

CMG GardenNotes #315

Key 2 – Key to Insect Orders

Notes:

- This key covers insect orders commonly and occasionally observed. However, it does not include all orders. Key #1 is similar, but easier, being limited to insect orders commonly associated with gardening and landscape maintenance.
 - This simplified key covers insects showing common characteristics for the order. Species with atypical appearances will not work with this simplified key.
-

1a. Wings present. — go to 2

1b. Wings absent. — go to 9

(1a) 2a. One pair of membranous wings. The insect may look like a fly or bee. (Look carefully for a second pair of wings hidden beneath the front pair.) — ***Diptera*** (**flies**)



2b. Two pair of wings present. — go to 3

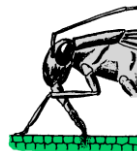
(2b) 3a. Front and hind wings not similar in texture. Front wings parchment-like, shell-like or leathery or thickened. Hind wings more delicate or membranous. — go to 4

3b. Front and hind wings similar in texture. Either membranous, transparent or covered with powdery-like scales. — go to 7

(3a) 4a. Chewing mouthparts. — go to 5

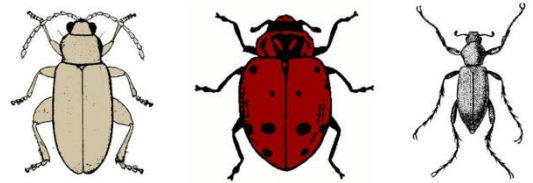


4b. Piercing-sucking mouthparts. — go to 6

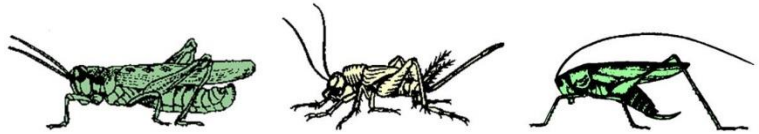


(4a)

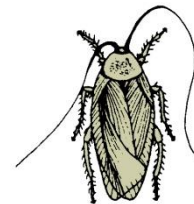
- 5a. Leathery front wings, without veins, lay over body in a shell-like fashion, making a straight line between wings. Hind wings membranous. No cerci (tail-like appendages). — ***Coleoptera*** (beetle)



- 5b. Front wings more or less parchment like with a network of veins. Hinds wings membranous, usually broad with folds like a fan. Hind leg enlarged for jumping — ***Orthoptera*** (grasshoppers, crickets, katydids)



- 5c. Front wings more or less parchment like with a network of veins. Flattened bodies, thread-like antennae — ***Blattaria*** (cockroach)

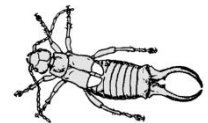


- 5d. Front wings more or less parchment like with a network of veins. Front legs modified to catch and hold prey. — ***Mantodea*** (mantids)



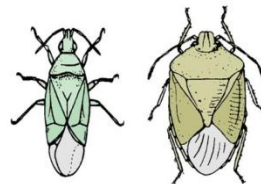
5e.

- Front wings short and leathery. Hind wings membranous. Elongated flattened body with distinct forceps-like pinchers (cerci). — ***Dermaptera*** (earwigs)



(4b)

- 6a. Front wings thickened at base but membranous and overlapping at tips, so that the wings form a triangle pattern on the back. Beak-like mouthparts usually easily visible and appears to arise from front of head, ahead of eyes. — ***Hemiptera*** (true bugs), **suborder *Heteroptera***



[details page 313-7]

- 6b. Wings membranous folded tent-like at rest. Beak-like mouthparts not very visible and appear to arise from under the head or between the front pair of legs. — ***Hemiptera***, **suborder *Auchenorrhyncha* or *Sternorrhyncha*** (leafhoppers, treehoppers)

