant pollinators.

**Appearance:** Honey bees are about ½-inch long and have brown, hairy, yellow-striped abdomens.

**Life Cycle:** Bees are social insects. Eggs are laid singly in cells in a wax honeycomb that is produced by the worker bees. Larvae are initially fed with jelly produced by the worker bees, but they eventually switch to honey and pollen. The larvae undergo several moltings before spinning a cocoon and pupating. Drones hatch from unfertilized eggs and females hatch from fertilized eggs.

**Where to Collect:** Honey bees can be easily found around flowers and flowering trees. Beekeepers raise them in artificial hives by the thousands.



Photo Credit: Extension, Purdue University

**Common Name:** Horntail

**Order:** Hymenoptera

**Family:** Siricidae

**Pest Status:** Horntail wasps are seldom found in sufficient numbers to be considered pests.

**Appearance:** Adults resemble typical wasps, but each has a long abdomen with a spear-like plate on the last abdominal segment. They are relatively large and vary in length from ½ to ¾ inch. The females are marked with bright yellow and black and have long ovipositors. Males are mostly black.

**Life Cycle:** Females deposit their eggs in “drilled” holes in the bark of trees. The larvae hatch and bore down into the tree, living there for up to two years before they pupate. When the adults emerge, they leave small holes in the timber.

**Where to Collect:** Horntails can be found where there are many dead, dying, or recently felled trees.



Photo Credit: Drees, University of Texas

**Common Name:** Horse fly

**Order:** Diptera

**Family:** Tabanidae

**Pest Status:** Horse flies are vicious biters and may draw blood from people, as well as from horses and other animals.

**Appearance:** Horse flies are large (¾- to 1-inch long) and heavy-bodied with large heads. They can be brown, black, or gray and their eyes are sometimes crossed with red-gold bands.

**Life Cycle:** Eggs are deposited in masses on vegetation near water. The eggs hatch within two weeks and the larvae drop down and burrow into moist soil found in marshes, stream banks, and bottoms of lakes and ponds. The larvae overwinter in these soils and eventually mature in the late spring. Pupation occurs in drier soil and usually lasts one week. The adults appear in early summer.

**Where to Collect:** Horse flies are most active in hot weather. They also prefer wet environments.





Photo Credit: Extension, Purdue University

**Common Name:** House fly

**Order:** Diptera

**Family:** Muscidae

**Pest Status:** House flies are filth-breeding insects and can transmit diseases that adhere to their bodies.

**Appearance:** Adults are ½-inch long and have gray thoraxes with four dark longitudinal lines on the back. The undersides of their abdomens are yellow, and their bodies are covered with hair. They have red, compound eyes.

**Life Cycle:** Females lay their eggs singly in moist environments. The larvae develop over two weeks and the pupal stage lasts less than one week. Adults live for two months during warmer months.

**Where to Collect:** During daylight hours, house flies will rest on floors, walls, and ceilings indoors. Outdoors, they will rest on plants, the ground, fence wires, and garbage cans. In all situations, they prefer edges or thin objects such as wires and strings.



Photo Credit: Howard Ensign Evans, Colorado State University, Bugwood.org

**Common Name:** Ichneumon wasp

**Order:** Hymenoptera

**Family:** Ichneumonidae

**Pest Status:** Ichneumon wasps are parasites of wood-boring beetle grubs.

**Appearance:** Adults can range in length from ¼ to 5 inches. Most are slender. The most distinctive feature is that the female of many species has an extremely long ovipositor for laying eggs deep into the trunk of a tree. They have brown bodies with black and yellow markings and transparent wings.

**Life Cycle:** Most species overwinter in cocoons as mature larvae. The larvae hatch from eggs inserted into tunnels in the bark of trees. The larvae develop through several instar stages before pupating. Adults emerge in the spring.

**Where to Collect:** Ichneumonids are found around dead, deciduous trees.



Photo Credit: Extension, Purdue University

**Common Name:** Indian meal moth

**Order:** Lepidoptera

**Family:** Pyralidae

**Pest Status:** Indian meal moths are common pests of stored foods in homes as well as in food handling establishments.

**Appearance:** Adults are small (⅜-inch long) with a wingspan of about ⅝ inch. The overall body color is generally brown-gray, but the tip half of the wing is rust or bronze colored.

**Life Cycle:** Female moths lay their eggs singly or in clusters on suitable larval food. The larvae hatch from the eggs and produce silken tunnels for protection while feeding. Larval development time varies with temperature and type of food material. Before pupating, the larvae leave the food source.

**Where to Collect:** Moths are often found flying in kitchens and other rooms of the house. Sometimes, the appearance of moths is an indication of a breeding population of larvae in some type of stored food.



Photo Credit: Extension, Purdue University

**Common Name:** Japanese beetle

**Order:** Coleoptera

**Family:** Scarabaeidae

**Pest Status:** Japanese beetles are serious pests of turfgrass when they are grubs and also serious pests of many plants (trees, shrubs, flowers, fruits, and agronomic crops) when they become adults.

**Appearance:** The Japanese beetle is about ½-inch long with shiny copper-colored wing covers and a shiny green top of the thorax and head. The abdomen has a row of white hair tufts of hair on each side.

**Life Cycle:** The larvae overwinter in cells beneath the soil surface. In the spring, the larvae move upward to complete feeding and to pupate. Adults emerge from the ground in mid-summer and the females deposit their eggs in the soil. The eggs hatch about two weeks after deposition, normally between July and August.

**Where to Collect:** The adults are general herbivores and can be found on all types of plants.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** June beetle

**Order:** Coleoptera

**Family:** Scarabidae

**Pest Status:** June beetles (often called May beetles) feed on tree leaves as adults and grass roots as grubs. In most situations the damage is only minimal.

**Appearance:** June beetles range from ¼ to 1 inch in length. The adults have red-brown or black bodies and have an oval shape.

**Life Cycle:** May or June beetles usually have a two-year life cycle. Females tunnel into the soil to deposit their eggs. In three to four weeks, the larvae hatch from the eggs and develop through three instars. In spring and early summer, the larvae pupate deep in the soil. Adults emerge in about three weeks.

**Where to Collect:** Adults are nocturnal and are highly attracted to lights in spring and early summer. Most species prefer open woods, meadows, lawns, grasslands, cultivated fields, and ornamental plant beds.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

**Common Name:** Katydid

**Order:** Orthoptera

**Family:** Tettigonidae

**Pest Status:** Katydid are very minor pests that feed on leaves and make a loud, irritating noise during the evening hours.

**Appearance:** Adults range in size from 1¼ to 5 inches long. Most katydids are green with leaf-shaped wings that are held roof-like over their bodies. They have the general shape of grasshoppers with antennae usually longer than their bodies and large hind legs.

**Life Cycle:** Females lay gray, oval, flat eggs in leaves where they feed. Nymphs appear in late spring and require two to three months to mature. There is one generation per year.

**Where to Collect:** Katydid are found in trees and on other plants in grassland areas and forests. They are particularly attracted to light sources.





Photo Credit: John Obermeyer, Purdue University

### **Common Name:** Lace bug

**Order:** Hemiptera

**Family:** Tingidae

**Pest Status:** Lace bugs can cause serious damage to nursery and ornamental plants.

**Appearance:** Lace bugs are small insects (¼- to ⅛-inch long), broad, flattened, and somewhat rectangular in shape. Their bodies are usually brown or black, but their wings are partially transparent and lace-like.

**Life Cycle:** The female lays her eggs on the lower leaf surface and covers them with a brown substance. Most species have five nymphal instars before becoming adults. Each generation, from egg to adult, takes approximately one month. There may be three to five generations per year.

**Where to Collect:** Lace bugs attack a wide range of deciduous trees and shrubs.



Photo Credit: Extension, Purdue University

### **Common Name:** Lady beetle

**Order:** Coleoptera

**Family:** Coccinellidae

**Pest Status:** Lady beetles are very beneficial, especially as aphid consumers.

**Appearance:** Lady beetles are small, round, and dome-shaped. The most well known lady beetles have black markings on red, orange, or yellow forewings, but some are black.

**Life Cycle:** In the spring, overwintering adults find food and the females lay their eggs, often near aphid colonies. The eggs hatch in three to five days and the larvae feed on aphids or other small insects. After two to three weeks, they pupate. Adults emerge within a week. There may be five to six generations per year.

