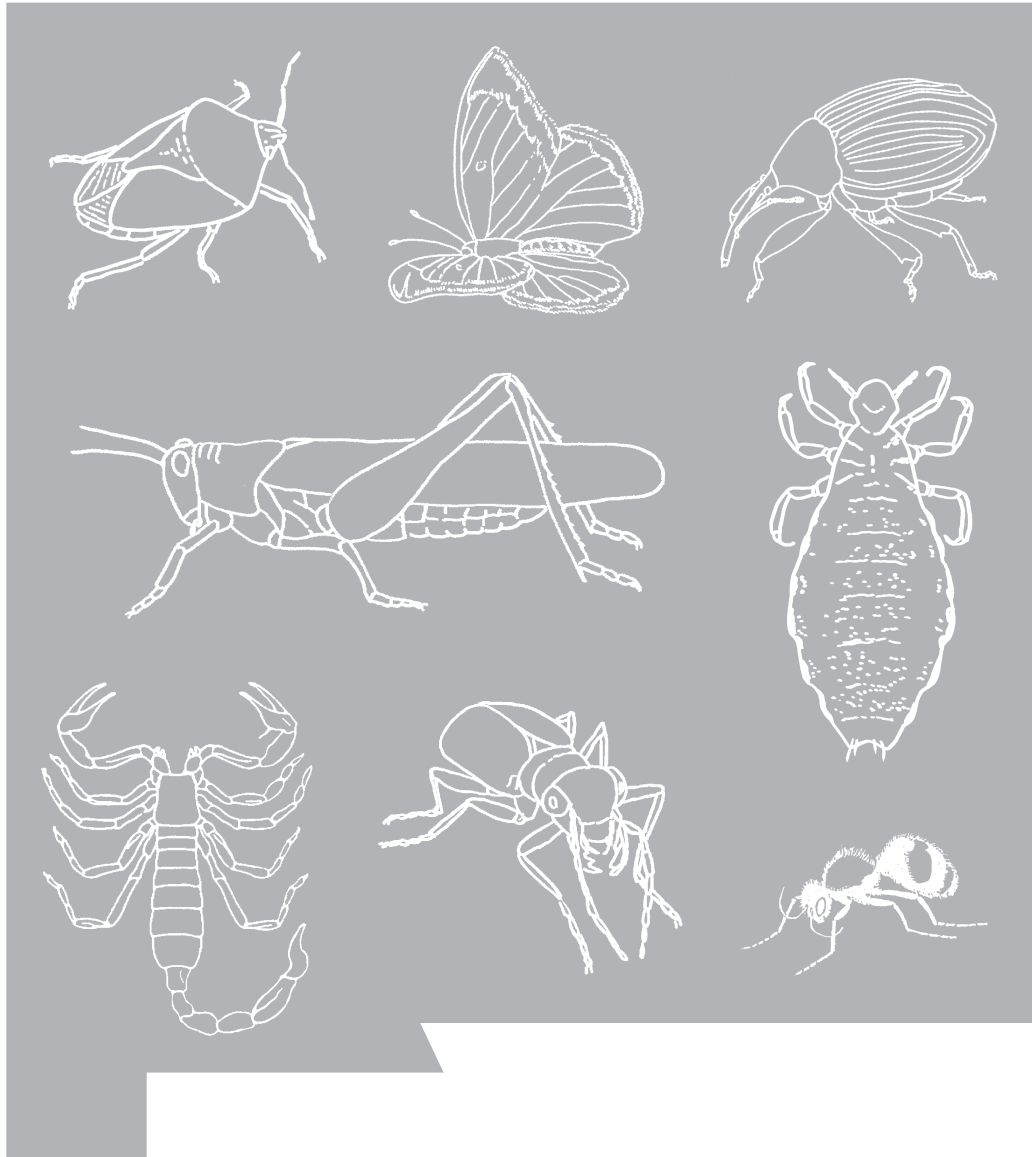


# One Hundred Common Insects of New Mexico



Cooperative Extension Service • Circular 570  
College of Agriculture and Home Economics

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# One Hundred Common Insects of New Mexico

David B. Richman<sup>1</sup>, Carol A. Sutherland<sup>2</sup>, and Christian Y. Oseto<sup>3</sup>

Welcome to the third edition of “One Hundred Common Insects of New Mexico!” This manual began as a study guide for insect identification contests in New Mexico, although the illustrations and text make it handy for anyone with a basic interest in common arthropods in the state. The 100 species of insects and their relatives included in this manual were selected for their abundance, economic importance, diversity of form and, sometimes, their peculiar appearance.

In the late 1970s, Ellis Huddleston, an entomologist at New Mexico State University, started the first New Mexico state entomology contests with just 77 common insects and their relatives. That list increased to 100 species when this manual was first printed in the early 1980s. The second edition included the key to all orders, including several not covered in this manual, as well as an artificial key to all families included in the manual. In this third edition, we have five classes, 21 orders, two superfamilies, one multifamily group and 84 separate families of arthropods represented. Between the second and third editions, the Order Orthoptera was revised, such that mantids (Mantodea), cockroaches (Blattaria) and stick insects (Phasmida) were placed into their own orders. This update, plus improvements in the artwork by Carol Sutherland and Christian Oseto, justified preparation of the third edition.

To simplify arthropod systematics for beginners, we are using only common names for the family or superfamily levels. Often, these names include all members of a family, with a few exceptions noted in the text.

Brief descriptions of taxonomic classes and orders are introduced by boldface type, while common names are noted in italics.

Descriptions and common names are based on those included in *A Field Guide to the Insects* (1970, 1<sup>st</sup> edition) by D.J. Borror and R.E. White (Peterson Field Guide Series, Houghton Mifflin Company, Boston). This and other introductory books about insects and their relatives are excellent references for beginners; the artwork and photography in some volumes are spectacular.

While we wrote this manual to help students prepare for identification contests, it also can be used to identify insects and other arthropods that people commonly collect. Compare your specimen to descriptions or illustrations of the orders or classes and then go through family descriptions, comparing specimens to illustrations. Remember that only 100 common arthropods are included here. The key will be “artificial,” because it will lead you correctly, or otherwise, to just those species. Consult the *Field Guide* listed above for unknowns that don’t fit our descriptions.

For those who are making arthropod collections, helpful notes on where to look for various species and their feeding habits are included in the text. A handy glossary of technical terms is at the end. Instructions on collecting and preserving arthropods are summarized in Borror and White and other beginning texts, including the 4-H Entomology (project) Manual.

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# Insect Identification List for Reference

## COMMON NAMES

1. \*Ambush bug
2. \*American cockroach
3. \*Ant
4. Antlion
5. \*Aphid
6. \*Assassin bug
7. Backswimmer
8. \*Bark beetle
9. Bee fy
10. Black fy
11. \*Blister beetle
12. Blow fy
13. \*Braconid wasp
14. Brush-footed butterfly
15. \*Camel cricket
16. Carrion beetle
17. \*Centipede
18. Chalcidid wasp
19. Checkered beetle
20. Cicada
21. \*Click beetle
22. Cricket
23. Damsel bug
24. Damsel fy
25. \*Darkling beetle
26. \*Dermestid beetle
27. Diving beetle
28. \*Dragon fy
29. \*Earwig
30. \*Flea
31. \*Flesh fy
32. Geometer moth
33. \*German cockroach
34. Giant silkworm moth
35. \*Gossamer-winged butterfly
36. \*Green lacewing
37. Ground beetle
38. Halictid bee
39. Hister beetle
40. \*Honey bee
41. \*Horse fy
42. Ichneumon wasp
43. \*Jerusalem cricket
44. \*Ladybird beetle
45. Leaf beetle
46. Leafcutting bee
47. \*Leaf-footed plant bug
48. \*Leafhopper
49. \*Long-horned beetle
50. \*Long-horned grasshopper
51. Louse fy
52. \*Mantid
53. Metallic wood-boring beetle
54. Millipede
55. \*Mosquito
56. Muscid fy
57. \*Noctuid moth
58. Oriental cockroach
59. Picture-winged fy
60. Plant or leafbug
61. \*Plant hopper
62. Pyralid moth
63. \*Robber fy
64. Rove beetle
65. Sap beetle
66. Scale insect
67. \*Scarab beetle
68. Scoliid wasp
69. Scorpion
70. Seed bug
71. Short-horned grasshopper
72. \*Silverfish
73. Skipper
74. Snout beetle
75. Soft-winged flower beetle
76. Soldier beetle
77. \*Sowbug
78. Sphecid wasp
79. \*Sphinx moth
80. \*Spider
81. Spider wasp
82. \*Stink bug
83. \*Sucking louse
84. Sulfur Butterfly
85. \*Swallowtail
86. Syrphid fy
87. Tachinid fy
88. \*Termite
89. Tick
90. Tiger beetle
91. Tiger moth
92. Tiphiid wasp
93. \*Treehopper
94. Twig borer
95. \*Velvet ant
96. \*Vespid wasp
97. \*Walkingstick
98. Water boatman
99. Water scavenger beetle
100. Waterstrider

## CLASSES

- A. Arachnida
- B. Chilopoda
- C. Crustacea
- D. Diplopoda
- E. Insecta

## ORDERS

- F. Acari (= Acarina)
- G. Araneae (= Araneida)
- H. Anoplura
- I. Blattaria
- J. Coleoptera
- K. Dermaptera
- L. Diptera
- M. Hemiptera
- N. Homoptera
- O. Hymenoptera
- P. Isopoda
- Q. Isoptera
- R. Lepidoptera
- S. Mantodea
- T. Neuroptera
- U. Odonata
- V. Orthoptera
- W. Phasmida
- X. Scorpiones (= Scorpionida)
- Y. Siphonaptera
- Z. Thysanura

## METAMORPHOSIS

- None
- Simple
- Complete

## MOUTHPARTS

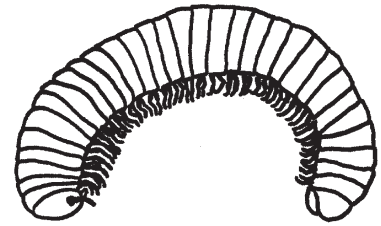
- Chewing
- Sucking

*NOTE: The novice age group in 4-H is responsible for knowing only 50 of the 100 common insects of New Mexico. These are marked with an asterisk.*

**\*CLASS CRUSTACEA, Order Isopoda:** *Sowbug*. Terrestrial crustaceans, related to crabs and shrimp. With seven pairs of legs and strongly segmented bodies. True antennae present, usually bending at several points. Body usually gray or black and 10 mm long or less. Common in gardens, under boards, damp areas, etc. Occasional pests; sometimes eat seedlings, developing strawberries. Nuisances in damp places. Metamorphosis none. Mouthparts chewing.



**CLASS DIPLOPODA:** *Millipede*. Wormlike, cylindrical arthropods with many-segmented bodies. Most segments with two pairs of walking legs (only one pair per segment found in centipedes). Does not have venomous bite as some centipedes do but can produce foul smelling, defensive chemicals. Primarily plant feeders and scavengers. Occasional nuisances in flower beds rich in organic matter. Bodies black gray or brown; length variable, from a few mm to more than 100 mm (*Orthoporus*). Usually under rocks or boards; crawl on surface after summer rains. Mouthparts chewing. Metamorphosis none. True antennae present.

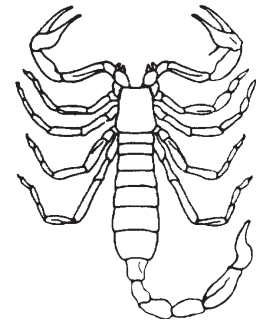


**\*CLASS CHILOPODA:** *Centipede*. Body many-segmented, but usually fattened and with only one pair of legs per segment. Poison claws near head; some species have painful, venomous bites. Length from a few mm to 150 mm. Color variable: red, orange, gray and green. Desert centipedes often found under rocks, boards, and “cowpies.” Long-legged house centipedes usually found in buildings. Mouthparts chewing. Metamorphosis none. Antennae present.

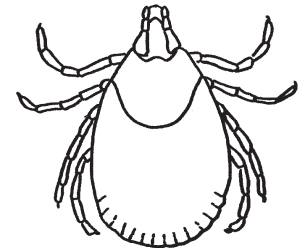


**CLASS ARACHNIDA:** *Spiders, Scorpions, Mites and Ticks*. Tiny to large arthropods, usually with two body regions: prosoma (cephalothorax) and opisthosoma (abdomen), latter sometimes segmented. Eyes simple. Always wingless. No antennae; pedipalpi or one pair of legs often substitute for antennae. Four pairs of walking legs usually present (three pairs of legs in larval mites and ticks). Mouthparts usually a combination of chewing-sucking. Metamorphosis none.

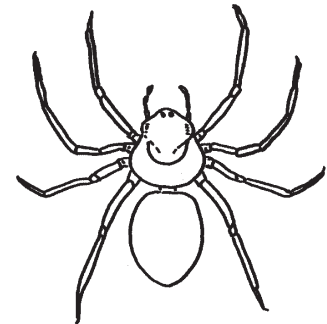
**Order Scorpiones:** *Scorpion*. Medium to large (to 100 mm in Arizona) arachnids with elongated, segmented tails tipped with stingers. Pedipalpi modified as claws. Venom of most common species similar in effect to wasp venom; a few species with lethal venoms. One dangerous species, *Centruroides exilicauda* (formerly *C. sculpturatus*), distributed in southern Arizona and southwestern New Mexico. Nocturnal predators. Found occasionally in buildings and commonly under rocks and bark.



**Order Acari:** *Tick*. Largest of the mites, up to several mm long. Blood-sucking ectoparasites; transmit certain animal and human diseases, such as Lyme disease and Rocky Mountain spotted fever. One body region; Opisthosoma (abdomen) and prosoma combination (head and thorax) without distinct separation. Opisthosoma leathery, fattened in unfed ticks; opisthosoma globose when tick is engorged. With sucking mouthparts, instead of the combination found in other arachnids. Larval ticks with three pairs of legs; all other stages with four pairs. Usually found on mammals and birds. Common dog ticks often a serious problem to dogs and their owners.

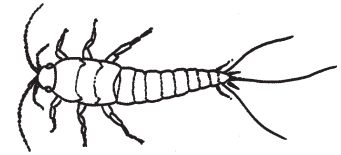


**Order Araneae:** *Spider*. Tiny to large arachnids; spin silk from spinnerets on tips of opisthosoma. Common predators usually with wide range of arthropod prey; introduced European sowbug spider feeds mostly on sowbugs and beetles. Numerous species. Black widow and violin spiders venomous; tarantula overrated as a dangerous arthropod. With poisonous fangs. All spin silk; although many species do not build webs. Some spin beautiful orb-shaped webs, others make hap-hazard space webs, sheet webs, funnel webs or hammock webs. Generally can be found almost anywhere; very common under rocks, boards and dead plants, in vegetation, on and in houses, on flowers, and on the ground. Often taken in sweep net samples.



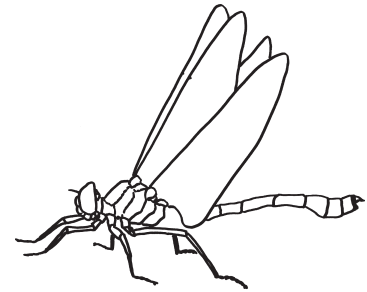
**CLASS INSECTA:** *Insects*. (Remainder of orders and families in manual.) With three body parts (head, thorax and abdomen), three pairs of walking legs, compound (many faceted) eyes; adults wingless or with one or two pairs of wings. Mouthparts may be chewing, sucking or a modification of these. Metamorphosis none, simple or complete. With true antennae.

**Order Thysanura:** *Silverfish*. Metamorphosis none. Mouthparts chewing. Wingless. With three hairlike appendages at end of abdomen. Antennae long, many-segmented. Body fattened, carrot-shaped, about 10 mm long, often silvery. Common pests in houses; eat starchy substances, including paste, paper finishes and some paper and fabric. Often collected around books or papers, or found trapped in sinks.

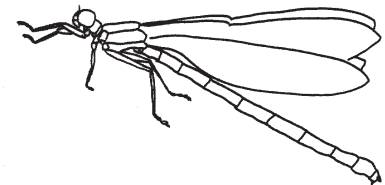


**Order Odonata:** *Dragonflies and Damselflies*. Metamorphosis simple. Mouthparts chewing. With two pairs of long, many-veined wings. Immatures (naiads, nymphs or larvae) aquatic. Predators as nymphs and adults. Antennae short, bristlelike, inconspicuous.

*\*Dragonfly*. Medium to large (to almost 80 mm) insects; legs spiny. Head spherical; almost completely covered by compound eyes. Wings outstretched when at rest. Common around standing or very slow-moving water, including stock tanks; sometimes seen miles from water; may be very numerous. Prey on variety of insects, including other dragonflies and mosquitos. Usually considered beneficial. Often difficult to catch; use the aerial net and catch the dragonfly as it rests, or in early morning when the dragonflies are not as alert or as fast. Includes several families.

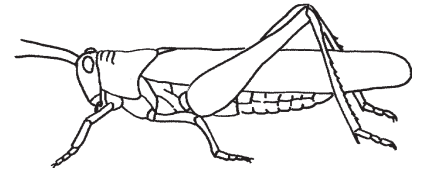


*Damselfly*. Similar to dragonflies, but smaller, with thinner body and with wings held over the back when at rest. Usually slow, weak fliers; often collected while sweeping vegetation. Preferred habitats similar to those of dragonflies. Body length usually 50 mm or less. Includes several families.

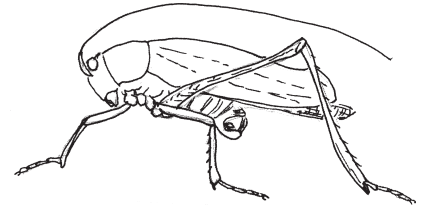


**Order Orthoptera:** *Grasshoppers, Katydid, and Crickets*. Metamorphosis simple. Mouthparts chewing. Order relatively uniform. Most with jumping legs. Many species with leathery forewings and membranous hind wings; others with short wings or wingless. Mostly vegetarian, but some are predatory, especially some of the long-horned grasshoppers.

\**Short-Horned Grasshopper*. Common grasshoppers; widely distributed. Antennae filamentous, much shorter than body. Tarsi three-segmented. Size variable, 10-80 mm long depending on species. Ovipositor reduced or not apparent. Often categorized as lubber, slant-faced, spur-throated, or band-winged grasshoppers. Collected by sweeping, aerial netting and capturing by hand. Some very difficult to catch. Several species common pests on rangeland and /or crops; others eat weeds.



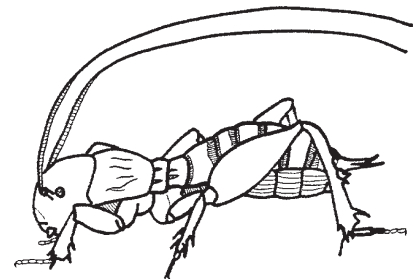
\**Long-Horned Grasshopper*. Usually with filamentous, fragile, antennae that are often much longer than the body. Tarsi four-segmented. Often wingless. Some resemble leaves (katydids). Ovipositors fattened, blade-like. Colors usually more uniform than for short-horned grasshoppers; usually fade after death; many specimens turn brown and shrivel because bodies are soft and decompose readily. Reasonably common; often nocturnal. Few pests, except for the Mormon cricket and some near relatives that devastate rangeland. Most phytophagous; some predators. Size variable; 15-80 mm, depending on species.



\**Camel Cricket*. Similar to wingless long-horned grasshoppers, but more hump-backed. Tarsi four-segmented. Hind legs very long. Ovipositor fattened, bladelike. Usually gray or brown. Found under rocks and in caves, or occasionally on sandy soils at sunrise. Not known to be pests. Size variable; usually less than 40 mm long.



\**Jerusalem Cricket*. With relatively short hind legs; large, spherical heads; and distinct separation between the wingless thorax and black-banded abdomen. Antennae hold shorter than body. Tarsi four-segmented. Usually nocturnal; frequently collected under rocks, in pitfall traps, and while digging. Occasionally found trapped inside buildings in early morning. Probably omnivorous; rarely pests. Not venomous despite folktales to contrary in which it is referred to as “Niña de la Tierra” (Child of the Earth). Length usually less than 50 mm.



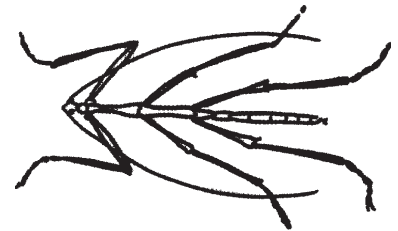
*Cricket*. Somewhat fattened and with shorter threadlike antennae than long-horned grasshoppers or camel crickets. With three-segmented tarsi (unlike other Orthoptera except short-horned grasshoppers). Ovipositor long and needlelike. Males and females of many species with elongate cerci. Common examples include tree crickets (pale green or straw colored, chirp in trees at night or found in alfalfa), field and house crickets (brown or black; often found under boards, hay bales and in cracks; males chirp loudly at night; may feed on fabric and paper inside homes). Size variable but usually less than 30 mm.