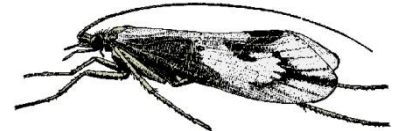
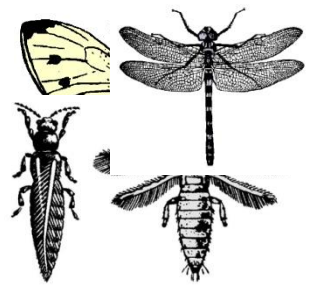


(3b) 7a. Wings membranous — go to 8

7b. Wings usually covered with powdery-like scales. Mouthparts in the form of a coiled up tube beneath the head. — *Lepidoptera* (butterflies, moths)

7c. Wings very narrow and fringed with hair. Tiny insect (less than 1/8 inch). Foot ending in balloon-like swelling. — *Thysanoptera* (thrips)

7d. Wings covered with fine hairs, held roof-like over body at rest. Looks like moth with hairy wings. Long antennae extended back over body. — *Trichoptera* (caddisfly)



(7a) 8a. Piercing-sucking mouthparts. Beak-like mouthparts not very visible and appear to arise from under the head or between the front pair of legs. Wings generally held roof-like over body when at rest. — *Hemiptera*, suborder *Auchenorrhyncha* or *Sternorrhyncha* (aphids, cicadas, leafhoppers, psyllids, treehoppers, whiteflies)



aphids



cicada

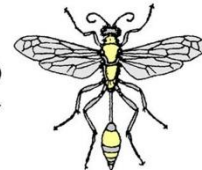


leafhopper



whitefly

8b. Front wing usually larger than hind wing. Wings may be connected. Chewing or chewing sucking mouthparts. Bee, wasp, hornet like. — *Hymenoptera* (bees, wasps, hornets, wings ants)



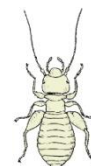
8c. Large wings in comparison to petite body. Wings usually with many veins and cross veins, held roof-like over body when at rest. Mouthparts chewing. No cerci (tail-like appendages). — *Neuroptera* (lacewing)



8d. Wings longer than body. Body whitish, looks like a fat ant without a slim waist. Straight and beaded antennae. — *Isoptera* (winged termite)



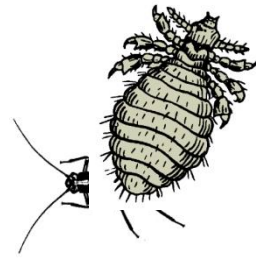
8e. Tiny (less than 1/8 inch). Wings held roof-like over body when at rest. Veins prominent. Hair-like antennae as long or longer than body. Whitish body. — *Psocoptera* (book lice)



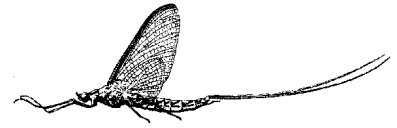
8f. Insect dominated by very large eyes. Wings elongated, highly veined. Slender, needle-like body. Chewing mouthparts used to capture and consume prey in flight. — *Odonata* (dragonflies and damselflies)

damselflies)

- 8g. Elongated wings fold flat over body when at rest. Long thread-like antennae. Two tail-like filaments. — **Plecoptera (stonefly)**



- 8h. Front wings large and triangular shaped. Hind wings small and rounded. Held vertical over body. Two-very long tail-like filaments. — **Ephemeroptera (Mayfly)**



-
- (1b) 9a. Piercing-sucking mouthparts. — go to 10



- 9b. Chewing mouthparts. — go to 11



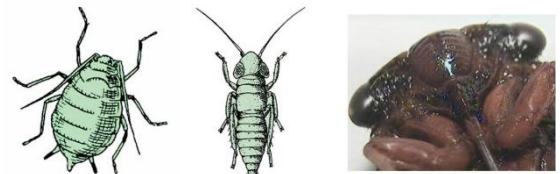
- 9c. Rasping-sucking mouthparts. Tiny (less than 1/8 inch), slender insects. Balloon-like swelling on end of foot. Often noticed by scarring and deformation of leaves and flowers where it feeds. — **Thysanoptera (thrips)**