**Where to Collect:** In the fall, lady beetles aggregate along the bases of trees, along fencerows, under fallen trees, or under rocks to protect themselves from cold temperatures. One species of lady beetles becomes a nuisance pest because it congregates in and around homes.



Photo Credit: Arnold T. Drooz, USDA Forest Service, Bugwood.org

### **Common Name:** Locust leafminer

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Locust leaf miners can cause the leaves of trees to appear unsightly. High populations can cause minor injury.

**Appearance:** Adults are small, flattened beetles that are about ½-inch long. Their heads are black and the thorax and outer margins of the wing covers are orange. They have a prominent black dorsal stripe extending down their backs. The wing covers are deeply pitted and have three longitudinal ridges.

**Life Cycle:** Adults overwinter in bark crevices or leaf litter and emerge in the spring. Eggs are deposited on the underside of leaves. Upon hatching, the larvae feed together in blister-like mines. Shortly after, they disperse and excavate their own mines in preparation for pupation. There are two generations per year.

**Where to Collect:** Leaf miners are commonly found around fruit-bearing trees.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Longhorned beetle

**Order:** Coleoptera

**Family:** Cerambycidae

**Pest Status:** Longhorned beetles are the adult stage of many of the wood borers that sometimes damage trees. Most often, however, people find them in already dying trees and mistakenly assume that they are the cause.

**Appearance:** Adults vary in size from ¼ to 2¼-inches in length. They characteristically have very long antennae. The body is long and cylindrical.

**Life Cycle:** After mating, females chew oval pits in host trees and lay their eggs. The eggs hatch and young larvae bore into the trunk to feed. After pupating, the adult beetle then chews its way out to create the characteristic emergence hole.

**Where to Collect:** Longhorned beetles prefer stressed, dead, or dying trees. Peeling the bark back from or splitting these trees often reveals longhorned beetles.



Photo Credit: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org

**Common Name:** Luna Moth

**Order:** Lepidoptera

**Family:** Saturniidae

**Pest Status:** Luna moths are not considered pests.

**Appearance:** An adult luna moth is very large (4- to 5-inch wing), and has pale-green wings, each with a transparent eyespot. The outer margins of the wings are either pink or yellow. The hindwings have unique long, curving tails.

**Life Cycle:** Females lay their eggs on the undersides of leaves. Eggs hatch after one to two weeks. The larvae go through five instars before forming cocoons. Pupation takes approximately two weeks.

**Where to Collect:** Luna moths can be found in forested areas of North America; they prefer deciduous woodlands. Adults usually fly at night and are often attracted to large lights at construction sites or athletic fields.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

**Common Name:** Mayfly

**Order:** Ephemeroptera

**Family:** Baetidae

**Pest Status:** Mayflies are beneficial insects in aquatic ecosystems, both as an important source of fish food and also because their presence or absence can indicate water pollution.

**Appearance:** Mayflies are soft-bodied insects with very short antennae and two long cerci at the end of the abdomen. Most adult mayflies have two pairs of wings, with the second pair being much smaller than the first.

**Life Cycle:** Adults are short-lived, surviving only one or two nights. The eggs are deposited while flying low over the water. The immature stages develop through several instars, but the precise number of molts varies depending on the species. The larvae swim to the water surface before they become adults, then fly off to mate. The adult stage is very short.

**Where to Collect:** Mayflies are found around streams, lakes, or ponds and are attracted to lights.





Photo Credit: Extension, Purdue University

**Common Name:** Mexican bean beetle

**Order:** Coleoptera

**Family:** Coccinellidae

**Pest Status:** Mexican bean beetles are the only member of this family that is considered a serious pest.

**Appearance:** The copper-colored adults resemble large lady beetles. They are 1/4-inch long with eight black spots on each wing.

**Life Cycle:** Adults overwinter and emerge when temperatures increase, usually mid-summer. After feeding, the females lay their eggs on the undersides of foliage. They hatch within a week during warm weather. The larvae feed for two to five weeks before pupating. When pupating, a larva fastens the tip of its abdomen to a part of the plant and sheds its larval skin. The pupal stage lasts for a week before the adult emerges.

**Where to Collect:** Adults are most commonly encountered on garden and field beans and cowpeas.



Photo Credit: Tim Gibb, Purdue University

**Common Name:** Midge (chironomid midge)

**Order:** Diptera

**Family:** Chironomidae

**Pest Status:** This group of midges is informally known as chironomids or non-biting midges and are thus not considered pests.

**Life Cycle:** Chironomids are distributed globally, but are always associated with water, where the immature stages live. The immature forms are sometimes referred to as blood worms, because they are red. They are considered an important source of food for fish.

**Appearance:** Many species superficially resemble mosquitoes, but they lack wing scales and elongated mouthparts.

**Where to Collect:** Midges are commonly found flying near water, but are also attracted to lights at night.



Photo Credit: Tom Murray, Bugguide.net

**Common Name:** Mimosa webworm

**Order:** Lepidoptera

**Family:** Galactiidae

**Pest Status:** Mimosa webworms are pests of locust trees, because they can damage leaves.

**Appearance:** The larvae are gray to dark brown, sometimes tinged with pink. A larva is 1/2 to 1 inch in length and has five white stripes that extend down the body.

**Life Cycle:** Adults appear in mid-summer and lay their eggs on the surfaces of foliage. The larvae hatch and begin tying foliage together with silk. Feeding continues throughout the summer until pupation occurs. New moths appear in fall. The pupae of the second generation overwinter.

**Where to Collect:** Adults and young are found near their host plants: mimosa and honey locust trees.



Photo Credit: Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org

**Common Name:** Mole cricket

**Order:** Orthoptera

**Family:** Gryllotalpidae

**Pest Status:** Mole crickets are pests of turfgrass in the southern states, where their tunneling can create damage.

**Appearance:** Adults are plump, winged, and 1- to 1¼-inches long. They have robust front legs that are highly modified for digging.

**Life Cycle:** Mole crickets overwinter as adults and nymphs. The adults emerge in early spring and begin mating. The females construct egg chambers and lay their eggs inside. The eggs take three to four weeks to hatch, depending on the temperature. Newly hatched nymphs begin to feed and tunnel immediately after hatching and molt eight to ten times in four months. Adults spend late fall and winter in the soil.

**Where to Collect:** Mole crickets are often found in well-maintained turfgrass systems. Southern species are also attracted to lights.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Monarch butterfly

**Order:** Lepidoptera

**Family:** Nymphalidae

**Pest Status:** Monarch butterflies are not pests.

**Appearance:** Adults are about 3½-inches long and are bright orange with black wing veins and outer margins. The hindwings are rounded and lighter in color than the forewings.

**Life Cycle:** Adult female monarchs lay their eggs on the undersides of milkweed leaves. These eggs hatch, depending on temperature, in 3 to 12 days. Larvae feed on leaves for about two weeks and then attach themselves to twigs to pupate. The adults emerge in about two weeks.

**Where to Collect:** Monarchs are found around milkweed plants and are present most of the spring, summer and early fall. They are known for their long migrations (up to 1,800 miles) to pass the winter in a specific valley of Mexico, even though each migrant is three generations removed from its ancestor that overwintered there the previous year.



Photo Credit: J. Gathany, Centers for Disease Control and Prevention

**Common Name:** Mosquito

**Order:** Diptera

**Family:** Culicidae

**Pest Status:** Mosquitoes are the most serious pests threatening human health in the world.

**Appearance:** Most mosquitoes are ¼- to ½- inches long and have two wings covered in scales. Males differ from females by having feathery antennae and mouthparts incapable of piercing skin.

**Life Cycle:** Female mosquitoes lay their eggs together in rafts on the surface of water. Most eggs hatch into larvae in about two days. The larvae live in the water for two weeks until they pupate. The pupae float on the surface of the water. The adults emerge in two days. Most mosquito species overwinter as eggs.

**Where to Collect:** Most adults remain fairly close to the breeding site that they lived in as larvae. Collectors seldom have to look far in these locations, as the mosquitoes will come to them.





Photo Credit: J. Dell, www. forestryimages.org

**Common Name:** Mud dauber wasp

**Order:** Hymenoptera

**Family:** Sphecidae

**Pest Status:** Mud dauber wasps are considered nuisance pests when they nest close to human activity. They may sting if handled.