**Order Mantodea:** *Mantids*. Metamorphosis simple. Mouthparts chewing. Order very uniform. Usually large (over 25 mm). Front legs modified for grasping, first coxae very long. Prothorax elongate, mobile, necklike. Eyes bulbous; head triangular. All stages predaceous; beneficial, although they will kill bees and butterflies. Occasionally come to lights, but often found in bushes, trees, or on bark. Some species wingless (both sexes), females of other species often with short wings; males with wings usually weak flyers.



**Order Phasmida:** *Walkingsticks*. Metamorphosis simple. Mouthparts chewing. Order quite uniform in structure. All North American species elongated (stick or twiglike) and most without wings. Some species very large to 75 mm or larger. One New Mexico species common in mesquite, another in creosote; commonly seen resting on walls, fences. Tarsi five-segmented. Plant feeding. Seldom pests.

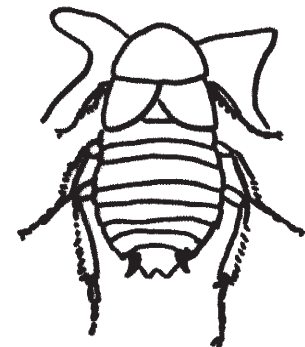


**Order Blattaria:** *Cockroaches*. Metamorphosis simple. Mouthparts chewing. Order relatively uniform. Usually fattened insects often with spiny legs. Usually, but not always, winged as adults. Some more than 30 mm in length (not counting the wing tips). Most of our common species are imported pests

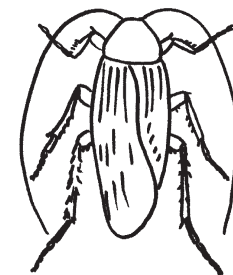
*\*German Cockroach*. Bodies fattened, usually about 10 mm long. Color gray-brown. Head usually not visible from above. Tarsi spiny and (as in other roaches) five-segmented. Prothorax with two black stripes. Antennae filamentous. Typically nocturnal. Found inside and outside houses, usually around water sources. Can be serious pests in kitchens, pantries and bathrooms. Omnivorous; feed on many kinds of stored products, all types of food and garbage not properly stored. Defecate frequently, leaving brownish black spots with pungent, ammonia-like odor. Easily confused with closely related field cockroach, which prefers drier areas.



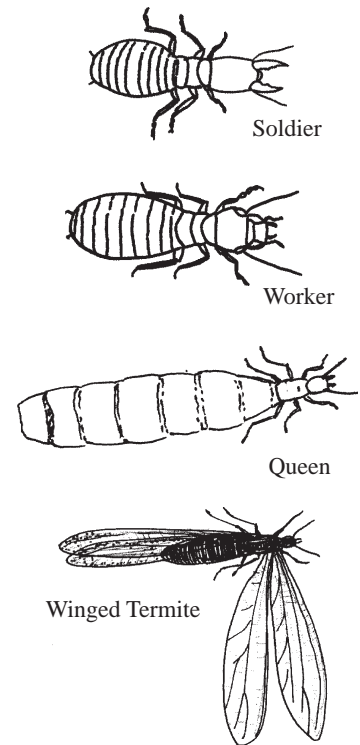
*\*Oriental Cockroach*. Size of adults intermediate between German and American cockroaches. Body broadly oval. Females with very short wings. Color dark brown to black. Body fattened, head not visible from above; legs and five-segmented tarsi spiny. Nocturnal. Females common in compost heaps. Commonly hide in crevices in rock walls and under manhole covers for underground utilities. Commonly associated with garbage and filth; especially obnoxious pests in homes, hospitals, food processing plants, etc. Body length approximately 25 mm.



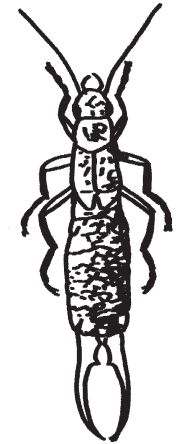
*\*American Cockroach*. Larger than Oriental cockroach; length to 30 mm, longer if wings included. Both sexes winged. Color reddish-brown, prothorax yellowish with a pair of reddish brown patches. Antennae filamentous, but often broken. Common in sheds, homes and other buildings. Can be a pest in buildings; habits like German cockroaches. Destroy books, papers and some fabric; contaminate foodstuffs, dishes and cooking utensils.



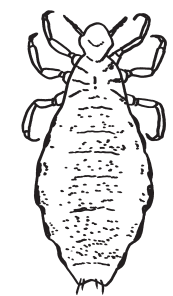
**\*Order Isoptera: Termite.** Metamorphosis simple. Mouthparts chewing. Small, soft-bodied, “thick waisted” and usually off-white, social insects with beadlike antennae. Workers are sterile males or females; nymphs live and work in the nest with the workers. Tarsi four-segmented. Reproductives winged; fore- and hind wings roughly equal in size and many veined. Wings lost soon after swarming or mating flight. Many common species with soldier caste; most soldiers thick-waisted, off-white, with enlarged black or reddish brown heads with protruding mandibles. Many major pests of wood and wood products; often cause serious structural damage. Others beneficial from standpoint of converting dead wood, “cow pies,” dried weeds, partially buried wood and other cellulose to humus. Gut contains symbiotic one-celled microorganisms (protozoans) that digest wood. Usually collected in dead wood; reproductives often swarm in the evenings after rains. Workers usually 5 mm long or less, except in damp wood termites where workers are about 10 mm long. Soldiers and reproductives are slightly larger than workers of respective species.



**\*Order Dermaptera: Earwig.** Metamorphosis simple. Mouthparts chewing. Small- to medium-sized, fattened, elongate insects with flexible forceps at end of abdomen. Tarsi three-segmented. Usually two pairs of wings; hind wings membranous, folded under short leathery fore wings. Females usually guard nests; eggs laid in cavities in the soil. Nocturnal, plant feeding; sometimes predaceous. Some serious pests; others beneficial predators. Common under boards and debris. Occasionally confused with rove beetles, which lack the forcepslike cerci of earwigs and have complete metamorphosis. Body length 10-15 mm. In folklore, often thought to enter brain through ear, giving one possible source for common name.

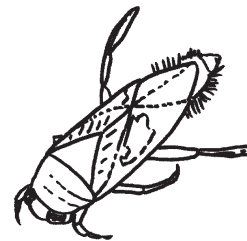


**\*Order Anoplura: Sucking Louse.** Metamorphosis none or simple. Mouthparts sucking; withdrawn into head when not in use. Usually less than 4 mm long. Dorsoventrally fattened, rather than laterally fattened like fleas. Antennae short, tarsi one-segmented and plierslike; adapted for grasping hairs of host. All ectoparasitic, some on man and domestic animals.



**Order Hemiptera: True Bugs.** Metamorphosis simple. Mouthparts sucking. Forewings divided into leathery and membranous halves (Hemi=half,-ptera=wing). Wings held flat over body when at rest. Tarsi with three or fewer segments.

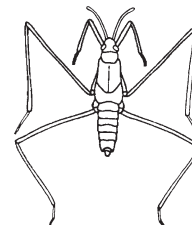
\**Water Boatman*. Usually less than 10 mm long. Aquatic bug with very short forelegs; first legs with tarsi one-segmented and scoop-shaped. Middle and hind legs nearly equal length. Hind legs long, fattened and oarlike, often with zebra stripes across the dorsal surface. Swim right side up; backswimmers swim upside down. Feed on algae. Do not bite; backswimmers do. Common in ponds and stock tanks. Adults fy.



*Backswimmer*. Aquatic bugs, usually a bit larger than water boatmen. Dorsal surface convex and often brightly colored (red, etc.). No zebra stripes. Front legs without scooplike tarsi. Swim upside down. Hind legs oarlike and longer than middle pair. Predators; backswimmers can bite if handled. Found in ponds, stock tanks and puddles. Adults fy. Commonly 8 mm long; some species reach 17 mm.



\**Waterstrider*. Middle legs closer to hind legs than front legs. Tarsi two-segmented. Legs elongate and spread widely away from slender body. Adults usually dark brown and white. Found on the surfaces of canals, rivers, ponds, etc. With or without wings. All are predators or scavengers; do not bite. Body length usually about 10 mm.



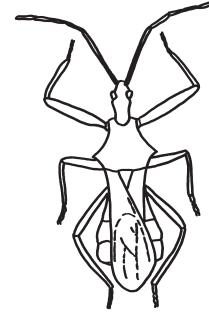
*Plant Bug* or *Leaf Bug*. Mostly less than 10 mm long; with two closed cells in membranous part of forewings. Ocelli absent. Beak four-segmented. Color variable; some quite brightly colored. All rather soft-bodied. Nearly all feed on plant sap; some serious pests; some are predators. Some jump (leafhoppers). Common in sweep net samples, especially from alfalfa and cotton.



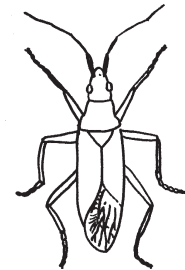
\**Ambush Bug*. Small (10-13 mm), stout-bodied bugs with greatly enlarged raptorial front legs. Antennae four-segmented, slightly clubbed. Ocelli present. Beak three-segmented. Abdomen angled; wider posteriorly. Usually yellow with green or brown on wings and abdomen. Predators. Usually do not bite. Found commonly in late summer or fall while sweeping or beating flowers or flowering shrubs.



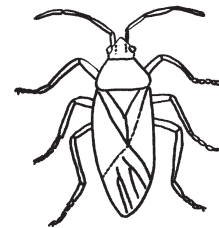
\**Assassin Bug*. Body oval, elongate or very elongate. Beak three-segmented, curved and fitting into groove anterior to front legs. Head elongate. Antennae four-segmented. Ocelli usually present but absent in the most elongate species. Edges of abdomen often extend laterally. Front legs somewhat raptorial. Usually 10-25 mm long. Common in sweep net samples in late summer or early fall. Most species predaceous; a few blood feeders transmit certain diseases to humans. Many can inflict painful bite. Most are beneficial.



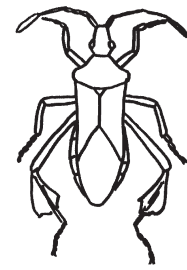
*Damsel Bug*. Similar to assassin bug, but usually smaller, 3.5-11 mm long. Beak four-segmented. Antennae four- to five-segmented. Ocelli present. Front legs slightly raptorial. Winged or wingless. Membrane of hemelytra usually with numerous small cells around the margin. Predators. Usually do not bite; beneficial.



*Seed Bug*. Small to medium-sized, relatively hard-bodied bugs with ocelli. Antennae and beak four-segmented. Tarsi three-segmented, with a pad at the base of claws. Front femora sometimes thickened as in assassin bugs and damsel bugs. Membrane of forewing with only four to five veins. Some species brightly colored. Most less than 10 mm long. Some species pests (false chinch bugs); some beneficial (big-eyed bugs). Plant feeders usually attack seeds; big-eyed bugs are predators. Do not bite. Swept from plants or found on ground.



\**Leaf-Footed Plant Bug*. Mostly medium-sized to large, somewhat elongate, dark-colored bugs. Head narrower and shorter than pronotum. Hind tibiae of some species expanded and fattened. Membranous portion of forewing with numerous veins. Some pests (squash bug, leaf-footed plant bug). Majority feed on plants; some species predaceous. Found on cacti, many shrubs and trees; occasionally in sweep net samples. Many species 18 mm long or less.

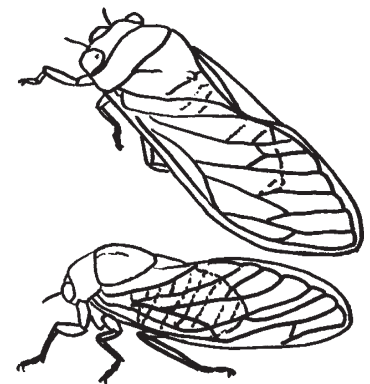


\**Stink Bug*. Broadly oval, often shield-shaped bugs. Scutellum large and triangular. Body usually larger than 7 mm. Tibiae with few spines. Some plant feeders and crop pests; several are predators with one species predaceous on Colorado potato beetle (a leaf beetle). Common in sweep net samples and various plants, at lights and occasionally on tree bark. Color variable; usually brown or green.

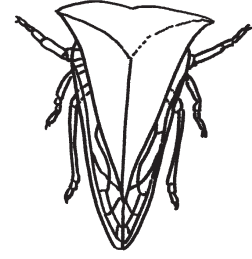


**Order Homoptera:** *Cicada, Leafhoppers, Planthoppers, Treehoppers, Whiteflies, Aphids, and Scale Insects*. Metamorphosis simple. Mouthparts sucking; phytophagous. Winged or wingless. Variable order with individuals ranging in size from large cicadas to nearly microscopic males of some scale insects.

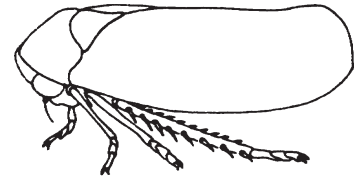
*Cicada*. Large insects, most 25-50 mm long. Two pairs of membranous wings, each with numerous veins. Male with sound-producing organs on venter of abdomen. With three ocelli. Do not jump. Common during summer; male cicadas make loud chirring noises heard in trees and shrubs during the day. Occasionally found at lights. Most specimens caught by stalking singing males. Generally not pests; egg laying occasionally damages twigs on young trees. Longest living insects to 17 years for subterranean nymphs; feed on root sap of various trees and shrubs.



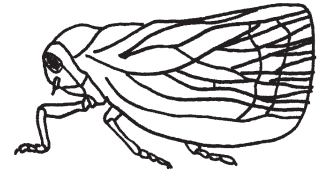
\**Treehopper*. Small, hump-backed jumping insects, usually less than 10 mm in length. Pronotum expanded, often projecting backward over abdomen. Often with sharp spines or corners on green or brown body. Hind tibiae without comblike row of spines. Common on sweep net samples. Feed on trees, shrubs, weeds, grasses and other forage. Not important economically, except for occasional damage on forage crops.



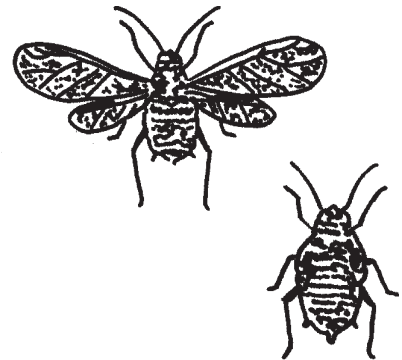
\**Leafhopper*. Small (usually under 10 mm), cigar- or wedge-shaped bodies, with comblike row of spines on hind tibiae. Coloration variable, often green or brown, but can have red stripes or other colorful markings. Many serious pests of cultivated crops; some important vectors of certain plant diseases. Common in sweep net samples. Easy to find in almost any field during the warmer months. Usually mounted on points.



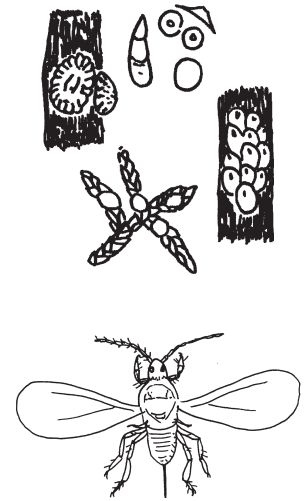
\**Planthopper*. (Includes several families in super family Fulgoroidea). Similar to treehoppers, but antennae are attached to sides of head beneath eyes; hind tibiae lack rows of comblike spines. Generally small (under 13 mm), phytophagous, jumping insects. Wings bulge near middle of body in some species; a few have projections on their heads. Most species not economically important. Common in sweep net samples taken in late summer.



\**Aphid*. Soft-bodied, pear-shaped, small (4-8 mm) insects, usually with two tube-like projections (cornicles) on abdomen. Winged or wingless. Adults and immatures found together; often numerous. Occasionally tended by ants; exude large amounts of sugary honeydew. Some species host specific; others have extremely broad host range. Some serious pests of assorted field crops and ornamental. Many transmit certain plant diseases. Should be preserved in alcohol or on microscope slides.

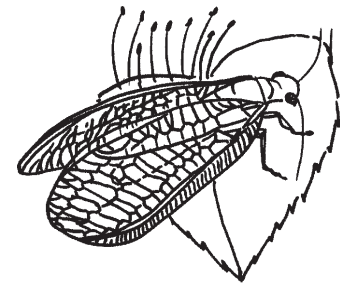


*Scale Insect.* (Includes several families in the super family Coccoidea). Many species not insectlike in appearance, except when recently hatched. Bodies of older immatures and adults covered with nonliving scales, either waxy and soft or hard and variously ornamental. Females wingless and usually legless. Males usually two-winged; nearly microscopic. Ground pearls, armored scales, wax scales, soft scales and cochineal insects included in this group; cochineal insects found on cacti in New Mexico. Other species often found on perennial orchard, yard, garden, or potted plants; some serious pests, weakening or killing their hosts or blemishing fruit. Females usually collected within their scales and dried; males routinely mounted on microscope slides. Mealybugs and soft scales can be stored in alcohol. Body size usually 1-2 mm; a few species reach 5 mm in diameter.

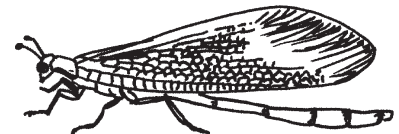


**Order Neuroptera:** *Net-winged Insects.* Metamorphosis complete. Mouthparts chewing. Two pairs of membranous wings with many veins. Antennae relatively long, threadlike, pectinate or clubbed as opposed to short, threadlike antennae on Odonata. Tarsi five-segmented (three-segmented in Odonata).

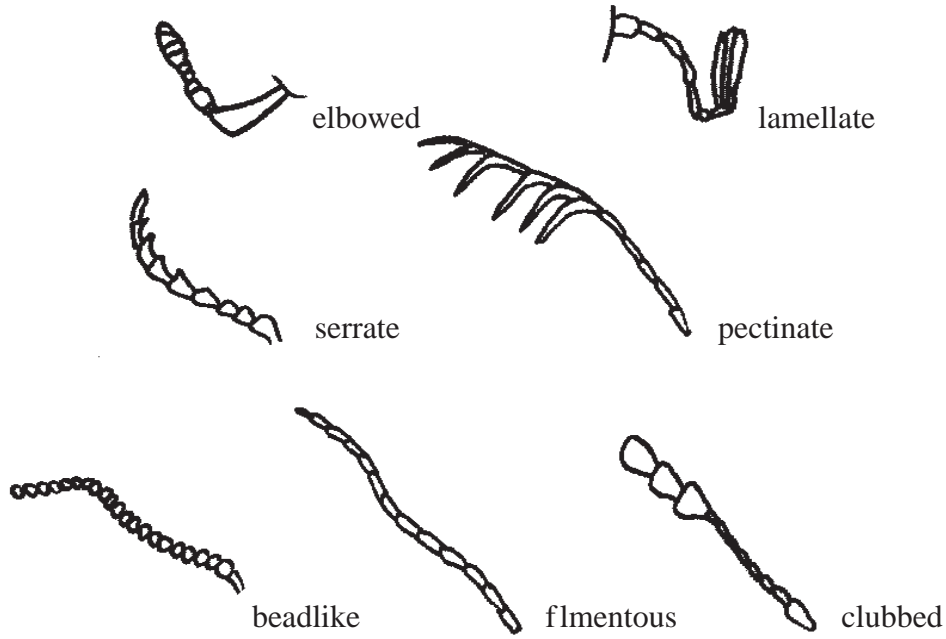
\**Green Lacewing.* Most about 10 mm long. Wings and body pale green. Eyes metallic gold or copper in life. Produce a bad smell when brushed or crushed. Eggs laid singly on thin stalks. Larvae and adults predaceous, usually on aphids. Among the most beneficial insect in crops. Very delicate, fluttery flyers. Often attracted to lights at night.



