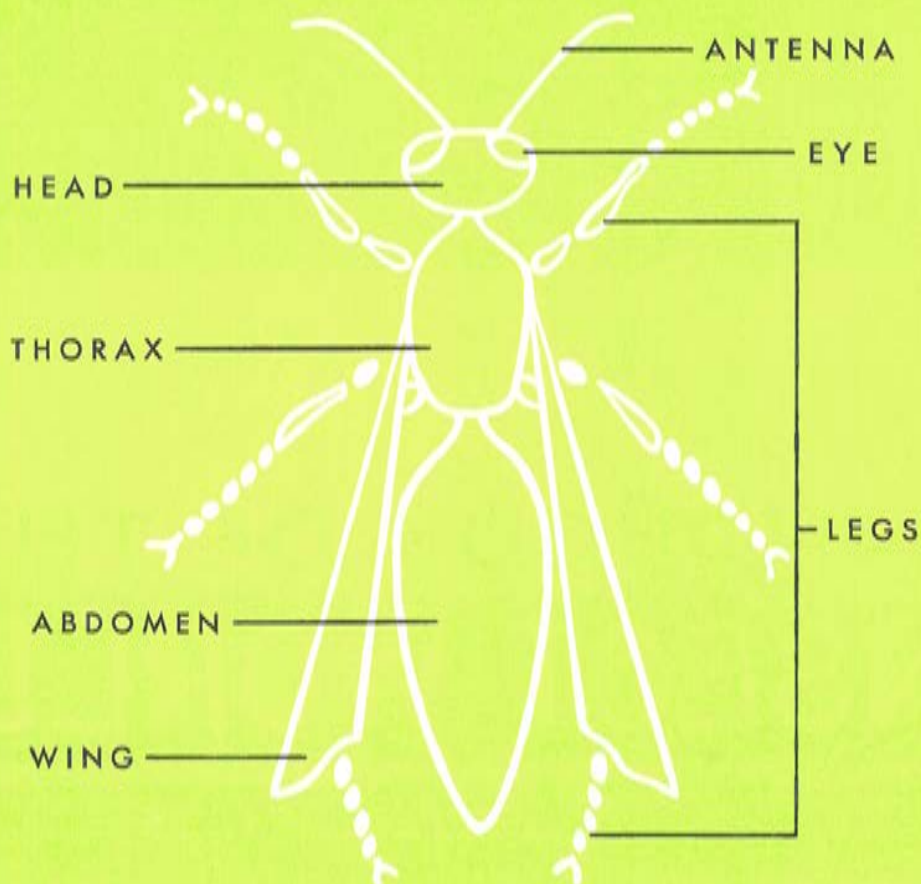




HANDBOOK OF THE INSECT WORLD





PARTS OF INSECTS

The insect's small body is flexible and well-armored. This has much to do with its success in staying alive. A protective hard shell, lighter in weight than bone, covers the many segments that form three main body regions: head, thorax, and abdomen. Other parts are antennae and eyes found on the head; wings and three pairs of jointed legs attached to the thorax.

HANDBOOK OF THE INSECT WORLD

ACKNOWLEDGMENT

This educational material has been made available for use in connection with official 4-H projects supervised by the Cooperative Extension Service. Special acknowledgment is given to Hercules Incorporated, Wilmington, Delaware, for preparation of the original materials. The handbook is published by the National 4-H Service Committee, Inc. 59 East Van Buren Street, Chicago, Illinois 60605 in behalf of the Cooperative Extension Service of the State Land-Grant Universities and the U. S. Department of Agriculture.

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An Approach to Insect Understanding

WE LIVE in a world teeming with insects. At least 686,000 known species, plus an additional 9,000 species of ticks and mites, compete with man. Each of these thousands of species numbers into millions, even billions of individuals. The common housefly, *Musca domestica* L., for instance, is just one species or kind of insect. Every summer day there are billions of this one insect species about.

Some insect species are large enough to be seen easily. Most are so small they are seldom noticed. Termite colonies containing thousands of individuals may exist hidden away unnoticed in the floors of homes for many years. Yet, a single roach running across the kitchen floor may be seen immediately.

This booklet presents in a single volume concise descriptions, drawings, and approximate sizes of some of the most common insects. Although an insect primer in one respect, it is sufficiently complete to be used as a guide by farmers, gardeners, students, 4-H and F. F. A. members, amateur collectors, and many others interested in insects.

Man's future on this earth may very well depend on how well we understand the insect world—how well we fight our insect enemies—how well we protect our insect friends. The more we know about the world of insects, ticks, and mites, the better chance we have of protecting ourselves against them.

It is impossible to illustrate every insect in this limited space. But we hope this booklet will encourage readers to seek further information from the excellent texts available on the fascinating study of entomology. Included also are some of the near relatives of insects, such as spiders and centipedes, commonly mistaken for insects.

From these drawings you will not be able to name exactly all the many kinds of insects you find. Hundreds of species differ from each other in ways so minute that even authorities find it difficult to tell them apart. But you will find out much of what you wish to know by comparing insects you collect with drawings in this booklet.

For extra help in identification, approximate size for the insects is given as the greatest body length usually attained, or as the average maximum wing span in cases where wings are a more prominent feature.

After establishing as much identification as possible, it may be important economically to know the exact name of the species you have. Kill your insect with chloroform or ether; pack it between layers of tissue paper in a pillbox of sufficient size, or put it directly in a vial containing alcohol (rubbing alcohol is adequate). Then send it to your county agent, state extension entomologist, state agricultural experiment station, or the Agricultural Research Service of the U.S. Department of Agriculture. Include a note giving your name and address, the name of the collector of the insect, the state and county in which it was found, the date of the capture, and the host on which it was found. Ask specific questions if you want to know more than the correct name of the insect.

For more information on any particular insect pest or all insects attacking various crops, ornamentals, trees, livestock, house, and garden, contact your local authorities or write the Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C. 20250.

* * * *

We gratefully acknowledge the cooperation of the U.S. Department of Agriculture for help with this booklet, particularly Mr. David G. Hall, Mrs. Claudelle Gaddis, and the insect identification specialists of the Entomology Research Branch, Agricultural Research Service.

Publishers and authors of the excellent texts below gave generous consent to use certain illustrations as a guide for many drawings.

Cornell University Press, Ithaca, New York

An Introduction to Entomology by John Henry Comstock

Henry Holt & Company, Inc., New York, New York

American Insects by Vernon L. Kellogg

McGraw-Hill Book Company, Inc., New York, New York

Applied Entomology by H. T. Fernald and Harold H. Shepard

Destructive and Useful Insects: Their Habits and Control by C. L. Metcalf and W. P. Flint

J. B. Lippincott Company, Chicago, Illinois

Insects Injurious to Fruits by William Saunders

The Macmillan Company, New York, New York

Manual of Vegetable-Garden Insects by Cyrus Richard Crosby and Mortimer Demarest Leonard

Illinois Natural History Survey, Urbana, Illinois

U.S. Department of Agriculture, Washington, D.C.

A—FAMILIAR INSECTS

Most of you know the insects in this group from actual experience. Some are seen darting over ponds, streams, and lakes; others swarm around lighted doors and windows; and the flicker of the firefly is seen competing with evening stars. Colorful butterflies and moths attract attention, flitting from one blossom to another. These and other insects have enriched our lives since infancy.

We are constantly alert for those insects that molest our bodies, our dwellings, and our possessions. The barefoot child knows the merciless sting of the wasp and bee. Gardeners and farmers battle the plant pests.

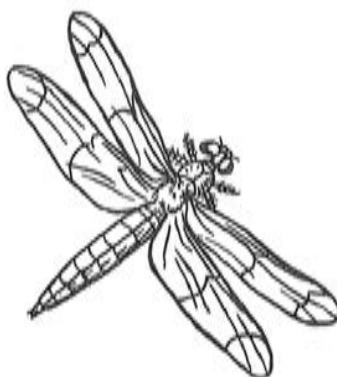
Now when these insects are encountered, maybe this booklet will make it easier for you to identify them and understand their habits.



Damselfly

Order Odonata
wing span, 3 in.

Found about ponds and streams;
adult feeds on soft-bodied insects;
nymph is fish food.



Dragonfly

Order Odonata
wing span, 3 in.

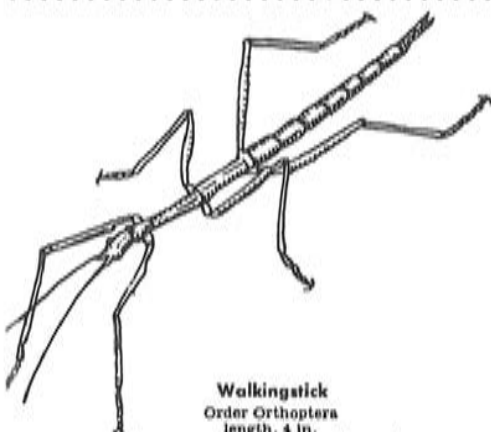
Distinguished by large size and
rapid flight; lives about fresh
water; feeds on other insects.



Caddisfly

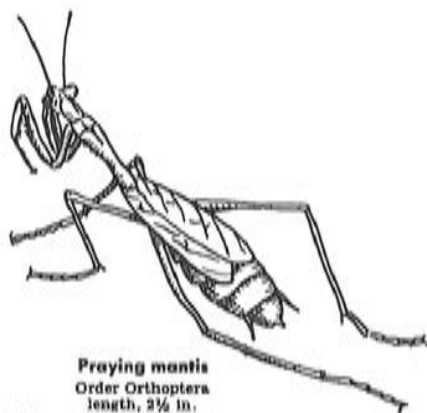
Order Trichoptera
length, 1 in.

Moth-like insect attracted to
lights about lakes and streams;
larva valuable fish food.



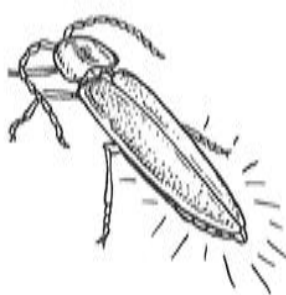
Walkingstick
Order Orthoptera
length, 4 in.

Slow-moving, leaf-feeding insect;
color mimics surroundings;
can sometimes be serious pest.



Praying mantis
Order Orthoptera
length, 2½ in.

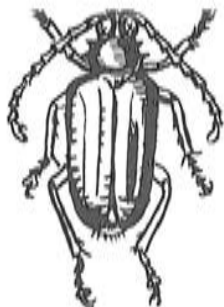
Adult waits patiently in praying
position for insect victims;
color blends with vegetation.



Firefly or lightning bug

Order Coleoptera
length, $\frac{1}{2}$ in.

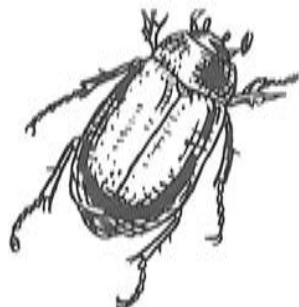
Elongate, flattish; appears at night; both sexes emit light; larva called glowworm.



California prionus

Order Coleoptera
length, $1\frac{1}{4}$ in.

Long-horned, wood-boring beetle; teeth on prothorax; larva lives in tree-trunk burrows.



Junebug or May beetle

Order Coleoptera
length, 1 in.

Adult, leaf-feeder; white grub, root-feeder; in early summer adults buzz about foliage.



Rhinoceros beetle

Order Coleoptera
length, $2\frac{1}{2}$ in.

Name suggested by horned male; one of largest beetles; larva lives in decaying tree roots.



Eyed click beetle

Order Coleoptera
length, $1\frac{1}{2}$ in.

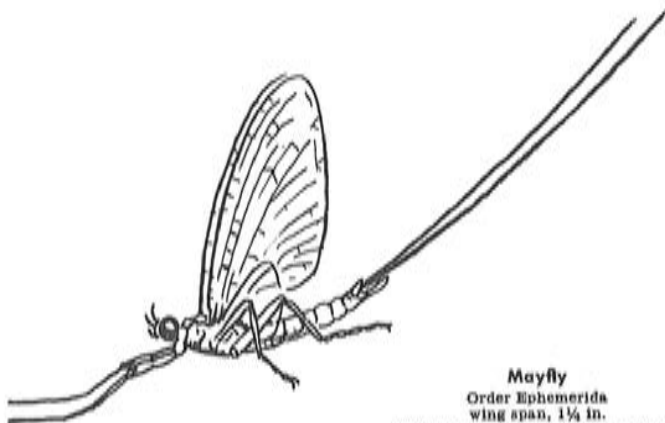
Adult, leaf-feeder, when lying on back springs up with clicking sound; larva is wireworm.



Giant stag beetle

Order Coleoptera
length, 2 in.

Mandibles resemble stag antlers; night flier, attracted to lights; larva lives in decaying wood.



Mayfly

Order Ephemeroptera
wing span, $1\frac{1}{4}$ in.

Found around lakes and streams; nymph feeds on water vegetation and is important fish food.



Stonefly

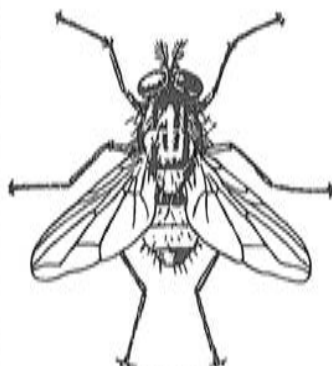
Order Plecoptera
length, 1 in.

Adult probably eats nothing; immature stages found in aerated water, food for fish.



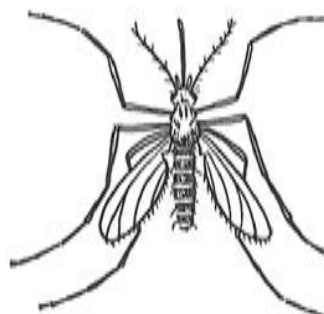
March fly
Order Diptera
length, $\frac{1}{2}$ in.

adults common in early spring;
in swarms; larva feeds on
decaying matter or grass roots.



House fly
Order Diptera
length, $\frac{1}{4}$ in.

Most familiar insect of its order;
common in dwellings; many
generations a year.



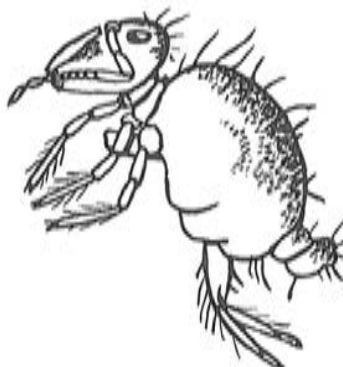
Mosquito
Order Diptera
length, $\frac{1}{4}$ in.

Female is bloodsucker; some
transmit disease; larvae or
wigglers seen on water surface.



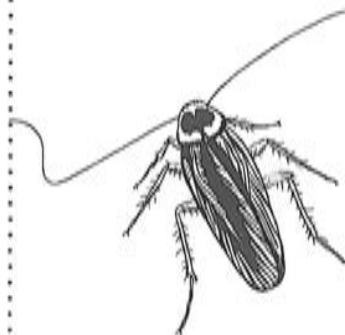
Giant crane fly
Order Diptera
length, 2 in.

large species of fly; lives at
water edges; feeding habits and
breeding ability of family vary.



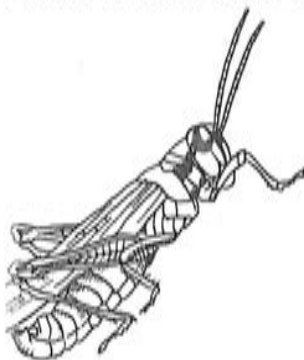
Springtail
Order Collembola
length, $\frac{3}{16}$ in.

Minute, primitive, wingless;
found in damp places; moves
by jumping; lives on decaying
matter.



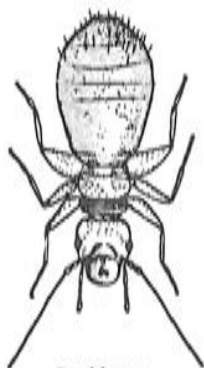
Cockroach
Order Orthoptera
length, $1\frac{1}{2}$ in.

Many species common in dwell-
ings; feeds on many things;
breeds rapidly in warm areas.



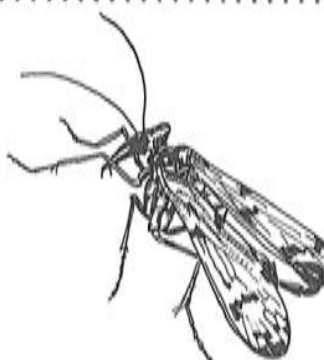
Grasshopper
Order Orthoptera
length, $2\frac{1}{4}$ in.

commonly seen hopping or
running in grassy areas; voracious
plant feeder, found world-wide.



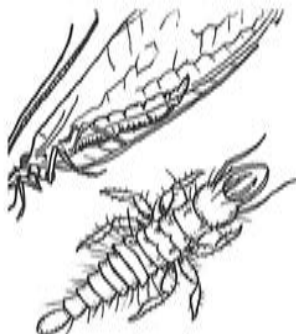
Booklouse
Order Corrodentia
length, $\frac{1}{16}$ in.

Minute, soft-bodied insect found
in old books and damp, dark,
unused rooms.



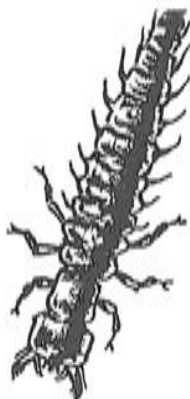
Scorpionfly
Order Mecoptera
length, 1 in.

Found along shaded streams and
in damp woods; feeds on dead or
injured insects.



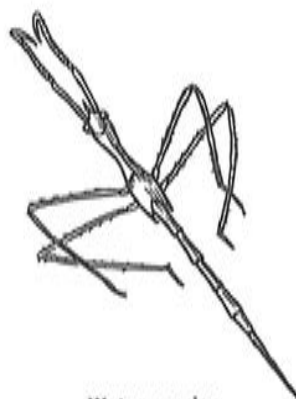
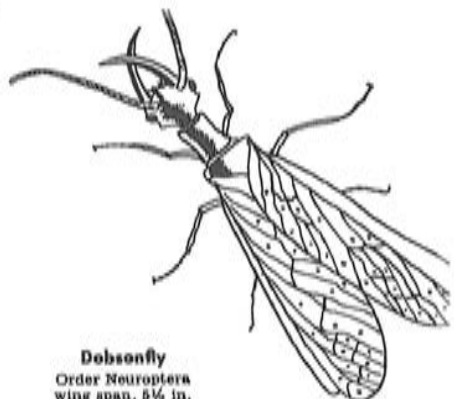
Green lacewing
Order Neuroptera
wing span, $1\frac{1}{4}$ in.

Golden-eyed adult; larva, known as aphid lion, eats aphids and other insects.



Dobsonfly
Order Neuroptera
wing span, $5\frac{1}{2}$ in.

Horned adult; larva, a fish food, called hellgrammite by anglers; eats other insects.



Water scorpion
Order Hemiptera
length, $\frac{1}{2}$ in.

Adult lives concealed in shallow water; breathes by keeping long tube at water surface.



Toad bug
Order Hemiptera
length, $\frac{1}{2}$ in.

Common on muddy stream banks; protective colors vary with soils; lives on insects.



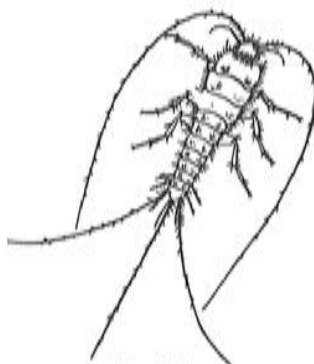
Giant water bug
Order Hemiptera
length, $2\frac{3}{4}$ in.

Adult, electric-light bug; flies from pond to pond, living on insects, snails, and small fish.



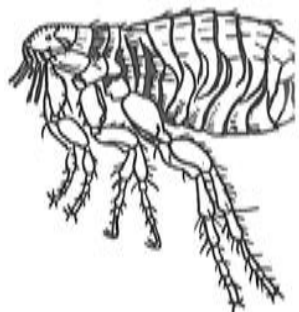
Water boatman
Order Hemiptera
length, $\frac{1}{2}$ in.

Lives in ooze, feeds on minute animals at pond bottom; air bubbles surround swimming body and glisten like silver.



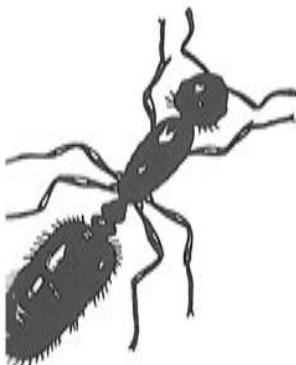
Silverfish
Order Thysanura
length, $\frac{1}{8}$ in.

Name suggested by silvery-white scales covering body; common in dwellings, libraries.



Flea
Order Siphonaptera
length, $\frac{3}{32}$ in.

Adult bites dogs, cats, and man; common; may infest dwelling.



Ant

Order Hymenoptera
length, $\frac{1}{4}$ in.

Social insect living in colony composed of males, female or queen, and workers; widespread.



Bald-faced hornet

Order Hymenoptera
length, 1 in.

Builds large, grayish, paper nest on tree limbs and buildings; feeds on insects; vicious stinger.



Yellow jacket

Order Hymenoptera
length, $1\frac{1}{4}$ in.

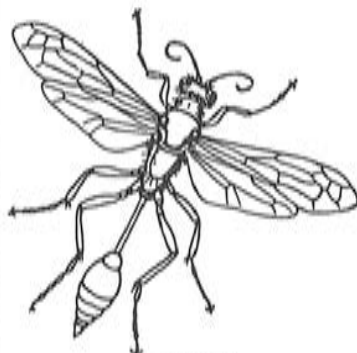
Builds paperlike nest in ground; feeds and raises young on other insects; has painful sting.



Honeybee

Order Hymenoptera
length, $\frac{1}{4}$ in.

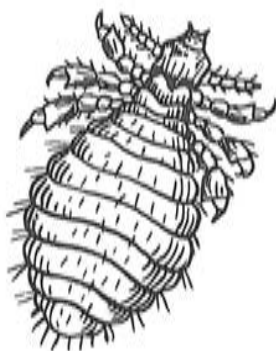
Builds nest in hollow trees or man-provided hives; collects pollen, produces honey, pollinates many crops.



Mud dauber

Order Hymenoptera
length, $1\frac{1}{4}$ in.

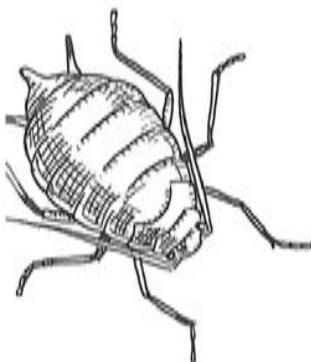
Makes mud nest on lower surface of stones or buildings; feeds young on spiders or caterpillars.



Louse

Order Anoplura
length, $\frac{3}{32}$ in.

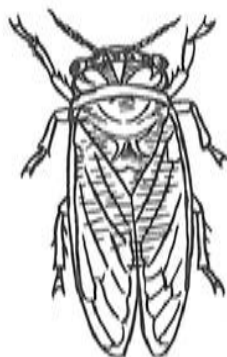
Minute, wingless insect; sucking louse that attacks domestic animals.



Aphid or plant louse

Order Homoptera
length, $\frac{3}{32}$ in.

Minute, soft-bodied, green insect; attacks vegetation; sucks



Harvestfly or cicada

Order Homoptera
length, $1\frac{1}{4}$ in.