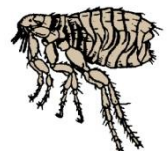
-
- (9a) 10a. Bug-like with jointed beak. Mouthparts usually easily visible and appear to arise from front of head, in front of eyes. — **Hemiptera (true bugs), suborder Heteroptera**



- 10b. Bug-like with jointed beak. Mouthparts not very visible and appear to arise from the area between the front pair of legs. — **Hemiptera, suborder Auchenorrhyncha or Sternorrhyncha (aphids, cicadas, leafhoppers, etc.)**

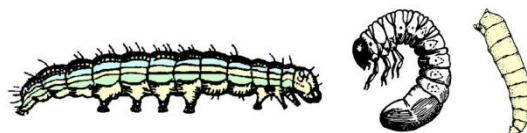


- 10c. Tiny, hard bodied, flattened sideways, covered with bristles that project backwards. Large hind legs designed for jumping, fast moving. — **Siphonaptera (fleas)**

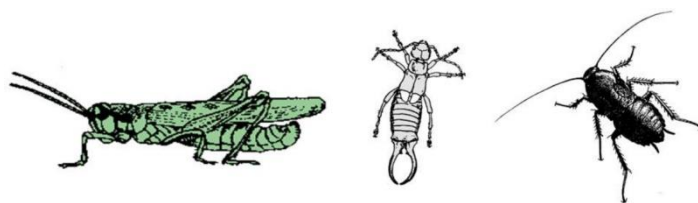


- 10d. Small, flattened parasites of animals and people. Forelegs with claw designed to grasp hair or feathers. Head narrower than thorax. — **Anoplura (sucking lice, including head lice and body lice)**

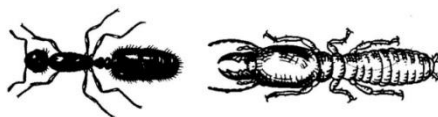
-
- (9b) 11a. Larva-like (caterpillar-like, grub-like, maggot-like).
— go to 12



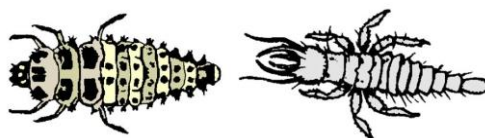
- 11b. Bug-like with tail-like features (cerci, filaments). — go to 15



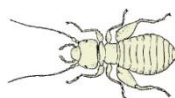
- 11c. Ant-like. — go to 16



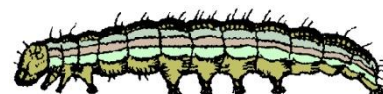
- 11d. Dragon-like. — go to 17



- 11e. Tiny, bug-like. — go to 18



-
- (11a) 12a. Caterpillar-like: soft bodied, three pair of legs on thorax, fleshy leg-like prolegs on abdomen. — go to 13



- 12b. Grub-like: head capsule, three pair of legs on thorax, no legs on abdomen. —
typical of *Coleoptera* (beetle grub)



- 12c. Legless — go to 14

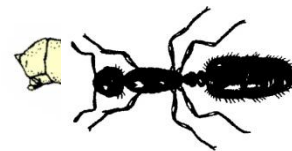
-
- (12a) 13a. Up to five pair of prolegs on abdomen. — *Lepidoptera*
(butterfly and moth caterpillar)



- 13b. Six or more pair of prolegs on abdomen. — *Hymenoptera*
(sawfly larva)



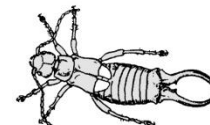
- (12c) 14a. Maggot-like: no legs, no head capsule, mouth-hooks. — **typical of *Diptera* (fly maggot)**



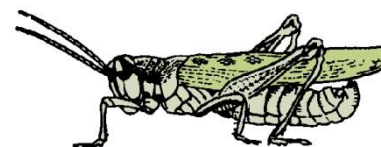
- 14b. Legless with enlarged head area. — typical of *Coleoptera* (borer larva) [details page 313-2] and some *Hymenoptera* larva