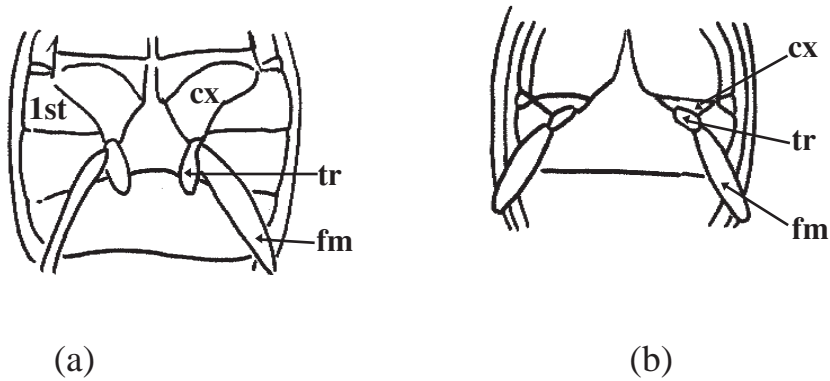
*Antlion.* Like damselflies, but with knobbed antennae; bodies usually finely mottled gray and brown. Extremely slender and often quite large, to 50 mm. Larvae (doodlebugs) dig conical pits in sand; antlion name comes from common food of larvae: ants. Adults common at lights; occasionally found resting on vegetation. Not economically important.



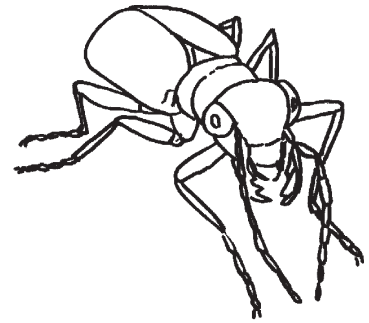
**\*Order Coleoptera: Beetles.** Metamorphosis complete. Mouthparts chewing. Forewings (elytra) without veins, usually hardened. Antennae of various types include filamentous, beadlike, clubbed, serrate, elbowed, lamellate, or pectinate.



First abdominal segment (a) in illustration below divided by hind coxae or (b) not divided by hind coxae. (cx=coxa; tr=trochanter; fm=femur).



*Tiger Beetle.* First abdominal segment divided by hind coxae. Tarsi with five segments. Head at eyes as wide or wider than pronotum (thorax). Mandibles often enlarged and with distinctive teeth; mandibles usually visible from above. Legs slender. Antennae threadlike. Hind trochanter bean-shaped and offset toward the midline. Found near water, in undergrowth, on hillsides, on field margins, sand dunes, playa lake beds, or along woodland paths. Often good flyers; visual predators. Most diurnal, few nocturnal (latter not good flyers). Usually collected with an aerial net; larvae occur singly in vertical burrows usually 10-20 mm long.



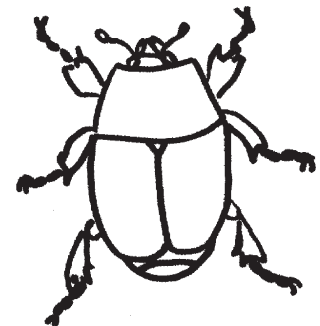
*Ground Beetle.* First abdominal segment divided by hind coxae. Tarsi with five segments. Head at eyes usually narrower than pronotum. Mandibles varied. Hind trochanter bean-shaped and offset toward the midline. Antennae filamentous. Often found near water, under rocks and running on ground; also collected by sweeping or pitfall trapping. Sometimes metallic but often black or brown, occasionally mottled. Predators as adults and larvae. Usually poor flyer. Many species beneficial. Many common species 10 mm long or less; a few reach 25 mm.



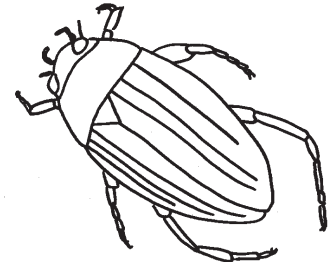
*Diving Beetle (Predaceous Diving Beetle).* First abdominal segment divided by hind coxae. Tarsi five-segmented. Head at eyes narrower than pronotum. Mandibles not visible from above; legs not slender, hind legs oarlike. Antennae filamentous and long. Palpi near mouth very short. Found in quiet water; stock tanks, ponds, lakes, etc. Usually brown or black, sometimes spotted; predators. Adults can fly, but usually observed swimming. Sometimes come to lights, but best collected with dip net. Commonly 10-12 mm long; some are only 3 mm long, while the largest reach 35 mm.



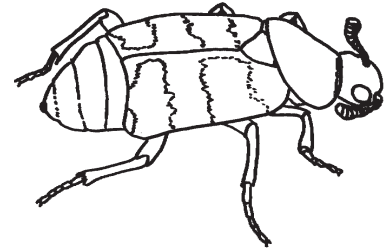
*Hister Beetle.* First abdominal segment not divided by hind coxae. Tarsi with five segments. Head at eyes narrower than pronotum. Mandibles often pincerlike. Legs often fattened, with lateral teeth. Antennae clubbed. Found in decaying organic matter. Usually shiny black, sometimes with red markings; occasionally metallic green. Predators. Can fly but usually seen crawling. Usually collected by turning over or digging through rotting plant or animal matter; occasionally come to lights. Commonly 7-10 mm long; smallest are 0.5 mm long.



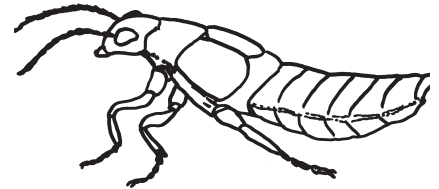
*Water Scavenger Beetle.* First abdominal segment not divided by hind coxae. Tarsi five-segmented; hind tarsi fattened with fringe of hairs. Palpi usually longer than antennae. Body oval or elliptical, often with ventral keel or spine. Antennae short and clubbed. Color usually black or brown. Usually aquatic but a few species live in dung. Predators of small aquatic animals or scavengers as name implies. Size variable; from a few mm to 40 mm long.



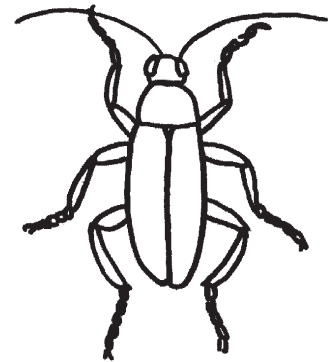
*Carrion Beetle.* First abdominal segment not divided by hind coxae. Tarsi five-segmented. Forewings long in some species; short in others, exposing one to three abdominal segments. Body relatively soft, fattened. Usually about 10 mm in length. Antennae clubbed. Solid black, dark gray or black with yellow, orange or red markings. Feed on carrion, occasionally found in dung. Collected by turning over dead animals or baiting a pitfall with meat, especially fish.



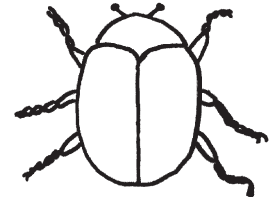
*Rove Beetle.* First abdominal segment not divided by hind coxae. Tarsi five-segmented. Forewings short, exposing three to six abdominal segments. Body elongate, slender. Abdomen soft, flexible. Sometimes confused with earwigs, but lack forceps. Antennae filamentous or clubbed. Often less than 5 mm long; some common species reach 10 mm. Found on carrion, dung, along streams, under rocks, in fungi, under bark, in decaying vegetable matter. Predators and scavengers, some feed on fly larvae and have been used in biological control programs around domestic animal units.



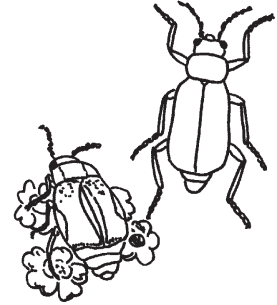
*Soldier Beetle.* First abdominal segment not divided by hind coxae. Tarsi five-segmented. Body elongate, parallel-sided. Head visible from above. Body and wings soft. Color black, yellow, or brown, lighter colored species often with black markings. Usually around 10 mm long. Common on flowers, especially yellow composites in summer and fall. Larvae are predators, adults feed on pollen and nectar. Easily collected by sweeping.



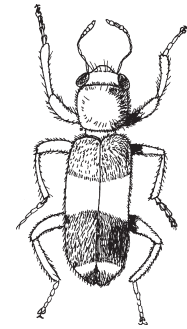
*Dermestid Beetle*. First abdominal segment not divided by hind coxae. Tarsi five-segmented. Generally small (under 5 mm), elongate to oval beetles, often with scales or hairs on elytra. Carrion beetles usually larger, 10 mm or more. Antennae clubbed. Color usually brown or black, sometimes mottled. Larvae feed on dead plant and animal matter. Often serious pests in stored products, carpets, upholstery, fur hides, and insect and plant collections.



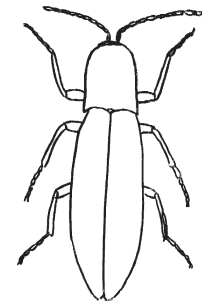
*Soft-Winged Flower Beetle*. First abdominal segment not divided by hind coxae. Tarsi five-segmented. Forewing broadest posteriorly; small, somewhat wedge-shaped beetles, usually less than 8 mm long. Antennae serrate or filamentous, sometimes with basal segments enlarged. Often black, metallic green or blue with red, orange, or yellow markings. Some are predators; others feed on pollen. Relatively common on flowers and in various field crops.



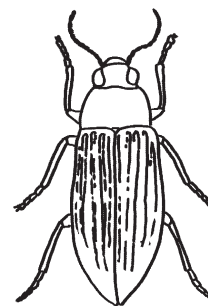
*Checkered Beetle*. First abdominal segment not divided by hind coxae. Tarsi five-segmented. Body elongate, often with long erect hairs. Pronotum usually narrower than forewings or head. Usually black, often with red, orange or yellow markings. Antennae clubbed or filamentous. Predators of wood-boring insects; one species attacks stored meats. Adults often collected on flowers. Most species 5-12 mm long.



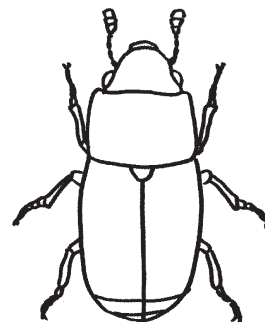
\**Click Beetle*. First abdominal segment not divided by hind coxae. Tarsi five-segmented. Body elongate, fattened, and with posterior corners of pronotum pointed. Clicking mechanism on underside, between bases of legs. Overturned adults can right themselves by cocking and snapping their bodies, often with a distinct clicking sound. Usually brown or black, occasionally patterned; some with eye spots, with light organs at corners of pronotum, or metallic green. Larvae are wireworms; some predators, but most are root and seed feeders. Some serious pests of crops. Adults common in lights. Occasionally collected while sweeping or found under wood or bark. Size usually 10-30 mm.



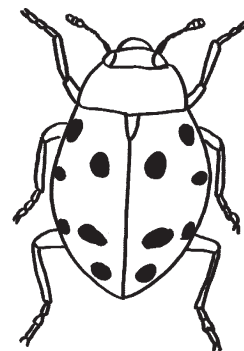
*Metallic Wood-Boring Beetle*. First abdominal segment not divided by hind coxae. Tarsi five-segmented. Usually metallic or bronzed, especially ventrally. Resembling click beetles, but proportionally shorter usually and cannot click. Antennae short, serrate or filamentous. Usually 5-20 mm. Several common species on willows, mesquite and flowering composites. Larvae called fat-headed borers; bore into wood of trees and shrubs. Some pests in orchards, and on ornamental shrubs, trees, and structural timber. Adults feed on leaves, bark and flowers. Some species collected by sweeping flowers, especially in summer and fall. Use aerial net for single beetles.



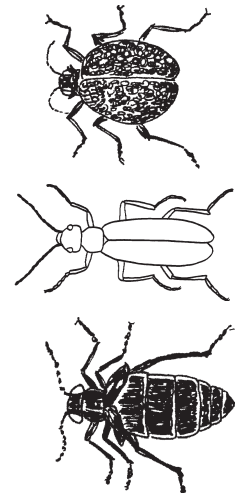
*Sap Beetle*. First abdominal segment not divided by hind coxae. Tarsi all four- or five-segmented. Antennae with three-segmented club, which sometimes appears four-segmented. Body shape varies, usually robust-elongate. Abdomen often exposed beyond short elytra. Color usually black or brown, sometimes marked with red or yellow. Usually small (ca. 3 mm long), but occasionally larger. Common in flower heads, fungi, or decaying fruit and vegetables; thistle heads sometimes contain many sap beetles.



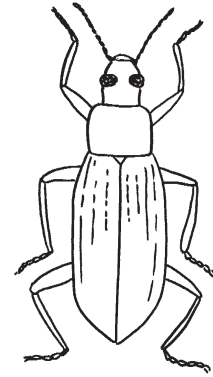
\**Ladybird Beetle*. First abdominal segment not divided by hind coxae. Tarsi apparently three-segmented. Shape usually oval to nearly hemispherical. Head mostly concealed. Often brightly colored: red, yellow or orange with black spots or black with red or yellow spots. Some totally black. Usually about 5 mm. Common in alfalfa and other crops, on roadside weeds; gregarious in fall in the mountains. Most are predators; several species have been used in biological control. Very few pests; Mexican bean beetle defoliates beans and related crops. Commonly collected by sweeping.



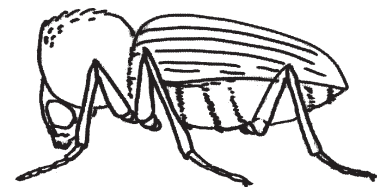
*\*Blister Beetle.* First abdominal segment not divided by hind coxae. Tarsal formula 5-5-4. Body usually elongate; pronotum narrower than head or forewings. Body soft; elytra usually soft, sometimes exposing abdomen. Antennae filamentous or beadlike. Color black, gray, brown, metallic purple, green or blue; some are banded, striped or spotted with red, black, white or other colors. Size usually around 10 mm. Larvae usually beneficial, feeding in grasshopper egg pods; some species parasitize underground nests of wasps or bees, however. Adults produce cantharidin, a blistering agent that may kill horses or other stock when ingested in hay. People coming into contact with beetle body fluids can develop spectacular blisters. Adults common on plants and flowers, which they often defoliate. Often collected by sweeping or by hand picking as they run over the ground.



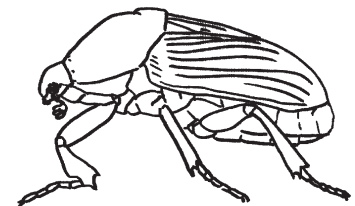
*\*Darkling Beetle.* First abdominal segment not divided by hind coxae. Tarsal formula 5-5-4. Body elongate or hemispherical. Antennae usually 11-segmented, filamentous, beadlike, or clubbed. Eyes usually notched. Often confused with ground beetles, darkling beetles differ by having four tarsal segments on the hind legs, no division in the first abdominal segment, conical hind coxae and notched eyes. Usually black or brown and from a few mm to 30 mm long. Mostly scavengers that can be found under rocks, on the ground, in rotten wood, in fungi etc.; some species pests of stored grains. Easily collected in pitfall traps or while running over the ground in the desert.



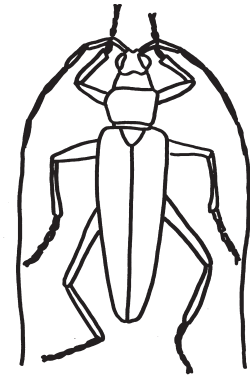
*Twig Borer.* First abdominal segment not divided by hind coxae. Tarsi five-segmented. Antennae clubbed, three- to four-segmented. Head mostly concealed from above. Elongate body, usually with tubercles or teeth on pronotum. Usually about 10 mm in length and dark brown or black. Often found at lights. Feeds by boring into twigs or branches.



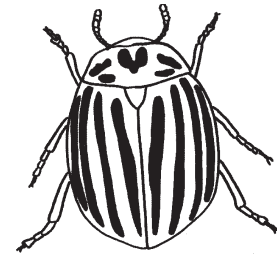
*\*Scarab Beetle.* First abdominal segment not divided by hind coxae. Tarsi five-segmented. Antennae lamellate. Body usually robust. Size minute highly variable, ranging from (2 mm) up to at least 50 mm in some unicorn beetles. Color variable: black, brown, green, metallic green, green with silver stripes, mottled gray and brown, etc. Common at lights, under dung, in sweep net samples, on fruit trees, rose bushes, composite flowers, rotten wood, in lawns, etc. Includes several economic species: fig eater, Japanese beetle, white grubs (May and June beetles) among others. Feed on fruit, pollen, or leaves as adults; larvae feed on rotting organic matter, dung, or roots.



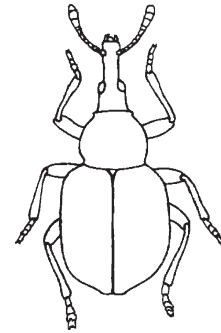
*\*Long-Horned Beetle.* First abdominal segment not divided by hind coxae. Tarsi apparently four-segmented. Antennae usually at least half as long as body. There are exceptions! Eyes usually notched. Tarsi usually with pads similar to those of leaf beetles and snout beetles. Size from a few mm to over 50 mm. Color variable, often brown or black; but some metallic, mottled, or with colorful bands or stripes. Often found on flowers, in decaying wood, or around lights. Larvae feed as borers (round-headed borers) in wood of various forbs, shrubs and trees. Some species destructive in cut logs and firewood or timbers made from them; adults often feed on pollen. Can be collected from wood, on bark or by sweeping flowers.



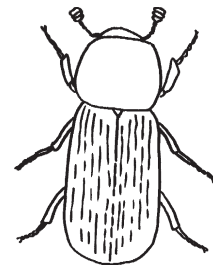
*Leaf Beetle.* First abdominal segment not divided by hind coxae. Tarsi apparently four-segmented. Antennae almost always shorter than half of body length; usually filamentous or beadlike. Tarsi with pads. Body usually oval, but sometimes elongate. Eyes not notched. Size usually 10 mm or less. Color variable, often metallic, striped, spotted or mottled. Often destructive pests, many of these beetles feed on crop plants and ornamentals, both as larvae and adults. Found almost anywhere plants grow and often taken in sweep net samples.



*Snout Beetle.* First abdominal segment not divided by hind coxae. Tarsi appear four-segmented. With a more or less distinct snout; some species with very long snout. Antennae elbowed and clubbed. Size usually less than 10 mm. Color variable, but usually gray, brown or black, sometimes metallic. Many pests of crop and ornamentals, both as adults and as larvae. Found in sweep net samples, at lights, and on various plants.



*\*Bark Beetle.* First abdominal segment not divided. Tarsi apparently four-segmented. Antennae elbowed and clubbed. Body elongate, cylindrical, somewhat lozenge-shaped; some with abdomen appearing scooped out. Most species small; less than 5 mm. Color usually dark; brown, black or red. Many serious pests of shade and forest trees where they bore into bark or wood.

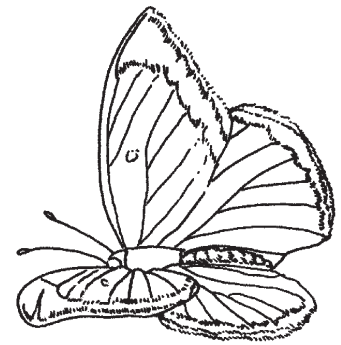


**Order Lepidoptera:** *Butterflies and Moths*. Wings mostly or entirely covered with scales. Metamorphosis complete. Mouthparts sucking, nonfunctional or absent in some species.

\**Swallowtail*. Large butterflies with wing span to 100 mm. With clubbed antennae; antennae lack terminal hooks. Hind wing tailed (some species outside New Mexico lack tails). Wings usually striped, spotted or at least partly blue or green. Larvae defoliate various plants; adults sip nectar. Black swallowtail larvae common as pests on carrots, parsley and related plants. Usually collected as adults on various flowering plants. Can be raised from larvae if fed on proper host plants.



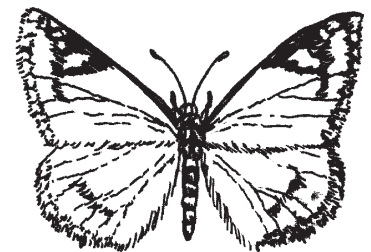
*Sulfur Butterfly* (including *Whites* and *Orange-tips*). Small to medium-sized (to 50 mm wingspan) butterflies with clubbed antennae lacking hooks. Color usually yellow, orange or white, marked with black and/or orange. Common in alfalfa fields, gardens and weedy lots. Larvae of several species economically important, feeding on alfalfa or mustards, including cabbage and related plants.



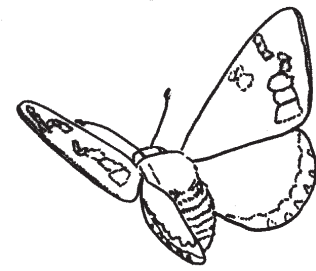
\**Gossamer-Winged Butterfly*. Small (wingspan less than 35 mm), delicate butterflies. Antennae clubbed and without hooks. Some species with hairlike tails on hind wings. Colors variable; many species metallic blue or purple, gray with red eyespots or orange and black. These include the smallest butterflies. Often found around flowers or weeds, such as Russian thistle. Few species (e.g. cotton square borer) are economically important.