Shrill cry familiar in late summer; foliage-feeder; seldom



Thrips

Order Thysanoptera
length, $\frac{1}{20}$ in.

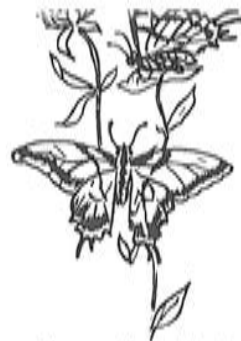
Very active, minute insects with piercing, sucking mouth parts



Woolly bear caterpillar

Order Lepidoptera
length, 2 in.

Common fuzzy caterpillar seen crawling in or near plants; grows up to be a moth.



Tiger swallowtail butterfly

Order Lepidoptera
wing span, 8 in.

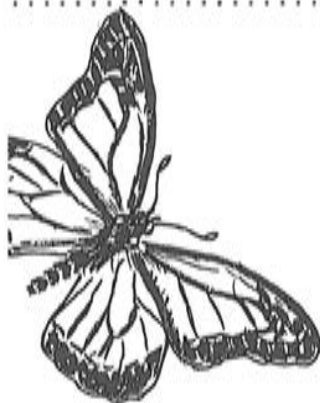
Magnificent; tail-like edges on hind wings; black marked with yellow, blue, or green.



Luna moth

Order Lepidoptera
wing span, 4 1/4 in.

Favorite with amateur collectors; delicate light-green with purple-brown band and transparent-center eyelike spots.



Monarch butterfly

Order Lepidoptera
wing span, 4 in.

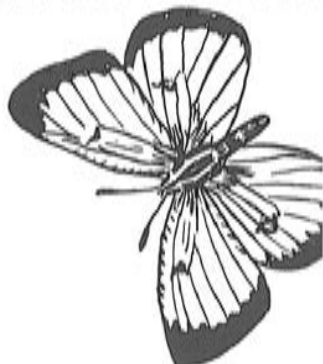
luddy-brown, black-bordered, white-spotted; larva feeds on milkweed; distasteful to birds.



Viceroy butterfly

Order Lepidoptera
wing span, 3 in.

Orange to cinnamon with black, white-spotted; mimics monarch in detail, perhaps for protection.



Clouded sulphur or roadside butter

Order Lepidoptera
wing span, 2 in.

Pale greenish-yellow, blackish-brown border; underside sulphur-yellow; found in muddy places.



Clearwing moth

Order Lepidoptera
wing span, 1 1/4 in.

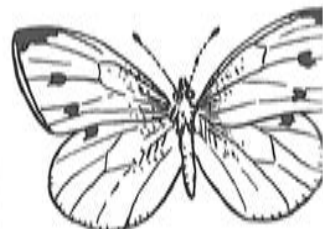
Wings have transparent areas; larva chews into woody plant parts; this one peach tree borer.



Clothes moth

Order Lepidoptera
wing span, 1/2 in.

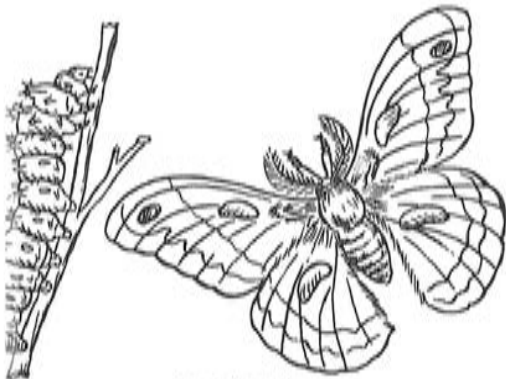
Straw color to silky brown, some spotted; larva feeds on fabrics, some stored products.



Cabbage butterfly

Order Lepidoptera
wing span, 1 1/4 in.

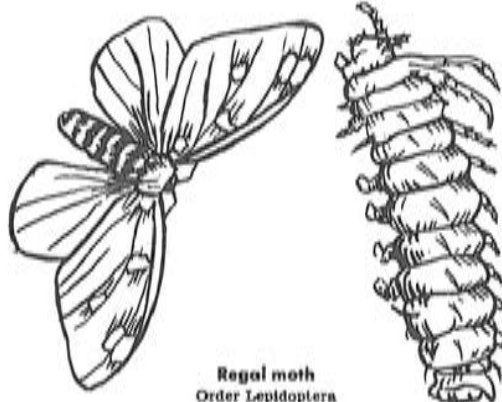
One of most common butterflies; wings are dull-white with black spots; larva is plant feeder.



Cecropia moth

Order Lepidoptera
wing span, 7 in.

Tawny-brown, red, golden, black; largest of giant silk-worm moths; larva, leaf-feeder.



Regal moth

Order Lepidoptera
wing span, 5 in.

Magnificent royal moth; olive, yellow, red, orange-red; larva, hickory horned devil, feeds on leaves of trees and shrubs.



Bollworm

Order Lepidoptera
wing span, 1½ in.

Yellowish to brownish; larva infests many plants; known also as orn earworm, tomato fruitworm, tobacco budworm.



Cutworm

Order Lepidoptera
wing span, 2 in.

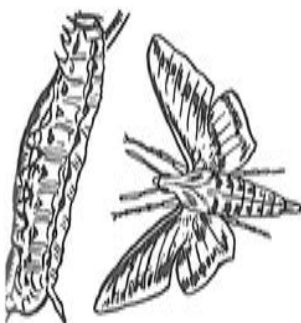
Night-flying moths attracted to lights; varying colors; larvae cut plants off near soil surface.



Armyworm

Order Lepidoptera
wing span, 1½ in.

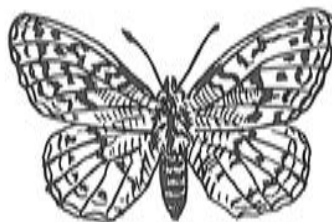
Pale-brown or brownish-gray with white dot in front wing, center; larva, very destructive



White-lined sphinx or hawk moth

Order Lepidoptera
wing span, 3½ in.

Olive-brown, buff, black, red, with white stripes; larva feeds



Great spangled fritillary

Order Lepidoptera
wing span, 4 in.

Tawny, black-checked, silvery-spotted; Latin name means dice box; larva feeds on passion



Mourning-cloak butterfly

Order Lepidoptera
wing span, 2½ in.

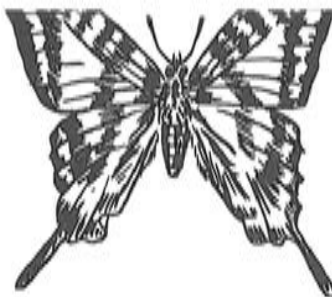
Purplish-brown, yellow border, brown and blue spotted; larva feeds on tree leaves



Red-admiral

Order Lepidoptera
wing span, 2½ in.

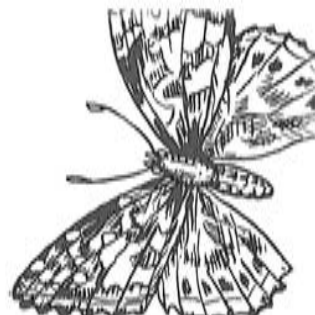
Dark brownish-black, bright orange and white spots; larva feeds on certain tree leaves.



Zebra swallowtail butterfly

Order Lepidoptera
wing span, 3½ in.

Black wings are crossed by several bands of greenish-white; larva feeds on pawpaw.



Painted-lady

Order Lepidoptera
wing span, 2½ in.

Dark brownish-black, orange; eyelike spots on hind wings; larva feeds on composite plants.



Giant skipper

Order Lepidoptera
wing span, 2 in.

Daytime flier with rapid, darting flight; rests wings vertically; larva, stem-borer.



Prometheus moth

Order Lepidoptera
wing span, 4 in.

Giant silkworm; reddish-brown, whitish and black lines, clay-colored margin; cocoons common sight in trees.



Black witch

Order Lepidoptera
wing span, 6 in.

Night-flying moth attracted by lights; eyes shine in darkness; larva feeds on tree leaves.



California tortoise-shell butterfly

Order Lepidoptera
wing span, 2 in.

Angle-wing butterfly with rapid flight; caterpillar feeds on leaves of various plants.



Diamondback moth

Order Lepidoptera
wing span, ¾ in.

Gray; male fore wings yellow-striped to form diamond shapes; larva, plant-feeder.

"Great bugs have lesser bugs
Upon their backs to bite 'em
And they in turn have lesser bugs
And so *ad infinitum*."

Scientists think about one-tenth of all insects may be helpful to man's economy. Assistance from this small group of beneficial insects could be essential to our survival.

At least fifty of our important food crops are dependent upon pollinating insects, such as bees, for setting of fruit and resultant seed. Insect pests could soon ruin crops and vegetation but for predatory insects that capture and feed on other insects, and parasitic species that help check insect pests.

The scavengers receive our thanks for helping keep the earth clean and sanitary. Some insects help to aerate, fertilize, and condition the soil. There are insects that make shellac, others dyes; the silkworm produces silk, and only bees make honey and beeswax. Other benefits from insects are: providing food for fish and animals, aiding scientific research, and producing certain medicinal substances.

Knowing man's friends in the insect world can be important in controlling his enemies. Entomologists study the life cycles of the beneficial insects, learning how to utilize them to our fullest advantage.



Honeybee on comb
Order Hymenoptera
length, $\frac{3}{4}$ in.

Hive-dwelling social family of drones and workers care for egg-laying queen; workers pollinate



Carpenter bee
Order Hymenoptera
length, $\frac{3}{16}$ in.

Resembles bumblebee; builds solitary nest in wood or hollow



Bumblebee
Order Hymenoptera
length, $1\frac{1}{2}$ in.

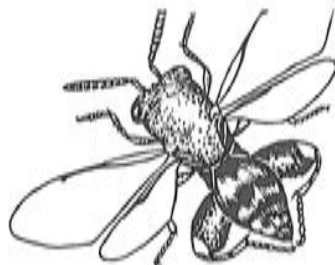
Social family with queen, workers, males; queen of builds in deserted ground n



Sphecid digger wasp

Order Hymenoptera
length, $\frac{3}{4}$ in.

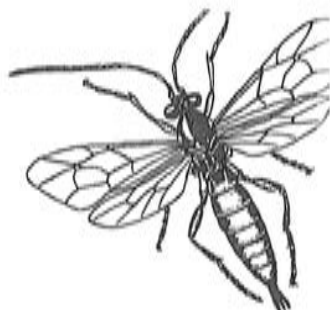
Best builder in earth or dead wood; provisions nest with paralyzed insects or spiders.



Black and yellow chalcid

Order Hymenoptera
length, $\frac{1}{4}$ in.

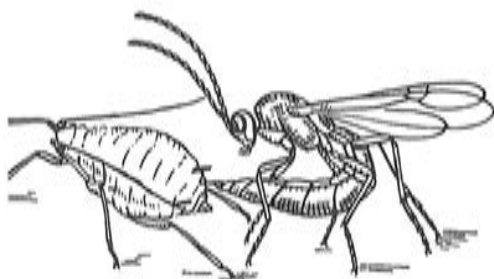
Resembles yellow jacket; parasitic in pupae of moths and butterflies; may attack parasite already in host.



Oakworm ichneumonid

Order Hymenoptera
length, $\frac{1}{4}$ in.

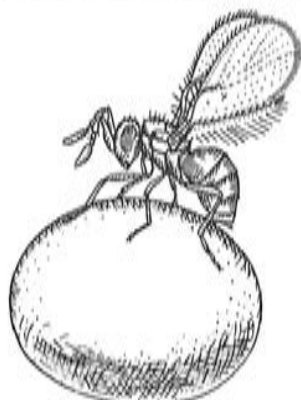
Parasitic in grubs, caterpillars including Calif. oakworm; size varies according to host.



Small braconid wasp stinging aphid

Order Hymenoptera
length, $\frac{1}{12}$ in.

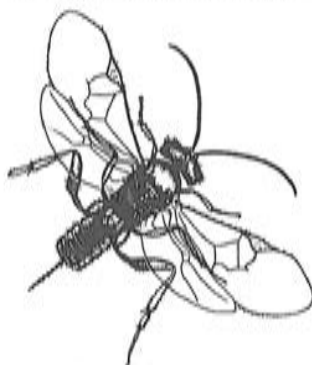
Inserts egg in aphid body; wasp larva kills aphid; destroys many grain aphids.



Minute trichogrammatid wasp

Order Hymenoptera
length, $\frac{3}{64}$ in.

Stings moth eggs, putting in own egg; larva hatches, destroys moth egg; widespread.



Braconid wasp

Order Hymenoptera
length, $\frac{1}{10}$ in.

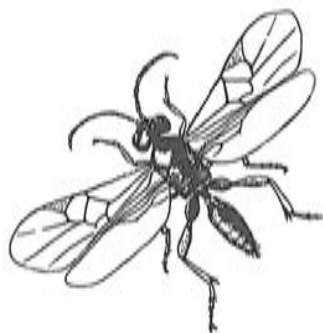
One of most beneficial braconids, laying eggs in many caterpillars; larvae emerge simultaneously.



Braconid wasp

Order Hymenoptera
length, $\frac{1}{4}$ in.

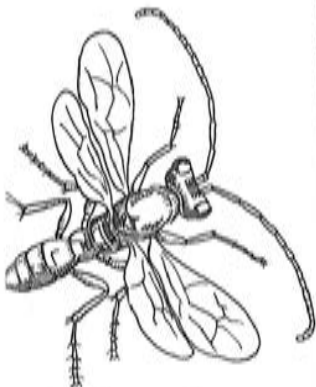
Amber; ovipositor long as body; parasite in caterpillars; colonized to control Oriental fruit moth.



Braconid wasp

Order Hymenoptera
length, $\frac{1}{4}$ in.

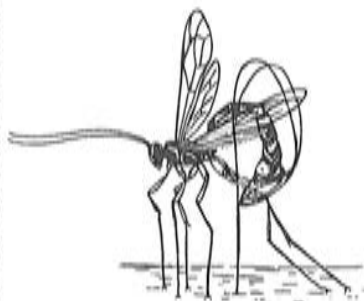
Parasitic to European corn borer; numbers may develop from one parasitized caterpillar.



Secondary parasite

Order Hymenoptera
length, $\frac{1}{4}$ in.

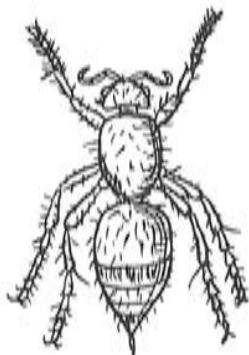
attacks many species of helpful
bees; proof that not all parasites are helpful to man.



"Longtail" ichneumonid parasite

Order Hymenoptera
length, $1\frac{1}{4}$ in.

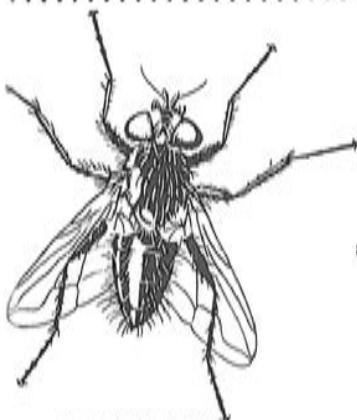
Interesting; long ovipositor;
drills in tree trunks, placing
eggs to hatch in horntail larvae.



Wingless wasp or velvet ant

Order Hymenoptera
length, $1\frac{1}{4}$ in.

Some clothed in velvetlike hairs;
guest or parasite in nests of
wasps or bees; strong stinger.



Small tachinid fly

Order Diptera
length, $\frac{1}{4}$ in.

enemy of Mexican bean beetle;
lays eggs in beetle larva; fly
larva feeds on beetle larva.



Ichneumonid hyperparasite

Order Hymenoptera
length, $\frac{5}{16}$ in.

Enemy of tachinid fly that
attacks Mexican bean beetle; lays
eggs in fly larva.



Robberfly

Order Diptera
length, 2 in.

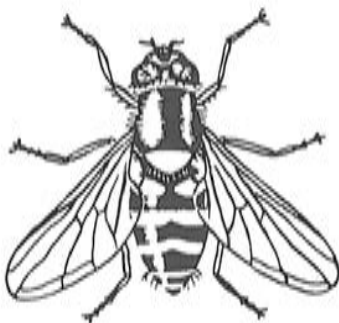
Large, fierce fly capable of fast
flight; adult, larva feed on in
sects including large species.



Bumblebee-like robberfly

Order Diptera
length, 2 in.

Protective mimicry; larva lives
in decaying wood; feeds on in-



Flowerfly or syrphid fly

Order Diptera
length, $\frac{1}{4}$ in.

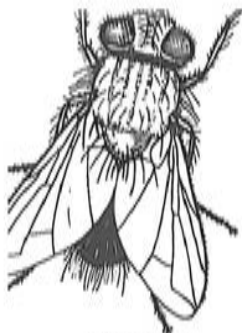
Adults hover around flowers
and do some pollinating; larvae



Net-winged midge

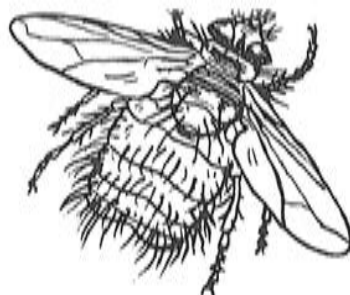
Order Diptera
length, $\frac{2}{5}$ in.

May appear in large swarms
dancing in air; breeds in swif



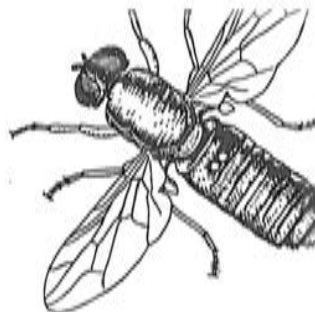
Tachinid fly
Order Diptera
length, $\frac{1}{4}$ in.

Parasitic in larvae of European corn borer; imported from Europe to help control corn borer.



Tachinid fly
Order Diptera
length, $\frac{1}{4}$ in.

Found about flowers and rank vegetation; larva parasitic in caterpillars; interesting how eggs are deposited.



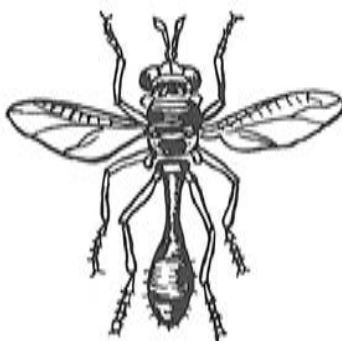
Window-pane fly
Order Diptera
length, $\frac{3}{16}$ in.

Often found around windows of mills and warehouses; preys on stored-grain insect pests.



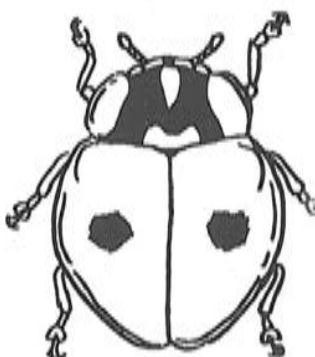
Beefly
Order Diptera
length, $\frac{1}{2}$ in.

Adult feeds on flower nectar, sits on sunny paths, sticks or stones; larva feeds on insects.



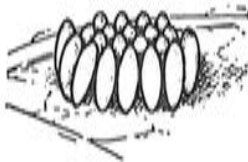
Conopid fly
Order Diptera
length, $\frac{1}{4}$ in.

Protective mimicry; adult feeds on nectar and pollen; larva parasitic to other insects.



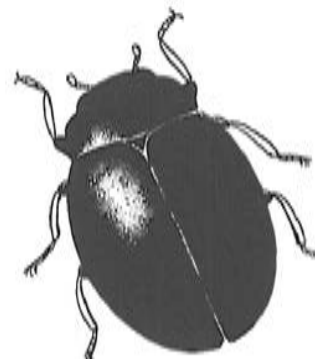
Two-spotted lady beetle
Order Coleoptera
length, $\frac{3}{16}$ in.

Feeds on insects; may receive chant "Lady bird, lady bird! Fly away home! Your house is on fire, your children do roam!"



Convergent lady beetle
Order Coleoptera
length, $\frac{1}{2}$ in.

Adult, pupa, larva, eggs; red with black spots; larva and adult feed on other insects.



Black lady beetle
Order Coleoptera
length, $\frac{1}{16}$ in.

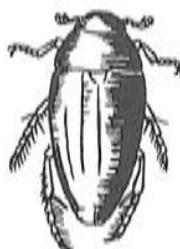
Adult; larva and adult help fruit growers, feed on orchard mites and scale insects.



Rove beetles attacking cabbage maggot

Order Coleoptera
length, $\frac{1}{4}$ in.

Black adults; feed on fly maggots; common about decaying animal or vegetable matter.



Great water-scavenger beetle

Order Coleoptera
length, $1\frac{1}{2}$ in.

Common in quiet pools; swims or crawls on plant life; feeds on decaying material in water.



Fiery hunter

Order Coleoptera
length, $1\frac{1}{2}$ in.

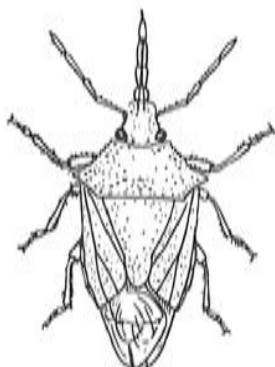
Shiny black ground beetle with reddish punctures; keen hunter of cutworms, other insects.



Carrion beetle

Order Coleoptera
length, $1\frac{1}{2}$ in.

Buries dead animals in which eggs are deposited; adult, larva feed on decaying animal matter.



Spined soldier bug

Order Hemiptera
length, $\frac{3}{4}$ in.

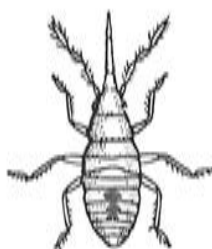
Destroys many pests in various stages; sucks eggs dry of California oakworm; related to destructive harlequin bug.



Whirligig beetle

Order Coleoptera
length, $\frac{3}{4}$ in.

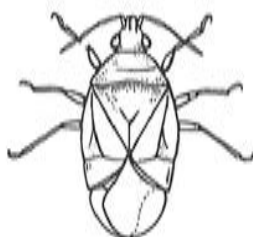
Groups spin or dart rapidly on still water; some emit fluid with disagreeable odor; feed on aquatic insects.

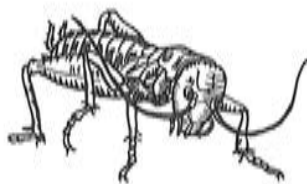


Predaceous flower bug

Order Hemiptera
length, $\frac{3}{4}$ in.

Common on vegetation; enemy of corn earworm, spider mites,

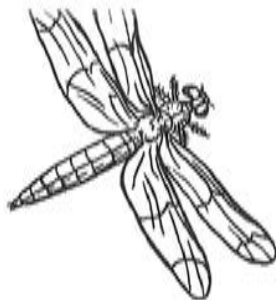




Jerusalem cricket

Order Orthoptera
length, 1½ in.

Baby-faced, clumsy creature;
lives under stones, in loose soil;
feeds on insects, dead vegetation.



Dragonfly

Order Odonata
wing span, 3 in.

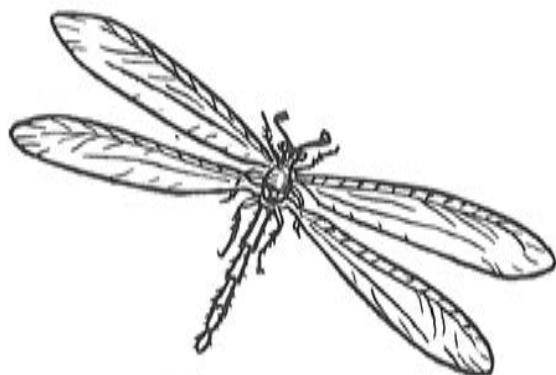
Adult, immature stages predaceous on many insects captured in flight; seen about fresh water.