**Appearance:** Mud daubers are long (½- to 1-inch), slender wasps with thread-like waists. They vary in color.

**Life Cycle:** Mud daubers create unique nests of mud that are often plastered to man-made structures. Most capture spiders and carry them to the nest to feed to their developing larvae. The legless larvae reach up to 1-inch long and are cream-colored. They pupate in cocoons within the nest and overwinter. The adults emerge the following summer.

**Where to Collect:** Adults construct their nests on porches, decks, sheds, eaves, attics, ceilings, and walls and under roof overhangs. Adults are easily netted close to their nests.



Photo Credit: Brian Christine, Purdue University

**Common Name:** Northern corn rootworm

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Corn rootworm larvae are serious pests of field corn when they feed on the roots and cause the corn to lodge or die. The adults also disrupt pollination when they feed on the silks.

**Appearance:** Adults are only ¼-inch in length. Newly emerged adults are cream-colored and become yellow-green over time.

**Life Cycle:** The females lay their eggs in the soil during the late summer. The larvae hatch in late spring of the following year and begin feeding on corn roots. The larvae complete three instars and pupate in mid-summer. The adults emerge a short time later.

**Where to Collect:** All stages are commonly found in fields of corn.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Oriental cockroach

**Order:** Dictyoptera

**Family:** Blatellidae

**Pest Status:** Oriental cockroaches are pests in homes and other buildings.

**Appearance:** An adult has a flattened oval shape; spiny legs; and long, filamentous antennae. These cockroaches are shiny, dark brown or black, and large (1- to 1¼-inches long) and have nonfunctional wings incapable of flight.

**Life Cycle:** Females carry their egg capsules for a day or two and deposit them in sheltered areas. The eggs hatch within two months and the nymphs develop in about one year.

**Where to Collect:** These cockroaches are most common in summer and develop in damp basements and sewers. They are usually not found in cupboards, on walls, or on upper levels of buildings. They prefer high-moisture conditions.



Photo Credit: Extension, Purdue University

### **Common Name:** Oystershell scale

**Order:** Homoptera

**Family:** Diaspididae

**Pest Status:** Oystershell scales can damage many species of trees and shrubs as the insects colonize them and begin sucking out plant juices.

**Appearance:** Adults are about 1/8-inch long, gray-brown, and noticeably convex, resembling miniature oyster shells.

**Life Cycle:** The females lay their eggs in the late fall and the eggs overwinter. Hatching occurs in the late spring and the crawlers move around for a few hours before settling. The scales are white in color at first, but become brown with maturity. They mature in mid-summer, mate, and lay eggs. The second generation develops by late fall.

**Where to Collect:** These scales develop on the bark of host plants. Searching plants for the scale shells is a good way to find and mount these insects.



Photo Credit: Clemson University - Whitney Cranshaw, Colorado State University, Bugwood.org

### **Common Name:** Pavement ant

**Order:** Hymenoptera

**Family:** Formicidae

**Pest Status:** Pavement ants can become nuisance pests when they enter homes while foraging for food.

**Appearance:** Pavement ants are small, ranging from 1/16 to 1/10-inch in length. Their antennae have 12 segments and the thorax has one set of spines. These ants are generally dark brown in color and can be separated from most other ants by the unique ridges or grooves that occur on the head and thorax.

**Life Cycle:** A new ant colony is started by a single queen. She lays the eggs and tends the brood that develops into worker ants. Tending of the brood is then taken over by the workers.

**Where to Collect:** Pavement ants often nest under sidewalks, stones, logs, boards, bricks, and patio blocks. These ants rarely nest indoors in walls, under floors, or in insulation.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

### **Common Name:** Peachtree borer

**Order:** Lepidoptera

**Family:** Sesiidae

**Pest Status:** Peachtree borers damage trees by tunneling into the trunks.

**Appearance:** At first glance, peachtree borers look more like wasps than moths. The female has a dark blue-black body with an orange band on the abdomen, dark blue front wings, and clear hind wings. The adult male is blue-black, marked with narrow yellow bands on the abdomen, thorax, head, and legs; front wings and hind wings are clear, but the edges and veins are outlined with blue-black scales.

**Life Cycle:** Peachtree borers overwinter as larvae under bark and pupate in spring and early summer. The adults emerge in mid-summer and early fall. Soon after the adults emerge, the females lay their eggs under bark that hatch within one week.

**Where to Collect:** Borers are found under the bark of fruit-bearing trees, particularly peach trees.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Periodical cicada

**Order:** Homoptera

**Family:** Cicadidae

**Pest Status:** Periodical cicadas can cause damage to young trees when they cut the tender branches while ovipositing on them.

**Appearance:** Adults are large (1- to 2-inches long), with prominent wide-set eyes, short antennae and clear wings held roof-like over the abdomen. They have black bodies and orange wing veins.

**Life Cycle:** Immature nymphs develop underground and feed on sap from plant roots. After 13 or 17 years (depending on the species) underground, mature nymphs emerge from the soil and climb onto nearby vegetation to molt to the winged adult stage. The adults emerge in summer and live for only two to four weeks. The females deposit their eggs into the bark of trees. After six weeks, eggs hatch and the newly hatched nymphs fall to the ground and burrow into the soil.

**Where to Collect:** In places and in years when cicada emergence occurs, they may be found in all stands of mature trees.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Picnic beetle

**Order:** Coleoptera

**Family:** Nitidulidae

**Pest Status:** Picnic beetles are nuisance pests but can also cause damage to ripe fruits and vegetables.

**Appearance:** Picnic beetle adults are ¼-inch long and black with four orange-red spots on the wing covers.

**Life Cycle:** Adults emerge in the spring and mate. The females lay their eggs in late spring and the larvae develop on food sources. They leave their food when mature and wander through the soil to pupate. The entire cycle lasts about a month.

**Where to Collect:** Picnic beetles prefer damaged plants and decomposing plant tissue. They can congregate on screen doors, around garbage cans, in backyards, around picnic areas, and at roadside vegetable stands.

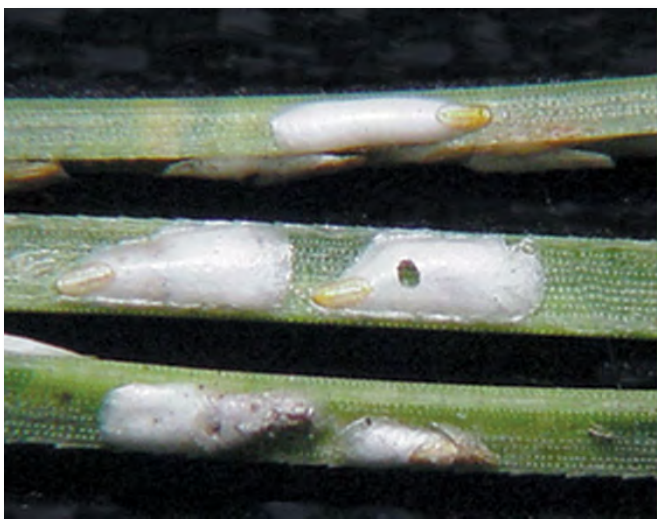


Photo Credit: Extension, Purdue University

**Common Name:** Pine needle scale

**Order:** Homoptera

**Family:** Diaspididae

**Pest Status:** Pine needle scales can damage evergreen trees.

**Appearance:** Adult female covers are white, elongated, and tapered at one end. They are ⅓ inch in length. The male covers are smaller, white, and rectangular.

**Life Cycle:** After mating, the females begin to produce a white, waxy covering as they deposit their eggs. The eggs hatch in late spring and the crawlers seek feeding sites on the previous year's foliage. After a couple of weeks, the nymphs molt and continue to increase in size for about three weeks before emerging as adults.

**Where to Collect:** Although these scales prefer pines, they can also infest spruces and firs.



Photo Credit: John Obermeyer, Purdue University

### **Common Name:** Plum curculio

**Order:** Coleoptera

**Family:** Curculionidae

**Pest Status:** Plum curculio is a significant pest of the fruit industry.

**Appearance:** Adults are small (1/4-inch long), hard-bodied, brown-black beetles. They always have the prominent snouts characteristic of all weevils.

**Life Cycle:** Adults overwinter in ground litter or other protected places and become active in early spring. The females deposit their eggs in holes cut in the fruit and hatch in about five days. The larvae feed in the fruit for three weeks and then tunnel out to enter the soil. They construct small, earthen cells and pupate after about two weeks. There are usually two generations per year.