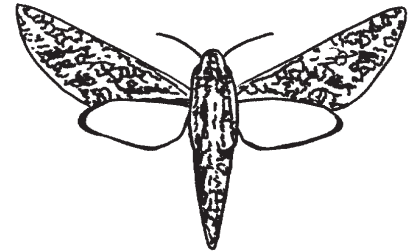
*Brush-Footed Butterfly*. Highly variable in size and color; primarily distinguished by their reduced front legs, making them appear four-legged. Antennae clubbed and without hooks. Includes some of our most common butterflies, such as the mourning cloak, red admiral, viceroy, monarch, queen, and painted lady. Many species have red or orange patches, often on black or dark brown background. Few economically important species. Adults may congregate around wet spots on the ground or on flowers. Body length up to 25 mm; wingspan to 50 mm.



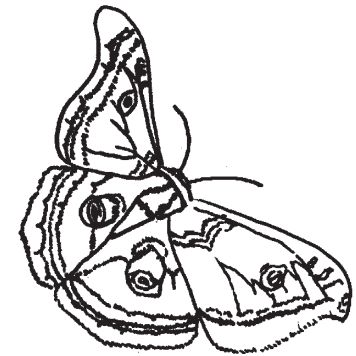
*Skipper*. Antennae clubbed and with a hook. Head as wide or wider than thorax. Hind leg with two pairs of spurs. Usually 10-20 mm long. Color black, brown, spotted or orange. Common at flowers. Larvae roll leaves. Not economically important usually; a few species may be pests of legumes. Giant skipper larvae attack yuccas and agaves.



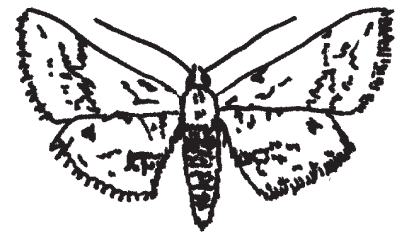
\**Sphinx Moth*. Medium-sized to large moths (up to 100 mm wing span). Antennae thickened, and sometimes slightly hooked, but not clubbed. Body typically bullet-shaped and heavy. Larvae called hornworms; several species attack vegetables and ornamentals. Common flyers just at sunset and occasionally around lights at night. Adults can hover; their size, hovering ability, whirring sound and activities around flowers closely mimic those of hummingbirds.



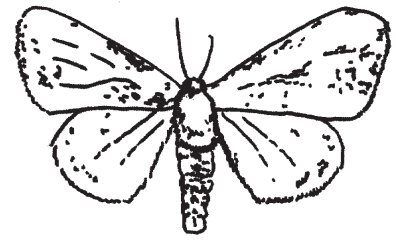
*Giant Silkworm Moth*. Medium-sized to large moths (wingspan sometimes more than 100 mm). Antennae threadlike in females, feathery in males. Wings broad. Body heavy. Includes some of our largest moths, such as the io and polyphemus moths. Most serious pest in this family in New Mexico is range caterpillar, a grassland pest. Most species difficult to collect; adults usually available in only limited geographic areas and populations usually are small. Larvae of some can be reared from cottonwood, mesquite, range grasses or certain trees, depending on host preferences. Adults do not feed and are short-lived.



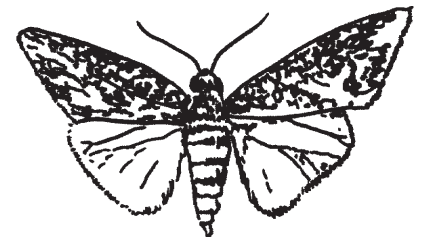
*Geometer Moth*. Small to medium-sized moths, often with angulate, scalloped or fringed wings. Body slender. Many species with light pastel wings: yellow, tawny or green. Larvae called "inchworms." Adults of some species common at lights. Antennae filamentous, without clubs or hooks. Wingspan usually 30 mm or less.



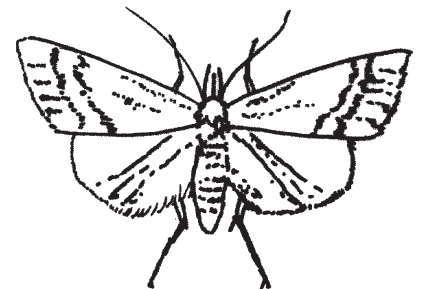
*Tiger Moth.* Small to medium-sized moths. Often brightly colored or white with black spots. Occasionally pure white (for example, the fall webworm). Second pair of wings may be brightly colored on some species. Antennae filamentous, without hooks or clubs. Larvae generally foliage feeders sometimes on ornamental annuals; fall webworm larvae often partially defoliate broad leaf trees in autumn. Salt marsh caterpillar occasionally minor pest of cotton. Can be found as adults at lights or reared from larvae. Wingspan usually 25 mm or less.



\**Noctuid Moth.* Most species small to medium-sized; underwings with wingspan of up to 60 mm. Black witch (occasionally collected in New Mexico) among our largest moths with a wingspan of up to 100 mm. Antennae filamentous, never feathery. Includes many of the rather nondescript “millers” that come to lights in the summer. Coloration varies, but most species gray or brown and mottled with various patterns. Underwing moths have hind wings black marked with red or orange. Black witch moths have intricate patterns on dark brown wings, making them blend in with the tree bark. Includes some of our most important plant pests, such as the corn earworm, various cutworms and armyworms.



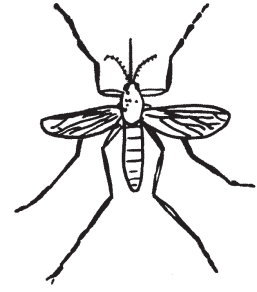
*Pyralid Moth.* Mostly small moths (wingspan 25 mm or less). Antennae filamentous. Palpi very long in most species; palpi usually (but not always) resemble a snout. Adults usually light tan to gray or white. European and Southwestern cornborers, sod webworms, pecan nut casebearers and alfalfa webworms economically important. Some species commonly found at lights.



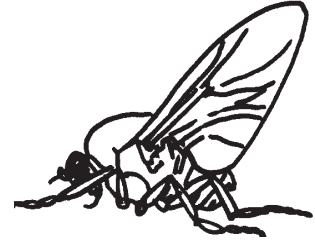
**Order Diptera: Flies.** Adults with one pair of membranous wings; some species wingless. Second pair of wings reduced to knoblike organs called halteres. Metamorphosis complete. Mouthparts sucking or with various modifications, enabling piercing or sponging.

(NOTE: “Fly” is part of the common name of many insects. Only in the Diptera can it stand alone in the common name. For example, robber fly, bee fly, horse fly all have “fly” as a separate word. For insects in other orders, “-fly” will be a suffix in the common name as in butterfly and whitefly.)

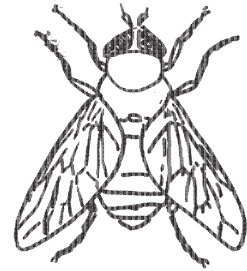
\**Mosquito*. Legs threadlike; wings long and narrow, with scales along veins and margins. Proboscis long; piercing-sucking. Females of most species suck blood; may transmit diseases, such as malaria, yellow fever, West Nile virus, or encephalitis in humans and heartworm in dogs. Males do not bite. Adults usually less than 7 mm. Larvae are common wigglers in stagnant water. Common around any standing water during the summer.



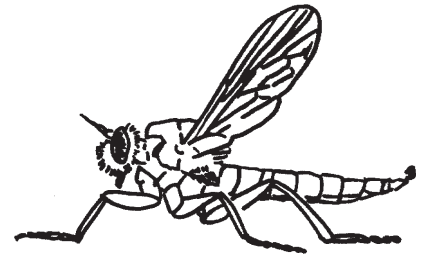
*Black Fly*. Small, usually less than 4 mm; stocky and hump-backed. Antennae short. Wings broad at base. Females suck blood. Larvae live in streams, usually attached to rocks. Adult color usually black, gray, or yellow; antennae very short. Often viciously attack both animals and humans.



\**Horse Fly* (including *Deer Flies*). Stout-bodied, often large (to 25 mm long) flies with helmet-shaped heads. Eyes almost completely cover head, especially in males; eyes often iridescent and rainbow-striped in life. Third antennal segment elongate. Proboscis elongate, blunt-tipped, usually visible. Females suck blood. Larvae of most species aquatic.



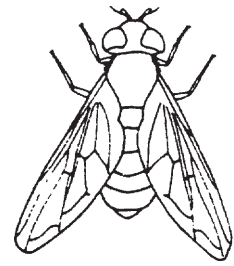
\**Robber Fly*. Head hollowed out on top between eyes. Third antennal segment elongate. Face usually with fuzzy beard. Size variable, up to 25 mm; pointed proboscis. Predaceous on other insects. Adults suck fluids from bodies of prey; many look and behave like bees, wasps or dragon flies. Larvae live in soil or decaying wood. Very common flies that often perch on twigs while eating or waiting for prey or mates.



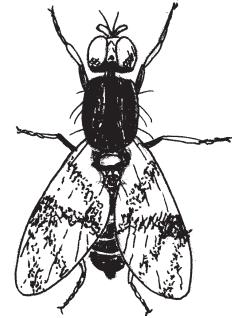
*Bee Fly*. Head rounded. Stout-bodied and hairy. Antennae short. Wings often mottled or with anterior dark-colored band. Tend to hover over plants or patches of bare ground. Larvae parasitic on insects; adults nectar feeders or predaceous; sucking mouthparts. Small to medium-sized. Body usually 15 mm or less.



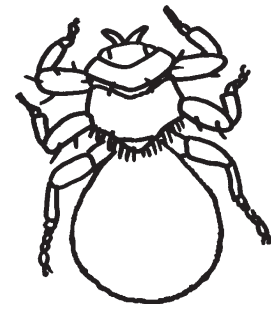
*Syrphid Fly*. Small to medium-sized often shiny flies, to 12 mm long. Many have yellow markings on abdomen; some beelike. Spurious (false) vein usually present on wings. Often seen hovering over flowers. Larvae of many predaceous, especially on aphids and some other small-bodied arthropods; others (such as rat-tailed maggot) are scavengers. Adults suck nectar or other fluids from flowers.



*Picture-Winged Fly*. Small to medium-sized flies with wings banded or spotted. Picture-wings common in sweep net samples from flowering plants, including some weeds. Plant feeders or scavengers as larvae; adults suck plant exudates, especially from overripe or damaged fruits. Some serious pests of fruit. Body length usually 10 mm or less.



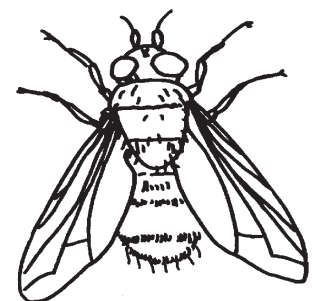
*Louse Fly*. Adults winged or wingless; depending upon species. Body dorsoventrally fattened. A common wingless species is the sheep ked, an ectoparasite (blood feeder) of sheep. Winged species usually found on birds. Winged species have strong anterior veins and weak posterior veins in the wings. Collect from skin of live birds and mammals. Body length about 6 mm. Adult females retain immature forms internally, “giving birth” to mature larvae, ready to pupate.



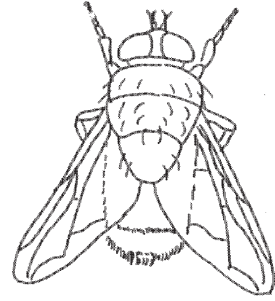
*Muscid Fly*. Small to medium-sized gray flies, often with dark bands on thorax. These include house flies, face flies, horn flies and stable flies. Larvae are scavengers, often in filth or decaying organic matter. Adults may transmit disease organisms on their bodies; stable flies and horn flies are blood feeders, piercing skin of hosts and sucking their blood. House flies and face flies suck fluids (mouthparts sucking but adapted for sponging) from various sources (house flies) or from eyes, mouth or nostrils of host (face fly). Common wherever garbage, sewage, animal wastes or dead animals exist. Body length 10 mm or less.



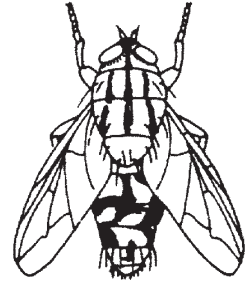
*Tachinid Fly*. Small to large flies with stout bristles on the abdomen and enlarged or fleshy postscutellum. Many are beelike only black or brown; some look like house flies or flesh flies. Presence of bristles on the abdomen usually separates tachinids from other flies. Larvae are internal parasites on other insects; many are beneficial. Can be collected with an aerial net on flowers; adults suck fluids from or off various flowers. Body length usually 7 mm or less; occasionally longer.



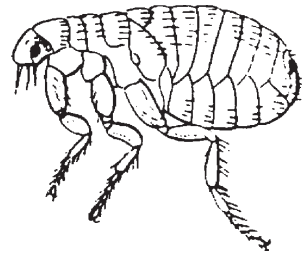
*Blow Fly*. Similar to tachinids, but usually metallic and usually blue or green. Adults may be numerous on flowering plants in the spring. Larvae are usually scavengers, feeding on carrion and dung, but one species, the screw-worm, attacks living tissue and is a serious pest of livestock. Body length usually 7 mm or less.



\**Flesh Fly*. Similar to muscid flies and some tachinid flies, but generally larger than the former and without the heavy bristles of the latter. Many species with a checkerboard pattern on the gray abdomen; many also have a red tip on the abdomen. Larvae of most species scavengers; a few parasitic on such insects as grasshoppers. Often common on flowers and around houses; adults suck various kinds of fluids they can find in their habitat, ranging from anything associated with the animal host to nectar and fluids on flowering plants. Body length usually 7-9 mm.

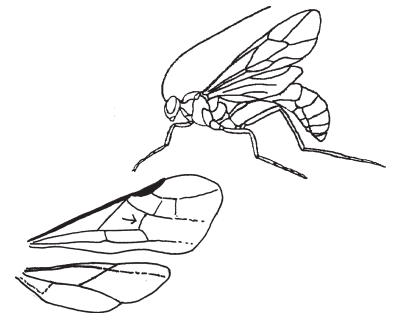


\***Order Siphonaptera:** *Flea*. Wingless insects with brown or black, laterally fattened bodies and strong jumping legs. Generally less than 5 mm long. Antennae short and three-segmented. Metamorphosis complete. Mouthparts of adults fleas sucking. Ectoparasites of birds and mammals; some species with broader host range than others. Larvae maggotlike scavengers of dried blood and animal dander; develop away from their host, usually in nests, bedding or carpeting. Can be serious, blood-sucking pests in homes and yards, even those without pets. Some species transmit serious diseases including plague.

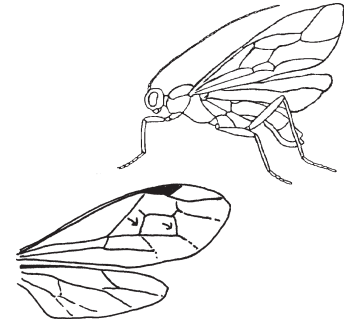


**Order Hymenoptera:** *Parasitoids, Ants, Wasps, and Bees*. Two pairs of membranous wings or sometimes wingless. Ovipositors usually long; females of many species sting using ovipositor and modified accessory glands (sources of venoms). Mouthparts chewing or modified chewing. Metamorphosis complete.

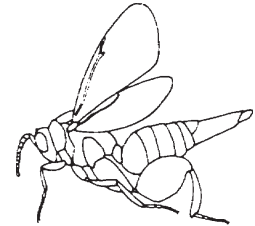
*Braconid Wasp.* Mostly small, slender parasitoids with one recurrent vein in each forewing. Antennae filamentous, with 16 or more segments. Some as large as 15 mm. Many species brown or black, a few red. Larvae are parasitoids of other insects and are among the most important of biological control agents. Adults often collected by sweep net or on flowers.



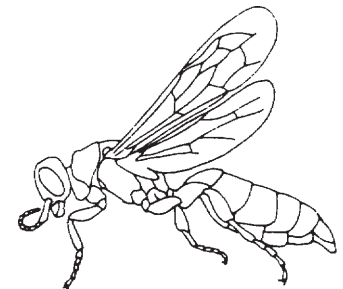
*Ichneumon Wasp.* Small to very large (to 40 mm), slender parasitoids with two recurrent veins in each forewing. Antennae filamentous with 16 or more segments and usually half as long as body. A very large family with more than 3,000 species in North America. Color patterns vary widely. Larvae parasitize almost every type of insect and many other arthropods. Extremely beneficial. Commonly collected in sweep net samples.



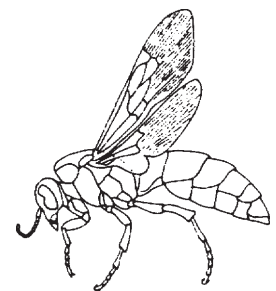
*Chalcidid Wasp.* Mostly small to medium-sized (to 7 mm), relatively robust parasitoids with very few wing veins. Antennae short and with 13 or fewer segments. Hind femora greatly swollen and toothed below. Hind coxae much longer than front coxae. Larvae of many species are parasitoids on a variety of insects. Adults occasionally collected while sweeping or at flowers.



*Tiphiid Wasp.* Usually 10 mm or larger; elongated. Mesosternum with two posterior lobes or anterior abdominal segments highly constricted. Antennae 12-13 segmented. Body often banded black and yellow. Larvae parasitoids of various insects, especially white grubs (larvae of scarab beetles). Occasionally large numbers of adults congregate around flowers or in mating swarms, flying over lawns.



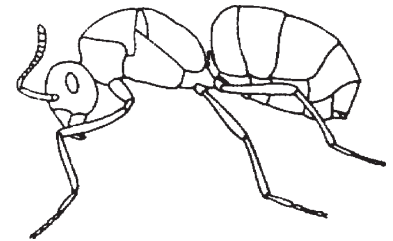
*Scoliid Wasp.* Large, hairy, robust wasps (commonly 20-30 mm long). Mesosternum and metasternum form a ventral plate divided by transverse suture. Antennae 12-13 segmented. Wing membrane beyond cells wrinkled (differs from male velvet ant, which has basically smooth wing tips). Color often black and red or yellow. Larvae mostly parasitoids of white grubs. Adults often collected around flowers, such as tamarisk (salt cedar). May swarm over lawns like tiphiids.



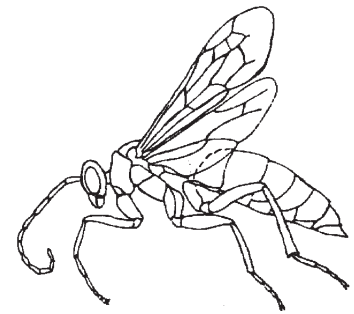
\**Velvet Ant*. Small to large (20 mm), very hairy wasps. Often brightly colored with red, yellow, or orange on black. Antennae 12-13 segmented. Females wingless (some tiphid wasps also have wingless females). Females with very painful sting. They are sometimes called “cow killers.” Larvae mostly parasitize ground-nesting bees and wasps. Females commonly collected while they run on the ground. Males often collected while they fly over dirt roads or bare ground in search of females or visit flowers.



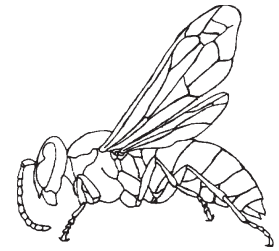
\**Ant*. Most flightless, small to medium-sized insects, with one or two knots at waist. Antennae 6-13 segmented and strongly elbowed, with first segment very long. Queens and males usually winged, at least during dispersal phase; workers always wingless. Adult females capable of reproducing. Usually found in small (just a few individuals) to gigantic colonies of many thousands. Eat almost anything. Most will bite and many will sting. Immature stages are tended underground by the workers. Many species are pests, including fire ants, harvester ants and carpenter ants. Easy to collect; found almost everywhere, including indoors. Body size variable, depending on species and developmental conditions. Workers usually 2-4 mm, occasionally reaching 8-9 mm. Reproductive often slightly larger than workers.



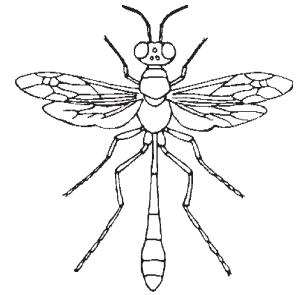
*Spider Wasp*. Medium to large wasps (some to 40 mm) with very long legs. Mesopleura with transverse sutures. Wings not folded when resting. Most dark blue or black; many with bright red or orange wings. Females often have curled antennae. Females have a potent sting. Common around flowers during the summer, especially mesquite, tamarisk and various weeds. Females capture spiders and lay their eggs on them in underground nests. Larger species (called “tarantula hawks”) attack tarantulas. Tarantula hawk is New Mexico’s state insect. It has a blue-black body and orange wings, mostly rimmed by black.