Scorpionfly

Order Mecoptera
length, 1 in.

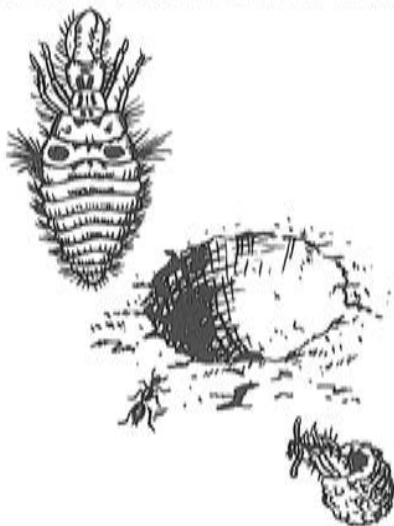
Hangs suspended by fore legs from rank herbage; hind and fore legs catch living insects.



Ant lion

Order Neuroptera
length, 1 in.

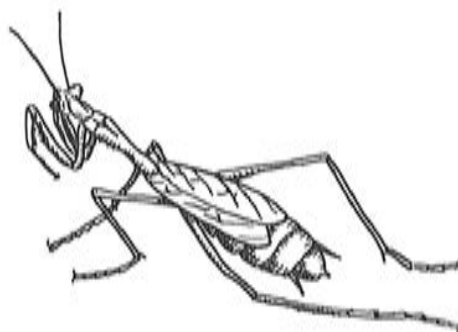
Graceful adult; larva, doodlebug, digs pit, partially buries itself in bottom waiting for ant victims; pupa rests in sand cocoon.



Aphis lion

Order Neuroptera
length, ¾ in.

Lacewing larva; feeds on aphids, other insects; stalked eggs on leaf keep larvae from eating each other.



Praying mantis

Order Orthoptera
length, 2½ in.

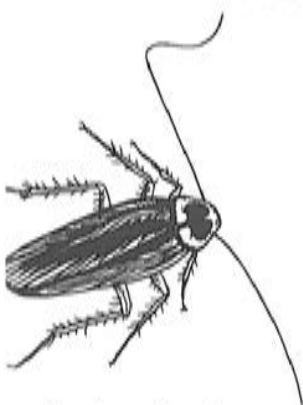
Sits in praying position waiting to catch insects; color resembles surroundings.

C—HOUSEHOLD AND STORAGE PESTS

Insects and the damage they cause can be seen easily in any home. A woolen suit or favorite carpet, with newly discovered moth holes, brings immediate attention to the insect problem. Rice, flour, cereal, or dried fruit—infested with a wormlike pest—is ruined for human food. Roaches, ants, and termites are among the most despised of household pests. The crawly appearance of the house centipede makes it unwelcome, even though it does little harm and much good.

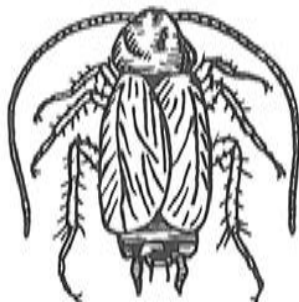
Other pests shown in this chapter emphasize in a forceful way the constant battle man has with insects in mills, granaries, and storage silos, as well as on other commercial premises.

Each year millions of dollars are spent to keep homes, food, and merchandise free of such insect pests.



American cockroach
Order Orthoptera
length, 1½ in.

Common, large, dark roach in-
sting dwellings, particularly
the South.



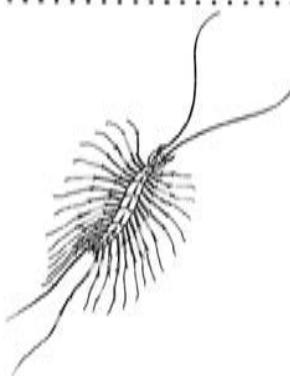
Oriental cockroach
Order Orthoptera
length, 1 in.

Cosmopolitan species from Asia;
blackish-brown, with wings
that do not cover body.



German cockroach
Order Orthoptera
length, ½ in.

Known in northern cities as
croton bug; common in kitchens,
bathrooms, other damp areas.



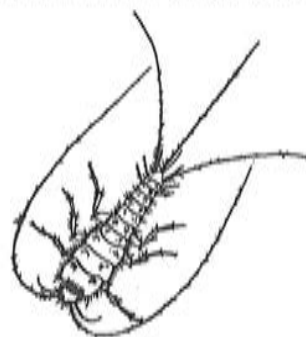
Centipede
Class Chilopoda
length, 1 in.

Feeds on small insects and other
household pests; bites man very



House cricket
Order Orthoptera
length, ¾ in.

Common in dwellings; active at
night; feeds on woollens and



Silverfish
Order Thysanura
length, ¾ in.

Silvery-white and yellowish;
feeds on human food.



Black carpenter ant
Order Hymenoptera
length, $\frac{3}{8}$ in.

Winged female and two workers;
largest common ant; fond of
sweets; attacks house timbers.



Little red ant or Pharaoh's ant
Order Hymenoptera
length, $\frac{1}{32}$ in.

Light-yellow; most troublesome
of dwelling invaders; builds
nest in walls and foundations.



Ants

Order Hymenoptera

Pinched-in waistline, rear wings
smaller than front wings.

or

Termites

Order Isoptera

Thick waistline, front and rear
wings almost same size.



Little black ant
Order Hymenoptera
length, $\frac{1}{4}$ in.

Troublesome household ant
nests outside, invading dwelling
in search of food.



Termite

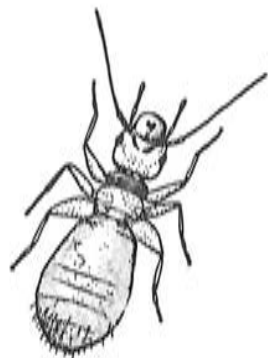
Order Isoptera
length, $1\frac{1}{4}$ in.

Winged adult, second-generation
caste, worker, soldier;
live in social colonies; infest
house timber.



Argentine ant
Order Hymenoptera
length, $\frac{3}{16}$ in.

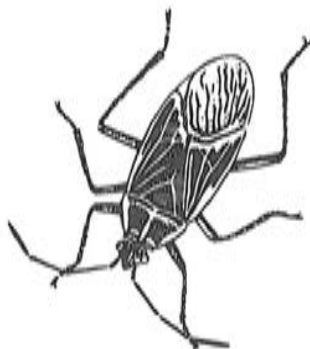
Workers; annoying, destructive
gets in foods, beehives, poultry
yards; fosters injurious insect



Booklouse

Order Corrodentia
length, 1/16 in.

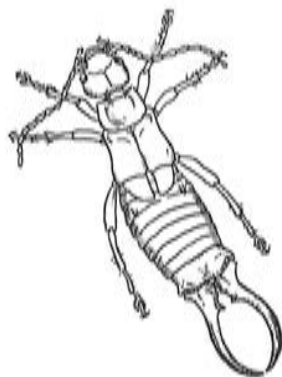
Minute, soft-bodied insect found in old books and unused, damp rooms; feeds on dead vegetable and animal matter.



Boxelder bug

Order Hemiptera
length, 3/4 in.

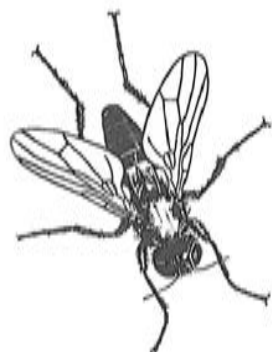
Bright-colored; seen around houses fall and spring; cannot bite, or harm household articles.



European earwig

Order Dermaptera
length, 3/4 in.

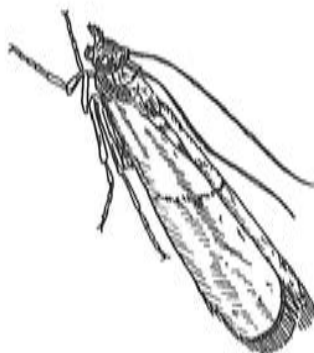
Reddish-brown; foul odor; nest in decaying matter near house; feeds on organic material.



Cheese skipper or meggot

Order Diptera
length, 3/16 in.

Shiny fly; larva infests meat, cheese, other foods; beads by jumping; able to leap; world-wide.



Indian-meal moth

Order Lepidoptera
wing span, 3/4 in.

Pest of stored foods, grain; larva spins silken tubes through meal, dried fruits, and other products.



Mediterranean flour moth

Order Lepidoptera
wing span, 1 in.

Larva prefers flour and meal, attacks other foodstuff; webs masses of flour in mills.



Angoumois grain moth

Order Lepidoptera
wing span, 1/2 in.

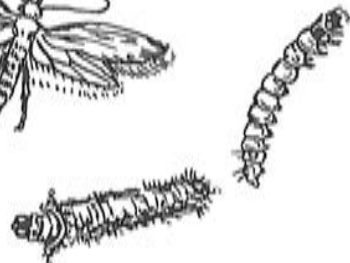
Weathered straw-colored adult; larva, dangerous common pest.

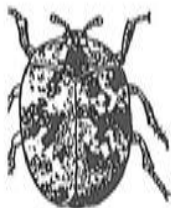


Clothes moth

Order Lepidoptera
wing span, 1/2 in.

Adult flies about, depositing eggs; larvae feed on fabrics.

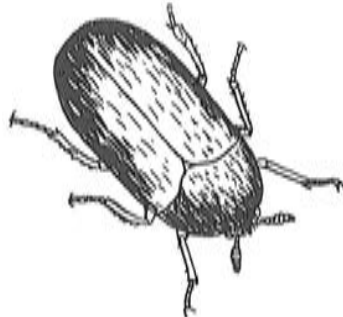




Carpet beetle

Order Coleoptera
length, 3/16 in.

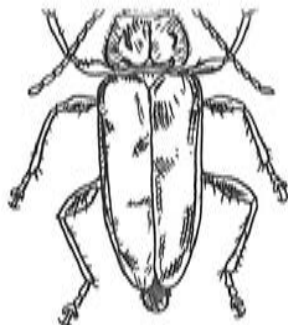
Larva pest of woolen fabrics, especially carpets; hides in dark, cluttered places; active adults on flowers.



Black carpet beetle

Order Coleoptera
length, 3/16 in.

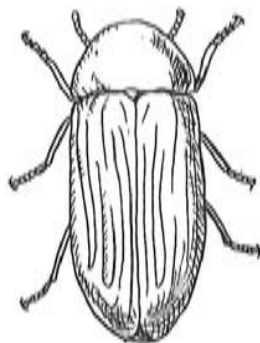
Larva injures woolen fabrics, carpets, fur, leather; infests cereals, stored grain; cosmopolitan.



Old-house borer or housebock

Order Coleoptera
length, 1 in.

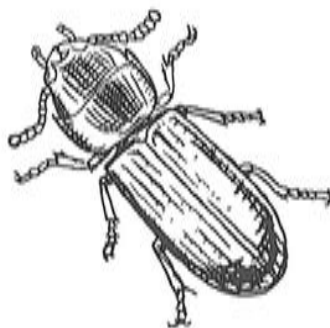
Infests old and new wood construction, stored lumber; larva lives in wood 2 to 17 years.



Powder-post beetle

Order Coleoptera
length, 1/8 in.

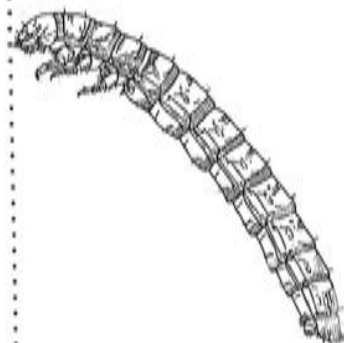
Small, narrow adult; grub is severe pest of seasoned wood.



Cadelle

Order Coleoptera
length, 1/8 in.

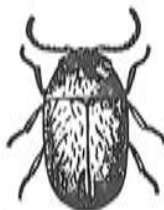
Found in granaries, mills, ships, railroad cars; attacks stored grain, other dry food products; larva often bores woodwork.



Yellow mealworm

Order Coleoptera
length, 1 1/4 in.

Infests stored cereal products; scavenger on animal and vegetable matter; fish bait; bird food; adult, black beetle.



Cigarette or tobacco beetle

Order Coleoptera
length, 1/10 in.

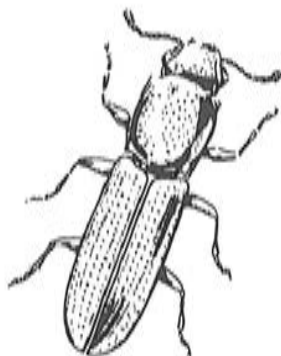
Adult light-brown; serious pest to tobacco and infests other stored products; widespread.



Drug-store beetle

Order Coleoptera
length, 1/10 in.

Adult reddish-brown; named for serious feeding on pharmaceutical drugs; infests most dry plant and animal products.



Square-necked grain beetle

Order Coleoptera
length, $\frac{1}{8}$ in.

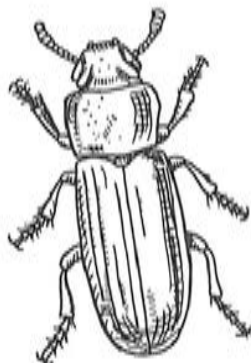
Attacks seed pods of many plants; common in stored corn, damages ears in field.



Bean weevil

Order Coleoptera
length, $\frac{1}{8}$ in.

Adult appears on plants, depositing eggs; larva feeds on beans in field and in storage.



Confused flour beetle

Order Coleoptera
length, $\frac{1}{7}$ in.

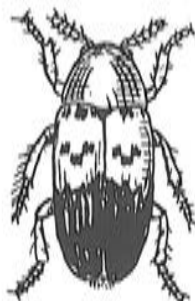
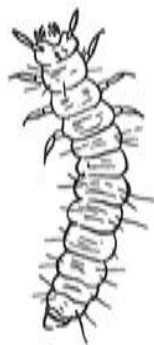
Shiny, reddish-brown; most injurious pest in U.S. flour mills found where grain or grain products are stored.



Saw-toothed grain beetle

Order Coleoptera
length, $\frac{1}{10}$ in.

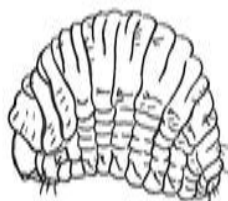
Beetle often found in stored food and dry organic matter; adult and larva serious pests.



Larder beetle

Order Coleoptera
length, $\frac{1}{3}$ in.

Larva feeds on meat and animal products; adult sometimes feeds on pollen; world-wide.



Rice weevil

Order Coleoptera
length, $\frac{1}{8}$ in.

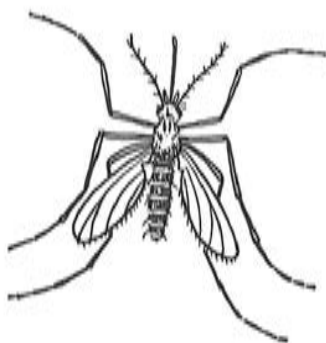
Attacks corn in field, and many stored and grain products; many generations a year possible.

D-HUMAN AND ANIMAL PESTS

Insect problems of towns and cities are multiplied many times in rural areas, where conditions and hosts are more favorable for development of certain pests. The annual production of livestock and crops would be half or less if farmers did not control these insect enemies. Thousands of people would die and hundreds of thousands more would be ill each year, if disease-carrying insects were not controlled.

Mosquitoes and flies are major pests familiar to everyone. A flea infestation, originating with a house pet, is an experience never to be forgotten; ticks picked up in wooded areas are a danger to both man and animal. The black widow spider, bed bug, or gnat molest town, city, and rural dwellers.

Stockmen and farmers wage a constant battle against insect pests to produce the food and fiber necessary for man's well-being, and we are all in the battle against insects to protect man's health.



Southern house mosquito

Order Diptera
length, $\frac{1}{4}$ in.

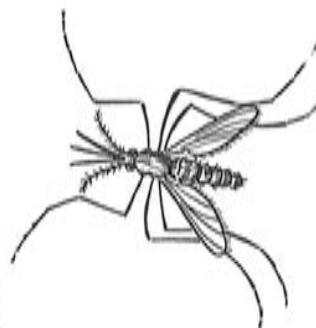
Rests parallel to surface; lays eggs in masses on water surface; not important U.S. disease carrier.



Northern house mosquito

Order Diptera
length, $\frac{1}{4}$ in.

Male with large, feathery antennae; female is bloodsucker; rests parallel to surface.



Common malaria mosquito

Order Diptera
length, $\frac{3}{16}$ in.

Rests at angle with surface; lays eggs singly on water surface; transmits malaria.



Yellow fever mosquito

Order Diptera
length, $\frac{1}{4}$ in.

Primarily in tropics; lives and breeds in water near man's habitations; transmits yellow fever.



Black fly, turkey or buffalo gnat

Order Diptera
length, $\frac{1}{8}$ in.

Bites man, livestock, poultry; widespread; some carry disease.



House fly

Order Diptera
length, $\frac{1}{4}$ in.

Common in dwellings nationwide; deposits eggs in manure; disease carrier.



Little house fly

Order Diptera
length, 3/16 in.

Larva or maggot sometimes found in man, causing intestinal myiasis.



Striped horse fly

Order Diptera
length, 1/2 in.

Adult with green eyes; sucks blood of livestock; larva lives in moist soil.



Stable fly

Order Diptera
length, 1/4 in.

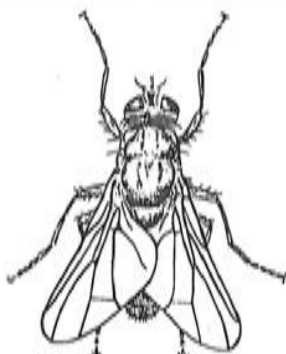
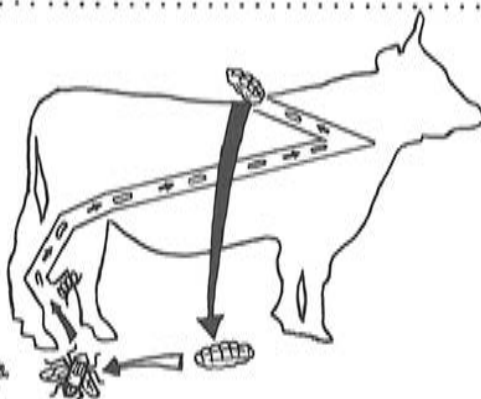
Looks like house fly; attacks animals and man; bites, especially on legs.



Cattle grub, heel or warble fly

Order Diptera
length, 7/16 in.

Adult deposits eggs on cattle hairs; maggots live in body, bore out back, fall to ground, pupate in soil.



Horn fly

Order Diptera
length, 3/16 in.

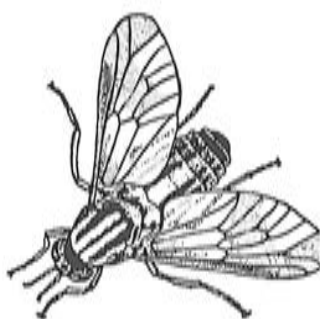
Annoying, bloodsucking pest of cattle; deposits eggs in fresh



Horse bot fly

Order Diptera
length, 2, 3 in.

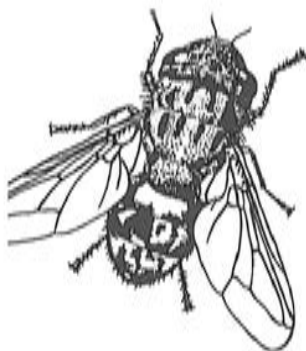
Adult annoys livestock by buzzing flies; larvae bore in tissue



Deer fly

Order Diptera
length, 1/2 in.

Attacks man and animals; bites



Sheep bot fly

Order Diptera
length, $\frac{1}{2}$ in.

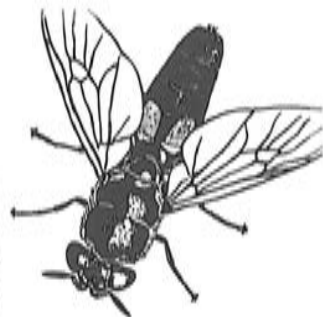
Adult deposits larvae in nose of sheep and goats, maggots develop in sinus area.



Red-tailed flesh fly

Order Diptera
length, $\frac{3}{8}$ in.

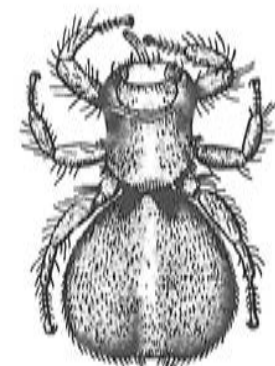
Attacks various animals, sometimes man; works in sores.



Soldier fly

Order Diptera
length, $\frac{3}{8}$ in.

Adult; widespread; larva may invade human body, causing intestinal myiasis.



Sheep tick, louse fly, or ked

Order Diptera
length, $\frac{1}{4}$ in.

Wingless fly; lives in fleece of host, sucking blood through skin; attacks goats, sheep.



Green-bottle fly

Order Diptera
length, $\frac{5}{16}$ in.

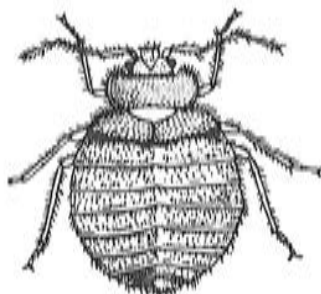
Blowfly species; breeds in decomposing animal matter; is known to deposit eggs in food-stuff or open wounds of animals.



Screw-worm fly

Order Diptera
length, $\frac{2}{5}$ in.

Bluish-green livestock pest; feeds and lays eggs on wounds; sometimes infests man; larva develops in living flesh.



Bed bug

Order Hemiptera
length, $\frac{3}{16}$ in.

Feeds primarily on man at night; sometimes found on caged animals and birds; rests during day in cracks and dark areas.



Masked hunter

Order Hemiptera
length, $\frac{3}{8}$ in.

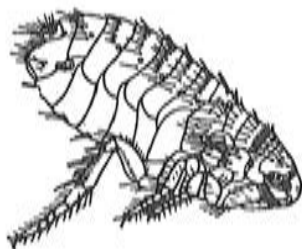
Infests houses to prey on bed bugs, other insects; painful bite; sticky nymph attracts dust, looks like mass of lint.



Scorpion

Class Arachnida
length, 5 in.

Crablike with long, fleshy tail catches and stings spiders and insects at night; sting painful to man.



Dog flea

Order Siphonaptera
length, $3/32$ in.

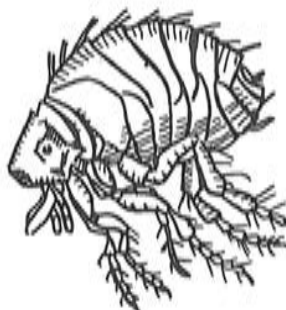
Bites both man and animals;
shifts from host to host; transmits disease.



Human flea

Order Siphonaptera
length, $3/32$ in.

Adult bites man and animals;
larva lives in dirt or excreta; can transmit disease.



Sticktight flea

Order Siphonaptera
length, $1/4$ in.