**Where to Collect:** Plum curculio is found around fruit-bearing trees. They may be collected as they crawl about on food sources looking for mates or oviposition sites.



Photo Credit: Extension, Purdue University

### **Common Name:** Polistes paper wasp

**Order:** Hymenoptera

**Family:** Vespidae

**Pest Status:** Paper wasps are considered pests when they nest near human structures, because they can sting if provoked.

**Appearance:** Paper wasps are 3/4- to 1-inch long, slender, narrow-waisted wasps with smoky black wings that are folded lengthwise when at rest. The body coloration varies widely depending upon species.

**Life Cycle:** Fertilized queens overwinter in protected habitats. In the spring, they select nesting sites and begin to build gray paper, open-faced nests. Eggs are laid singly in cells and hatch into larvae that develop through several instars before pupating. Cells remain open until developing larvae pupate. In late summer, the queens stop laying eggs and the colonies begins to decline. In the fall, mated female offspring of the queen seek overwintering sites.

**Where to Collect:** Paper wasps can be found on flowers, particularly goldenrod, in late fall or near their paper nests.



Photo Credit: John Obermeyer, Purdue University

### **Common Name:** Potato leafhopper

**Order:** Homoptera

**Family:** Cicadellidae

**Pest Status:** Potato leafhoppers can become serious pests of many different plants, including alfalfa.

**Appearance:** The adult potato leafhopper is winged, pale green, and wedge-shaped. They are usually about 1/8-inch in length.

**Life Cycle:** Adults emerge in early summer. After mating, they lay eggs inside the veins on the undersides of leaves. A female leafhopper lives about a month, producing one to six eggs daily. The eggs hatch in about 10 days and the nymphs mature in about two weeks. Mating occurs approximately two days after maturation.

**Where to Collect:** Potato leafhoppers are found on cultivated and wild plants in late June and early August. They are highly attracted to lights at night.





Photo Credit: Extension, Purdue University

**Common Name:** Praying mantid

**Order:** Dictyoptera

**Family:** Mantidae

**Pest Status:** The praying mantid is considered a highly beneficial insect, because it is an effective predator.

**Appearance:** Adults are quite large, some over 3 to 4 inches long. The body is tan-brown with the longitudinal forewing's outer margins edged in a pea-green color. They have a large head borne on a greatly lengthened prothorax. The raptorial forelegs are often held in a "praying position" and are armed with spines to help capture prey.

**Life Cycle:** One generation develops each season. In the fall, females lay eggs in large, tan frothy masses, glued to tree twigs, plant stems, and other objects. Overwintering occurs in the egg stage. Tiny nymphs emerge from the egg mass in the spring or early summer.

**Where to Collect:** Adults are active in late summer and early fall and are usually found on plants that host other insects.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Red-legged grasshopper

**Order:** Orthoptera

**Family:** Acrididae

**Pest Status:** Red-legged grasshoppers are plant feeders and can cause damage, usually during dry years.

**Appearance:** The red-legged grasshopper has a reddish-brown back, a yellow belly, and bright red hind legs. It can range in length from ¾ to 1½ inches.

**Life Cycle:** This grasshopper overwinters as eggs in the soil. Eggs hatch throughout the spring and early summer. Nymphs feed and grow for about a month, molting five or six times. Mature grasshoppers mate and continue feeding on crop plants. About two weeks later, the females begin to deposit clusters of eggs in the soil.

**Where to Collect:** This grasshopper prefers areas of low, moist soil.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Rice weevil

**Order:** Coleoptera

**Family:** Curculionidae

**Pest Status:** Rice weevils are common pests of stored cereal products.

**Appearance:** The rice weevil is small (1/10-inch), but has a long, curved snout almost one third of the total length of the insect. The body is red-brown to black in color with four light-yellow or red spots on the corners of the wing covers.

**Life Cycle:** Adults chew into the grain kernels from the outside and lay their eggs inside the grain. Larvae develop through several instars and also pupate inside the grain kernels. They may complete a generation in a month in warm conditions. Adults often live for seven to eight months.

**Where to Collect:** These weevils are most commonly found in stored grain bins or infested pantries.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

### **Common Name:** Robber fly

**Order:** Diptera

**Family:** Asilidae

**Pest Status:** Robber flies feed on other insects, but are not relied upon for biological control because they are excellent fliers and seldom stay in one place for long. They can deliver a painful bite if mishandled.

**Appearance:** Adults vary in body length ( $\frac{3}{8}$ - to  $1\frac{1}{8}$ -inch long) and appearance. Most species are gray to black, hairy-bodied, and have long, narrow, tapering abdomens. The adult has a deep depression between the large eyes.

**Life Cycle:** Females deposit their eggs on low-lying plants or in the soil. The larvae live in the soil or in decaying organic materials while preying on eggs, larvae or other soft-bodied insects. They overwinter as larvae, pupate and emerge as adults in the springtime. Development time ranges from one to three years, depending on environmental conditions.

**Where to Collect:** These flies are often observed on stems of plants, on the ground, or flying low.



Photo Credit: Susan Ellis, Bugwood.org

### **Common Name:** Rose chafer

**Order:** Coleoptera

**Family:** Scarabaeidae

**Pest Status:** Rose chafers feed on and can damage roses.

**Appearance:** Rose chafers are small, slender beetles up to  $\frac{1}{2}$ -inch long. Their bodies are pale green to tan in color with reddish-brown legs.

**Life Cycle:** Adult beetles emerge from the soil in late spring and live for about one month. Mating occurs soon after emergence, and the females lay their eggs in the soil in grassy, sandy areas. Upon hatching, the larvae burrow in the soil and feed on plant roots. They overwinter as larvae and continue development until pupation occurs in the spring.

**Where to Collect:** Rose chafers are most often found on plants near sandy soil.



Photo Credit: Maja Jurc, University of Ljubljana, Bugwood.org

### **Common Name:** Rove beetle

**Order:** Coleoptera

**Family:** Staphylinidae

**Pest Status:** Rove beetles are not considered pests.

**Appearance:** Rove beetles are slender, elongated insects with wing covers that are much shorter than the abdomen. Most are black or brown and quite small ( $\frac{1}{8}$ -inch).

**Life Cycle:** Females deposit their eggs in the soil and the larvae hatch in about 5 to 10 days. The larvae feed on small insect that they find in the surrounding soil. The beetles pupate within the host puparia and emerge as adults after one month.

**Where to Collect:** Rove beetles are typically found in most moist environments. They may easily be collected using pitfall traps.





Photo Credit: David Cappaert, Michigan State University, Bugwood.org

**Common Name:** Satyr/Wood nymph

**Order:** Lepidoptera

**Family:** Satyridae

**Pest Status:** Satyrs are not considered pests. The caterpillars feed on a range of grasses.

**Appearance:** Satyrs are small- to medium-sized butterflies, usually brown or grayish in color. They usually have eyelike spots on their wings.

**Life Cycle:** Eggs are laid during late summer, and after three or four weeks the caterpillars emerge and begin to feed on grasses. The young caterpillars overwinter, then pupate in early summer of the following year. The chrysalis is attached to the grass blades. Adults emerge in July.

**Where to Collect:** Satyr butterflies are typically found in living in grassland or woodland environments. They may easily be collected by netting them as they fly about shrubs and hedgerows.



Photo Credit: Cheryl Moorehead, Individual, Bugwood.org

**Common Name:** Sawfly

**Order:** Hymenoptera

**Family:** Tenthredinidae

**Pest Status:** Sawfly larvae can become very destructive as they consume leaves or needles of trees and bushes.

**Appearance:** Sawfly larvae are often confused with caterpillars, but sawfly adults are very wasp-like. They are distinguishable from other wasps by the broad connection between the abdomen and the thorax. Their common name comes from the appearance of the ovipositor, which looks much like the blade of a saw.

**Life Cycle:** Sawflies overwinter as eggs. The larvae begin feeding in late spring and continue through the summer. After feeding, the larvae pupate in the soil or on trees and adults begin appearing in the fall. There is one generation per year.

**Where to Collect:** Most sawflies are host-specific, so they can be found near their individual hosts, (pines, evergreens, and some deciduous trees).



Photo Credit: Van Waters & Rogers, Inc., Univar USA, Inc.