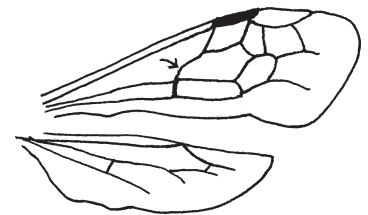
\**Vespid Wasp*. Common social or solitary wasps with long first discoidal cell in front wing. Pronotum not collarlike. Size usually around 10-20 mm. Often with pattern of brown and yellow or black and yellow or orange. Usually found in colonies made of paper (chewed wood or cellulose), or on flowers; occasionally seen floating on water. Young cared for by workers and queen in social species. Many solitary species make potlike mud nests. All feed their young on other insects or small spiders. Will attack in numbers if nest is disturbed.



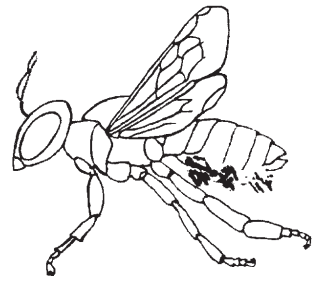
*Sphecid Wasp*. Common solitary wasps (often nest in groups, however) with short discoidal cell in forewings. Pronotum often distinctly collarlike. Often, but not always, thread-waisted. Usually 10-30 mm long. Color pattern varies; many species with patterns of black and yellow, gray and red, or brown and yellow or orange. Many species ground-nesters; some build mud nests. Sand wasps resemble stout vespids. All feed their young on other insects, which they paralyze with their sting. Often collected around flowers.



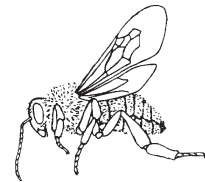
*Halictid Bee*. Mostly small bees, often metallic green or partly so. Most are dark colored. Some (sweat bees) attracted to perspiration; will sting. Often collected around flowers. Pollen feeders. Many species dig communal nests in the ground. Body length varies between species; smallest species are 4-5 mm, largest are about 15 mm.



*Leafcutting Bee.* Stout-bodied, medium-sized bees (10-20 mm usually) with two submarginal cells in forewings. Pollen carried on underside of abdomen. Abdominal segments usually distinctly outlined. Adults cut out rounded pieces from leaves of various plants, including roses, to line brood cells. Nest consists of linear series of larval cells in narrow cavities like nail or screw holes or drain holes in flower pots. Excellent pollinators of many plants not preferred by honey bees. Body length usually about 10 mm.



\**Honey Bee (including bumblebees but not carpenter bees).* Stout-bodied, medium to large bees with three submarginal cells in forewings. Pollen carried on hind legs. Honey bees and bumble bees social. Most species good pollinators; honey bees also produce honey and beeswax. Honey bees are brown and black. Bumblebees are very hairy; usually yellow and black, sometimes with red spots on the abdomen. Honey bees usually are about 8-10 mm long; carpenter and bumblebees reach 25-28 mm. Carpenter bees, which resemble bumblebees, actually belong to a different family. They can be differentiated from bumblebees because they only have one color (either all fuzzy brown or all shiny black) and by having apical spurs on the hind tibia (see p. 53). They nest in yucca stalks and other plant stems. Bumblebees nest underground.



Honey bee



Bumblebee

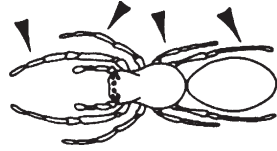
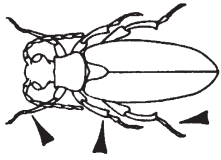


Carpenter bee

# Key to Common Groups of Arthropods

UNKNOWN SPECIMEN

Three or four pairs of walking legs



Five or more pairs of walking legs

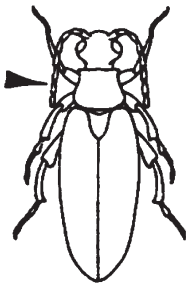
GO TO ARTHROPOD KEY 1, page 33



Antennae present; three pairs of legs

**Class: INSECTA**  
Insects

GO TO UNKNOWN  
INSECT KEY, page 34



Antennae absent; four pairs of legs

**Class: ARACHNIDA**

With constriction between cephalothorax and abdomen

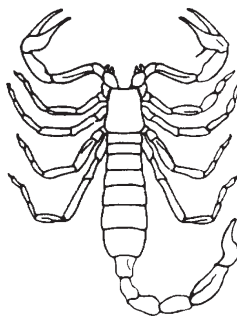
Order: Araneae, spiders



Without constriction between cephalothorax and abdomen

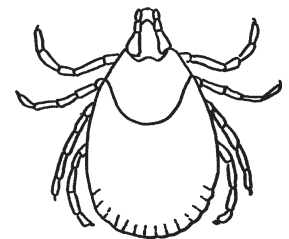
Abdomen with tail-like appendage; enlarged pincers or claws present near head

Order: Scorpiones  
scorpion



Tail-like appendage absent; pincers or claws usually absent near head

Order: Acari  
ticks, mites

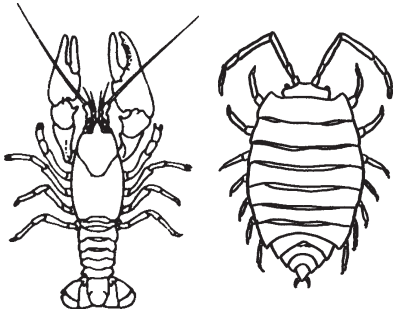


# Arthropod Key 1

FIVE OR MORE PAIRS OF WALKING LEGS

Five to seven pairs of legs

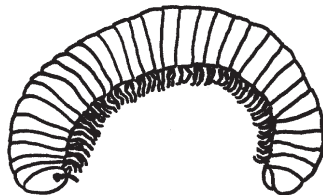
**Class: CRUSTACEA**  
crabs, lobsters, sowbus, etc.



10 or more pairs of legs

Two pairs of legs per body segment; body cylindrical

**Class: DIPLOPODA**  
millipedes



One pair of legs per body segment; body flat

**Class: CHILOPODA**  
centipedes



# Key to Selected Orders of Adult Insects

UNKNOWN INSECT

With one or two pairs of membranous (transparent) wings, or wings covered with scales or hairs

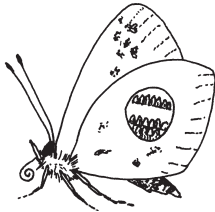
Forewings hardened or leathery, not membranous; wings may be absent

**GO TO KEY A, page 35**

Wings covered with minute scales, mouthparts coiled into a tube beneath the head (sometimes absent)

Wings not covered with scales, usually clear; mouthparts not coiled into a tube

**LEPIDOPTERA**  
butterfly, moth, skipper



With two pairs of wings

With one pair of wings, one pair of halteres

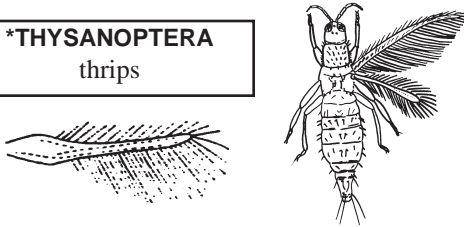
**DIPTERA**  
fly, mosquito



Wings long and narrow, fringed with long hairs; small insects less than 5 mm long

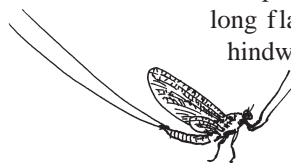
Wings not narrowed and fringed; length usually over 5 mm

**\*THYSANOPTERA**  
thrips



Posterior portion of abdomen with two or three long filaments about as long as body; hindwings smaller than forewings

**\*EPHEMEROPTERA**  
mayfly, fishfly



Abdomen with short filaments or absent; hindwings larger than forewings

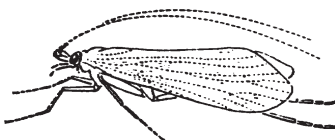
Forewings clearly longer and with greater area than hindwing

Forewings not clearly longer than hindwings, and with same or less area than hindwings

**GO TO KEY B, page 36**

Wings hairy, opaque; palps long; antennae as long as body or longer

**\*TRICHOPTERA**  
caddisfly



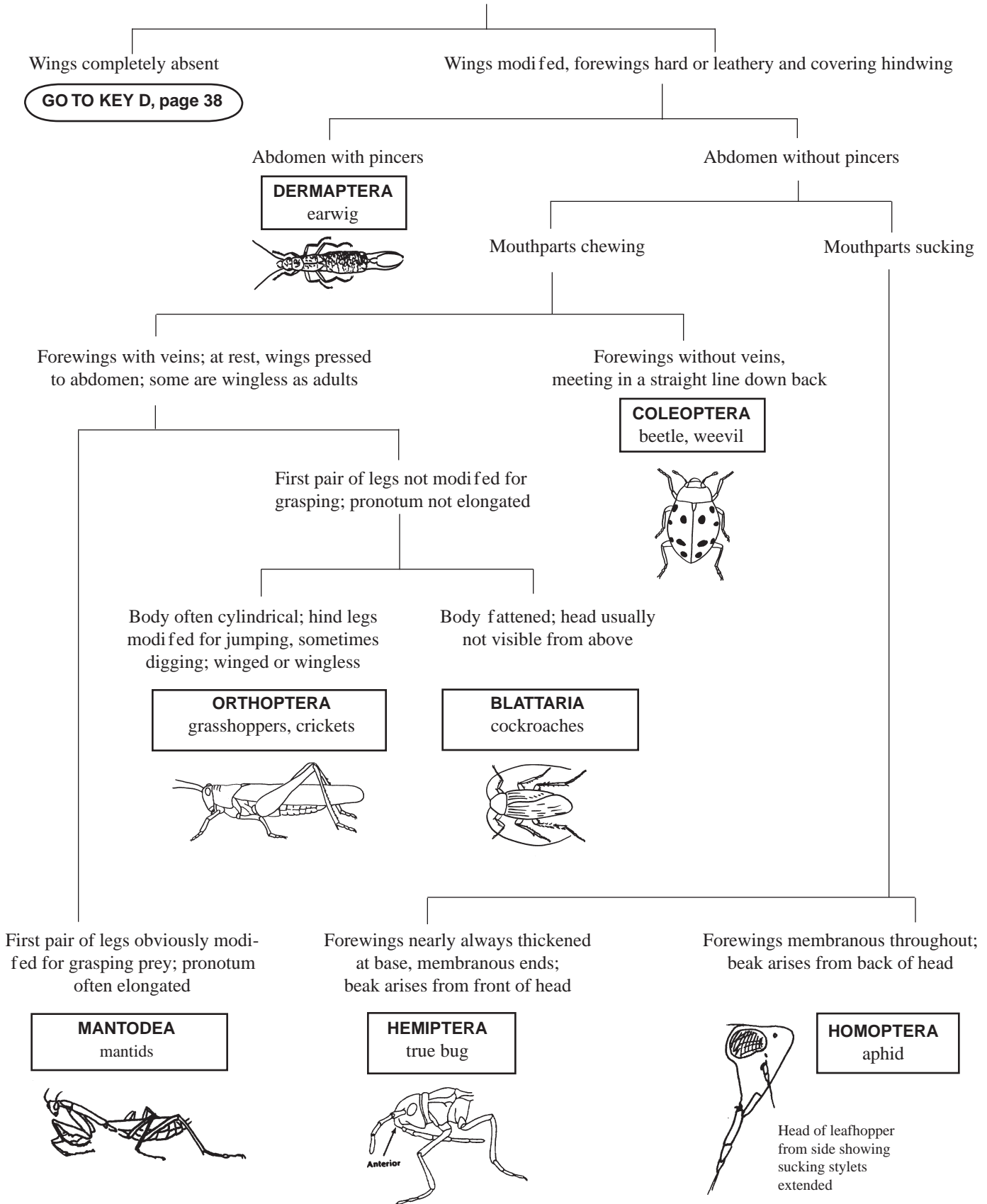
Wings transparent or translucent, not hairy; palps short or absent; antennae shorter than body

**GO TO KEY C, page 37**

\*Orders not included in "100 Common Insects of New Mexico."

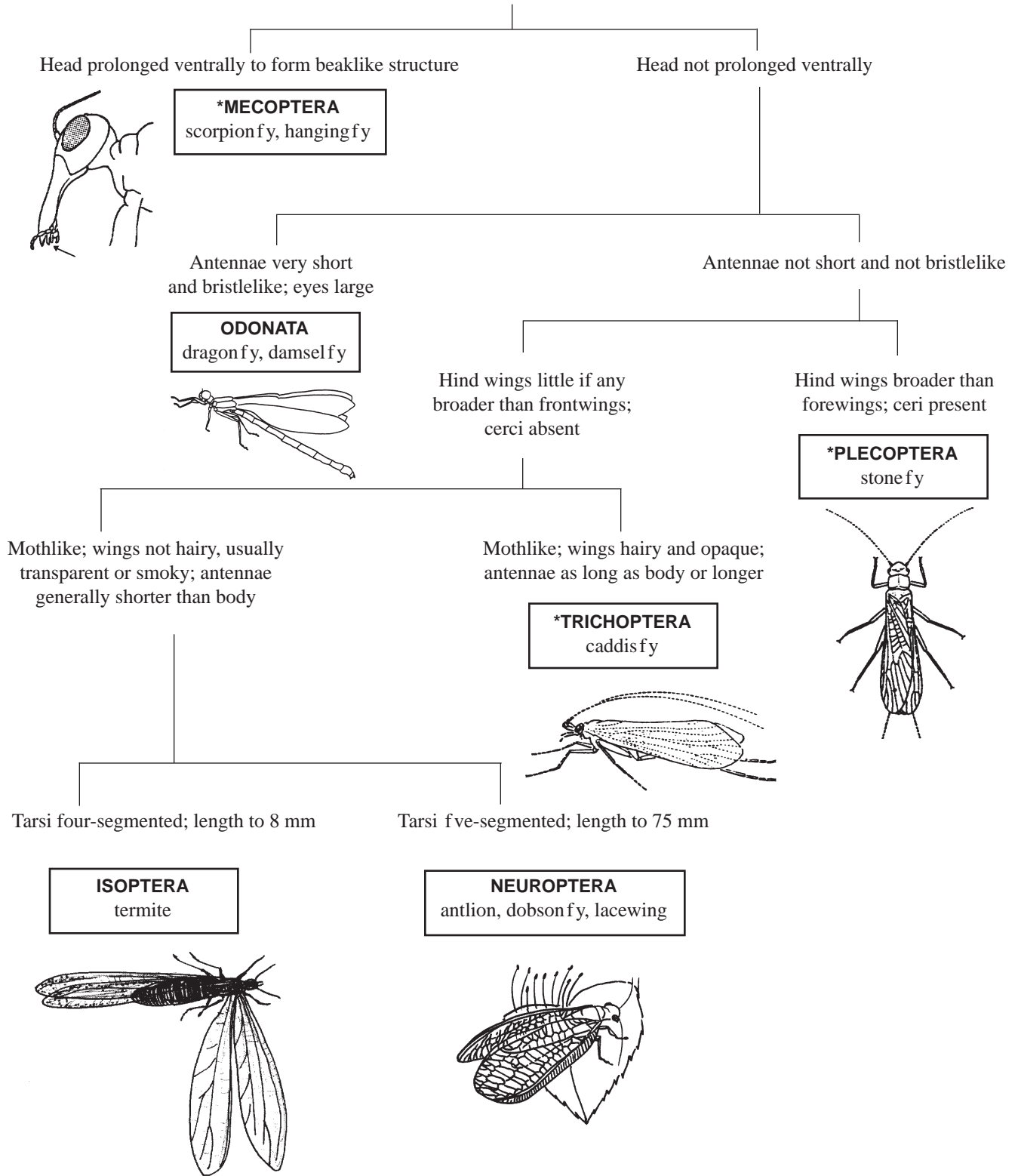
# Key A

FOREWINGS HARDENED OR LEATHERY, NOT MEMBRANOUS; WINGS MAY BE ABSENT



# Key B

FOREWINGS NOT, OR SLIGHTLY LONGER THAN HINDWINGS



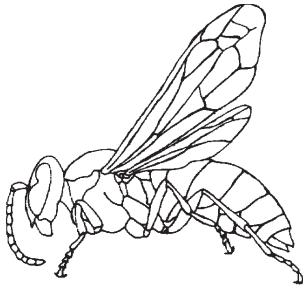
\*Orders not included in "100 Common Insects of New Mexico."

# Key C

WINGS TRANSPARENT OR TRANSLUCENT, NOT HAIRY

Tarsi five-segmented, usually wasplike or beelike

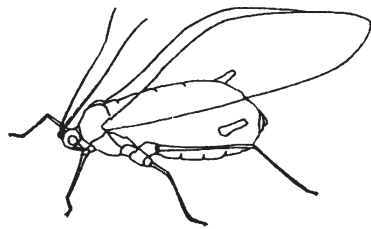
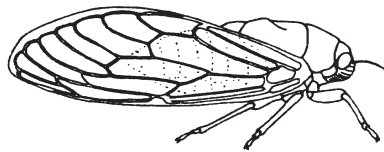
**HYMENOPTERA**  
bee, ant, wasp



Tarsi two- or three-segmented;  
not wasplike or beelike

Mouthparts sucking; beak rises at rear  
part of head; small to large insects

**HOMOPTERA**  
aphid, scale, hoppers



Mouthparts chewing; beak absent;  
length 7 mm or less

**\*PSOCOPTERA**  
barklice



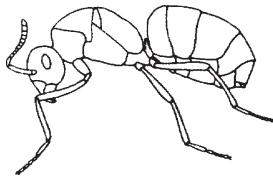
\*Orders not included in "100 Common Insects of New Mexico."

# Key D

WINGS COMPLETELY ABSENT

Narrow-waisted, antlike

**HYMENOPTERA**  
bee, ant, wasp

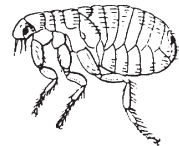


Not narrow-waisted or antlike

Body not fattened laterally;  
coxa not enlarged

Body fattened laterally (all body  
structures visible laterally); small insects;  
coxa enlarged, tarsi five-segmented

**SIPHONAPTERA**  
flea



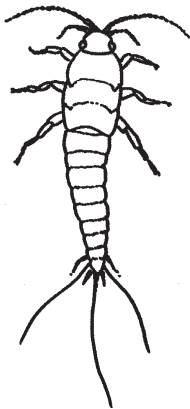
Body fattened dorso-ventrally

**GO TO KEY E, page 39**

Body not fattened  
dorso-ventrally or  
slightly fattened

Abdomen with threadlike tails

**THYSANURA**  
silverfish



Abdomen without threadlike tails

Abdomen with a forked jumping mechanism

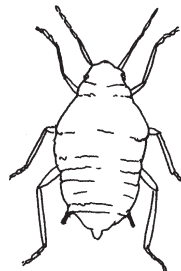
**\*COLLEMBOLA**  
springtails



Abdomen without a jumping mechanism

Abdomen with two short tubes  
(cornicles); small, plump insects

**HOMOPTERA**  
aphid



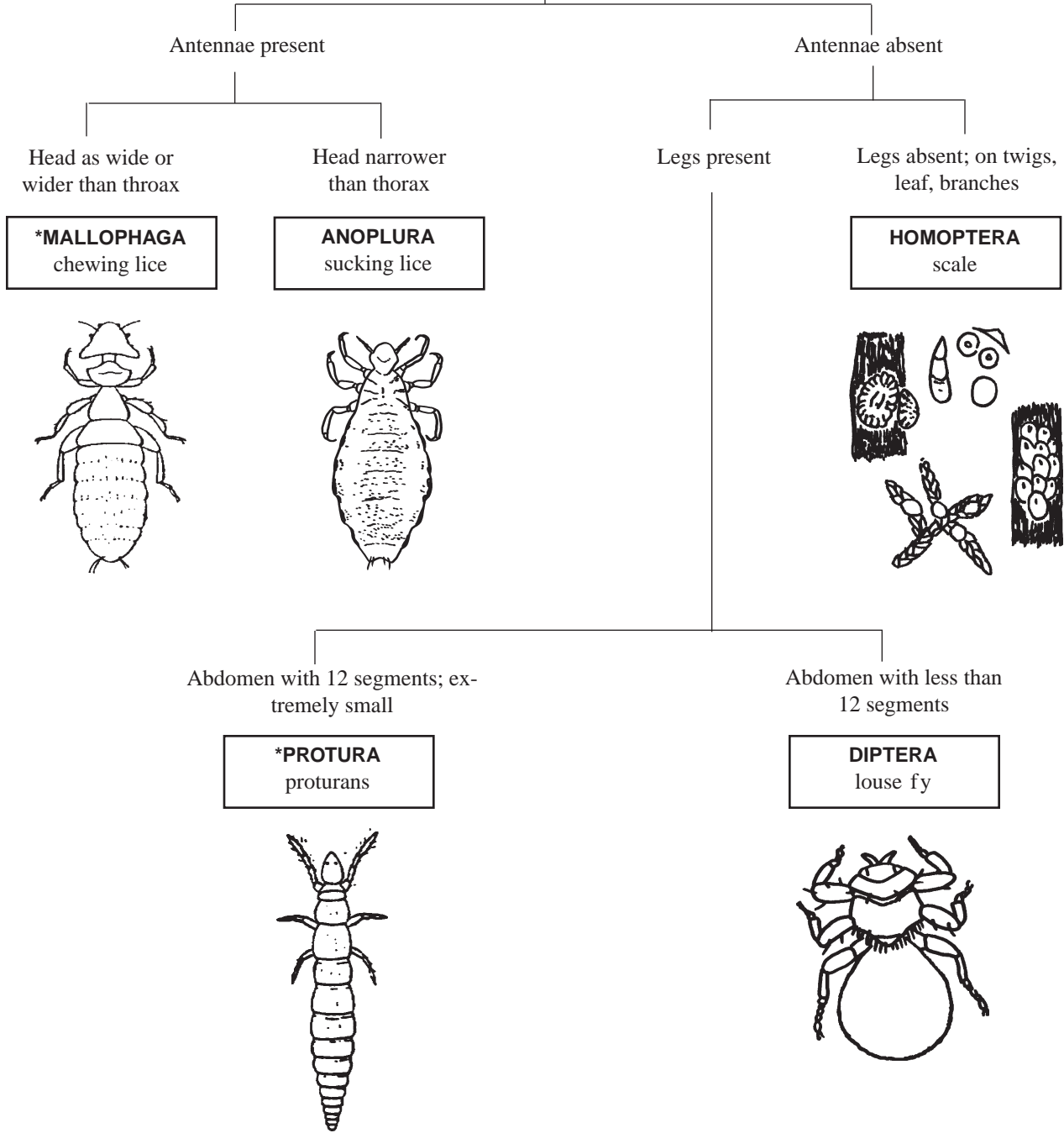
Abdomen without tubes

**GO TO KEY F, page 40**

\*Orders not included in "100 Common Insects of New Mexico."