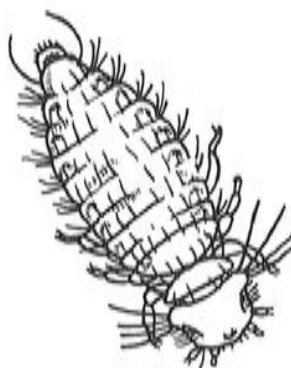
Southern chicken flea; found
dense masses around head
poultry, sometimes animals
stays on host for long period.



Large chicken louse

Order Mallophaga
length, $3/16$ in.

Smoke-gray to almost black;
found on chickens and other
fowl; skin contact serious.



Shaft louse

Order Mallophaga
length, $1/16$ in.

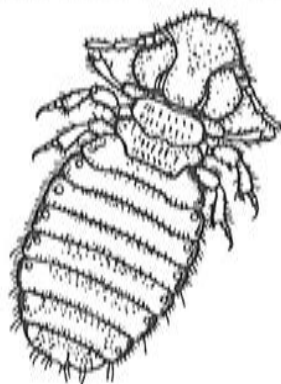
Small body louse attacks chickens
and other fowl; commonly
found on long wing feathers.



Hog louse

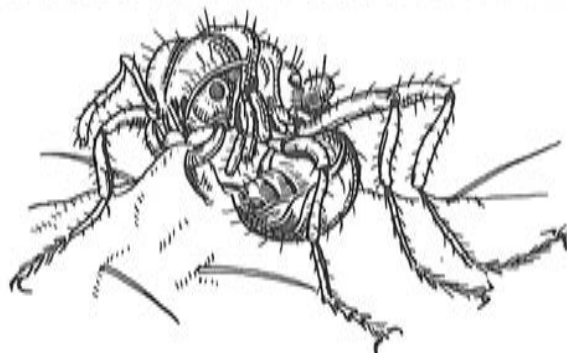
Order Anoplura
length, $5/16$ in.

Bloodsucking pest of hogs.



Cattle biting louse

Order Mallophaga
length, $1/16$ in.



Imported fire ant

Order Hymenoptera
length, $3/16$ in.

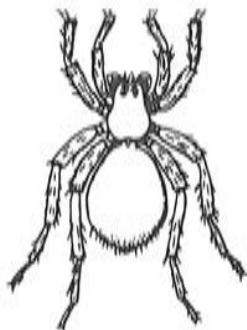
Thief ant; steals planted seeds;
severe sting; often kills young



Black widow spider

Class Arachnida
length, $\frac{1}{2}$ in.

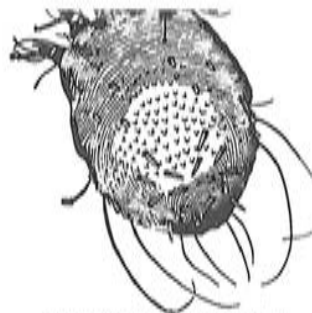
Most venomous spider in U.S.;
red hourglass-shaped spot on
underside; lives in dark places.



Spider

Class Arachnida
length, $\frac{1}{3}$ in.

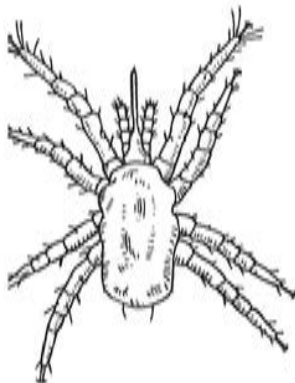
Most spiders harmless to man;
feed on insects; webs evidence
of spinning skill; widespread.



Itch mite or sarcoptic mange

Order Acarina
length, $\frac{1}{40}$ in.

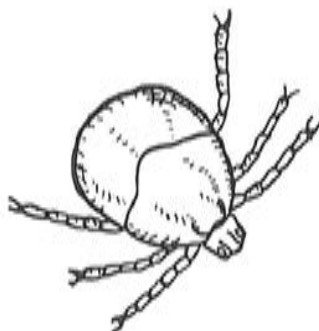
Causes mange in livestock and
wildlife, sometimes infesting
entire body; known to spread
"Cavalryman's itch" to man.



Chicken mite

Order Acarina
length, $\frac{1}{30}$ in.

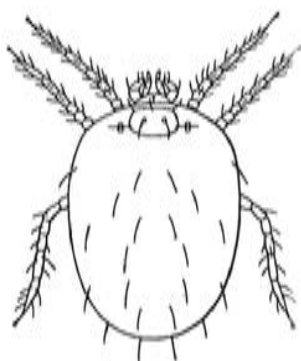
Infested nymph; adult, nymph
troublesome poultry pests; lays
eggs in cracks of roosts, nests.



Cattle tick

Order Acarina
length, $\frac{1}{2}$ in.

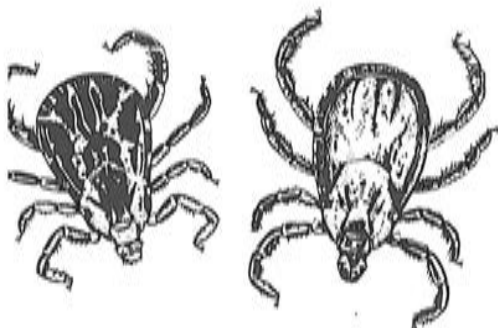
Seed tick stage; destructive
cattle parasite in southern areas;
transmits Texas fever.



Chigger

Order Acarina
length, $\frac{1}{80}$ in.

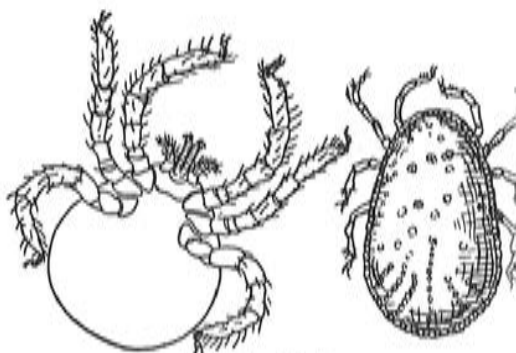
Orange-yellow; feeds on man
and many animals; lives in grass
and underbrush.



American dog tick

Order Acarina
length, $\frac{1}{2}$ in.

Male, female; pest of dogs,
other animals, man; carries
Rocky Mountain spotted fever.



Fowl tick or bluebug

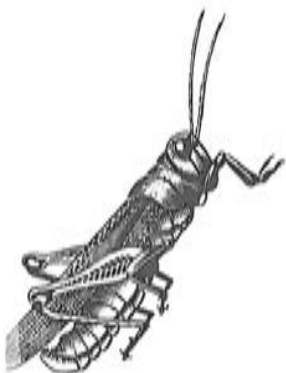
Order Acarina
length, $\frac{1}{2}$ in.

Adult, nymph suck blood from
domestic fowl, mostly at night;
found in roost cracks during day.

E—GENERAL PLANT FEEDERS

There are many specialists in the insect world; their appetite can be satisfied by only one crop or group of related crops. But the insect pests introduced in this section may be encountered eating many different kinds of vegetation. Armyworms and cutworms are real headliners during severe outbreaks; and from man's earliest records the destructive habits of the grasshopper or locust have been reported. The caterpillar seen crawling across the sidewalk—or the grub found instead of a fishing worm—may be the larval stage of one of these general feeders.

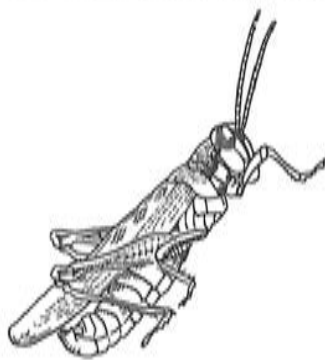
Be prepared to recognize these pests and to know how to deal with them before infestations become severe.



Differential grasshopper

Order Orthoptera
length, 2¼ in.

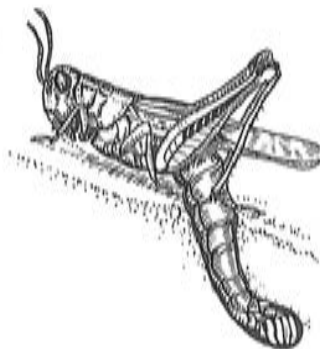
Serious pest; brownish or olive-green; one of the largest and most destructive 'hoppers.



Lesser migratory grasshopper

Order Orthoptera
length, 1¼ in.

Serious pest; attacks crops, range vegetation; migrates long distances in outbreak years.



Two-striped grasshopper

Order Orthoptera
length, 1½ in.

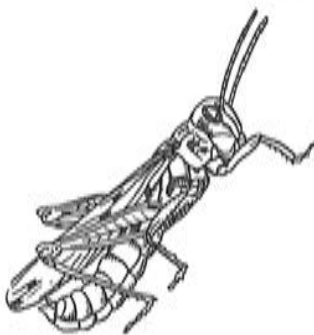
Female laying eggs; widespread; eats any vegetation, preferring cultivated crops.



Red-legged grasshopper

Order Orthoptera
length, 1¼ in.

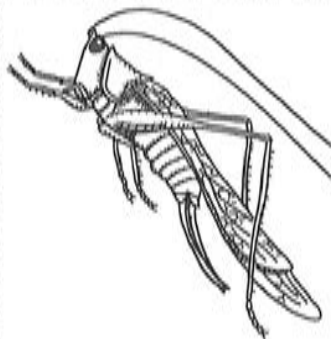
Adult male; one of the smallest and most destructive 'hoppers; at-



Clear-winged grasshopper

Order Orthoptera
length, ¾ in.

Adult male; appears in early spring; destructive general



Long-horned grasshopper

Order Orthoptera
length, 1¼ in.

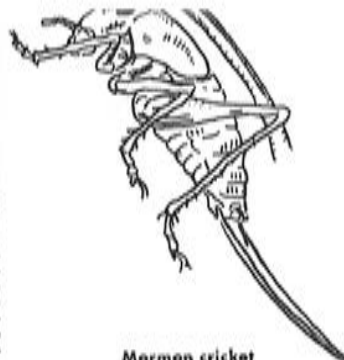
Adult female; pretty, light-green, called "meadow grass-



Field cricket

Order Orthoptera
length, 1½ in.

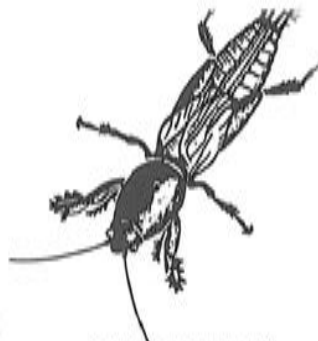
Dark-colored, thick-bodied;
feeds at night; seen in pastures,
gardens, and under stones.



Mormon cricket

Order Orthoptera
length, 2 in.

Adult female; serious pest on
western ranges; migrates to
crops during severe outbreaks.



Southern mole cricket

Order Orthoptera
length, 1½ in.

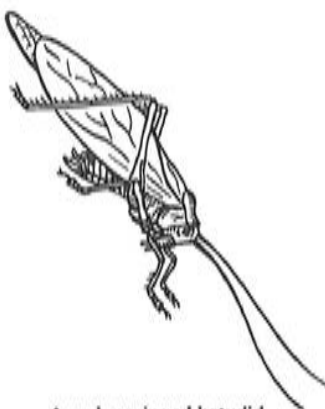
Covered with fine, brown, vel-
vety hairs; burrows, nests in soil
near water; feeds on plant roots



Stone or camel cricket

Order Orthoptera
length, 4/5 in.

Wingless long-horned 'hopper';
high-arched back like camel;
eats plants in dark, moist places.



Angular-winged katydid

Order Orthoptera
length, 3¼ in.

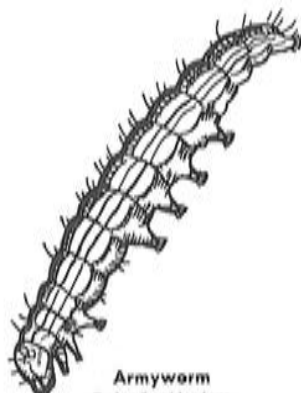
General foliage feeder; summer
singer of "Katy did, Katy did;
she did, she didn't."



Spider mite

Order Acarina
length, 1/80 in.

Whitish, reddish, or greenish;
feeds on plant sap, spins
slight web; attacks many plan



Armyworm

Order Lepidoptera
length, 2 in.

Attacks grain, forage crops; in
outbreak years moves in armies,
eats any vegetation.



Fall armyworm

Order Lepidoptera
length, 1½ in.

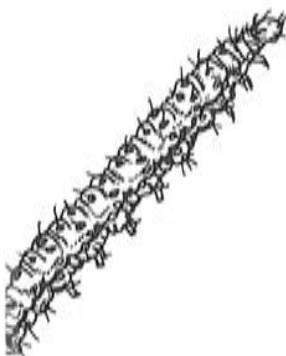
Inverted Y on head front; sur-
vives winter in Gulf states,
moves northward in spring;
attacks field and vegetable crops.



Cutworm

Order Lepidoptera
length, 1½ in.

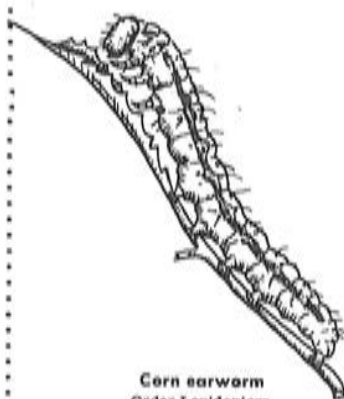
Caterpillar of night-flying mo-
tho; gray, brownish-black, spot-
ted or striped; lives in soil; cuts
young plants at night.



Garden webworm

Order Lepidoptera
length, 1 1/4 in.

Spins light web over plant,
feeds beneath it; widespread,
serious pest; adult, moth.



Corn earworm

Order Lepidoptera
length, 1 1/4 in.

Worst U.S. corn pest; general
feeder, also known as cotton
bollworm, tomato fruitworm,
and tobacco budworm.



Salt-marsh caterpillar

Order Lepidoptera
length, 3 in.

Dark-brown, hairy; feeds on
leaves, destroying all but heavy
veins; attacks many crops.



European earwig

Order Dermaptera
length, 3/4 in.

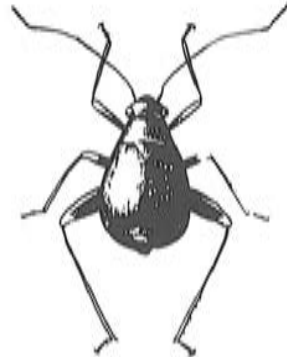
cosmopolitan; pest to many
vegetable plants; broods over
eggs and young as birds do.



Tarnished plant bug

Order Hemiptera
length, 1/4 in.

Sucks sap from varied crops,
flowers, fruit-tree buds and
blossoms.



Garden fleahopper

Order Hemiptera
length, 1/12 in.

Feeds on plant sap, discoloring
or destroying foliage; attacks
many types of crops.



Seed-corn maggot

Order Diptera
length, 1/4 in.

Legless, yellowish-white grub
with tough skin; severely dam-

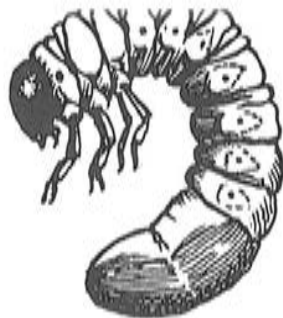


Southern corn rootworm

Order Coleoptera
length, 3/4 in.

Larva of spotted cucumber
beetle; lives in soil, attacking
underground parts of many

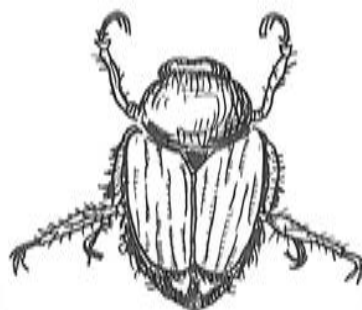




White grub

Order Coleoptera
length, 1 in.

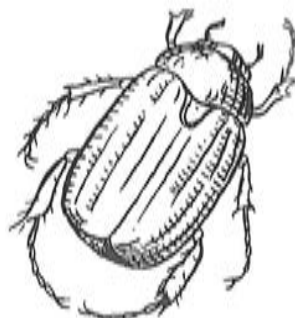
Among most destructive soil pests; attacks many plants; adult, May beetle, feeds on foliage.



Japanese beetle

Order Coleoptera
length, $\frac{1}{2}$ in.

Serious imported pest; larva or grub, root-feeder; adult feeds on leaves and flowers of plants.



Asiatic garden beetle

Order Coleoptera
length, $\frac{5}{16}$ in.

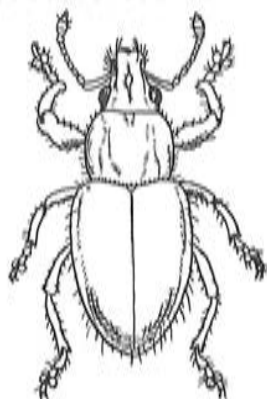
Velvety, cinnamon-brown adult feeds at night on foliage; grub feeds on roots.



Striped blister beetle

Order Coleoptera
length, $\frac{3}{4}$ in.

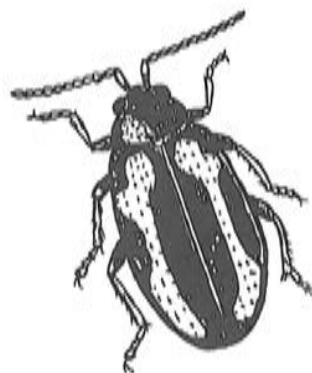
Feeds on leaves of plants, flowers, goldenrod pollen; body substance blisters skin on contact.



White-fringed beetle

Order Coleoptera
length, $\frac{1}{2}$ in.

General plant feeder in south-east U.S.; no males; larva or grub serious pest to plant roots.



Striped flea beetle

Order Coleoptera
length, $\frac{1}{12}$ in.

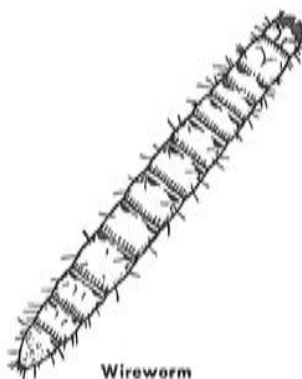
Jumps about on plants, eating holes in foliage; larva feeds on plant roots; widespread.



Vegetable weevil

Order Coleoptera
length, $\frac{1}{2}$ in.

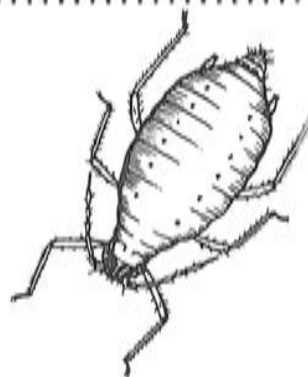
Spotted, grayish adult damages foliage of many plants; grub feeds on plant roots.



Wireworm

Order Coleoptera
length, $1\frac{1}{2}$ in.

Hard, smooth, wirelike larva of click beetle; serious pest to root crops, newly planted seeds.



Corn leaf aphid

Order Homoptera
length, $\frac{1}{10}$ in.

World-wide; infests foliage of many plants including certain grasses.

Insect pests destroy the production of about 120 million acres annually in the United States. Instead of providing food and fiber for the population, production from these acres feeds insect enemies. Entomologists estimate this loss in dollars to be at least four billion for an average year.

Of the 86,000 insect species that occur in the United States, 10,000 are considered major pests. Other tens of thousands do not occur commonly enough now to be considered *major* pests, or their feeding habits are not yet known to be of economic importance.

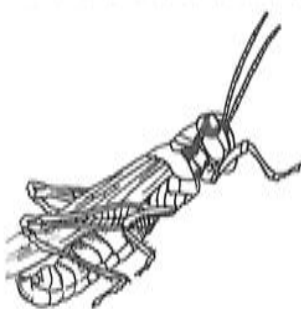
Entomologists still do not know the destructive potential of most insect enemies; those they know most about are the ones that have caused the greatest destruction.

The following five chapters illustrate many crop pests by the specific and related crops on which they commonly feed. It is impossible in limited space to illustrate all the insects in each order that feed on any one group of crops. These sections include the familiar pests in each order, or insects representative of common types, now known to attack the crops.

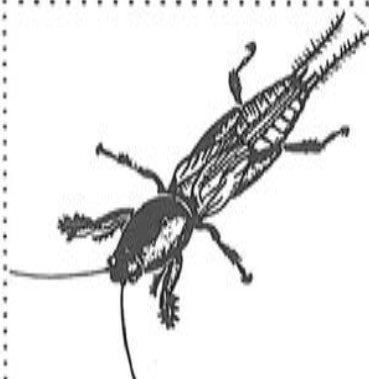
The general plant feeders are not always repeated, for they can be found on many crops. And although many of the insects adapt their feeding habits to one particular crop, they may be found sampling another.

This booklet can be helpful in identifying the insects illustrated. Then use the recommendations put out by your own state agencies, or the U.S.D.A., to control these pests.

F-1—VEGETABLE INSECTS



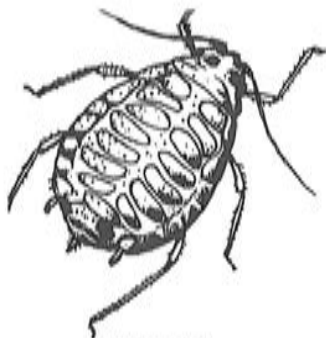
Grasshopper
Order Orthoptera
length, 2¼ in.
serious pest in outbreak years;
lays eggs in soil; feeds in weeds



Mole cricket
Order Orthoptera
length, 1½ in.
True cricket of modified form;
burrows and nests in moist soil;

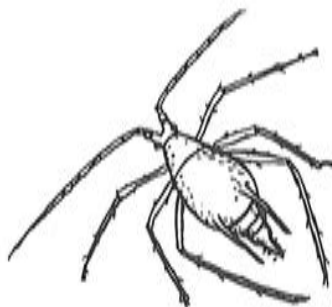


Melon or onion thrips
Order Thysanoptera
length, 1/20 in.
Narrow, fringe-winged adult;
attack many plants causing



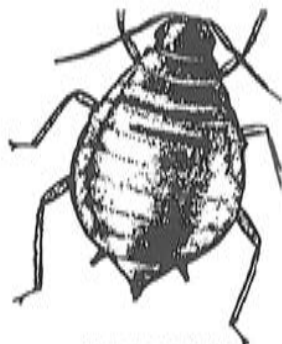
Turnip aphid
Order Homoptera
length, 1/16 in.

Soft-bodied, sucking insect; infestations may seriously damage plants; secretes honeydew.



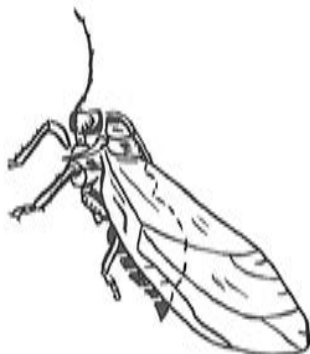
Potato aphid
Order Homoptera
length, 1/8 in.

Elongated, pear-shaped adult; similar species attack many field and house plants.



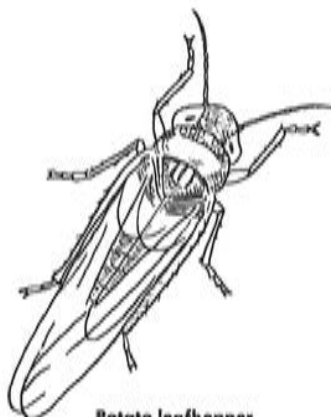
Corn root aphid
Order Homoptera
length, 1/16 in.

Wingless female; infests plant roots; cared for by ants that feed on its honeydew.