**Common Name:** Sawtoothed grain beetle

**Order:** Coleoptera

**Family:** Silvanidae

**Pest Status:** Sawtoothed grain beetles are common pests of stored cereal products, both commercial and in the home.

**Appearance:** These beetles are flattened, red-brown, and about 1/10-inch long. The common name comes from the six sawtooth-like projections on each side of the thorax. The sawtoothed grain beetle has exposed eyes and the head is triangular in shape.

**Life Cycle:** Eggs are laid singly or in small groups in the food material where the life cycle is completed. The eggs hatch in about one week; the larvae mature within a month; and the pupae mature in two months. Adults emerge in the spring and can live six to ten months.

**Where to Collect:** The sawtoothed grain beetle can be found in cereal-based products.



Photo Credit: David Cappaert, Michigan State University, Bugwood.org

### **Common Name:** Scorpionfly

**Order:** Mecoptera

**Family:** Panorpidae

**Pest Status:** Scorpionflies feed on dead insects and are not considered pests of people.

**Appearance:** This insect has four, long, narrow, membranous, yellow wings with dark, brown-banded patterns. The antennae are long and thread-like and the mouthparts are located at the end of an elongated “snout.” The body is up to 1-inch long and is unique due to the recurved, bulbous abdomen that resembles a scorpion.

**Life Cycle:** Adult female scorpionflies lay small masses of eggs in the soil. When they hatch, the larvae live and grow near the soil surface before pupating in underground cells. The pupae overwinter and adults emerge in summer.

**Where to Collect:** Scorpionflies occur in wooded areas and ravines with dense vegetation.



Photo Credit: University of Illinois

### **Common Name:** Seedcorn beetle

**Order:** Coleoptera

**Family:** Carabidae

**Pest Status:** Seedcorn beetles can become serious pests of newly emerging corn plants, and especially during cold or wet conditions when emergence is delayed.

**Appearance:** Adults are small, slender, flattened, brown beetles that sometimes have two darkened stripes on their wing covers.

**Life Cycle:** Seedcorn beetles overwinter as adults or pupae. The eggs are deposited on seeds, emerging plants and in decaying material. After two days, larvae hatch and develop into adults within the soil. There are approximately three generations per year.

**Where to Collect:** They are usually in high numbers when cool, wet weather occurs. They are highly attracted to lights.



Photo Credit: John Obermeyer, Purdue University

### **Common Name:** Silverfish

**Order:** Thysanura

**Family:** Lepismatidae

**Pest Status:** Silverfish are only considered a nuisance pest when they get into homes. There they are difficult to control.

**Appearance:** Adults are slender, wingless, soft-bodied insects, approximately ½-inch in length. They resemble a fish due to their shiny silver, scaly bodies that taper gradually to the rear.

Silverfish have two slender antennae in front and three long appendages in back.

**Life Cycle:** Silverfish females lay their eggs singly or in small groups that hatch in about three weeks. Young silverfish resemble adults except they gradually take on the adult color within a month. Adults are long-lived, sometimes from two to eight years.

**Where to Collect:** Silverfish normally live outdoors under rocks, bark, and leaf mold; in the nests of birds; and in ant nests. They can also be found in houses in bathtubs, sinks, or washbasins.





Photo Credit: Tim Gibb, Purdue University

**Common Name:** Sod webworm

**Order:** Lepidoptera

**Family:** Crambidae

**Pest Status:** Sod webworms can become serious pests of turfgrass and other plants.

**Appearance:** Adults are buff-colored, about ½-inch long with snout-like projections extending forward from the head. At rest, a webworm folds its wings around the body, giving it a cigar-shaped appearance. A larva is gray to tan with small, dark spots on the body.

**Life Cycle:** Sod webworm larvae overwinter several inches deep in the soil. In the spring, the larvae move upward and feed on new grass growth. In the summer, the larvae bury deeper into the soil to pupate. After two weeks, the new adult moths emerge at night to mate and lay eggs.

**Where to Collect:** Sod webworms are commonly found in well-maintained turfgrass, often in residential lawns.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Soldier beetle

**Order:** Coleoptera

**Family:** Cantharidae

**Pest Status:** Soldier beetles are not considered pests.

**Appearance:** Soldier beetles are elongated, soft-bodied, and about ½-inch long. Colors vary from yellow to red with brown or black wing trims. They somewhat resemble lightning bugs, but their heads are visible from above and they do not have light-producing organs.

**Life Cycle:** Adult females lay their eggs in clusters in the soil. The larvae overwinter in plant debris or in buildings, feeding on caterpillars and eggs. They pupate in the spring and a few weeks later, the adults emerge.

**Where to Collect:** Soldier beetles can be found in damp soil and debris or under loose bark, but are easiest to collect from flowers.



Photo Credit: Andrea Battisti, Università di Padova, Bugwood.org

**Common Name:** Spittlebug

**Order:** Homoptera

**Family:** Cercopidae

**Pest Status:** Spittlebugs occasionally damage agronomic crops such as alfalfa, but generally are considered minor pests.

**Appearance:** Spittlebugs derive their name from the white, frothy spittle the nymphs produce. Adults resemble leafhoppers, but are quite large, about ½-inch long. The eyes are bright red and the body color varies from brown to orange. They have dark wings with two red stripes that cross the back.

**Life Cycle:** Adults lay their eggs in late summer. Eggs overwinter. The eggs hatch in early spring, and the nymphs go through five instars before emerging as adults. It takes approximately 40 to 52 days to complete the life cycle.

**Where to Collect:** Spittlebugs are found in or near masses of froth at leaf nodes on various plants. Sweep nets often are the best collecting tools.



Photo Credit: John Obermeyer, Purdue Extension

**Common Name:** Spotted cucumber beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Cucumber beetles can be pests of vegetables and agronomic crops.

**Appearance:** Adults are shiny, greenish-yellow, and have six large, black spots on each wing cover. They are about ¼-inch long and have black heads.

**Life Cycle:** Cucumber beetles overwinter as adults in the soil. In the spring and summer the females lay groups of eggs at the bases of plants. These eggs hatch and produce larvae that develop for a month on the roots, pupate in the soil, and appear as adults in early fall.

**Where to Collect:** They are commonly found feeding on ornamental and vegetable plants.



Photo Credit: Extension, Purdue University

**Common Name:** Springtail

**Order:** Collembola

**Family:** Entomobryidae

**Pest Status:** Springtails can become nuisance pests in homes when populations are very high.

**Appearance:** Springtails are small (1/16-inch long), primitive, wingless insects. Body color varies, ranging from dark to light shades of gray. Some are patterned or iridescent due to the presence of body scales. Springtails jump using an unusual forked structure (furcula) located on the ends of their abdomens, that act like springs, propelling them into the air.

**Life Cycle:** Females lay their eggs singly or in clusters. After about 10 days, the eggs hatch into juveniles that appear similar to the adults. In about one week, and after five to eight molts, the juveniles become adults. Adults will continue to molt and are long-lived, with some individuals living for more than one year.

**Where to Collect:** Springtails are commonly found in moist or damp places, usually in contact with soil.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Squash bug

**Order:** Hemiptera

**Family:** Coreidae

**Pest Status:** Squash bugs use piercing, sucking mouthparts to suck juices out of plants – especially vegetables.

**Appearance:** Adults are rather large (3/8-inch long), winged, brown-black, flat-backed insects and give off a disagreeable odor when crushed.

**Life Cycle:** Adults overwinter in the shelter of dead leaves, vines, boards, or buildings. They emerge in the spring to lay masses of eggs on the undersides of leaves. The eggs hatch within ten days and the nymphs pass through five instars in one month. Only one generation develops each year and new adults do not mate until the following spring.

**Where to Collect:** Adults and nymphs are found clustered near plant crowns, beneath damaged leaves, under clods, or in any protective groundcover.





Photo Credit: C. Welty

**Common Name:** Squash vine borer

**Order:** Lepidoptera

**Family:** Sesiidae

**Pest Status:** Squash vine borers can kill plants as they bore up and down in the stems.

**Appearance:** The squash vine borer is a moth. The body is black marked with orange-red and the hind legs are feathery with black and orange hairs. The front wings are metallic green and the hind wings are transparent.

**Life Cycle:** The squash vine borer overwinters as a larva in the soil. It pupates in the spring and the adult emerges in summer.