# Key E

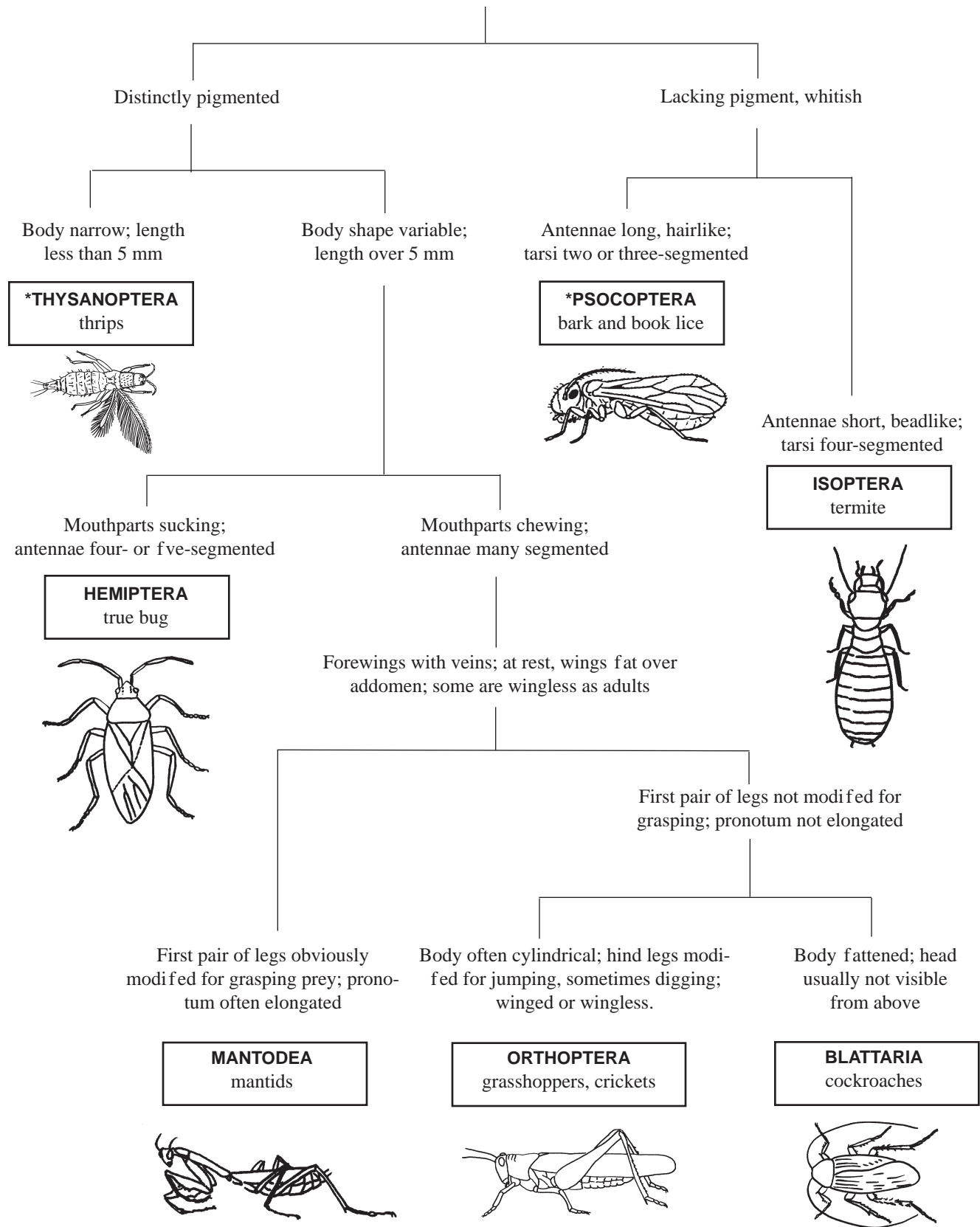
BODY FLATTENED DORSO-VENTRALLY



\*Orders not included in "100 Common Insects of New Mexico."

# Key F

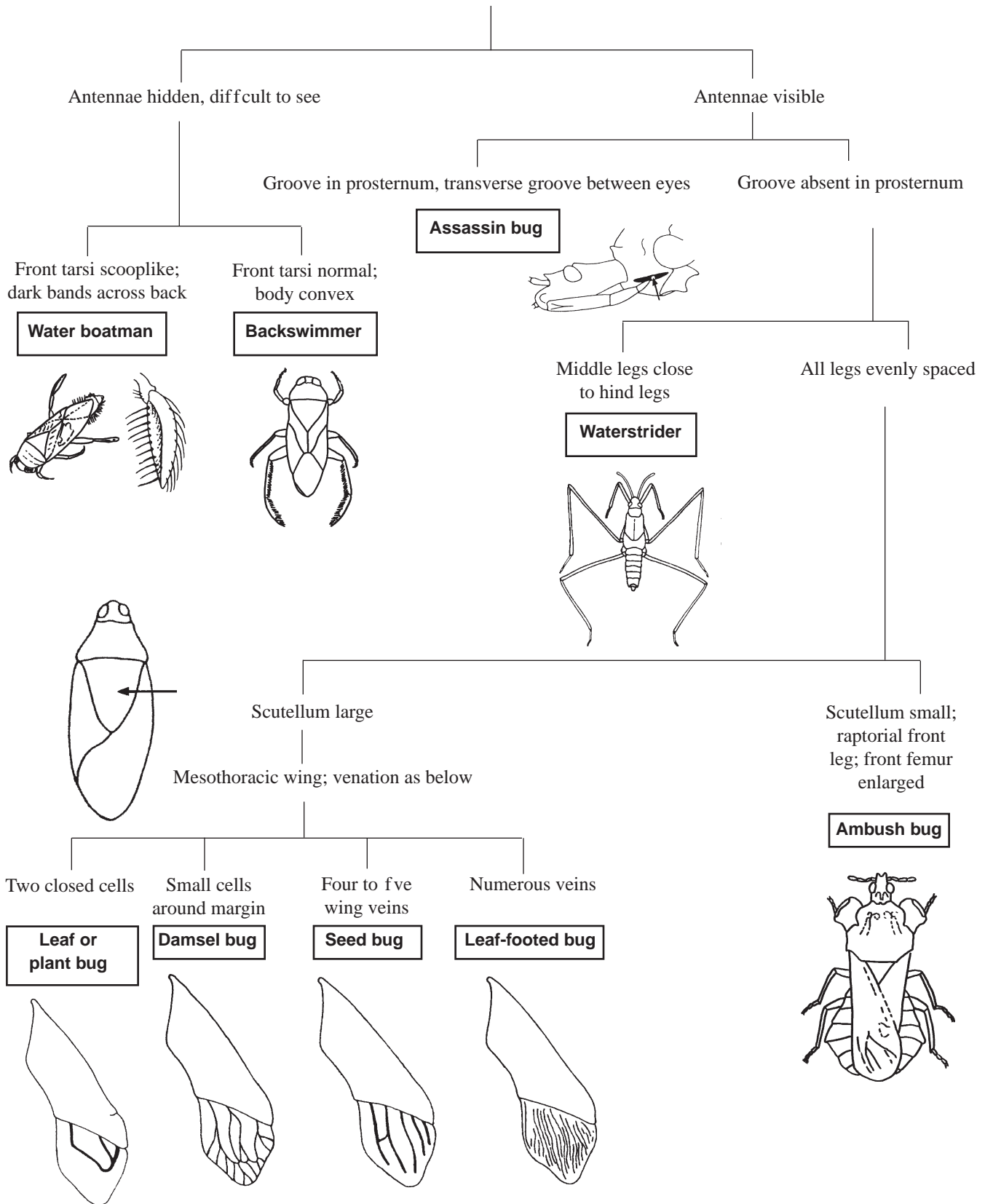
## ABDOMEN WITHOUT TUBES



\*Orders not included in "100 Common Insects of New Mexico."

# Key to Selected Hemiptera

## UNKNOWN HEMIPTERA

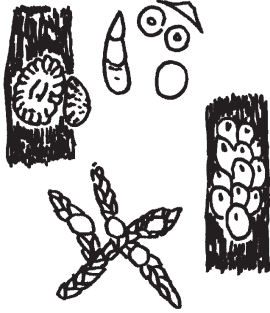


# Key to Selected Homoptera

UNKNOWN HOMOPTERAN

Not insectlike; on twigs, branches,  
and other plant material

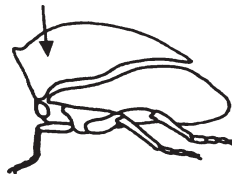
**Scale**



Body insectlike; distinct  
head, thorax, abdomen

Pronotum expanded  
over abdomen

**Treehopper**

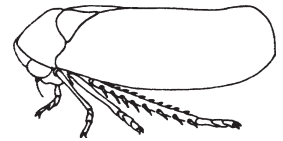


Pronotum normal,  
not expanded

Hind tibia without  
row of spines

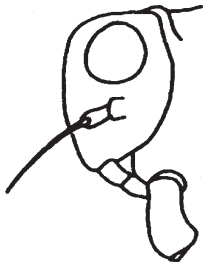
Hind tibia with  
row of spines

**Leafhopper**



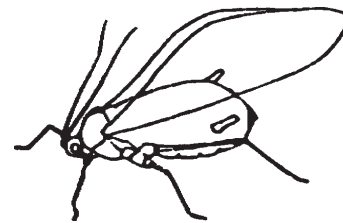
Antennae attached  
below compound eye

**Planthopper**



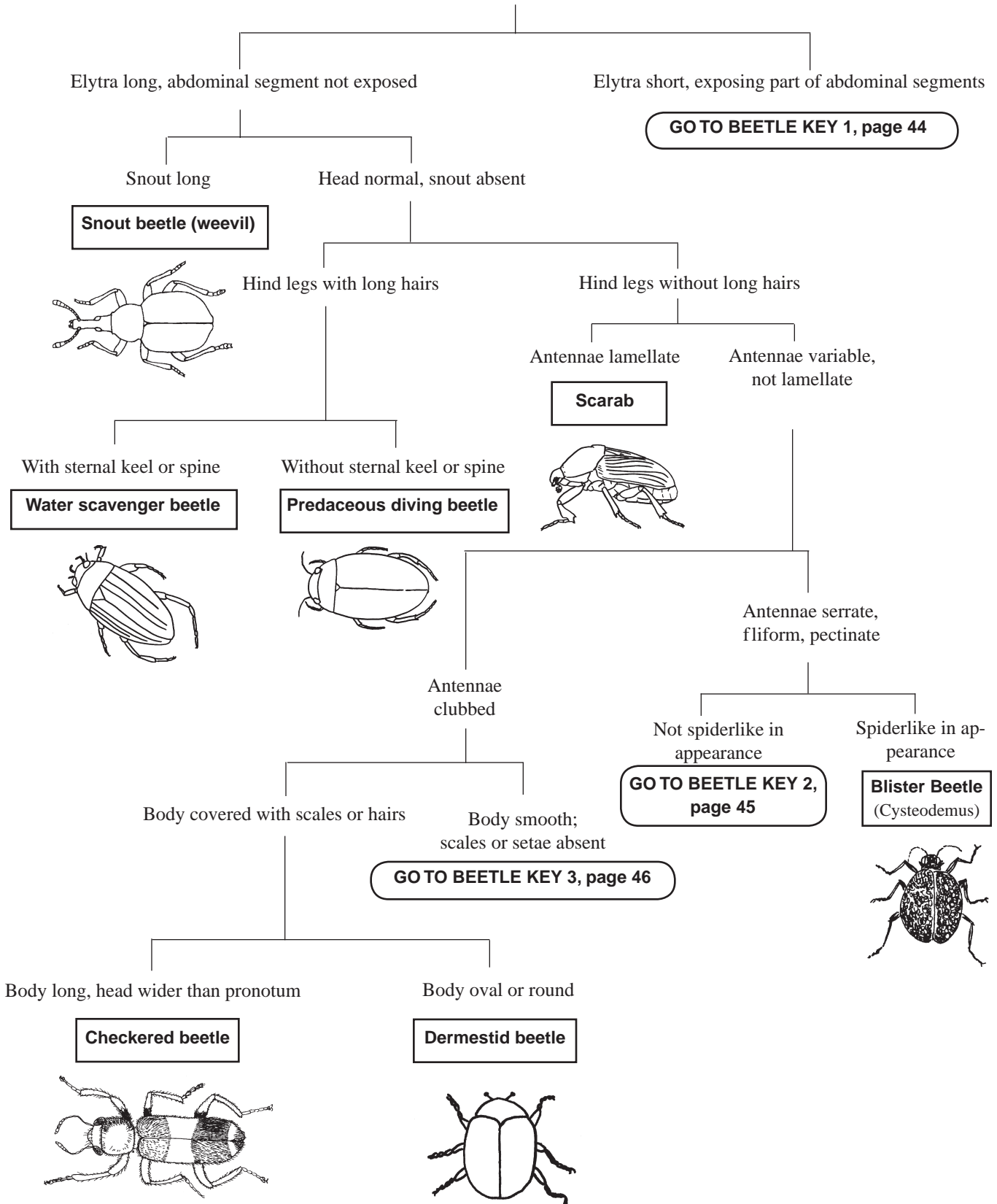
Antennae attached on front of head;  
abdomen usually with cornicles