Potato psyllid
Order Homoptera
length, 1/8 in.

Hopping insect resembles winged aphid; carries plant disorder more damaging than its feeding.



Potato leafhopper
Order Homoptera
length, 1/8 in.

Pale-green; sucks juices from plants, causes hopper burn; found on underside of leaves.



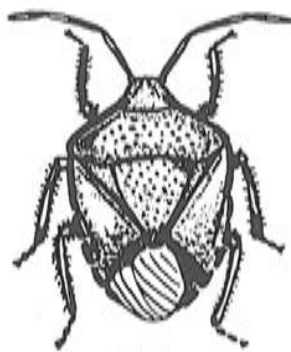
Spider mite
Order Acarina
length, 1/50 in.

Typical spider mite; attacks many plants, feeding on sap and spinning slight web.



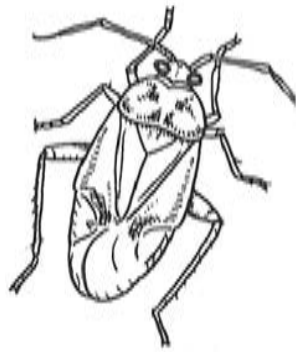
Garden fleahopper
Order Hemiptera
length, 1/12 in.

Black adult and greenish nymph suck sap from leaves and stems of many different plants.



Stink bug
Order Hemiptera
length, 1/8 in.

Variety of colors and markings; attacks many plants; leaves odor on plant fruit.



Tarnished plant bug
Order Hemiptera
length, 1/8 in.

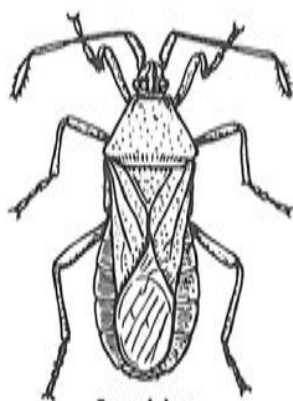
Brownish, flattened bug; suck sap from many types of plant foliage; widespread.



Harlequin bug or calico bug

Order Hemiptera
length, $\frac{3}{8}$ in.

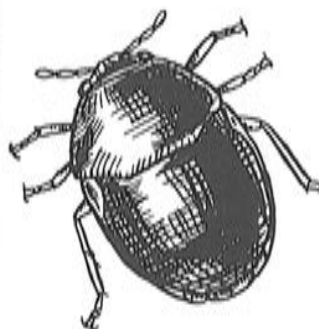
Black with red, orange, and yellow; important enemy of cabbage and related crops.



Squash bug

Order Hemiptera
length, $\frac{2}{3}$ in.

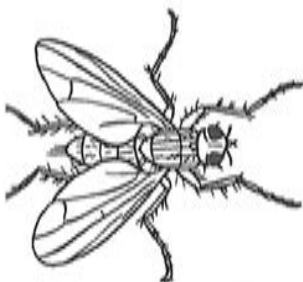
Grayish-black with dirty-yellow underside; attacks all cucurbits or vine crops; nation-wide.



Negro bug

Order Hemiptera
length, $\frac{1}{10}$ in.

Dark, beetlelike adult; injures celery, corn, wheat, other plants; deposits bad odor.



Cabbage maggot

Order Diptera
length, $\frac{1}{2}$ in.

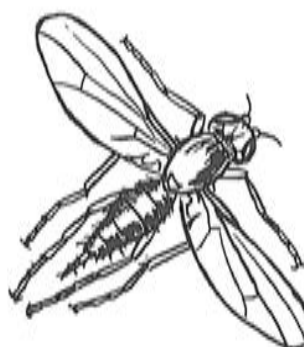
Larva deposits eggs at base of plants; maggot injures roots of cabbage, turnip, related crops.



Serpentine leaf miner

Order Diptera
length, $\frac{1}{14}$ in.

Larva disfigures leaves of cabbage, turnip, potato, spinach, many wild and forage plants.



Carrot rust fly

Order Diptera
length, $\frac{1}{8}$ in.

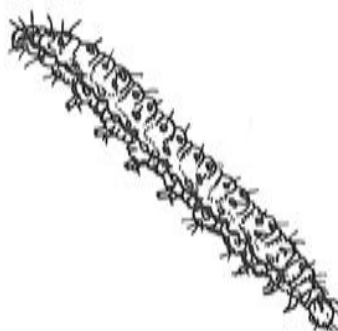
Shiny-black adult; maggot feeds on roots and surface of carrots, celery, parsley, similar plants.



Cutworm

Order Lepidoptera
length, $1\frac{1}{2}$ in.

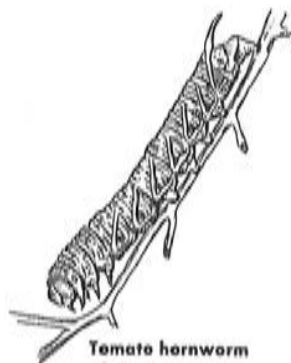
Larva lives in soil; cuts off young plants during night feeding; variety of species.



Garden webworm

Order Lepidoptera
length, $\frac{1}{4}$ in.

Slender, greenish or yellowish worm; skeletonizes leaves and stems leaving them webbed.



Tomato hornworm

Order Lepidoptera
length, 4 in.

Green-striped larva with red horn attacks tomato, potato, tobacco, related plants; adult,



Imported cabbageworm

Order Lepidoptera
length, 1¼ in.

Light-green larva covered with fine down attacks cabbage, crucifers, other plants; adult, white cabbage butterfly.



Cabbage looper or inchworm

Order Lepidoptera
length, 1¼ in.

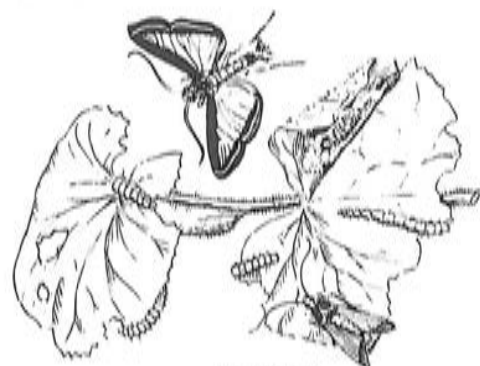
Light-green, white- or yellowish-striped caterpillar feeds on cabbage, related plants.



Woolly bear caterpillar

Order Lepidoptera
length, 2 in.

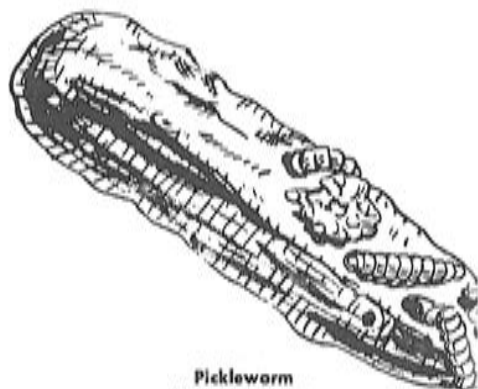
Typical hairy caterpillar four feeding on many types of foilag



Melonworm

Order Lepidoptera
length, 1¼ in.

Translucent, yellowish-green larva feeds on leaves, fruit of cucurbits; adult, iridescent, pearly-white, black-bordered.



Pickleworm

Order Lepidoptera
length, 1¼ in.

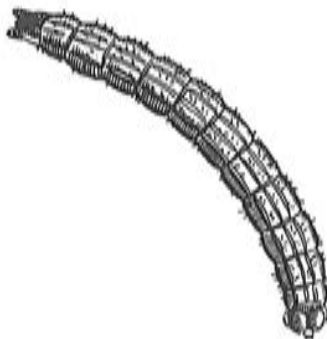
Light-green or yellowish larva destroys blossoms, mines into fruit of cucumber, related plants; serious in late season.



Black swallowtail caterpillar

Order Lepidoptera
length, 2 in.

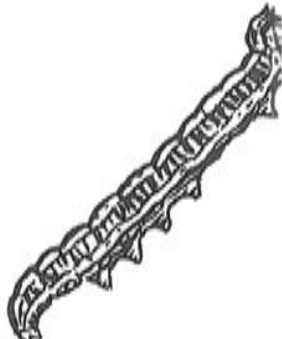
Green, black, yellow; forked horn rises when disturbed; feeds on celery, carrots, other plants.



Velvetbean caterpillar

Order Lepidoptera
length, 1¼ in.

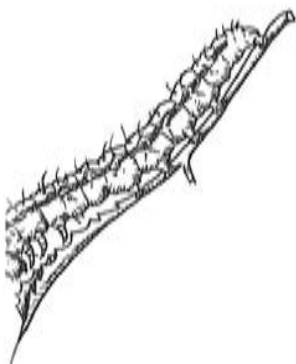
Striped larva; when disturbed spits brownish liquid; feeds on soybeans, peanuts, other crops.



Zebra caterpillar

Order Lepidoptera
length, 2 in.

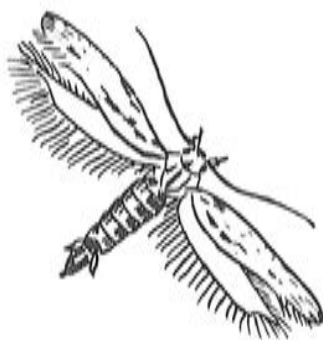
Black, yellow-striped, with red damages cabbage, other veg tables; two generations a yea



Corn earworm or tomato fruitworm

Order Lepidoptera
length, 1½ in.

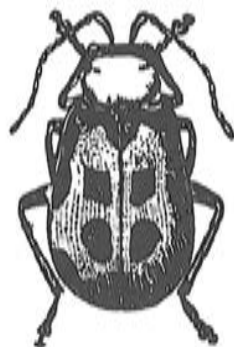
Serious pest in buds and fruit of plants; known also as tobacco budworm, cotton bollworm.



Potato tuberworm moth

Order Lepidoptera
wing span, ½ in.

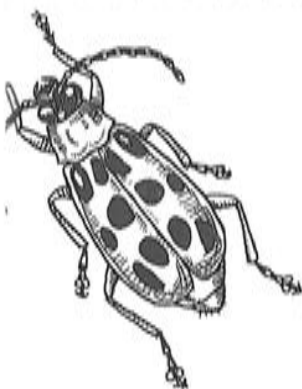
Slender, dark-headed larva attacks potatoes, other plants in field and storage; known also as tobacco splitworm.



Bean leaf beetle

Order Coleoptera
length, 1/8 in.

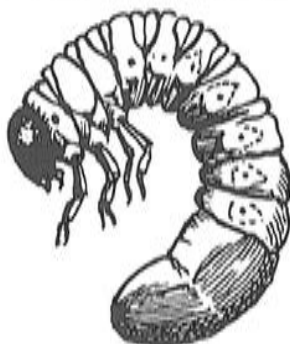
Reddish, yellowish, dark-spotted adult feeds on leaves; larva feeds on roots of peas, corn, other crops.



Spotted cucumber beetle

Order Coleoptera
length, ¼ in.

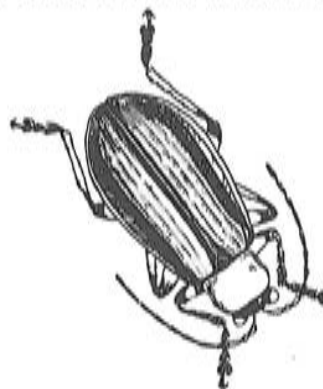
Yellowish-green, black-spotted; attacks many plants; larva bores roots and underground stems.



White grub

Order Coleoptera
length, 1 in.

Serious soil pest; double row of spines on underside of last body segment; usual 3-year life cycle.



Striped cucumber beetle

Order Coleoptera
length, 1/8 in.

Greenish-yellow adult feeds on cucurbit foliage, spreads disease; larva mines roots, stems.



Colorado potato beetle or potato bug

Order Coleoptera
length, ¾ in.

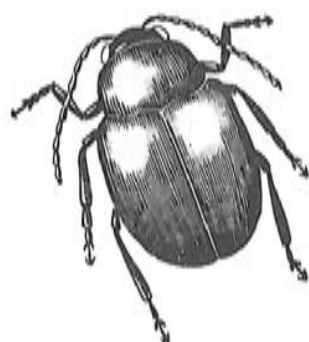
Yellow, black adult; larva, reddish-orange soft bug; feed



Asparagus beetle

Order Coleoptera
length, ¼ in.

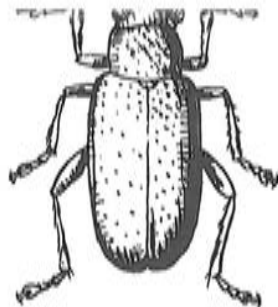
Cream, bluish-black, red adult deposits eggs on plant stems;



Potato flea beetle

Order Coleoptera
length, 1/16 in.

Adult jumps about, feeding on foliage; spreads early potato



Smartweed flea beetle

Order Coleoptera
length, $\frac{1}{8}$ in.

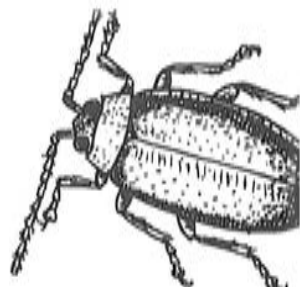
Adult feeds on leaves of many plants, destroys vitality, spreads disease; larva, root-feeder.



Striped cabbage flea beetle

Order Coleoptera
length, $\frac{1}{12}$ in.

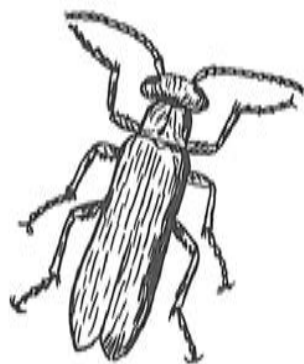
Dark, shiny adult feeds on foliage, preferring cruciferous plants; larva feeds on roots.



Spinach flea beetle

Order Coleoptera
length, $\frac{1}{4}$ in.

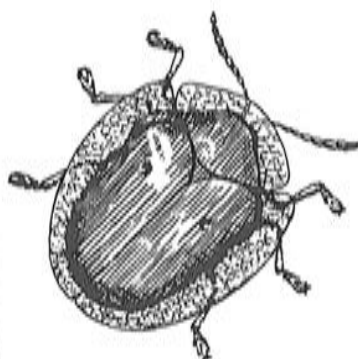
One of largest flea beetles; feeds on many plants, leaving leaves peppered with holes.



Ash-gray blister beetle or old-fashioned potato bug

Order Coleoptera
length, $\frac{3}{8}$ in.

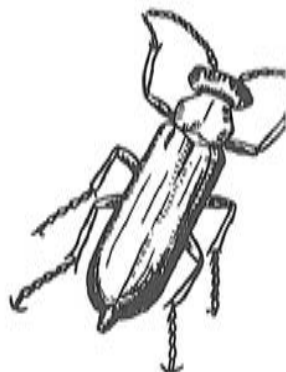
Fond of vegetable, legume foliage; secretion blisters skin; larva feeds on locust egg-pods.



Tortoise beetle or gold bug

Order Coleoptera
length, $\frac{1}{4}$ in.

Turtle-shaped adult and thorny larva feed on sweet potato foliage, morning glory, bindweed.



Nuttall blister beetle

Order Coleoptera
length, 1 in.

Restless, active beetles tend to feed together in swarms; secretion blisters skin.



Wireworm

Order Coleoptera
length, $\frac{1}{2}$ in.

Hard, smooth, dark-brown larva of click beetle; serious pest to root crops and seeds.



Vegetable weevil

Order Coleoptera
length, $\frac{3}{8}$ in.

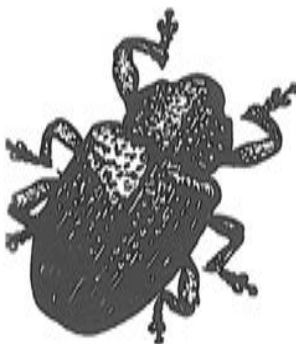
Spotted, grayish adult feeds on vegetable foliage; larva and adult feed on roots.



Bean weevil

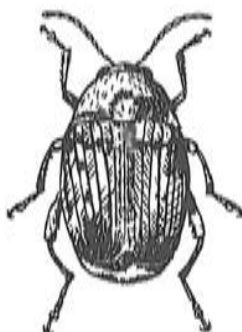
Order Coleoptera
length, $\frac{1}{2}$ in.

Adult feeds on plant leaves; concealed larva feeds on beans in field and storage.



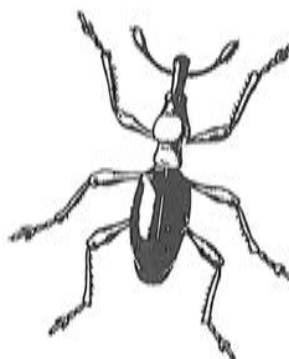
Cowpea curculio or pod weevil
Order Coleoptera
length, $\frac{1}{4}$ in.

Bump-backed weevil damages beans, cowpeas, seedling cotton, strawberries; grub develops in pods, found in storage.



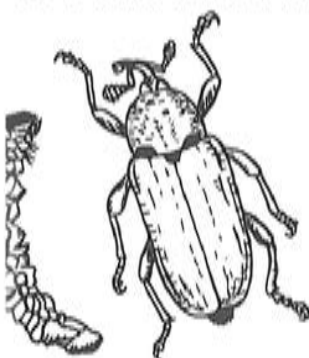
Pea weevil
Order Coleoptera
length, $\frac{1}{8}$ in.

One of worst pests to peas; dark-brown or blackish adult feeds on leaves; larva develops in growing pods.



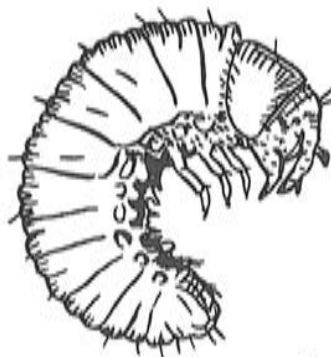
Sweet potato weevil or root borer
Order Coleoptera
length, $\frac{1}{4}$ in.

Bad pest of sweet potato; blue-black and red adult feeds on leaves, stems; grub honeycombs tubers in field and storage.



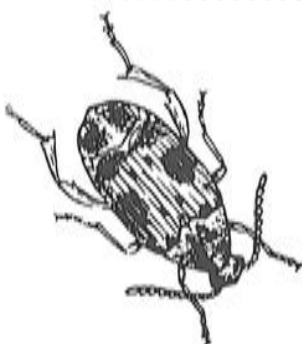
Potato stalk borer
Order Coleoptera
length, $\frac{1}{8}$ in.

Adult minor foliage pest; larva eats stalk interior of many plants, causing wilt or death.



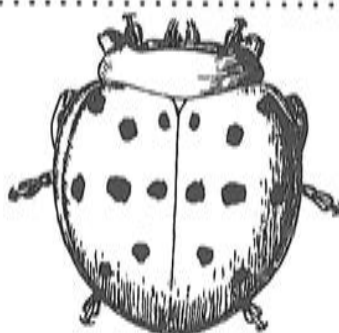
Grape colaspis
Order Coleoptera
length, $\frac{1}{8}$ in.

Adult flies about crops, feeds on foliage; grub, root-feeder; also known as clover rootworm.



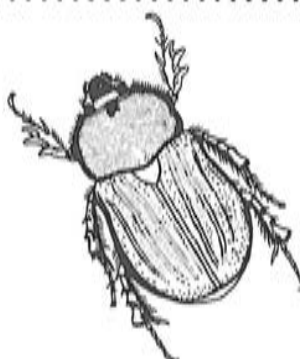
Southern cowpea weevil
Order Coleoptera
length, $\frac{5}{16}$ in.

Major pest of cowpeas in field and storage; larva develops in



Mexican bean beetle
Order Coleoptera
length, $\frac{1}{3}$ in.

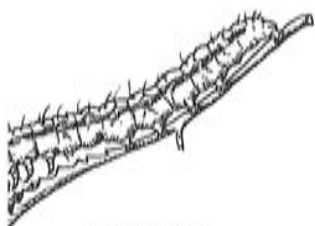
Yellow to coppery-brown adult and larva feed on underside of leaves; also attack pods and



Carrot beetle
Order Coleoptera
length, $\frac{3}{8}$ in.

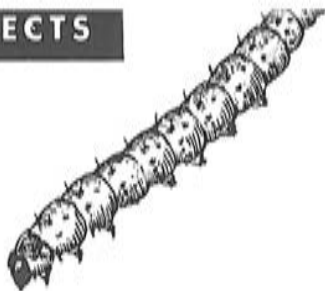
Adult feeds on corn and celer stalks, potato and carrot roots

F-2—CORN INSECTS



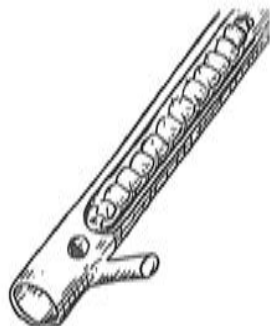
Corn earworm
Order Lepidoptera
length, $1\frac{1}{2}$ in.

Worst corn pest in U.S.; attacks ears in field; also known as tobacco budworm, tomato fruitworm, cotton bollworm.



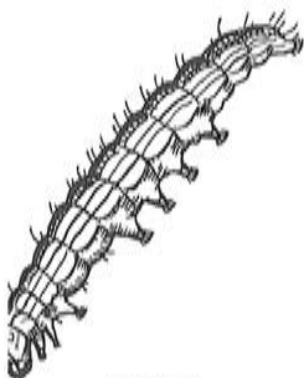
European corn borer
Order Lepidoptera
length, 1 in.

Among most damaging corn pests; larva feeds in whorl of young plant, bores in stalk and ear; attacks other plants.



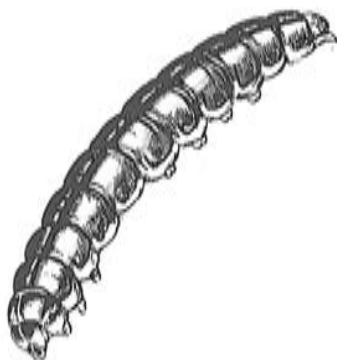
Stalk borer
Order Lepidoptera
length, 2 in.

Brown, white-striped caterpillar bores in stems, feeds on heart of plant; migrates about field.



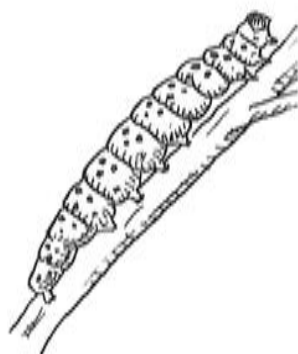
Armyworm
Order Lepidoptera
length, 2 in.

Migrates to cornfields; in outbreak years may strip fields of all vegetation.



Cutworm
Order Lepidoptera
length, $1\frac{1}{2}$ in.

Many species; cut off young corn plants; can make replanting necessary.



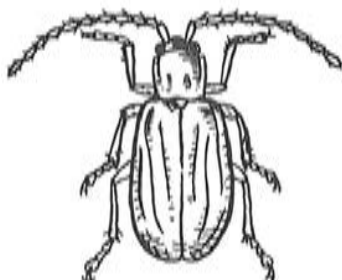
Sod webworm
Order Lepidoptera
length, $\frac{1}{2}$ in.

Cuts off young plants, may draw them into tunnel; found loose, silken web in soil.