**Where to Collect:** Moths are active during the daytime and rest on leaves in the evening.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

**Common Name:** Stable fly

**Order:** Diptera

**Family:** Muscidae

**Pest Status:** Stable flies are biting flies that can become serious pests of cattle and other animals.

**Appearance:** The stable fly resembles the house fly, but is more robust and aggressive. It is about 1/3-inch long with four distinct, dark, longitudinal stripes on the thorax and several dark spots on the abdomen.

**Life Cycle:** The females deposit their eggs in loose organic material usually associated with soggy hay or feed, or in piles of moist, fermenting grass. The eggs hatch in two to five days into larvae which feed and mature in two weeks. They transform into red-brown pupal cases from which the adult flies emerge. The average life cycle is 28 days.

**Where to Collect:** Stable flies are easy to find flying near and biting livestock. They are fast fliers and usually require a net to capture them.



Photo Credit: Extension, Purdue University

**Common Name:** Stag beetle

**Order:** Coleoptera

**Family:** Lucanidae

**Pest Status:** Stag beetles are not pests.

**Appearance:** Stag beetles are usually large (1- to 1 1/2-inch), robust beetles that are reddish to dark brown in color. Males have elongated mandibles used to joust with rival males.

**Life Cycle:** Females lay their eggs on or under the bark of dead, fallen trees. Upon hatching, the larvae chew their way into the tree and feed on the wood. Once they complete development (which can take several years), the larvae pupate in small chambers in the soil. When adults emerge, they search for mates. Adults can live one to two years, depending on the species.

**Where to Collect:** Stag beetles are attracted to damp, decaying wood, so they can be collected near stumps or rotting logs.



Photo Credit: Brian Christine, Purdue University

**Common Name:** Stink bug

**Order:** Hemiptera

**Family:** Pentatomidae

**Pest Status:** Stink bugs can be pests of some plants. They also can be beneficial insect predators, depending on the species.

**Appearance:** Stink bugs have broad, shield-shaped bodies; five-segmented antennae; and a large, distinctly triangular-shape inside their thoraxes.

**Life Cycle:** During warm months, females lay their eggs in clusters stuck to leaves and stems. After hatching, the wingless nymphs molt several times before becoming full-sized, winged adults. Large nymphs or adults usually overwinter.

**Where to Collect:** Stink bugs can be found in rural areas often on or near roadside vegetation.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

**Common Name:** Stonefly

**Order:** Plecoptera

**Family:** Perlidae

**Pest Status:** Stoneflies are an important part of the aquatic ecosystem and serve as food for fish. Their presence or absence can also help indicate water pollution levels.

**Appearance:** Adults are long, slender insects with two pairs of soft, clear wings having very heavy and dark veins, folded along their back. They have a pair of tail-like cerci, well-developed antennae, and three tarsal segments.

**Life Cycle:** Adults live for a few days while the females lay their eggs on or above bodies of water. The eggs sink to the bottom and usually hatch quickly. The nymphs grow through many instars (12 to 23) and move to the shore when mature. The length of the life cycle varies from one to four years.

**Where to Collect:** Stoneflies are found among shoreline vegetation near clean streams.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

**Common Name:** Strawberry root weevil

**Order:** Coleoptera

**Family:** Curculionidae

**Pest Status:** Strawberry root weevils can damage strawberries and can also become nuisance pests in homes.

**Appearance:** Adults are about 1/5-inch long, shiny-black with thinly-scattered yellow hairs, red-brown antennae and legs, and deep, strial punctures on the wing covers.

**Life Cycle:** Adults emerge in early spring from puparia in the soil. After one month, they begin to lay eggs. Hatching occurs about 10 days after the eggs are laid. The young larvae feed on roots and crowns of plants in mid-summer, overwinter in the soil and cause their heaviest damage in the spring. The pupation period lasts most of the spring.

**Where to Collect:** Weevils appear on sides of and within houses in late summer and early fall. This may be the easiest place to collect them.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Striped cucumber beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Striped cucumber beetles can be pests of cucumbers and related plants.

**Appearance:** Adults are about ¼-inch long and wing covers bear three, slate-black stripes on a yellow-green background. They are sometimes confused with western corn rootworm beetles, but are more oblong and shiny. The head and antennae are dark, and the wings are covered with very small punctures.

**Life Cycle:** Adults overwinter and leave their hibernation quarters in the spring. The females lay eggs that hatch within a week. The larvae spend two more weeks feeding on the roots and stems of plants before pupating. The pupal period lasts one week. As fall approaches, the beetles crawl under litter to overwinter.

**Where to Collect:** They are found in gardens or wooded, bushy areas, especially in the fall.



Photo Credit: Charles T. and John R. Bryson, Bugwood.org

**Common Name:** Swallowtail butterfly

**Order:** Lepidoptera

**Family:** Papilionidae

**Pest Status:** Swallowtail butterflies are not pests.

**Appearance:** Swallowtails are large, beautiful, butterflies that have distinctive yellow-and-black wings with a long “tail” on the end of each hindwing.

**Life Cycle:** Females lay their eggs on the undersides of leaves. Eggs hatch within two weeks into tiny caterpillars that take about one month to grow to full size. A pupa takes about 24 hours to complete development.

**Where to Collect:** Swallowtails are often found flying in rural areas where there are plenty of diverse plants. They are strong fliers, but usually can be netted by agile and patient collectors.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Sweat bee

**Order:** Hymenoptera

**Family:** Halictidae

**Pest Status:** Sweat bees are not considered pests, but they frequently annoy people by alighting on sweaty limbs and sometimes inflicting a painful sting.

**Appearance:** Sweat bees are normally black, brown, red, or metallic green and have sparse yellow markings. They are relatively small bees, usually ¼- to ½-inch in size.

**Life Cycle:** Females lay their eggs in burrowed tunnels in the soil. When the eggs hatch, the larvae feed on balls of pollen and nectar. Sweat bees overwinter as larvae or pupae in the soil and the adults emerge in the summer.

**Where to Collect:** Sweat bees prefer shady areas where vegetation is sparse. They are also common in flower patches, where they are easiest to collect.



Photo Credit: John Obermeyer, Purdue University

### **Common Name:** Syrphid fly

**Order:** Diptera

**Family:** Syrphidae

**Pest Status:** Syrphid flies are not considered pests. They cannot sting people.

**Appearance:** Adults have black and yellow bands on their abdomens and are often mistaken for honey bees or wasps. The body length ranges from 1/4- to 3/4-inch long. Unlike bees and wasps, they have just one pair of wings, short antennae and big, compound eyes.

**Life Cycle:** A female oviposits a single egg on a leaf near an aphid infestation. The larva hatches in about three days, and as it feeds on aphids it develops through several instars over two to three weeks before pupating. The adult emerges in one to two weeks unless the pupal stage remains throughout the winter.

**Where to Collect:** Syrphid flies are especially common where aphids are present in agricultural, landscape, and garden habitats.



Photo Credit: John Obermeyer, Purdue University

### **Common Name:** Tarnished plant bug

**Order:** Hemiptera

**Family:** Miridae

**Pest Status:** Plant bugs feed on a number of different plants. Although they can do some damage, they are not considered serious plant pests.

**Appearance:** The adult is about 1/4-inch long. It is light brown and variously spotted. The white, yellow, and black spots give the insect a tarnished appearance, but there is a clear, yellow, triangle, marked with a black dot on the lower third of each side.

**Life Cycle:** The adults and older nymphs overwinter under leaf litter. They become active in the spring and the females lay eggs on leaves and plant buds. Ten days later, the eggs hatch. It takes three to four weeks for the nymphs to develop to the adult stage.

**Where to Collect:** Plant bugs are routinely found on early colonizing plants, often in meadows and weedy patches that are left to flower.



Photo Credit: Jody Green, Purdue University

### **Common Name:** Termite

**Order:** Isoptera

**Family:** Rhinotermitidae

**Pest Status:** Termites can be very serious pests of homes and other buildings because they feed on wood.

**Appearance:** Termites are small, white, tan, or black insects. The name Isoptera means "equal wing" and refers to the fact that in the adult stage, all four wings are of the same length.

**Life Cycle:** Termites are social insects with three castes (reproductives, soldiers, and workers) each with separate functions in the colony. The reproductives (alates, de-alates, queen, and king) are responsible for producing large numbers of offspring. The workers and soldiers are sterile, wingless, and blind. The workers build the nest, forage for food, and care for the young. The soldiers defend the colony from intruders.