**Aphid**



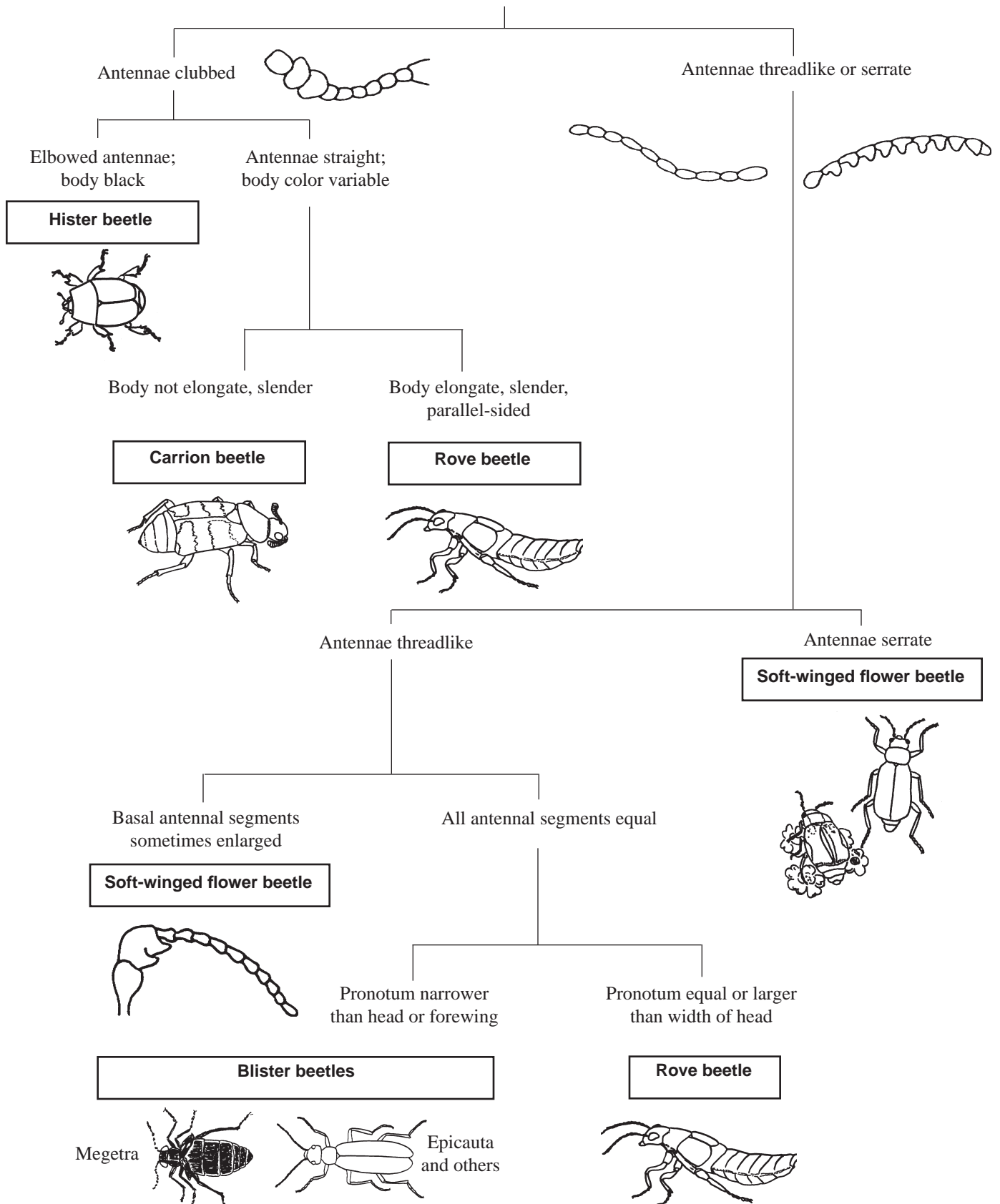
# Key to Selected Coleoptera

## UNKNOWN COLEOPTERA



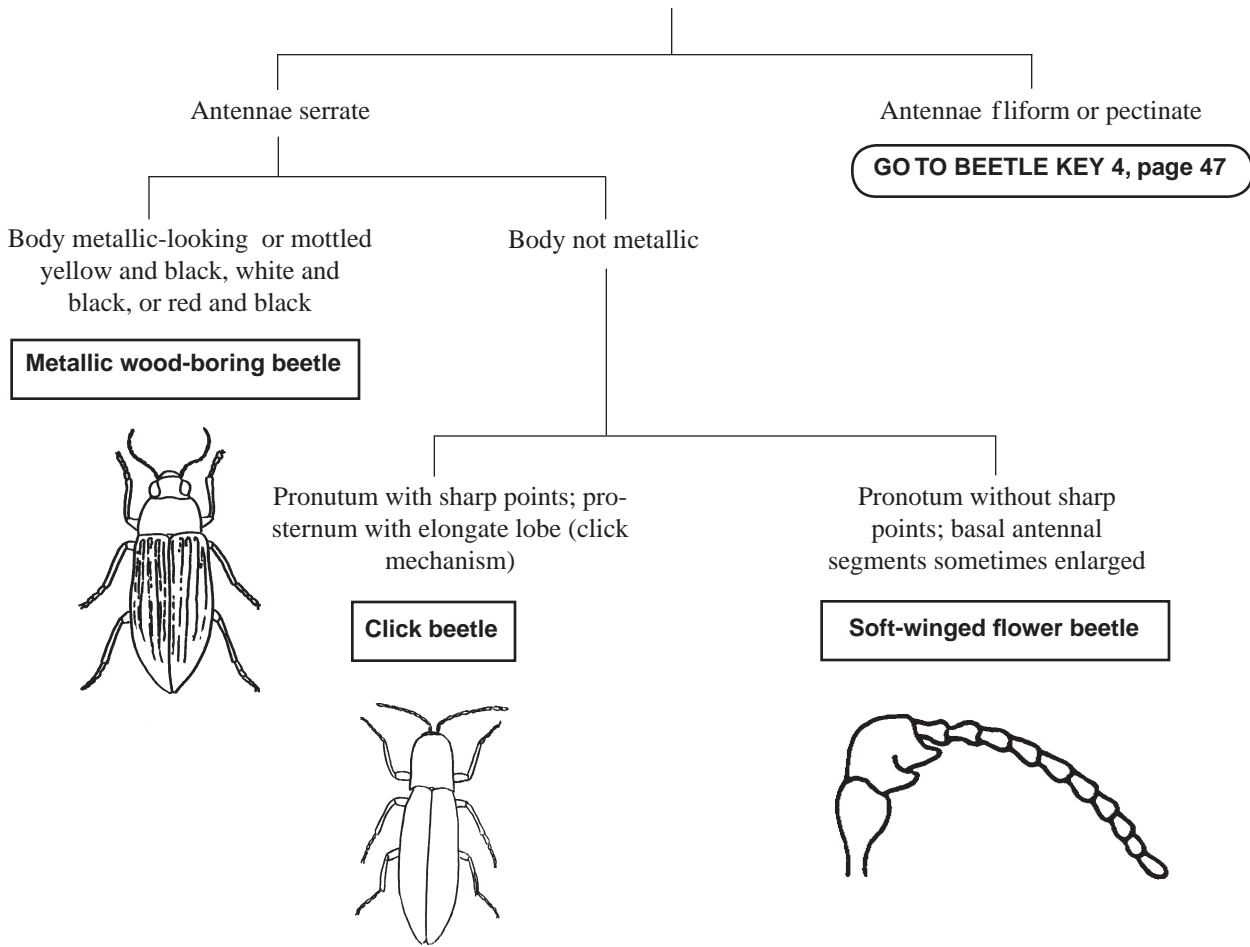
# Beetle Key 1

ELYTRA SHORT, NOT COVERING ENTIRE ABDOMEN



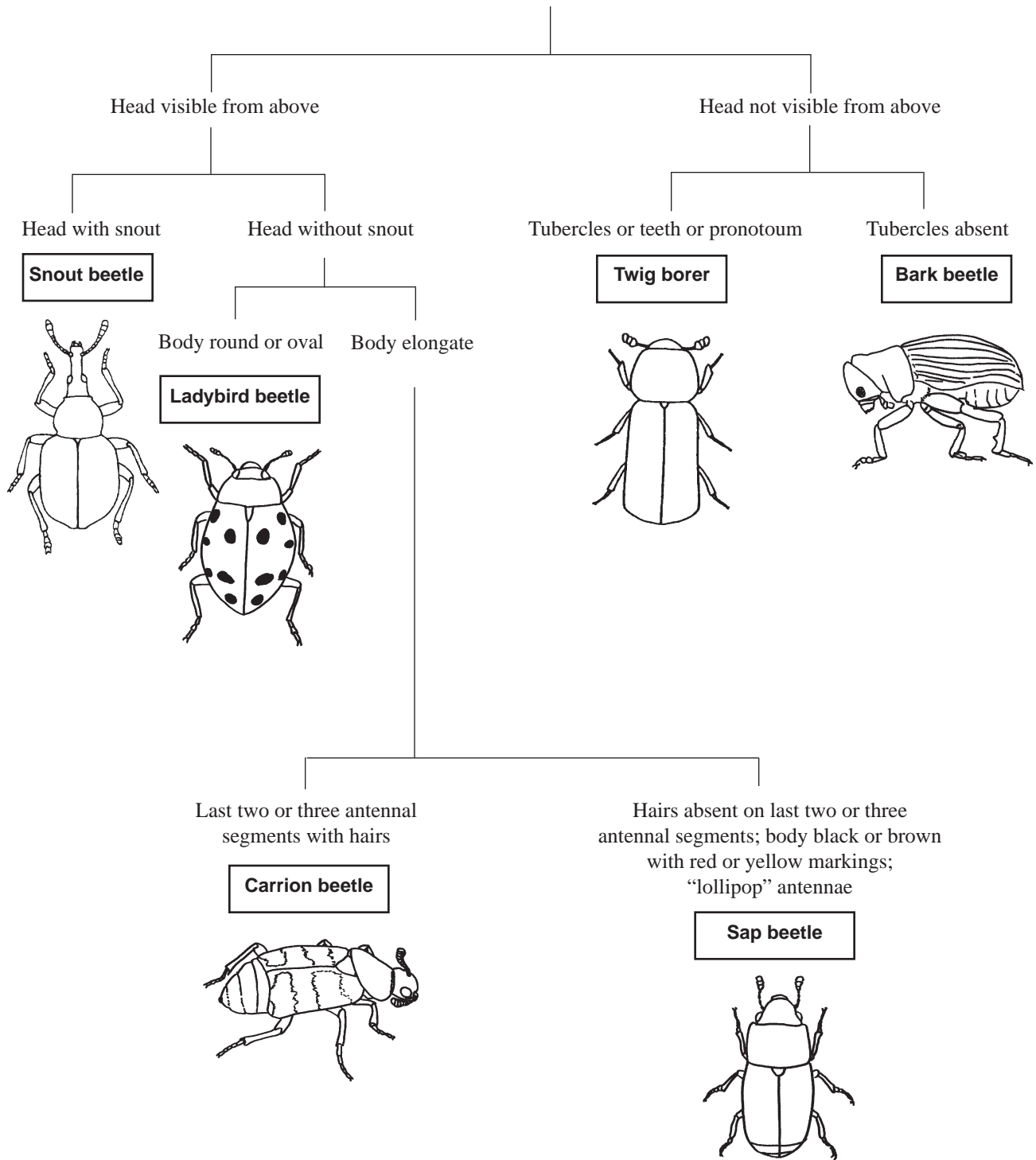
# Beetle Key 2

ANTENNAE SERRATE, FILIFORM, PECTINATE



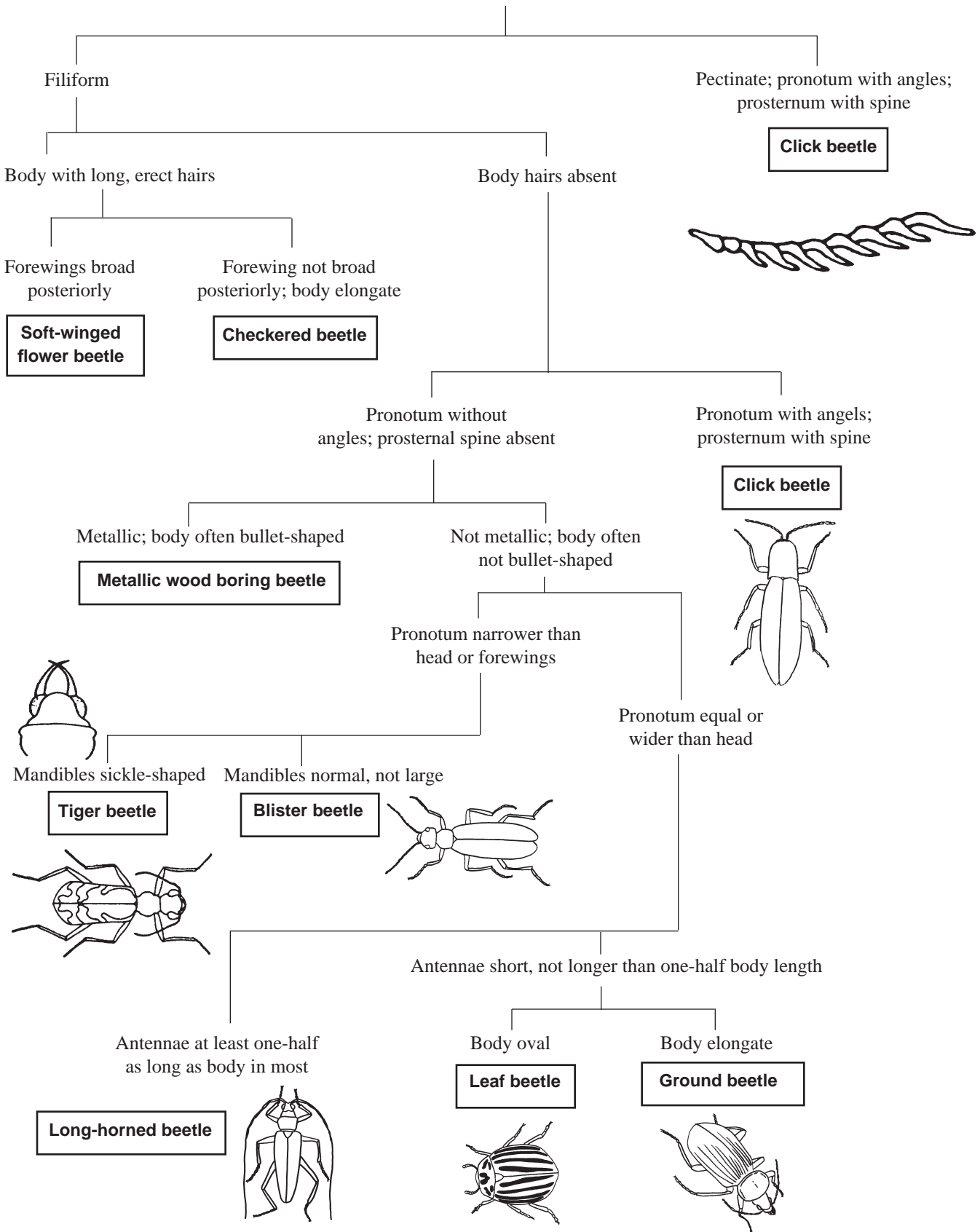
# Beetle Key 3

BODY SMOOTH, SCALES OR SETAE ABSENT



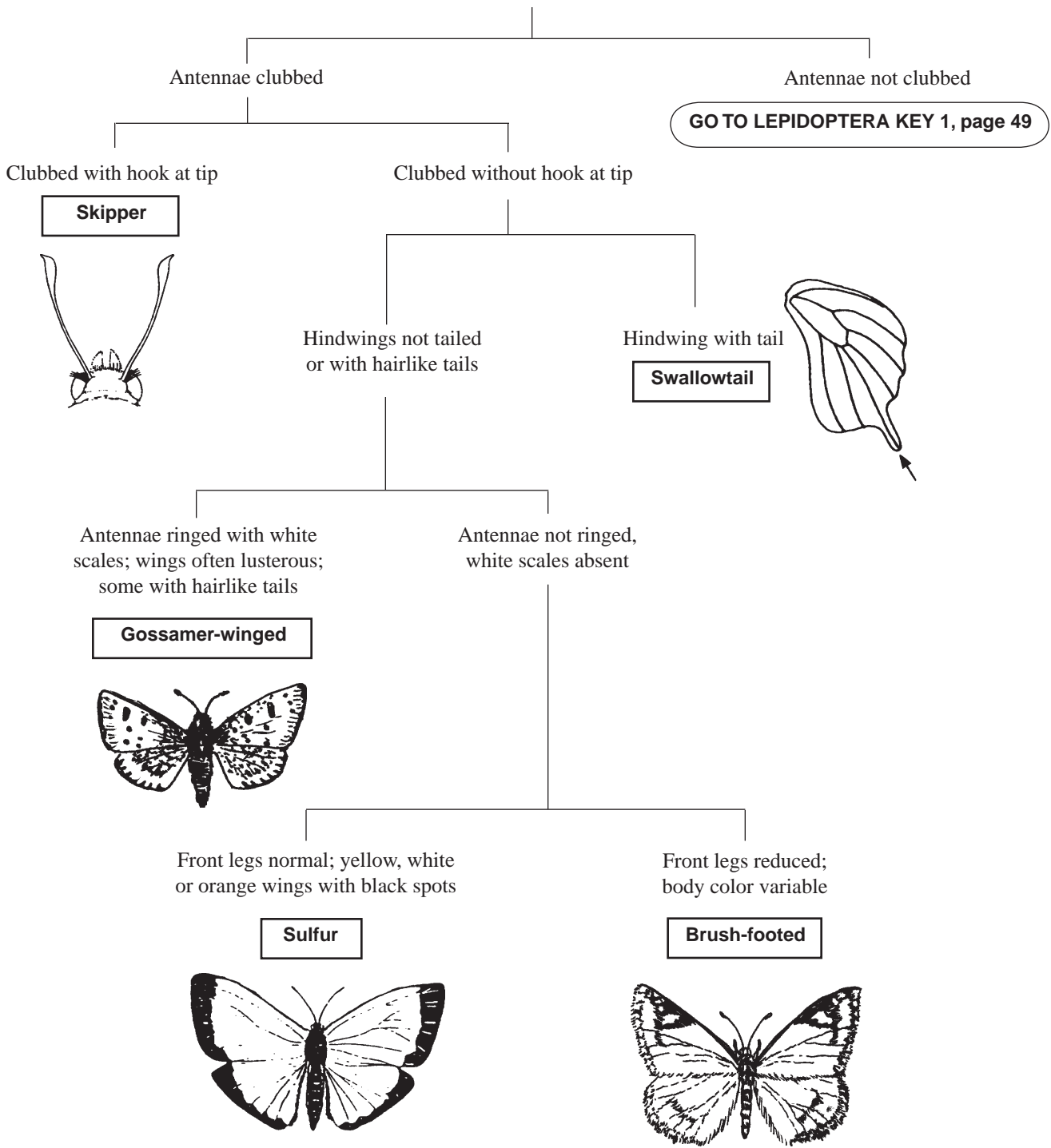
# Beetle Key 4

ANTENNAE FILIFORM OR PECTINATE



# Key to Selected Lepidoptera

## UNKNOWN LEPIDOPTERA

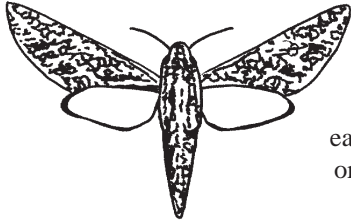


# Lepidoptera Key 1

ANTENNAE NOT CLUBBED, SIMPLE, SERRATE OR PECTINATE

Abdomen extends more than one-third of its length beyond the hindwing; body bullet-shaped, heavy

**Sphinx moth**



Abdomen not extending for more than one-third of its length beyond the abdomen

Antennae doubly bipectinate (featherlike); each wing often with a central eyespot, crescent or clear window; wingspan greater than 7.6 cm

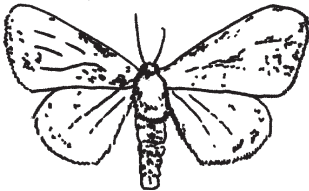
**Giant silkworm (male)**



Smaller species or if wingspan larger than 7.6 cm, usually without eyespots and always without pectinate antennae

Abdomen red, orange with black spots, blue in a few species; first pair of legs with orange or red scales

**Tiger moth**



Abdomen not red or orange

Snout projecting from head

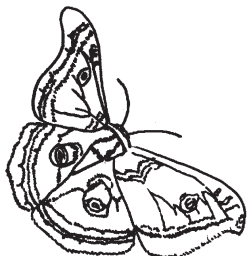
**Pyralid**



Without projecting snout

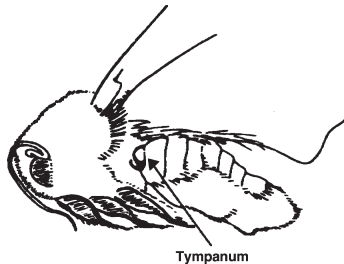
Thick-bodied; wingspan often larger than 7.6 cm; with eyespots or not

**Giant Silkworm Moth (female)**



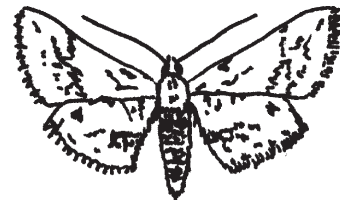
Thick bodied, fore- and hindwing with different patterns; ears on thorax

**Noctuid**



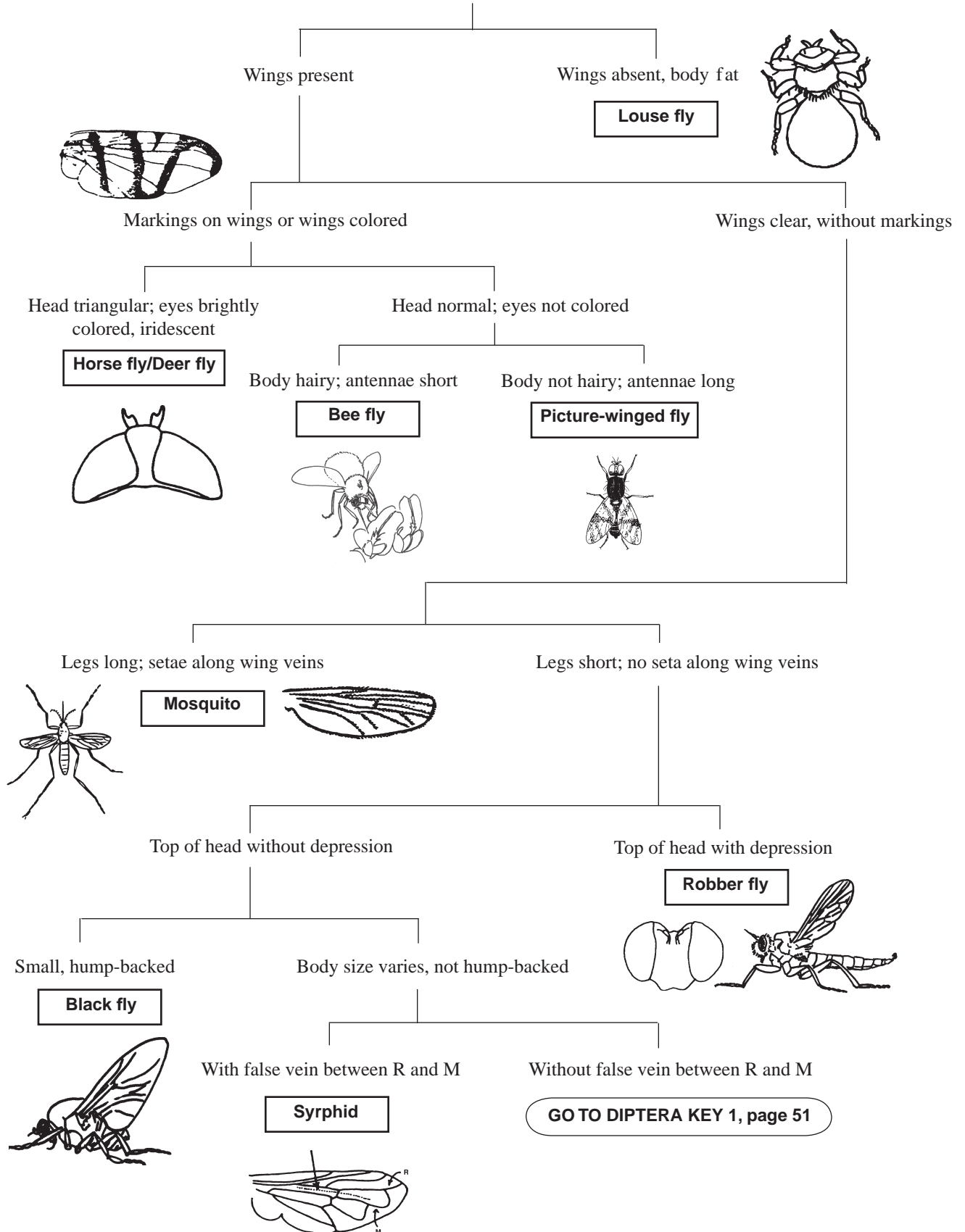
Thin bodied, fore- and hindwings usually with same pattern; ears absent on thorax