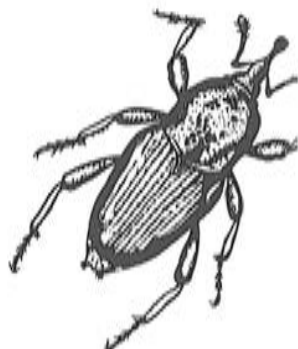
Maize billbug
Order Coleoptera
length, $\frac{1}{2}$ in.

Reddish-brown or black adult attacks young corn, damaging or killing plants; larva tunnels upper taproot.



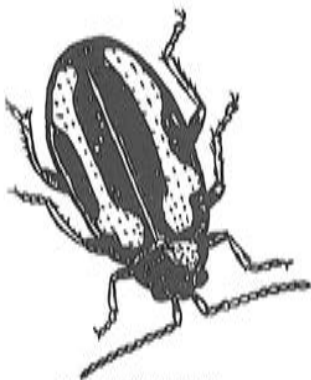
Corn rootworm
Order Coleoptera
length, $\frac{1}{2}$ in.

Wrinkled, threadlike larva damages roots; transmits disease; adult general plant feeder.



Corn billbug
Order Coleoptera
length, $\frac{1}{2}$ in.

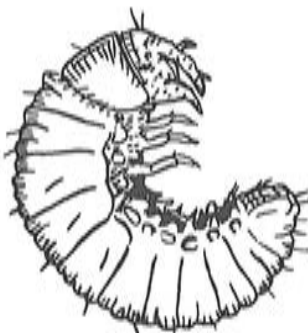
Brown, gold, black adult foliage-feeder; larva, root-feeder; sometimes destroy entire field.



Striped flea beetle

Order Coleoptera
length, 1/12 in.

Adult jumps about, feeding on foliage, severely damaging plant; larva feeds on roots.



Grape colaspis

Order Coleoptera
length, 1/8 in.

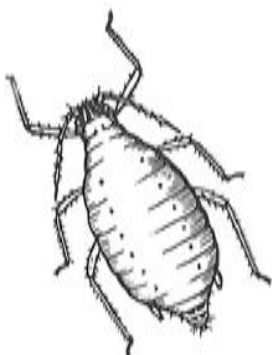
Larva attacks young roots, particularly crops following clover sod; also clover root worm.



Corn lanternfly

Order Homoptera
length, 3/32 in.

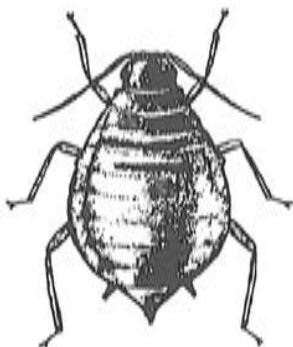
Young sucks sap from buds and leaves of late corn; found in scattered areas.



Corn leaf aphid

Order Homoptera
length, 1/10 in.

Feeds on leaf sap, upper stalks; honeydew secretion limits pollination, attracts earworm.



Corn root aphid

Order Homoptera
length, 1/16 in.

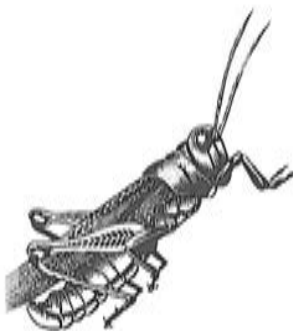
Clings to corn roots, retarding growth; sucks sap, secretes honeydew.



Cornfield ant

Order Hymenoptera
length, 1/4 in.

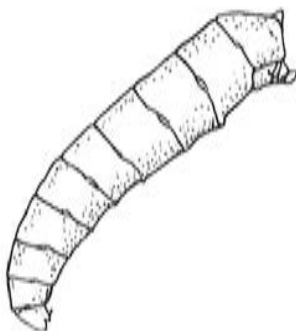
Brownish adult; protects aphid eggs and young; nests in field to pasture aphids on plant roots; feeds on their honeydew.



Grasshopper

Order Orthoptera
length, 2 1/4 in.

In outbreaks, various species migrate to cornfields, stripping



Seed-corn maggot

Order Diptera
length, 1/4 in.

Larva feeds on seeds, causing failure to sprout or weak plants;



Chinch bug

Order Hemiptera
length, 1/8 in.

Attacks leaves and plant base; sucks sap, wilting and killing.



Meadow spittlebug

Order Homoptera
length, $\frac{1}{4}$ in.

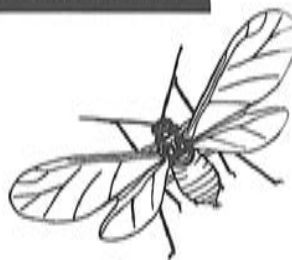
Attacks alfalfa and legumes;
feeds in frothy mass of sap;
spreads mildew, other diseases.



Greenbug or grain aphid

Order Homoptera
length, $\frac{1}{16}$ in.

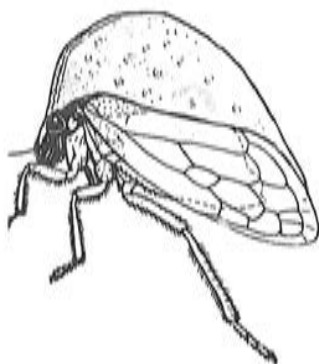
Pest of wheat and other small
grains; sucks plant sap, some-
times killing entire field.



Clover aphid

Order Homoptera
length, $\frac{1}{10}$ in.

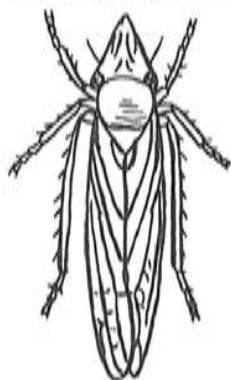
One of numerous aphid species
retards growth of plants, de-
posits harmful honeydew.



Green clover treehopper

Order Homoptera
length, $\frac{3}{8}$ in.

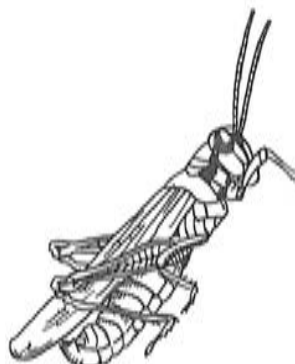
Grotesque adult; sucks juices
of alfalfa, clover, timothy; lays
eggs in stem punctures.



Sharp-headed leafhopper

Order Homoptera
length, $\frac{1}{4}$ in.

Common in meadow and pasture;
nymphs and adults feed on
plant sap.



Grasshopper

Order Orthoptera
length, $2\frac{1}{4}$ in.

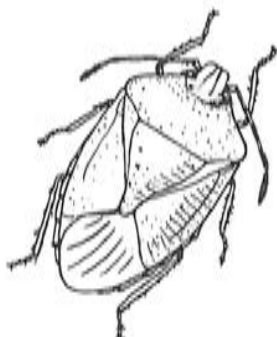
Various species migrate through
fields; in outbreak years devour
all vegetation.



Chinch bug

Order Hemiptera
length, $\frac{1}{5}$ in.

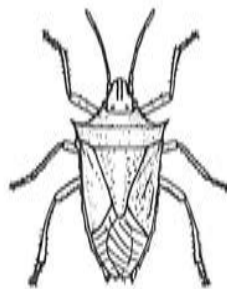
Attacks small grain; sucks sap,
wilts and kills plants; bad odor
when mashed.



Green stink bug

Order Hemiptera
length, $\frac{3}{8}$ in.

Shield-shaped, green adult; sucks
sap from legumes; stunts and
distorts seeds.



Rice stink bug

Order Hemiptera
length, $\frac{3}{8}$ in.

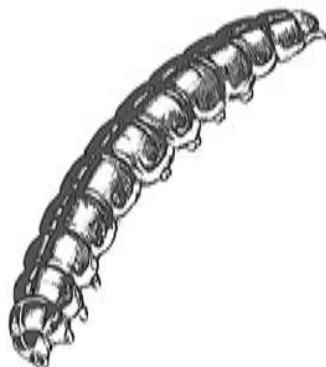
Adult and nymph feed on rice
and grasses; suck sap from de-
veloping rice grains.



Alfalfa caterpillar

Order Lepidoptera
length, 1½ in.

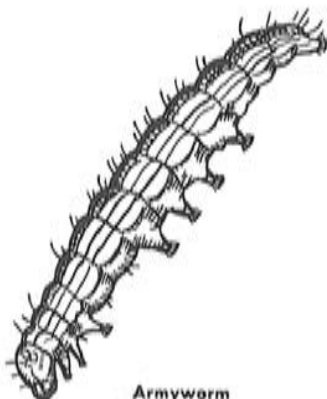
Green; prefers alfalfa foliage, may eat clover, other legumes; adult, sulfur-yellow butterfly.



Cutworm

Order Lepidoptera
length, 1½ in.

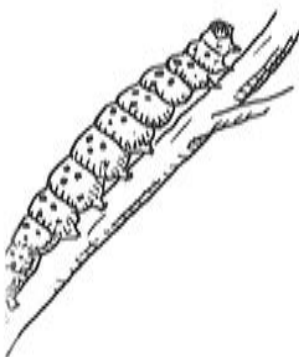
Many species live in soil, cut off young plants; may strip fields in serious outbreaks.



Armyworm

Order Lepidoptera
length, 2 in.

Wet weather, rank growth will attract them to small-grain fields; may strip vegetation.



Webworm

Order Lepidoptera
length, 1¼ in.

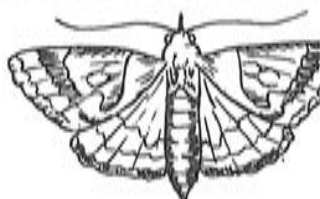
Larva covers plant with silken web, feeds on foliage; pale-brown moth hides in grasslands.



Green cloverworm

Order Lepidoptera
wing span, 1¼ in.

Dark-brown moth; slender, greenish larva attacks legumes and other crops.



Forage looper

Order Lepidoptera
wing span, ¾ in.

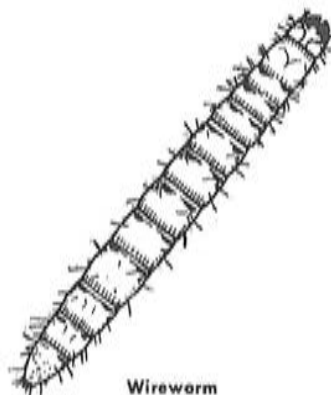
Moths appear early; several generations each year; later larvae most serious.



False wireworm

Order Coleoptera
length, 1 in.

In dry areas larva serious pest of wheat and other crops; black adult appears to stand on head.



Wireworm

Order Coleoptera
length, 1½ in.

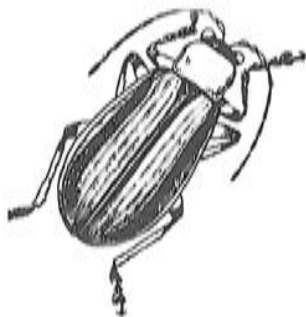
Hard, dark-brown, smooth; feeds on seeds and roots; adult,



Maize billbug

Order Coleoptera
length, ½ in.

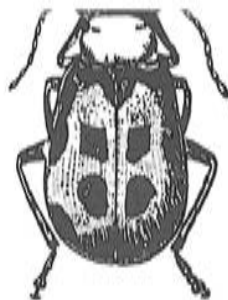
Snout beetle eats holes in stems feeding on inside tissue; larva,



Striped cucumber beetle

Order Coleoptera
length, 1/8 in.

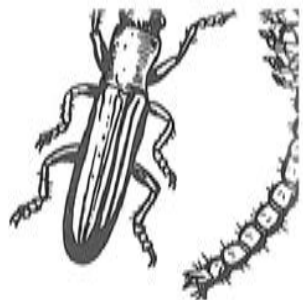
Adult general foliage-feeder; preads disease; larva mines plant roots and stems.



Bean leaf beetle

Order Coleoptera
length, 1/6 in.

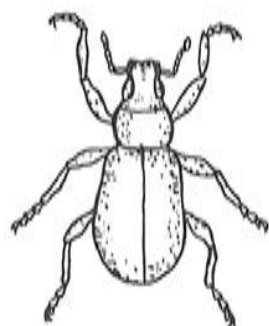
Reddish, yellowish adult eats holes in leaves; larva feeds on roots.



Clover stem borer

Order Coleoptera
length, 1/4 in.

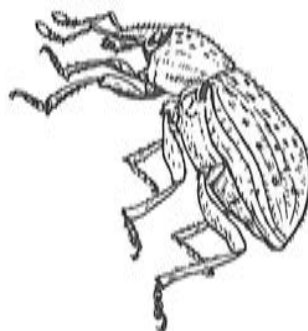
Reddish, blackish, shiny beetle feeds on foliage; lays eggs in stems, where larvae develop and feed.



Clover root curculio

Order Coleoptera
length, 1/6 in.

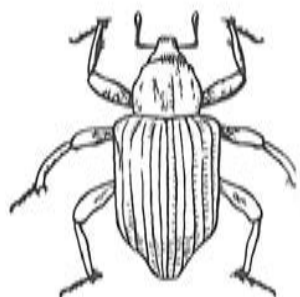
Attacks most legumes; grub burrows into roots; adult beetle gnaws stems and roots.



Clover leaf weevil

Order Coleoptera
length, 5/16 in.

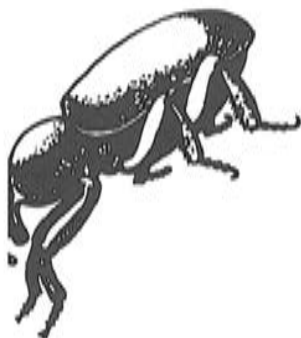
In dry seasons may destroy alfalfa plantings; larva curves body with head and tail almost touching.



Rice water weevil

Order Coleoptera
length, 1/2 in.

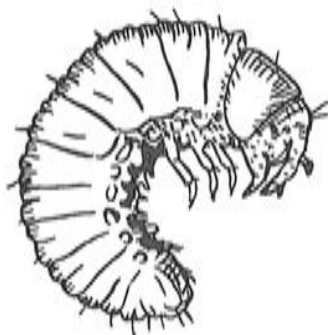
Adult feeds on leaves; larva tunnels and feeds on roots.



Alfalfa weevil

Order Coleoptera
length, 1/2 in.

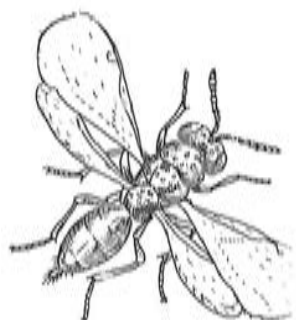
Important enemy of alfalfa; adult beetle and green larva feed and skeletonize foliage.



Clover rootworm

Order Coleoptera
length, 1/6 in.

Adult feeds on foliage; larva feeds on roots; known also as grape colaspis.



Clover seed chalcid

Order Hymenoptera
length, 1/16 in.

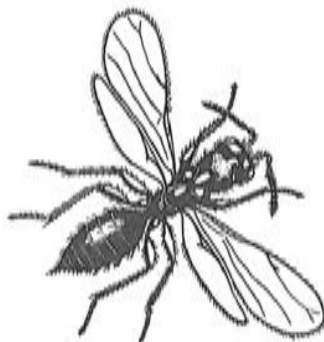
Black, wasplike adult; serious pest of alfalfa and red clover seed; larva develops in seed pod.



Wheat stem sawfly

Order Hymenoptera
length, $\frac{3}{8}$ in.

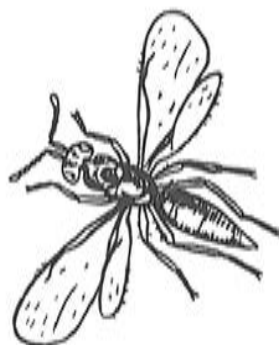
Wasplike adult; larva develops in upper stem of small grains and grasses, bores downward, weakens stems.



Wheat straw-worm

Order Hymenoptera
length, $1\frac{1}{8}$ in.

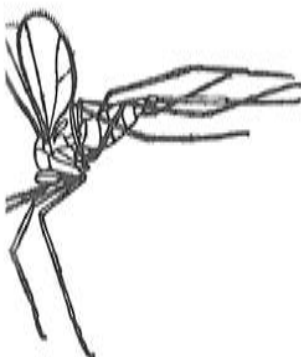
Hairy, antlike adult; larva eats out crown of early wheat, stunts growth of late crop.



Wheat jointworm

Order Hymenoptera
length, $\frac{3}{8}$ in.

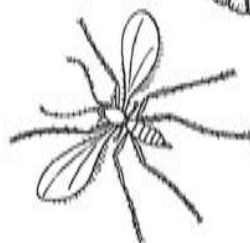
Wasplike adult; larva develops in stems, causing hard woody galls.



Clover seed midge

Order Diptera
length, $\frac{1}{8}$ in.

When abundant, ruins red clover seed crop; minor pest on other clovers; widespread.



Wheat midge or red weevil

Order Diptera
length, $1\frac{1}{10}$ in.

Maggot develops in kernel of wheat and other small grains, reducing yields.



Wheat-stem maggot

Order Diptera
length, $1\frac{1}{8}$ in.

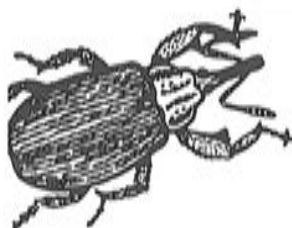
Attacks lower stem parts; feeds principally on wheat, rye, barley, oats; attacks other grasses.



Hessian fly

Order Diptera
length, $\frac{1}{8}$ in.

Wheat, barley, rye are preferred food, legless, headless maggots feed on plant sap.



Boll weevil

Order Coleoptera
length, ¼ in.

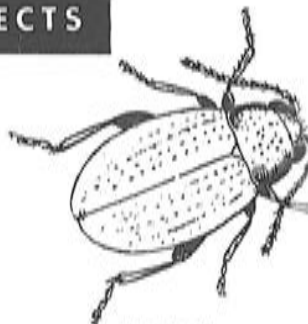
Serious pest to U.S. cotton;
grub and beetle feed on squares,
bolls, or terminal buds.



Darkling beetle

Order Coleoptera
length, ¼ in.

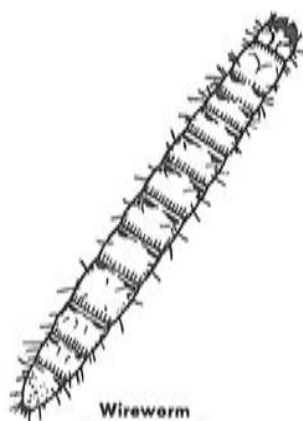
Cuts off young seedlings at
night, burrows in loose dirt in
daytime; larva, false wireworm.



Flea beetle

Order Coleoptera
length, 1/16 in.

Dark, oval, jumping beetle;
eats shot-holes in leaves; also
attacks seedbeds.



Wireworm

Order Coleoptera
length, 1½ in.

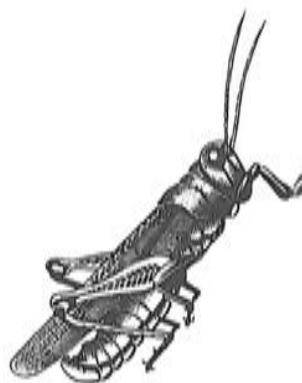
Slender worms attack seeds,
cause failure to sprout; attack
roots, hollow-out stems.



Thrips

Order Thysanoptera
length, 1/20 in.

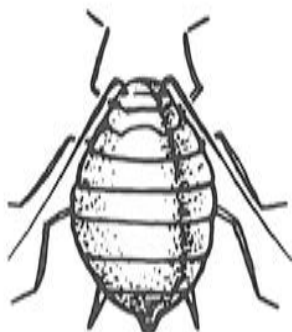
Light-yellowish to black; in-
jure leaves, young terminal buds;
leaves get cup-shaped, ragged.



Grasshopper

Order Orthoptera
length, 2¼ in.

Various species migrate to all
crops; when abundant, can
destroy all vegetation.



Aphid or plant louse

Order Homoptera
length, 3/32 in.

Soft-bodied, sucking insects;
feed on underside of leaves and
stems; curl or stunt leaves.



Fleahopper

Order Hemiptera
length, ¼ in.

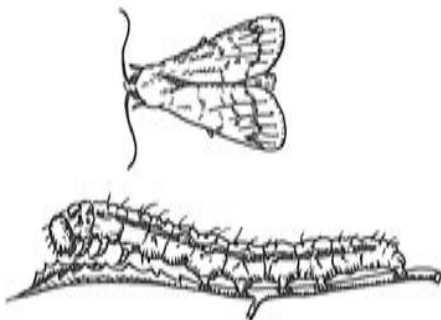
Pale-green, soft-winged, jumping
bug; attacks leaves and terminal
buds with piercing, sucking
mouth parts.



Spider mite

Order Acarina
length, 1/50 in.

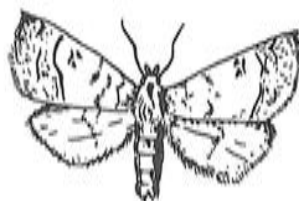
Found on underside of leaves;
sucks sap, spins filmy web
develops in hot, dry weather.



Bollworm or tobacco budworm

Order Lepidoptera
wing span, 1½ in.

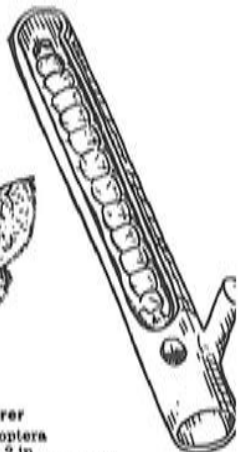
Major pest; deposits eggs on growing tips, squares, bolls, where worms feed; also corn earworm, tomato fruitworm.



Stalk borer

Order Lepidoptera
wing span, 2 in.

Caterpillar bores into stems, feeding on heart of plant; migrates about field.



Cutworm

Order Lepidoptera
length, 1½ in.

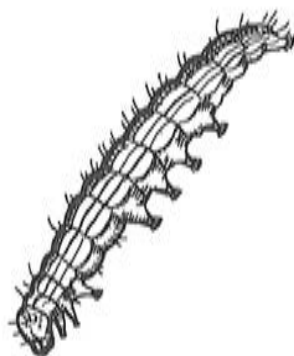
Chews off young plants at night; sometimes eats holes in leaves and devours plant.



Fall armyworm

Order Lepidoptera
length, 1½ in.

Inverted Y on head front; in outbreak years infestations may strip fields.



Armyworm

Order Lepidoptera
length, 2 in.

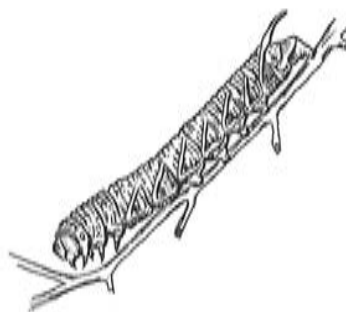
Migrates to crops; yellow-striped species (not illustrated) is serious cotton pest in many areas.



Cotton leafworm

Order Lepidoptera
length, 1½ in.

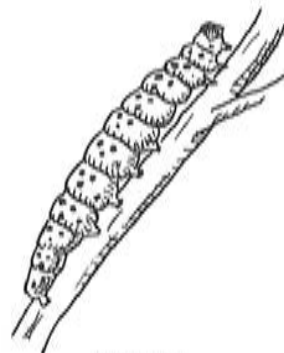
Eggs deposited on underside of leaves; greenish worm with self-looping crawl strips leaves.



Tobacco hornworm

Order Lepidoptera
length, 4 in.