**Where to Collect:** Termites are found in tree stumps, woodpiles, decaying organic matter, and rotting wood in buildings. Because they are soft-bodied, they should be preserved in alcohol.





Photo Credit: Alton N. Sparks, Jr., University of Georgia, Bugwood.org

### **Common Name:** Thrips

**Order:** Thysanoptera

**Family:** Thripidae

**Pest Status:** Thrips are tiny insects that can become plant pests as they scrape the epidermal leaf layer off of plant leaves. They can be especially problematic in greenhouse production.

**Appearance:** Thrips are slender and minute ( $1/20$ -inch long) and have long fringes on the margins of both pairs of their long, narrow wings. Magnification is required to make out important morphological features. Most thrips range in color from translucent white to dark brown.

**Life Cycle:** Female thrips deposit eggs in slits made in the leaf tissue. The eggs hatch within a week into active nymphs. The developmental period from egg to adult ranges from 11 days to three weeks. Parthenogenesis occurs in many species.

**Where to Collect:** Some species can be found within buds and furled leaves of plants. Others can be collected by shaking flower blossoms above dark paper.



Photo Credit: Rusty Papsdorf, Purdue University

### **Common Name:** Tiger beetle

**Order:** Coleoptera

**Family:** Carabidae

**Pest Status:** Tiger beetles are not pests.

**Appearance:** Adults are  $1/2$ -inch long and have long antennae and legs. With their large compound eyes, their heads measure wider than their thorax. Although colors can vary, common species have spectacular metallic blue, green, and bronze coloration.

**Life Cycle:** Female tiger beetles lay their eggs in burrows in the soil. The larvae hatch from the eggs, overwinter and develop through three larval instars. Both adults and young are predators. The larvae pupate in the summer and emerge as adults after one month.

**Where to Collect:** On sunny days, tiger beetles are found in sandy areas along the shores of rivers and streams. They are very shy and extremely fast runners and fliers. A collector must be equally quick with a net to capture these insects.



Photo Credit: Whitney Cranshaw, Colorado State University, Bugwood.org

### **Common Name:** Tiger moth

**Order:** Lepidoptera

**Family:** Arctiidae

**Pest Status:** Tiger moths are not considered pests.

**Appearance:** Adults have dark forewings with large, white splotches and bands. The hindwings are white.

**Life Cycle:** Tiger moths overwinter as caterpillars. Woollybear caterpillars in the fall are thought to indicate the severity of the oncoming winter by the proportion of red-brown to black on their bodies. They pupate in the spring and shortly thereafter they emerge as adults.

**Where to Collect:** Tiger moths can be found near downed logs, loose bark, or firewood in the spring time. Later in the year they occur in gardens and landscapes.



Photo Credit: R.J. Reynolds Tobacco Company Slide Set, R.J. Reynolds Tobacco Company, Bugwood.org

**Common Name:** Tobacco hornworm

**Order:** Lepidoptera

**Family:** Sphingidae

**Pest Status:** Tobacco hornworms have a caterpillar stage that can be very damaging to certain plants.

**Appearance:** Hornworms are large, robust moths that have long, narrow front wings. Their bodies are spindle-shaped, pointed at both ends. They have gray and white mottled wings and abdomens lined along each side with six conspicuous orange-yellow spots.

**Life Cycle:** Females lay their eggs singly on leaves. The eggs hatch and the larvae feed for three or four weeks and then burrow into the soil to pupate. The pupae overwinter and the adults emerge in the spring. There are two generations per year.

**Where to Collect:** Hornworms can be reared from pupae or caterpillars. Otherwise, they can be collected at lights or when found taking nectar from flowers.



Photo Credit: Jim Occi, BugPics, Bugwood.org

**Common Name:** Tomato hornworm

**Order:** Lepidoptera

**Family:** Sphingidae

**Pest Status:** Tomato hornworms can be very damaging to certain plants, especially tomatoes.

**Appearance:** Tomato hornworms are nearly identical to tobacco hornworms with the small exception of having five rather than six yellow spots on each side of the abdomen.

**Life Cycle:** The life cycle is also nearly identical. The unique caterpillars are large, green and have a distinct "horn" protruding from the rear.

**Where to Collect:** Hornworms are very fast fliers and may look like hummingbirds, hovering in front of flowers as they insert their long mouthparts.



Photo Credit: Johnny N. Dell, Bugwood.org

**Common Name:** Tortoise beetle

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Tortoise beetles are not considered pests.

**Appearance:** Adults are conspicuous, oblong-oval beetles that are gold in color with various black or red markings, depending on the species. Their bodies are slightly flattened and squared at the shoulders; they have a shell-like appearance. Body margins extend in a roof-like manner (like a tortoise shell) over much of the head and legs.

**Life Cycle:** Tortoise beetles overwinter as adults under bark or leaf litter. In the spring, the beetles emerge and feed on hosts. Female adults deposit clusters of eggs on the undersides of leaves. The larvae emerge within a week. After feeding for an additional three weeks, the larvae transform into pupae. A week later, the new adults emerge.

**Where to Collect:** Tortoise beetles can be found on host plants where their immature stages have fed. Search in areas where the leaves have been damaged by minute holes.





Photo Credit: John Obermeyer, Purdue University

**Common Name:** Treehopper

**Order:** Homoptera

**Family:** Membracidae

**Pest Status:** Treehoppers feed on the leaves of many kinds of trees and shrubs, sometimes causing injury to the plant.

**Appearance:** Treehoppers are usually less than ½-inch long. They have enlarged pronotums that are variously developed into horns, knobs, and other strange shapes depending on the species. Color also varies depending on species, but it usually ranges from green to brown.

**Life Cycle:** An adult female deposits eggs singly or in masses, either inserted directly into living tissue or on the surfaces of plants. The eggs remain in the plant through the winter and hatch in spring. Nymphs molt five times prior to reaching the adult stage. Treehoppers usually have multiple generations per year.

**Where to Collect:** Treehoppers can be collected by sweeping young trees and shrubs with a net in late summer and early fall.



Photo Credit: Extension, Purdue University

**Common Name:** Tulip tree scale

**Order:** Homoptera

**Family:** Coccidae

**Pest Status:** Tulip tree scales can injure young twigs and branches when populations are high.

**Appearance:** Adults are oval and convex and have distinct, protective waxy covers. The body colors of females can vary from light gray-green to pink-orange mottled with black. Adult males are small with only one pair of wings and are less commonly seen.

**Life Cycle:** Tulip tree scales overwinter in the nymphal stage. The adults emerge in mid-summer and in fall; the females give birth to first instar nymphs called crawlers. Crawlers move to a suitable host and feed for a short time before molting into the overwinter stage.

**Where to Collect:** Tulip tree scales can be found on host plants that are covered in a sticky honeydew substance produced by scales during the growing season.



Photo Credit: DAFF Archive, Bugwood.org

**Common Name:** Tussock moth

**Order:** Lepidoptera

**Family:** Lymantriidae

**Pest Status:** Tussock moths can damage forest and shade trees by feeding on leaves.

**Appearance:** Adult appearance varies widely by species. Usually they are ½- to ¾-inch long and are much less conspicuous than are the ornate and colorfully bristled caterpillars. In some species females are wingless, but males have white, gray or brown forewings mottled with wavy black or brown marks and gray hindwings.

**Life Cycle:** The female lays her eggs in a mass. The eggs hatch in early spring and the larvae feed and grow for four to six weeks. The pupal stage lasts for about two weeks. The adults emerge and mate in late spring.

**Where to Collect:** Tussock moths are commonly found in forested areas.



Photo Credit: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

**Common Name:** Velvet ant

**Order:** Hymenoptera

**Family:** Mutillidae

**Pest Status:** Velvet ants are not considered pests even though they can deliver a powerful sting if mishandled.

**Appearance:** Velvet ants are actually wasps, not ants. Females are wingless and covered with dense hair and may reach about ¾-inch in length. Males are similar, but are slightly smaller and have wings. They are black overall with distinctive patches of dense orange-red hair on the thorax and abdomen.

**Life Cycle:** Females feed on the immature stages of ground-nesting bees, digging into the nesting chambers and parasitizing the young. They deposit their eggs on the host larvae. Eggs soon hatch into white, legless grubs, and parasitize the hosts. Velvet ants develop through several larval instars before forming pupae.