**Geometer**



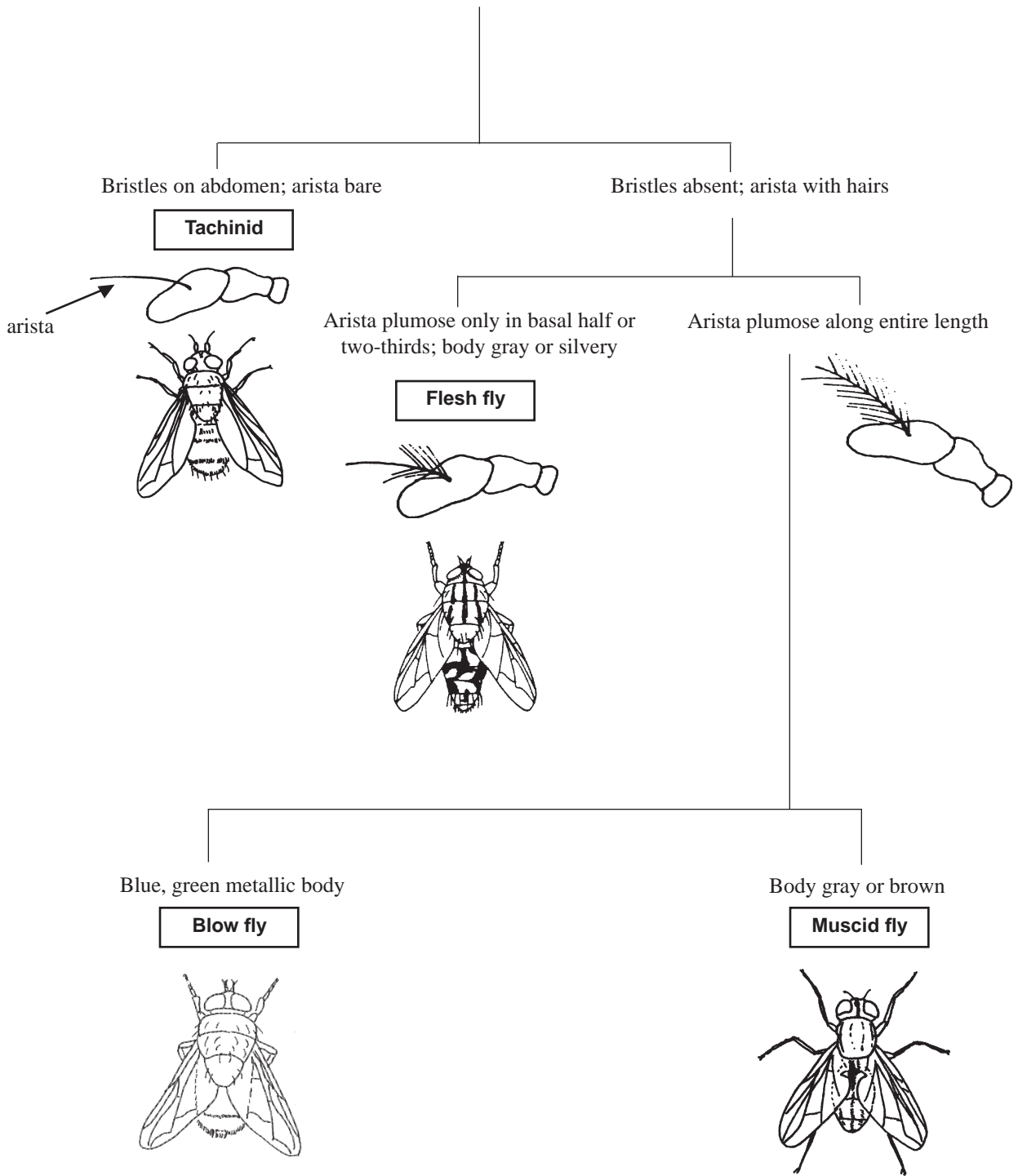
# Key to Selected Diptera

UNKNOWN DIPTERA



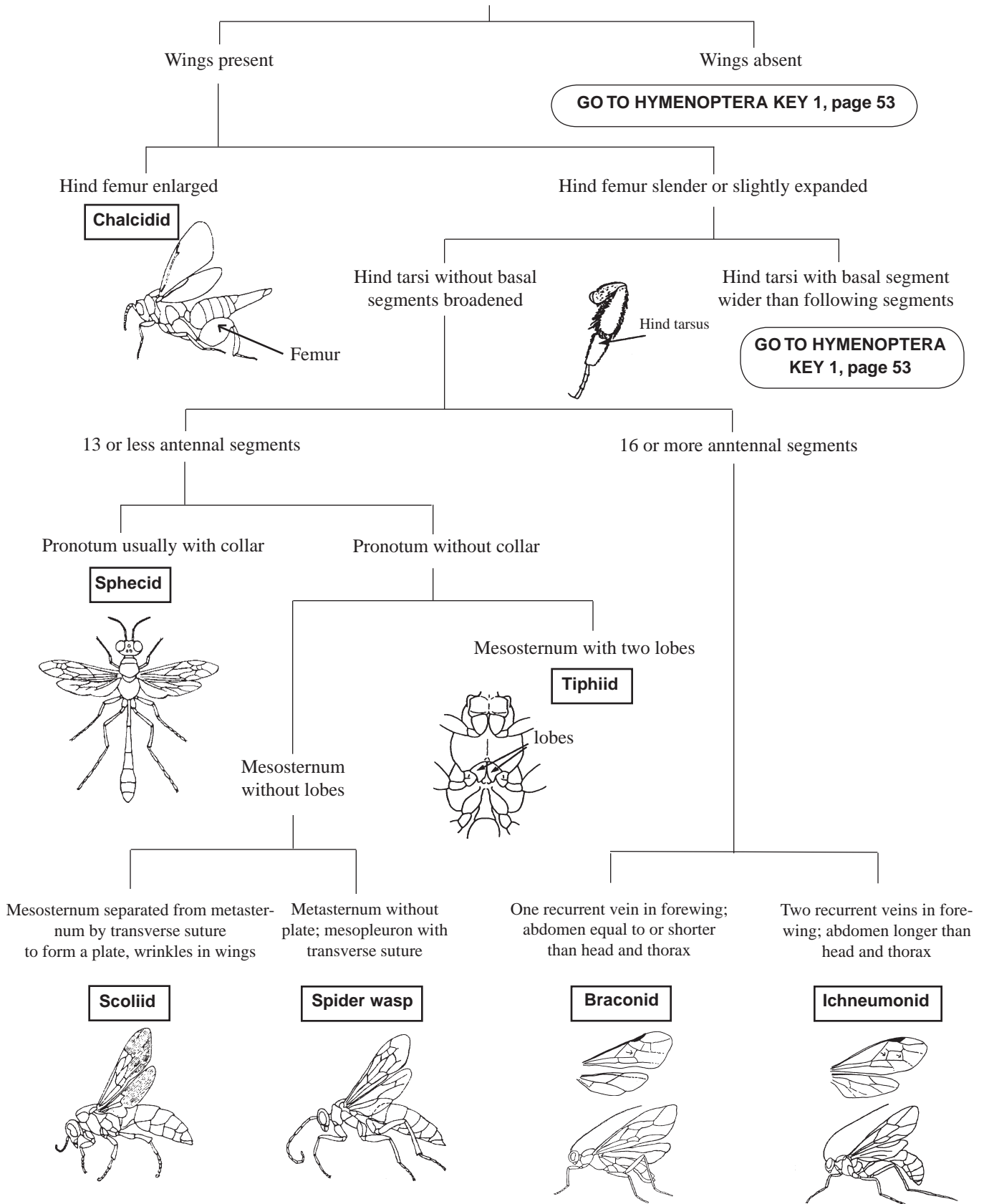
# Diptera 1

WITHOUT FALSE VEIN BETWEEN R AND M

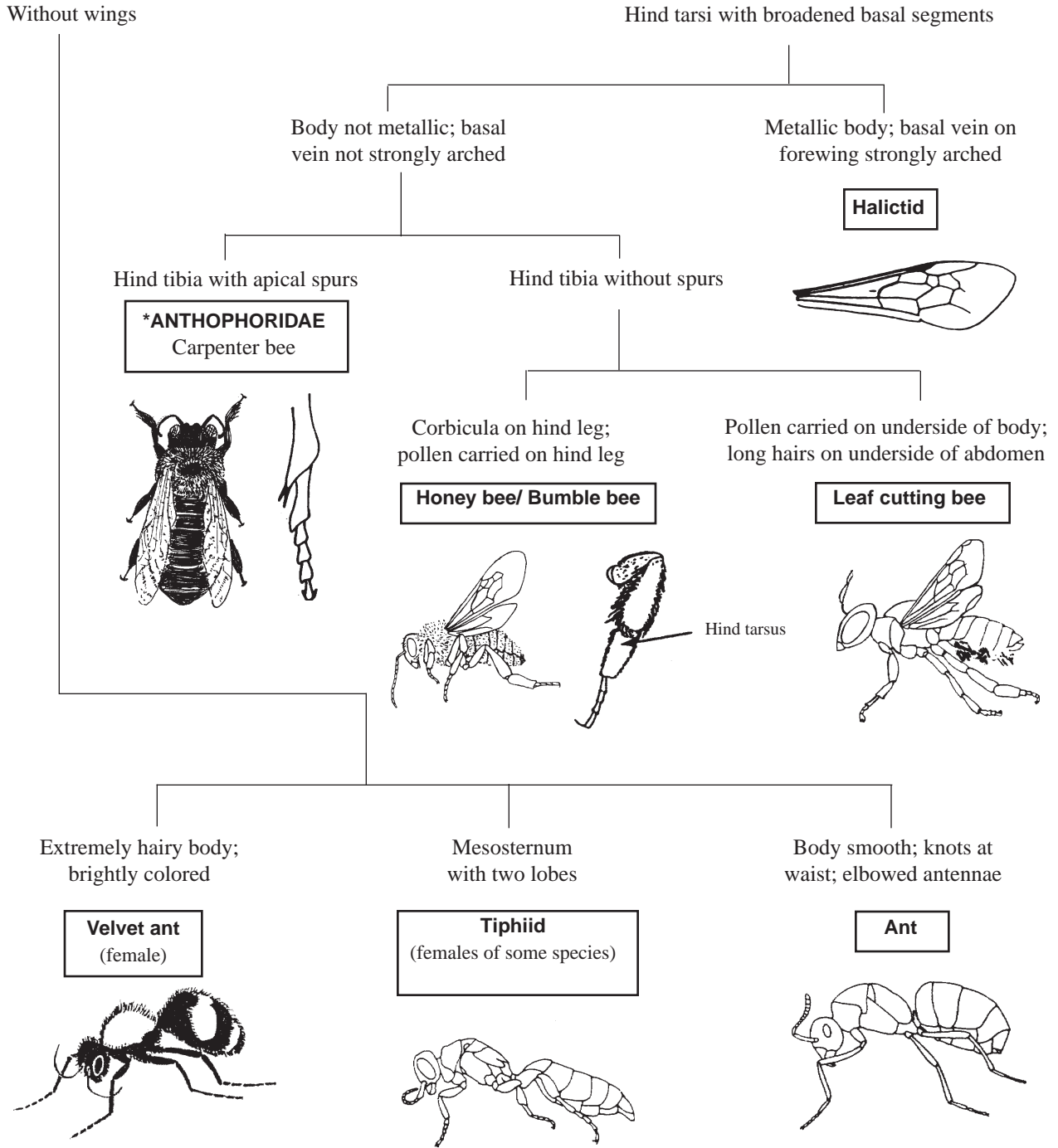


# Key to Selected Hymenoptera

## UNKNOWN HYMENOPTERA



# Hymenoptera Key 1



\*Orders not included in "100 Common Insects of New Mexico."



## GLOSSARY

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**Abdomen.** Posterior body part of insects . The abdomen, head and thorax comprise the three body regions of insects. Called opisthosoma in arachnids.

**Antenna** (pl. antennae). Paired, segmented, sensory appendages attached to heads of insects, sowbugs, centipedes and millipedes; absent in arachnids.

**Anterior.** Toward the front or head end.

**Aquatic.** Living in or associated with water.

**Basal.** The base or part of an appendage nearest the body.

**Beadlike Antenna.** Antenna composed of a string of nearly spherical segments. Characteristic of Isoptera or termites and certain other insects.

**Bulbous.** Protruding; rounded or swollen.

**Carnivorous.** Feeding on animals including other arthropods. See predaceous.

**Caterpillar.** The larva or immature stage of a moth or butterfly.

**Cephalothorax.** Combined head and thorax in arachnids. Also called the prosoma.

**Cercus** (pl. Cerci). Paired appendage at posterior end of abdomen in some insects.

**Chelicera** (pl. Chelicerae). Small, paired, pincerlike mouthparts of spiders, ticks, mites, scorpions and their relatives.

**Chewing Mouthparts.** Mouthparts adapted for grasping and breaking up food by a back and forth motion of the paired jaws. In some Hymenoptera, these also are modified for lapping nectar.

**Complete Metamorphosis.** Development of insects involving four major life stages: egg, larva, pupa and adult. The pupa is usually inactive and does not feed.

**Compound Eyes.** Eyes made up of numerous individual elements, represented externally by facets. Absent in arachnids.

**Concave.** Curved or rounded like the interior of a sphere.

**Convex.** Curved or rounded like the exterior of a sphere.

**Cornicle.** One of a pair of dorsal, tubular structures on an aphid's posterior abdomen.

**Coxa** (pl. Coxae). The basal segment of an arthropod's leg.

**Discoidal Cell.** A prominent cell, usually in the middle of an insect's wing. Useful for identifying some flies, bees or wasps.

**Diurnal.** Active during the day.

**Dorsal.** Of or belonging to the upper surface.

**Dorsoventrally Flattened.** Compressed between the upper and lower surfaces.

**Ectoparasite.** Parasite that lives on the outside of its host.

**Elytron** (pl. Elytra). A thickened, leathery or horny forewing, especially in the Coleoptera.

**Endoparasite.** Parasite that lives inside its host.

**Femur** (pl. Femora). The third leg segment in insects, between the trochanter and the tibia. In arachnids the femur is between the trochanter and patella.

**Filamentous.** Threadlike, as in antennae

**Forceps.** Hooklike or pincerlike projections on the end of the abdomen. Characteristic of earwigs

**Haltere** (pl. Halteres). Small knoblike structure, which represents the reduced second pair of wings in adult Diptera. Balancing organs for flies.

**Head.** First division in an insect's body. United with thorax in arachnids (see Cephalothorax, Prosoma).

**Hemelytron** (pl. Hemelytra). The "half-wing" (forewing) of the Hemiptera. Typically the half of the wing attached to the body is opaque and somewhat thickened, while the ends are more membranous.

**Lamellate.** Composed of sheets or leaves. See illustration of antenna types under description of Coleoptera.

**Larva** (pl. Larvae). General term for an immature stage of an insect with complete metamorphosis. Now often used for all immature insects. Also applied to six-legged stage in mites and ticks.

**Lateral.** Toward the side.

**Mandibles.** Jawlike structures of insects and related arthropods, except arachnids. The latter have jointed (two-segmented) structures called chelicerae.

**Mesopleuron.** The side (lateral surface) of the mesothorax.

**Mesosternum.** The underside (or breast) of the mesothorax.

**Mesothorax.** The second of the three thoracic segments; preceded by the prothorax and followed by the metathorax. Meso and metathorax are segments that have wings (if present) attached.

**Metathorax.** The last of the three thoracic segments; preceded by the mesothorax and followed by the abdomen.

**Metamorphosis.** The series of changes through which an insect or other arthropod follows in its growth from egg through the increasingly larger and more complex immature stages to adulthood. See complete metamorphosis, simple metamorphosis and no metamorphosis.

**Midline.** An imaginary line drawn through the center of an organism from the head to the tail.

**Mite.** Member of a large and diverse group of usually small to microscopic organisms belonging to the Class Arachnida and the Order Acari. Most have eight legs, first stage of larvae has six legs, the two body regions united into one pill-like body, an unsegmented abdomen and no antennae. No metamorphosis.

**Naiad.** Aquatic immature of insects with simple metamorphosis (dragon flies, damselflies).

**No Metamorphosis.** Organism hatches from egg, proceeds to molt through similar but larger stages to wingless adult.

**Nocturnal.** Active at night.

**Nymph.** Immature stage of insects with simple metamorphosis. Also applied to specific immature stages in the development of mites and ticks.

**Ocellus** (pl. Ocelli). Simple eye of insects or other arthropods.

**Omnivorous.** Feeding on a variety of plant and animal matter.

**Opisthosoma.** "Abdomen" of arachnids.

**Ovipositor.** The egg-laying apparatus of female insects, often tubular or saberlike

**Palp** (pl. Palpi). Segmented appendage near the mouth.

**Parasite.** An animal that lives on (ectoparasite) or inside (endoparasite) another animal (host) and feeds on its tissue, especially blood. A true parasite does not directly kill its host ( flea or mosquito). See Parasitoid.

**Parasitoid.** An animal that lives on or inside another animal and eventually kills its host. Certain Hymenoptera and some Diptera fit the category, because they attack and use other insects as food and hosts for larvae.

**Pectinate.** Comblike. See illustrations of antennae under the discussion on Coleoptera.

**Pedipalp** (pl. Pedipalpi). The second pair (after chelicerae) of appendages in the Arachnida. Leglike in spiders, but modified in other arachnid orders as grasping organs or used like antennae.

**Phytophagous.** Feeding on fresh or living plant matter.

**Picture-Wing.** Wings of some flies that have spots or blotches.

**Point:** An elongated triangular piece of cardstock paper that may be used to dry mount tiny insects. The insect pin is inserted in the narrow base of the triangle. The slender point of the triangle is dabbed with glue, and the insect is usually glued on the right side of the thorax.

**Pitfall Trap.** A collecting device for insects that run over the ground. Made by digging a small, steep-sided hole at least 6-8 inches deep and lining it snugly with an open can or jar. Bait and preservative fluids in the can or jar are optional, depending upon the types of insects to be trapped.

**Postscutellum.** In Diptera, this is the projection under and behind the scutellum on the posterior dorsal thorax. Especially important for the identification of tachinid flies.

**Predaceous.** Killing and feeding on other animals. See carnivorous.

**Proboscis.** A mouth structure that is extendible.

**Pronotum.** The dorsal or top surface of the first thoracic segment.

**Prosoma.** The united head and thorax of arachnids. See Cephalothorax.

**Prothorax.** Anterior of the three parts of the thorax in insects. Often expanded and may cover much of dorsal surface. Collarlike in sphecid wasps.

**Raptorial.** Suitable for grasping prey (the grasping forelegs of mantids).

**Recurrent Vein.** One of two transverse veins in the forewings of some Hymenoptera.

**Reproductive.** The reproducing form (male or female) of the social insects (termites, ants, and some bees) as opposed to sterile workers.

**Scavenger.** Feeds on decaying plant or animal matter.

**Scutellum.** Often triangular posterior plate of the thorax. Especially important for identifying Hemiptera.

**Serrate.** With wavy teeth, as the edge of a knife. Refers to the form of an antenna. See the illustrations of antennae under the discussion on Coleoptera.

**Simple Metamorphosis (= incomplete metamorphosis in some texts).** Development in which the immature stages look much like the adult, but lack wings and reproductive structures. In some cases, the immature stages live in a totally different habitat and feed on different things than the adult (dragon flies), or they may feed on the same foods and live in the same habitat as the adult (grasshoppers).

**Soldier.** A highly modified worker of the ants or termites that defends the nest. In ants, all soldiers are sterile females; in termites, soldiers may be sterile males or females.

**Spinnerets.** Silk spinning organs on posterior opisthosoma or abdomen of spiders.

**Spurious Vein.** Veinlike thickening of the wing between two true veins. Used to identify syrphid flies.

**Sterile.** Not capable of reproduction, as in the female workers and soldiers in ant colonies.

**Submarginal Area.** The part of the surface just within the margin.

**Sucking Mouthparts.** Modified mouthparts used to suck up liquid food. These include the strawlike mouthparts of the Lepidoptera; the piercing-sucking mouthparts of Hemiptera, Homoptera, Siphonaptera and most Diptera; and the sponging mouthparts of muscoid and some other flies.

**Symbiotic.** Separate species living together in a more or less intimate association. This relationship often benefits both, as in termites and their protozoans.

**Tarsal Formula.** Group of numbers (5-5-4 or 5-5-5) showing the number of tarsal segments on each of the legs in order from first to third legs.

**Tarsus.** (pl. Tarsi). Leg segment beyond the tibia, consisting of one or more subdivisions (segments); and usually a pair of claws.

**Thorax.** The second of the three main subdivisions of the insect body. Appendages include walking legs and usually wings in adults.

**Tibia** (pl. Tibiae). Fourth segment of insect leg, after femur. Fifth segment in arachnids after patella.

**Trochanter.** Second segment of the insect leg between the coxa and the femur.

**Worker.** A sterile adult insect that serves to help rear the young produced by a queen in social insects; also may forage for food, defend the colony, feed other colony members, and move debris. Some termite workers can reproduce if necessary. See also soldier.

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