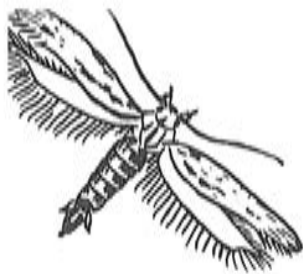
Well-known tobacco pest, may defoliate plants; also tomato hornworm; adult, hawk moth, called tobacco fly.



Webworm

Order Lepidoptera
length, 1½ in.

Larva feeds under tent of fine webbing on foliage; many generations.



Tobacco splitworm moth

Order Lepidoptera
wing span, $\frac{1}{2}$ in.

Pinkish-white larva mines leaves, ruining them for use; also potato tuberworm.



Pink bollworm

Order Lepidoptera
length, $\frac{1}{2}$ in.

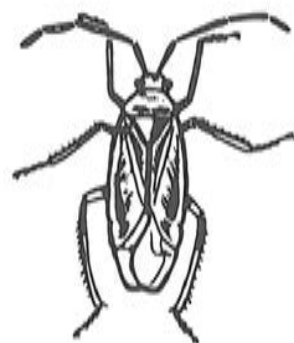
Moth lays eggs on cotton bolls, squares; pink worms eat out seeds in green bolls, stain fiber.



Lygus bug

Order Hemiptera
length, $\frac{1}{4}$ in.

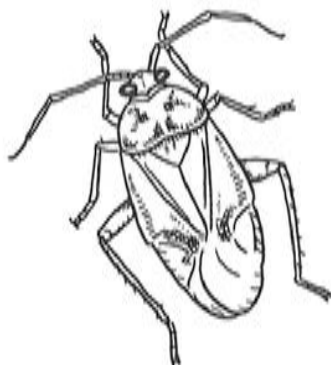
Cotton pest; causes shedding of squares, blooms, young boll and deforms plants.



Rapid plant bug

Order Hemiptera
length, $\frac{1}{3}$ in.

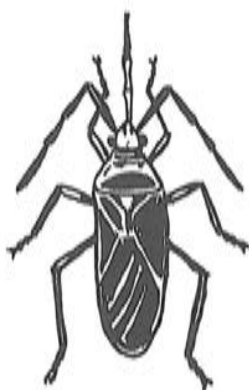
Pierces terminal buds, leaves, bolls, stems; destroys young squares.



Tarnished plant bug

Order Hemiptera
length, $\frac{1}{4}$ in.

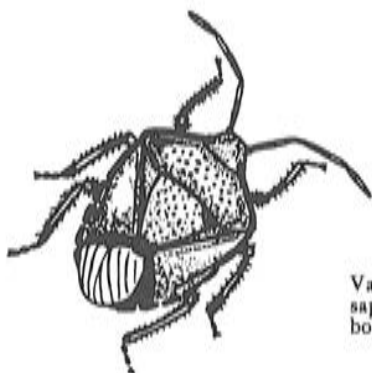
Feeds on plant sap; causes distorted, curly leaves; blasts young cotton squares.



Cotton stainer

Order Hemiptera
length, $\frac{2}{5}$ in.

Flat, narrow, long-legged bug; punctures bolls; causes yellow stain on cotton lint.



Conchuela or stink bug

Order Hemiptera
length, $\frac{1}{2}$ in.

Various shield-shaped bugs suck sap from buds; leaves, stems, bolls, causing them to shed.

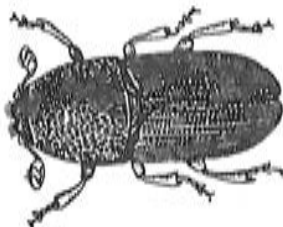
F-5—FRUIT, BERRY, AND NUT INSECTS



Roundheaded apple tree borer

Order Coleoptera
length, $\frac{3}{4}$ in.

Larva bores into tree; feeds on
sapwood, heartwood; young
trees show most serious effects.



Shot-hole borer

Order Coleoptera
length, $\frac{1}{10}$ in.

Beetle deposits eggs in twigs,
branches; larva tunnels with
grain of wood, exit holes look
like shot-holes.



Sinuate pear tree borer

Order Coleoptera
length, $\frac{1}{8}$ in.

Bronze adult feeds on foliage
flat-headed larva works beneath
bark, boring galleries.



Strawberry weevil

Order Coleoptera
length, $\frac{1}{4}$ in.

Damages strawberries, other
ants; feeds in buds and stems,
using fruit reduction.



**Strawberry root weevil
or crown girdler**

Order Coleoptera
length, $\frac{1}{4}$ in.

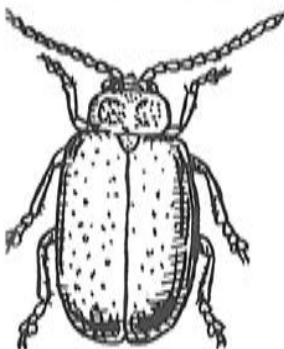
Wingless adult lays eggs about
crowns; larva feeds on roots.



Plum curculio

Order Coleoptera
length, $\frac{1}{4}$ in.

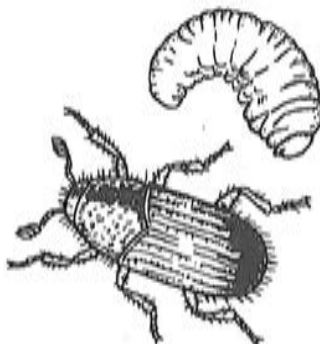
Pest of stone fruits, apple; adult
feeds on fruit, foliage; grub
feeds inside fruit.



Cherry leaf beetle

Order Coleoptera
length, $\frac{1}{4}$ in.

Chrysomelid beetle; attacks
m, apple foliage also; larva



Peach bark beetle

Order Coleoptera
length, $\frac{1}{10}$ in.

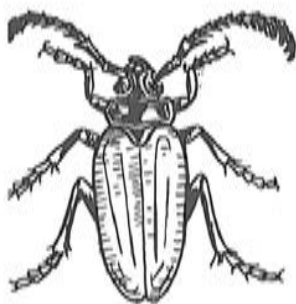
Resembles shot-hole borer in
appearance and damage; larva



Grape flea beetle

Order Coleoptera
length, $\frac{1}{8}$ in.

Turning black and brownish



Tile-horned prionus
Order Coleoptera
length, 2 in.

Adult deposits eggs on bark; arva burrows in trunks and roots of trees and vines.



Pigeon tremex or horntail
Order Hymenoptera
length, 1 1/2 in.

Long ovipositor pierces tree to deposit eggs; larva infests maple, elm, fruit, other trees.



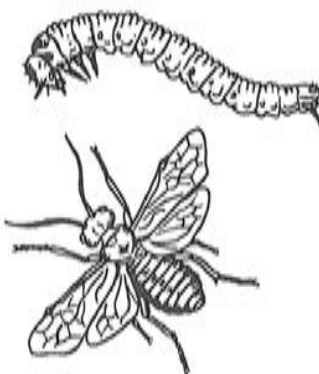
Blackberry leaf miner
Order Hymenoptera
length, 1/8 in.

Sawfly mines leaves of blackberry; two broods annually; important in Northeast.



Pear-slug
Order Hymenoptera
length, 1/8 in.

Sluglike larva of black sawfly; feeds on leaves of pear, cherry, plum, apple, other plants.



Plum web-spinning sawfly
Order Hymenoptera
length, 1/2 in.

Pest of plum and cherry trees; larva webs foliage together for feeding.



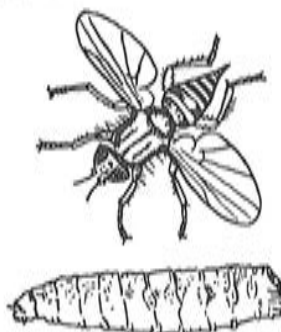
Grape seed chalcid
Order Hymenoptera
length, 3/16 in.

Deposits eggs on grape skin infests wild grape seed, sometimes cultivated varieties.



Mexican fruit fly
Order Diptera
length, 1/2 in.

Larva works inside fruit; attacks citrus in Rio Grande Valley of Texas.



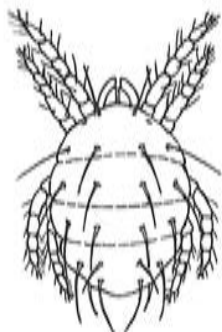
Cherry fruit fly
Order Diptera
length, 1/8 in.

Yellow, black fly; larva develops inside fruit, leaving no outside evidence until nearly full-grown.



Apple maggot or railroad worm
Order Diptera
length, 1/4 in.

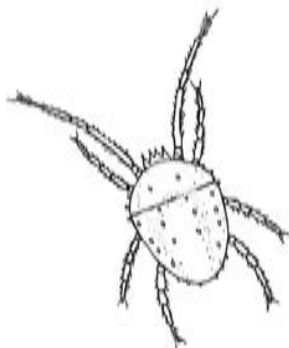
Dark-brown, yellowish-white adult; maggot mines irregular winding tunnels in fruit flesh.



European red mite

Order Acarina
length, 1/50 in.

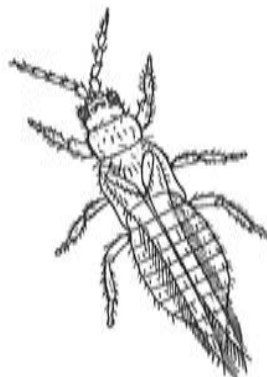
attacks apple, pear, peach,
plum, prune, causing discolored
leaves, at times defoliation.



Clover mite

Order Acarina
length, 1/30 in.

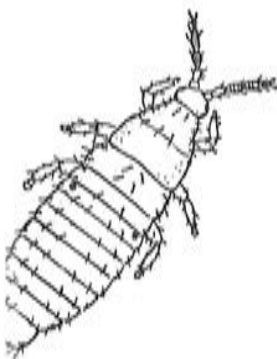
Swarms on fruit trees, herba-
ceous plants in dry seasons; over-
winters in egg stage on bark;
known to invade houses.



Citrus thrips

Order Thysanoptera
length, 1/36 in.

Yellowish; infest leaves and
fruit of oranges, grapefruit,
other citrus plants.



Pear thrips

Order Thysanoptera
length, 1/12 in.

dark yellowish-brown; infest
leaves, blossoms, leaves of pear,
apple, other plants.



San Jose scale

Order Homoptera
length, 1/12 in.

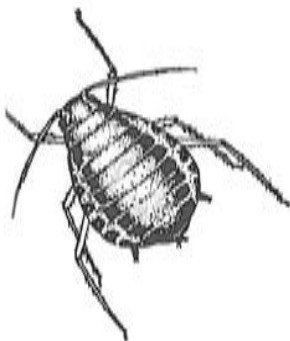
Yellow, moist-appearing, cir-
cular insect, concealed beneath
a scale; disfigures fruit; weakens
or sometimes kills trees.



Red-spotted apple leafhopper

Order Homoptera
length, 1/4 in.

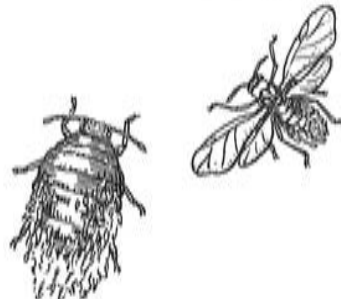
One of many leafhoppers attack-
ing apple trees; spot fruit, mottle
leaves, drain tree of vitality.



European peach aphid

Order Homoptera
length, 1/13 in.

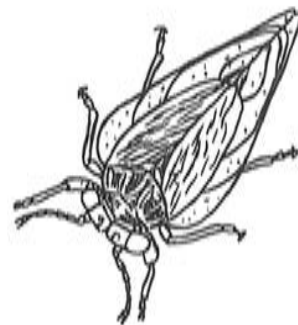
one of pest of peach in some
areas; sucks sap from fruit,



Woolly apple aphid

Order Homoptera
length, 1/10 in.

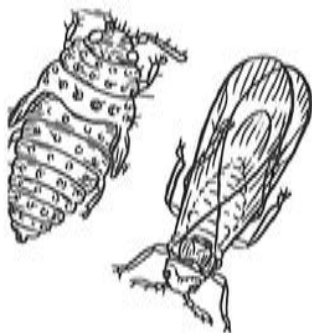
Attacks aerial parts and roots
of tree; causes serious gall-like
swellings on roots; prefers apple.



Pear psylla

Order Homoptera
length, 1/10 in.

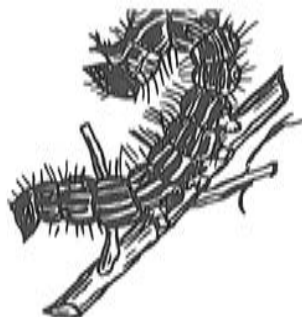
Sucks sap from foliage, other
tree parts; lowers tree vitality.



Grape phylloxera

Order Homoptera
length, 1/24 in.

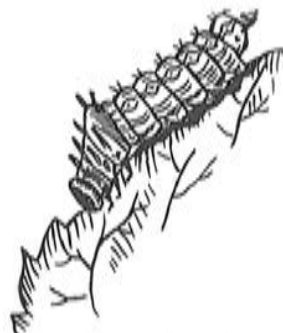
Complicated biology; injures roots and foliage with galls, causes tissue disintegration.



Yellow-necked caterpillar or walnut worm

Order Lepidoptera
length, 2 in.

Moth larva that feeds on foliage of orchard, walnut, other trees.



Red-humped caterpillar

Order Lepidoptera
length, 1 1/4 in.

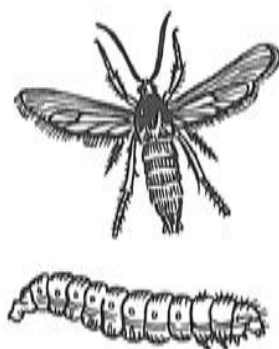
Larva of striking appearance; sometimes defoliates apple and nursery trees.



Grapevine amphion

Order Lepidoptera
wing span, 2 in.

Hawk moth; yellowish-green or chocolate-brown horned larva feeds on grape, woodbine.



Grape root borer

Order Lepidoptera
length, 2 in.

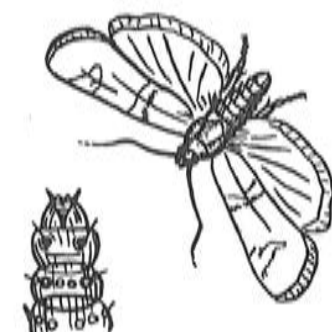
Clearwing moth lays eggs on leaves; larva bores in roots for about two years.



Red-banded leaf roller

Order Lepidoptera
wing span, 3/4 in.

Early larvae roll leaves and slight webs; later generations attack fruit.



Apple leaf skeletonizer

Order Lepidoptera
wing span, 1/2 in.

Late summer and early fall injury to trees by dark-green, active caterpillar feeding in web.



Oriental fruit moth

Order Lepidoptera
length, 3/4 in.

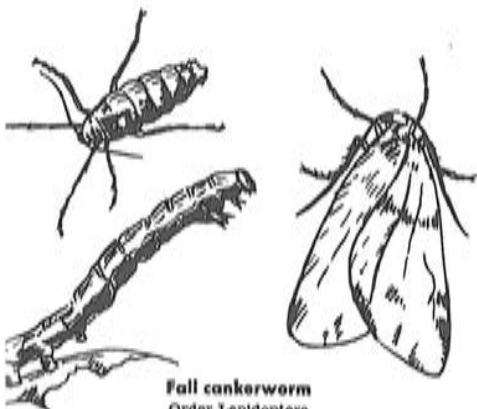
Attacks peach, apple, other fruit trees; early larvae tunnel twigs; later ones feed in fruit.



Grape berry moth

Order Lepidoptera
wing span, 2/5 in.

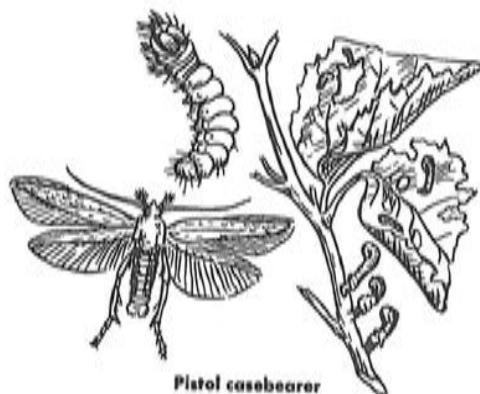
Larva spins silken web of grape clusters; feeds in and destroys grape berries.



Fall cankerworm

Order Lepidoptera
wing span, 1 1/4 in.

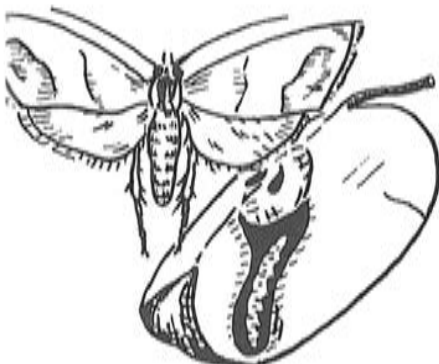
Male moth, wingless female; larva feeds on fruit and other trees; spring cankerworm is similar species.



Pistol casebearer

Order Lepidoptera
wing span, 1/2 in.

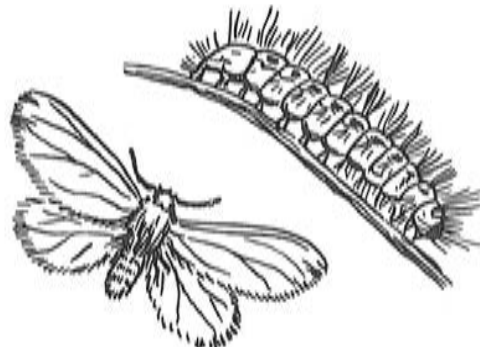
Brown worm enclosed in curved, silken case eats holes in leaves, buds, and fruits of apple, pear, cherry, plum, other trees.



Codling moth

Order Lepidoptera
wing span, 3/4 in.

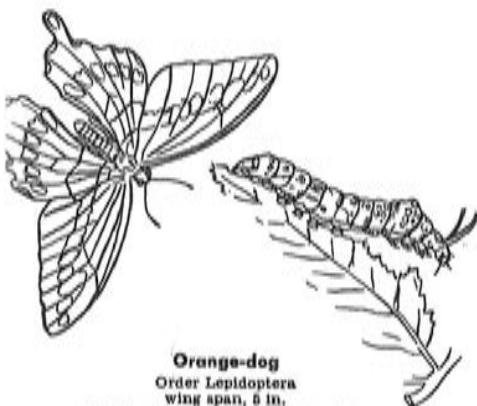
Most important pest of apple; larva feeds in fruit until full-grown.



Fall webworm

Order Lepidoptera
wing span, 1 1/4 in.

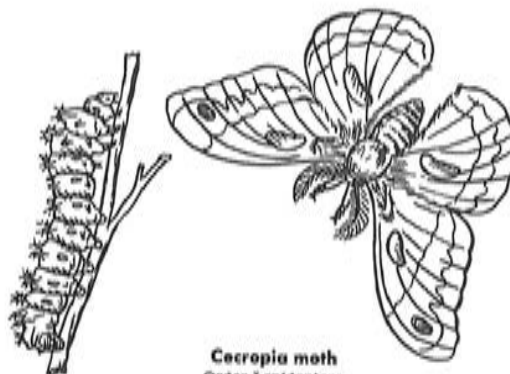
Pale-yellow, black-spotted, hairy caterpillar feeds in dirty-white, loosely-woven web on tree leaves.



Orange-dog

Order Lepidoptera
wing span, 6 in.

Larva feeds on orange tree, prickly ash foliage; red, pro-



Cecropia moth

Order Lepidoptera
wing span, 7 in.

Pale-green, red and yellow larva feeds on foliage of apple, peach

Everyone who has planted flowers, shrubs, or grass about a home knows that insect pests are an important problem. Insects left uncontrolled may make gardens almost barren, and flowers are often lost to insects before a pest's presence is realized.

Thus, the more known about such adversaries and what to do about them, the more successful the gardener.

Many of the insects that feed on vegetables and other crops migrate into flower gardens. If your flower pests are not found in this chapter, refer to the section on general feeders—or chapters on crop pests—where you may find them or a close relative.



Florida fern caterpillar
Order Lepidoptera
length, 1½ in.

Cutworm that attacks foliage in southern states as do many cutworms and armyworms.



Spanworm or inchworm
Order Lepidoptera
length, 1 in.

Type of looper; feeds on foliage; harmonizes with environment.



Yellow woolly bear
Order Lepidoptera
length, 2 in.

A common, hairy caterpillar feeds on foliage, buds, and flowers.



Stalk borer
Order Lepidoptera
length, 2 in.

Typical caterpillar tunneling stems; infests buds, feeds on leaves, eats plant heart.



Grasshopper
Order Orthoptera
length, 2½ in.

Brown, green, or gray, mottled, jumping insects strip leaves, eat tender stems.



Slug
Order Hymenoptera
length, 1/5 in.

Adult, sawfly; larva, false caterpillar, skeletonizes foliage, leaving slimy secretion.



Lesser bulb fly

Order Diptera
length, $\frac{3}{8}$ in.

Blackish-green, resembles wasp; wrinkled maggots infest bulbs, specially damaged ones.



Narcissus bulb fly

Order Diptera
length, $\frac{3}{8}$ in.

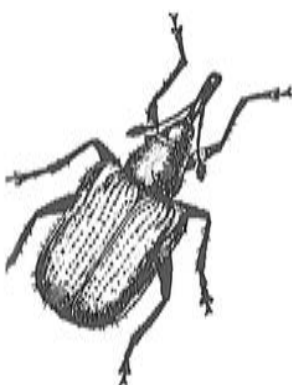
Yellow-black, hairy adult resembles bumblebee; maggots bore into bulb.



Japanese beetle

Order Coleoptera
length, $\frac{1}{2}$ in.

Greenish-bronze; skeletonizes and feeds on foliage; grub feeds on plant roots.



Rose curculio

Order Coleoptera
length, $\frac{1}{4}$ in.

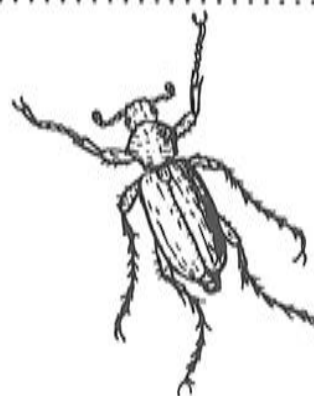
Light-red snout beetle; adult and grub feed on buds and fruit.



Potato flea beetle

Order Coleoptera
length, $1/16$ in.

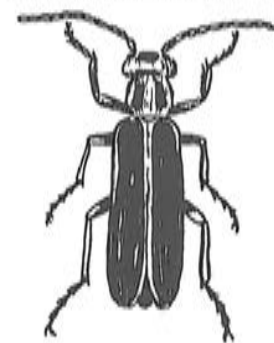
Jumping, hard-shelled, black adult; feeds on underside of leaves, eating many small holes.



Rose chafer

Order Coleoptera
length, $\frac{1}{2}$ in.

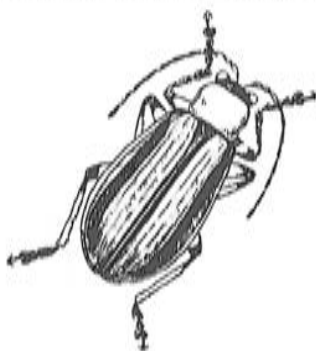
Fawn-colored, cylindrical beetle attacks buds and blossoms; grub develops on roots.



Margined blister beetle

Order Coleoptera
length, $\frac{1}{2}$ in.