**Where to Collect:** Adults are most common during the warmest summer months. Lone females can be found running very quickly on the ground, particularly in open, sandy areas.



Photo Credit: Russ Ottens, University of Georgia, Bugwood.org

**Common Name:** Viceroy butterfly

**Order:** Lepidoptera

**Family:** Nymphalidae

**Pest Status:** Viceroy butterflies are not pests.

**Appearance:** The viceroy butterfly is a large insect that is amazingly similar to the monarch butterfly in color and pattern of markings.

This mimicry is designed to take advantage of the monarch's defense system (distasteful to predators) that the viceroy lacks. The viceroy is distinguished, however, by a thick, black line curving across its hind wings. White spots also appear within the black borders of its wings.

**Life Cycle:** Females lay their eggs on the tips of host plant leaves. When the eggs hatch, the caterpillars feed at night on the plants.

The larvae overwinter before pupating and emerging as adults in the spring. Viceroys have one to two broods per year depending on the local climate.

**Where to Collect:** Viceroys prefer open or slightly shrubby areas that are wet or near water including: wet meadows, marshes, ponds, lakes, railroad tracks, and roadsides.



Photo Credit: Extension, Purdue University

**Common Name:** Vinegar fly/Fruit fly

**Order:** Diptera

**Family:** Drosophilidae

**Pest Status:** Vinegar flies are commonly called fruit flies but should be differentiated with the much more serious and unrelated "fruit flies" that damage citrus and other crops. Vinegar flies are a nuisance pest in homes, restaurants, and other areas where fresh fruits and vegetables are prepared or stored.

**Appearance:** Vinegar flies are small (1/10-inch), delicate flies, have red eyes, are yellow-brown in color, and have transverse black rings across their abdomen.

**Life Cycle:** Females lay their eggs on the surface of rotting fruit, in clogged drains or in dirty garbage cans. The time required to complete one life cycle is mainly dependent on the surrounding air temperatures, and can range from 8-20 days.

**Where to Collect:** Fruit flies are common during the fall in homes, restaurants, supermarkets, and wherever food is allowed to ferment or where trash receptacles are not cleaned.





Photo Credit: Extension, Purdue University

### **Common Name:** Walkingstick

**Order:** Dictyoptera

**Family:** Phasmatidae

**Pest Status:** Walkingsticks are not considered pests even though they eat plant leaves.

**Appearance:** Adults are wingless with brown, cylindrical bodies and long, tubular legs that resemble small twigs and stems. They have well-developed mandibles and compound eyes and have short, filiform antennae.

**Life Cycle:** The juveniles emerge from the eggs as miniature, wingless versions of the adults (nymphs) and mature by successive molts. Mimicry also extends to the eggs. Many species lay eggs that resemble plant seeds.

**Where to Collect:** Walkingsticks require leaves and woody growth of trees and shrubs for food and protection. They are very slow-moving insects that depend upon camouflage for protection. They can be difficult to see but may be dislodged from leaves by beating branches while holding a beat sheet below.



Photo Credit: David Cappaert, Michigan State University, Bugwood.org

### **Common Name:** Water strider

**Order:** Hemiptera

**Family:** Gerridae

**Pest Status:** Water striders are not pests.

**Appearance:** Water striders are flat-bodied insects. Their second and third pairs of legs are almost twice as long as their bodies. A water strider has the general appearance of a spider as it skates along the surface of water.

**Life Cycle:** Water striders are aquatic insects. There are normally four larval instars and developmental time is between 40 to 65 days. They prey on other small insects in the aquatic environment and have short forelegs to attack and hold their prey.

**Where to Collect:** Water striders are quite common and can be found on the surface of ponds, slow streams, marshes, and other quiet waters.



Photo Credit: Brian Christine, Purdue University

### **Common Name:** Western corn rootworm

**Order:** Coleoptera

**Family:** Chrysomelidae

**Pest Status:** Corn rootworms are serious pests of corn.

**Appearance:** Adults are about ¼-inch long and yellow with three black stripes running down the lengths of the wing covers. The wing covers of males may be entirely black except for narrow yellow margins and yellow tips.

**Life Cycle:** The western corn rootworm life cycle is similar to the northern corn rootworm. Adults emerge in mid-summer and females begin laying eggs about two weeks after emergence. The eggs hatch the following spring. The newly hatched larvae find their way to corn roots, bore in, and begin feeding. The larval stage lasts about three weeks, then they move into the soil to pupate. The adults emerge in the summer.

**Where to Collect:** Western corn rootworms can be found on the leaves or the silks of corn plants during mid- and late-summer.



Photo Credit: John Obermeyer, Purdue University

**Common Name:** Whitefly

**Order:** Homoptera

**Family:** Aleyrodidae

**Pest Status:** Whiteflies can become serious pests of ornamental plants, especially in greenhouse production.

**Appearance:** Adults are about 1/10- to 1/16-inch long and look like tiny moths. They have four broad, delicate wings that are held roof-like over the body and are covered with a white, powdery wax.

**Life Cycle:** Females deposit their eggs in a circular pattern on plants. The eggs hatch within a week into flattened nymphs that wander about, sucking juices from the plant. The nymphs live for about four weeks and the adults for about one month longer.

**Where to Collect:** Whiteflies are usually found on the undersides of leaves and are most active during the daytime when it is warm. The delicate insects are best collected straight into a vial of alcohol to avoid excessive handling and crushing them.



Photo Credit: Extension, Purdue University

**Common Name:** Wood cockroach

**Order:** Dictyoptera

**Family:** Blatellidae

**Pest Status:** Wood roaches are nuisance pests when they occur inside, but unlike other roaches, do not breed inside homes or buildings.

**Appearance:** Adults are approximately 3/4- to 1-inch long. The male is dark brown. The sides of the thorax and the front half of the wings have yellow margins. Adult males have wings longer than their bodies, while females have conspicuous but nonfunctional wing pads that cover only one-third of the abdomen.

**Life Cycle:** Females deposit their egg capsules outdoors usually under bark, leaf litter, or firewood. The eggs hatch after one month, and nymphs continue maturing until the following spring. The complete life cycle generally takes about two years.

**Where to Collect:** Wood cockroaches can be found in or under downed timber or rotting logs and firewood. Males can be collected at lights during the mid-summer.

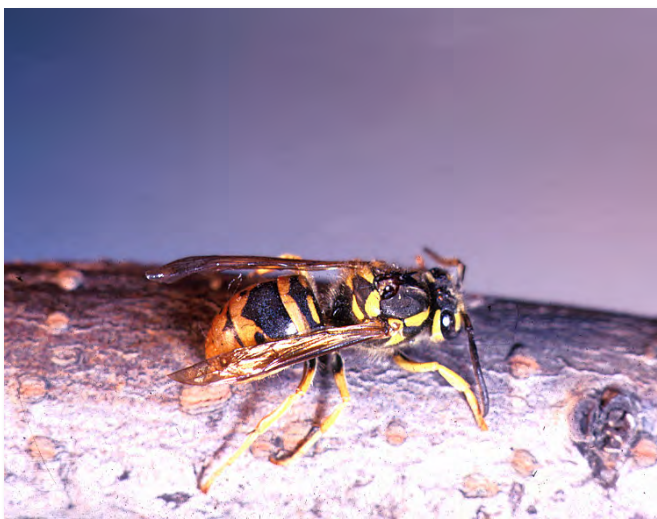


Photo Credit: Extension, Purdue University

**Common Name:** Yellowjacket

**Order:** Hymenoptera

**Family:** Vespidae

**Pest Status:** Yellowjackets are beneficial insects when they're far from people. However, because they aggressively defend their nests by stinging, they can become life threatening pests.

**Appearance:** Yellowjackets are smaller than their close relatives (hornets and paper wasps), but they occur in larger colonies, sometimes with 1,000s of workers. They are usually yellow and have black dots and stripes across their abdomens.

**Life Cycle:** A new queen leaves the nest during the fall, mates, and passes the winter under leaf litter or the bark of trees. In the spring, the queen starts a new colony by building a gray paper nest, usually underground or in a wall void or other cavity. Newly developed workers soon take over the foraging and defense of the colony.

**Where to Collect:** Yellowjackets are quite common in the late summer and fall when they forage widely for sugars and proteins. They should be collected very carefully to avoid being stung.





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