Typical, active, elongate blister beetle; feeds on blossoms, leaves.



Cucumber beetle

Order Coleoptera
length, $1/8$ in.

Striped and spotted adults feed on leaves, buds, and fruit.



Millipede

Class Diplopoda
length, 1 in.

Hard-shelled, active, many-legged; attacks and feeds on roots.



Flower Thrips

Order Thysanoptera
length, 1/15 in.

Yellow specks seen on many
lants; injure leaves, blossoms.



Gladiolus thrips

Order Thysanoptera
length, 1/13 in.

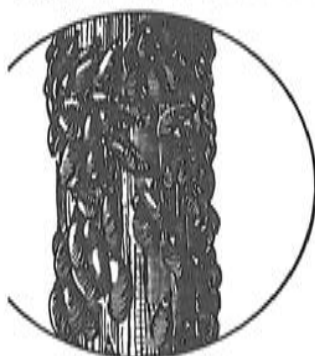
Brown with white band; hiber-
nate in corms; suck plant sap;
deform blossoms.



Greenhouse whitefly

Order Homoptera
length, 1/25 in.

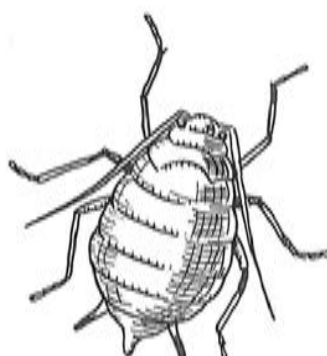
Snow-white adult and pale-
green nymph cover many plants,
suck sap, destroy vigor.



Oystershell scale

Order Homoptera
length, 1/4 in.

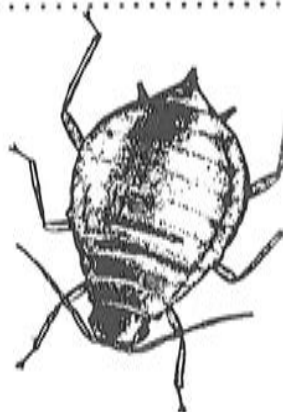
typical armor scale attacking
ees, flowers, shrubs; reduces
igor or kills plant.



Aphid or plant louse

Order Homoptera
length, 3/32 in.

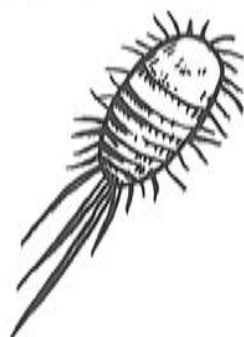
Sucks sap; weakens and distorts
plant; leaves coat of honeydew;
spreads plant diseases.



Root aphid

Order Homoptera
length, 1/16 in.

Infests roots and buds, especially
of aster; attracts ants to feed
on its honeydew.



Long-tailed mealybug

Order Homoptera
length, 1/8 in.

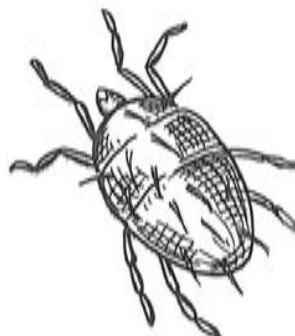
Covered with waxy or mealy
excretion; sucks sap, exuding
sticky honeydew on foliage.



Greenhouse pillbug or sowbug

Order Isopoda
length, 1/2 in.

Fat-bodied and segmented; re-
lated to crayfish; feeds on roots and
tender stems.



Spider mite

Order Acarina
length, 1/80 in.

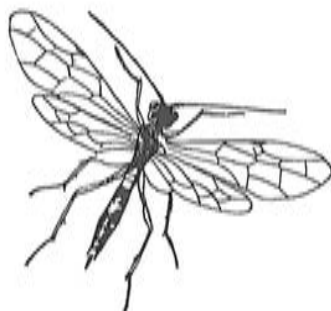
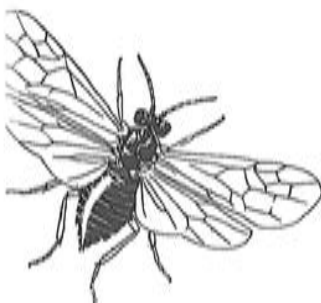
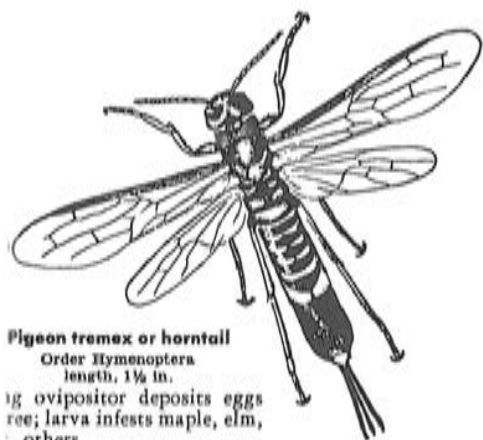
Minute pest sucks juice from
plants, discoloring foliage
sometimes spins web.

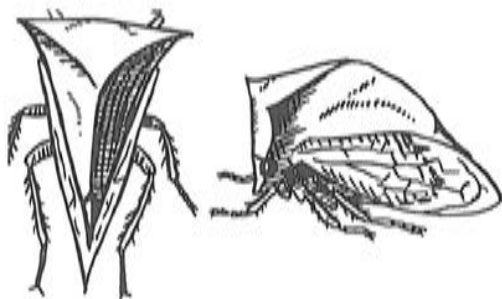
H—SHADE AND FOREST TREE, AND SHRUB PESTS

Insects destroy more forest trees than do fires. Both insects and forests are ancient, geologically speaking; and it is natural that the number of insect species attacking trees should be large. Many insects attack many kinds of trees; others attack only specific kinds of trees. Some insects are root-feeders; others bore into bark. There are those that suck sap, or feed on leaves; others tunnel in trunks; and still others feed on seeds and seedlings, thus reducing reforestation.

Forests destroyed by insects no longer protect birds and game. Their natural beauty and recreational facilities are lost. And most important to man is the loss of valuable timber.

It seems amazing that there are any trees at all, once the many insect species and large number of individuals that affect each tree are known. This section can illustrate only a representative group of these insect pests.

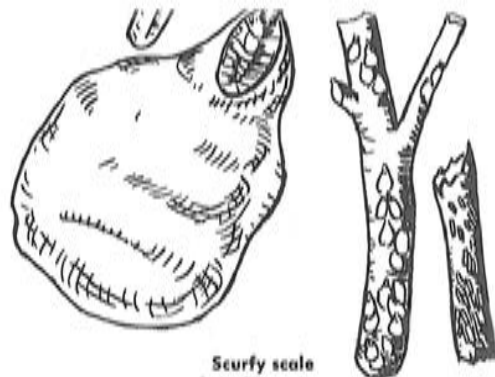




Buffalo treehopper

Order Homoptera
length, $\frac{1}{4}$ in.

Peculiar-shaped, light-green
adult slits bark, depositing eggs;
nymph feeds on vegetation.



Scurfy scale

Order Homoptera
length, $\frac{1}{4}$ in.

Pear-shaped, armor scale; lives
on tree bark, sucking sap.



San Jose scale

Order Homoptera
length, $\frac{1}{12}$ in.

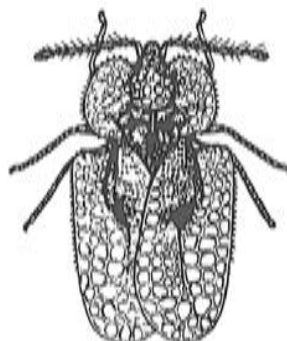
Disk-shaped specks on tree bark;
decreases vigor, causes thin
foliage.



Periodical cicada or 17-year locust

Order Homoptera
length, $1\frac{1}{4}$ in.

Adult punctures trees and shrubs,
depositing eggs; nymph lives
from 13 to 17 years on root sap.



Sycamore lace bug

Order Hemiptera
length, $\frac{1}{8}$ in.

Adult and spiny nymph feed on
under surface of leaves, sucking
sap.



Boxelder bug

Order Hemiptera
length, $\frac{3}{8}$ in.

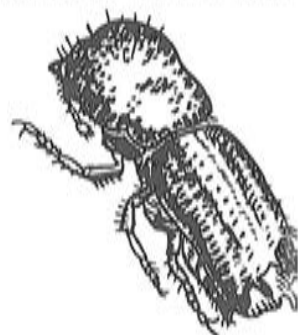
Bright-red and black adult; sucks
sap from leaves and new growth
of boxelder or ash.



Tree cricket

Order Orthoptera
length, $\frac{3}{4}$ in.

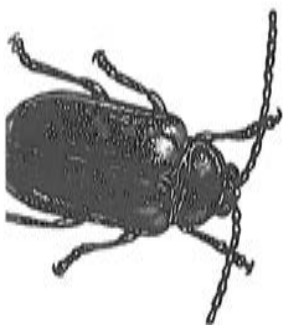
Delicate, slender, greenish; lives
in weeds, trees, bushes; punctures
twigs and branches to
deposit eggs.



Monterey pine engraver

Order Coleoptera
length, $\frac{1}{8}$ in.

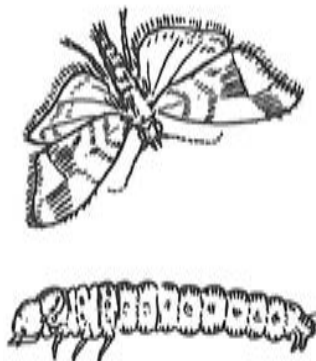
Bark beetle; lays eggs in inner
bark tunnels, where larva de-
velops, feeding on sap wood.



Alder flea beetle

Order Coleoptera
length, 1/8 in.

Adult and larva feed on and
mineralize leaves of alder,
lar, and willow.



Cypress webber

Order Lepidoptera
wing span, 1 in.

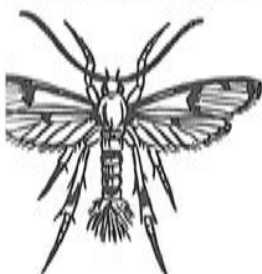
Adult moth; caterpillar burrows
through cypress leaflets.



Pitch nodule moth

Order Lepidoptera
wing span, 3/4 in.

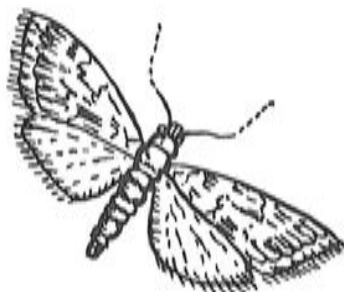
Adult; larva bores stems, twigs,
and branches of lodgepole and
ponderosa pine.



Maple callus borer

Order Lepidoptera
wing span, 1 in.

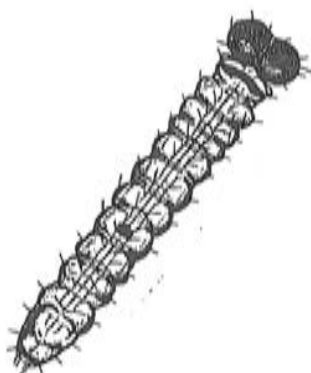
Adult, clearwing moth; larva
mineralizes in maple.



Fir cone moth

Order Lepidoptera
wing span, 1 in.

Adult; larva feeds in cones of
pine, Douglas fir, balsam fir, and
spruce.



California oakworm

Order Lepidoptera
length, 1 in.

Feeds on leaves of oak, chestnut,
and blue gum; grows up to be
a moth.



Gypsy moth

Order Lepidoptera
wing span, 2 in.

Devastating pest of evergreen, decid-
uous trees; larva strips foliage,



Spruce budworm

Order Lepidoptera
length, 3/4 in.

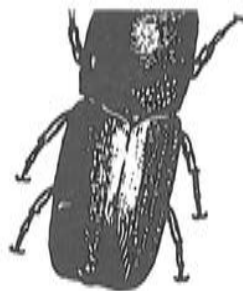
Destructive forest insect; feeds
on foliage and terminal shoots;
adults in a moth.



**Forest tent caterpillar
or forest armyworm**

Order Lepidoptera
wing span, 1 1/4 in.

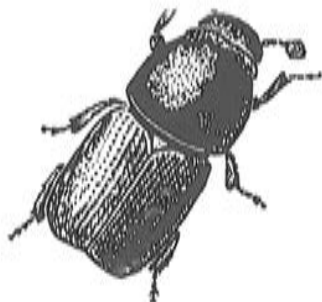
Adult; larva defoliates many
shade and forest trees.



Oak timber or ambrosia beetle

Order Coleoptera
length, $\frac{3}{8}$ in.

Female tunnels oak; grows ambrosia fungi for food; keeps larva under protective care.



Bark beetle

Order Coleoptera
length, $\frac{1}{4}$ in.

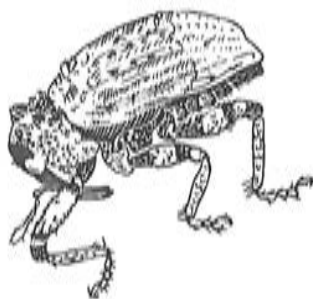
One of most destructive insects attacking coniferous trees; mines under bark; transmits fungi.



Locust borer

Order Coleoptera
length, $\frac{3}{4}$ in.

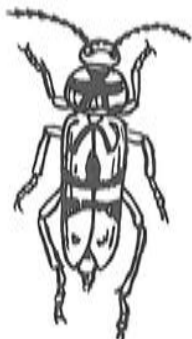
Black and yellow beetle; larva tunnels phloem and wood destructive to black locust.



Poplar and willow borer

Order Coleoptera
length, $1\frac{1}{8}$ in.

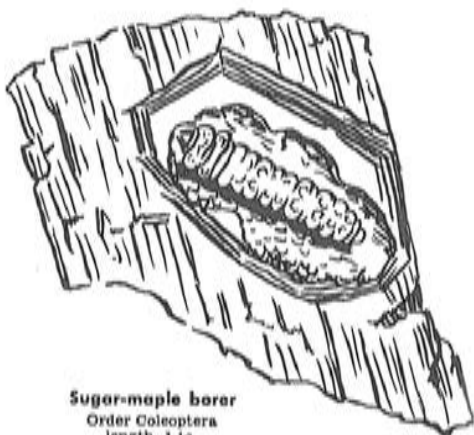
Adult weevil, coloration matches tree bark; larva tunnels wood to feed.



Sugar-maple borer

Order Coleoptera
length, 1 in.

Adult slits bark, deposits eggs; larva may tunnel around tree, killing it.



White-pine weevil

Order Coleoptera
length, $1\frac{1}{4}$ in.

Adult deposits eggs in pine and spruce bark; larva tunnels short-woles in twig bark;



Chestnut weevil

Order Coleoptera
length, $5/16$ in.

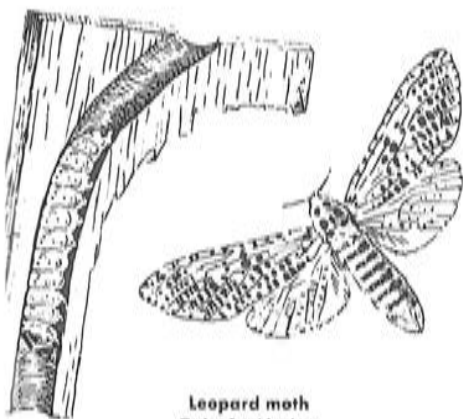
Long, curving beak bores in nut, deposits eggs singly; maggotlike larva feeds on kernel.



Wood-boring beetle larva

Order Coleoptera
length, $2\frac{1}{2}$ in.

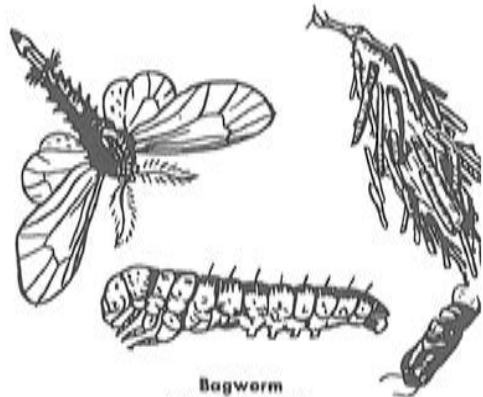
Hard-headed, strong-jawed; larva develops from egg on bark may live in tunnels several years



Leopard moth

Order Lepidoptera
wing span, 3 in.

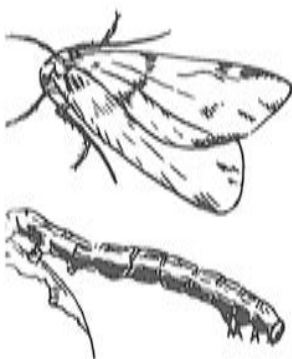
Striking adult; larva burrows heartwood of elm, maple, many deciduous and fruit trees.



Bagworm

Order Lepidoptera
wing span, 1 in.

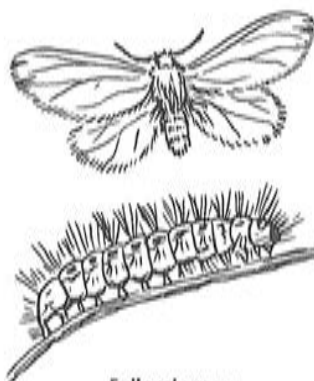
Male moth; female remains in bag; larva feeds in spindle-shaped bag on deciduous and evergreen foliage.



Fall cankerworm

Order Lepidoptera
wing span, 1 1/4 in.

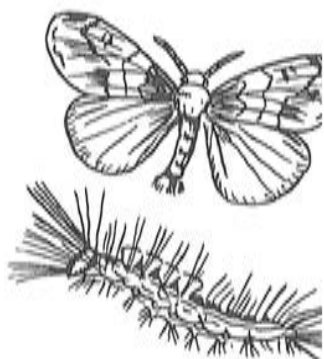
Male moth; female wingless; oper-type larva defoliates shade and fruit trees.



Fall webworm

Order Lepidoptera
wing span, 1 1/4 in.

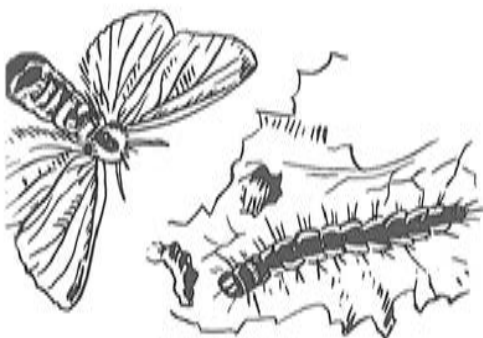
Hairy caterpillar spins dirty-white web on shade trees and shrubs, feeding on foliage.



White-marked tussock moth

Order Lepidoptera
wing span, 1 in.

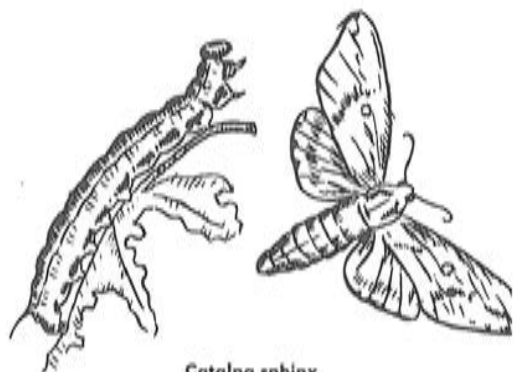
Male moth; wingless female; larva skeletonizes shade and fruit trees, scars fruit.



Brown-tail moth

Order Lepidoptera
wing span, 1 in.

Caterpillar serious pest of deciduous and fruit trees; netting later dangerous to man.



Catalpa sphinx

Order Lepidoptera
wing span, 3 in.

Gray moth; larva, ravenous foliage-feeder of catalpa tree,

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Modern agricultural chemicals are helping immeasurably in the fight against insect pests. Consult your county extension agent or entomologist for current information about insect control.

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minute trichogrammatid	10	clover leaf	40	Woolly bear, yellow	50
small braconid (stinging aphid)	10	pea	35	Worm, railroad	46
sphecid digger	10	pod	35	walnut	48
		red	41		
		rice	19	Yellow jacket	5

HANDLE ALL INSECTICIDES WITH RESPECT

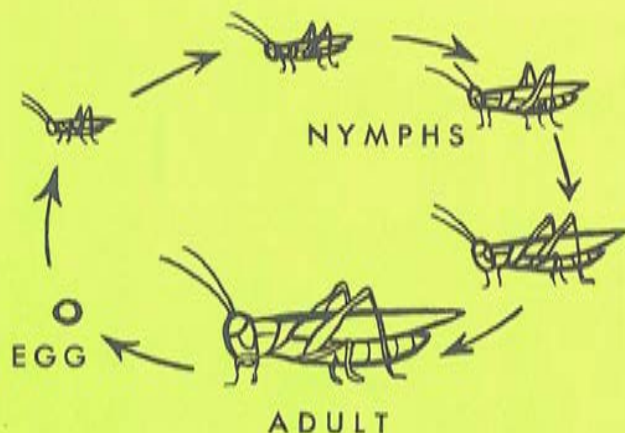
Insecticides have an excellent safety record. Never hesitate to use recommended insecticides; just be sure to use them properly and safely. Here are some basic safety rules:

1. Read the label.
2. Observe and follow all directions and all cautions on the label.
3. Store pesticides away from children, animals, and irresponsible persons.
4. Always keep chemicals in original and labeled containers.
5. Dispose of empty containers safely.

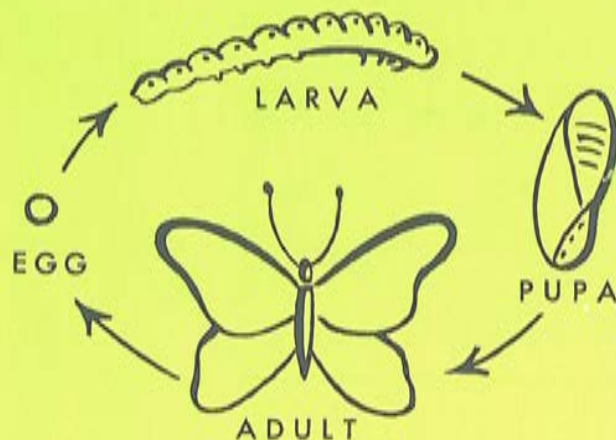
All insecticides can be poisonous to man and livestock. The residue resulting from dusting or spraying crops may persist for days or weeks after application. State agricultural authorities recommend periods of time which should elapse between application and harvest to avoid residue problems. These recommendations are important and should be consulted. When insecticides are used on food or forage crops, farmers should familiarize themselves with the residue tolerances, and make sure that spraying or dusting schedules and residue-removal procedures, if any, are arranged to eliminate the possibility of residues exceeding those permitted by law. Consult your county extension agent or entomologist for current recommendations and avoid insecticides which have been outlawed or banned from use in your state.

HOW INSECTS GROW UP

Insects thrive because they are able to adapt themselves to the world as they find it. This is clearly shown in their ingenious ways of reproduction. Most insects grow from egg to adult by means of one of two schemes, i.e., gradual growth or complete change. The eggs are deposited near a food supply, and for most insects the growing-up process occurs without help from the parents.



The grasshopper is an example of gradual growth. The egg hatches, and the tiny insect resembles the adult minus fully developed wings. Through a molting process, the insect sheds its hard skin several times as it grows from the young nymph to the adult.



The familiar butterfly is an example of complete change or metamorphosis. From the egg comes the caterpillar, which when fully grown transforms into a pupa or cocoon stage, from which later emerges the pretty butterfly seen flitting about.



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