-
- (11b) 15a. Elongated flattened body with distinct forceps-like pinchers (cerci). — *Dermaptera* (earwigs)



- 15b. Hind legs designed for jumping. Antennae tread-like. one pair of tail-like cerci on most adults. — *Orthoptera* (grasshoppers, crickets, katydids)



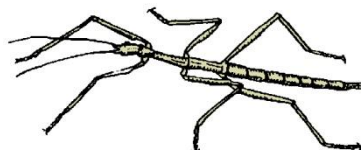
- 15c. Flattened body, long thread-like antennae. — *Blattaria* (cockroaches)



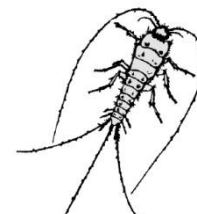
- 15d. Front legs designed for grasping and holding prey. Body elongated. Long, thread-like antennae. — *Mantodea* (mantids)



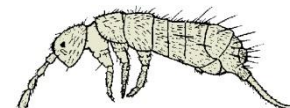
- 15e. Very elongated, stick-like insect. — *Phasmida*, (walkingstick)



- 15f. Two or three long, tail-like cerci. Fast moving. Small 1/4 to 1/2 inch. — *Zygentomaa* (Silverfish, firebrats)

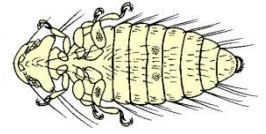


- 15g. Tiny (1-2 mm) soft-bodied insect. “Springtail” often present, used to jump. — *Collembola* (springtail)

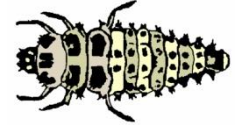


-
- (11c) 16a. Three distinct body segments. Ant like with narrow ant waist. Elbowed antennae. — *Hymenoptera* (ant)

- 16b. Looks like a fat ant with out a narrow waist. Creamy white. Straight beaded antennae. — *Isoptera* (termite)



-
- (11d) 17a. Generally dark colored with bright markings and spines. Lacking jaw as in 17b. — *Coleoptera* (lady beetle larva)



- 17b. Forward-projecting, curved pointed jaws designed to grasp prey, which they crush and suck out the insides of their prey. — *Neuroptera* (antlion)

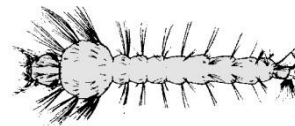


- 17c. Aquatic nymphs. —

- *Coleoptera* (aquatic beetle larva)



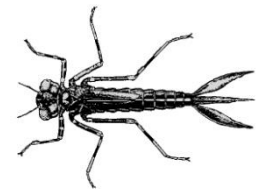
- *Diptera* (mosquito larva)



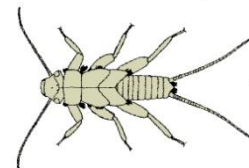
- *Ephemeroptera* (Mayfly naiads)



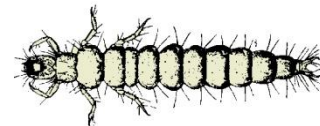
- *Odonata* (dragonfly and damselfly naiads)



- *Plecoptera* (stonefly naiads)

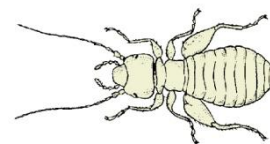


- *Trichoptera* (caddisfly naiads)



- (11e) 18a. Tiny parasite of birds. Flattened body. Head as wide or wider than thorax. — **Mallophaga**
(chewing or biting lice)

- 18b. Tiny, less than 1/8 inch. Hair-like antennae as long or longer than body. Whitish body. — **Psocoptera (book lice)**



Additional Information – CMG GardenNotes on Identify Insects

- #310 Identifying Insects: Reference and Study Questions
- #311 Taxonomy of Arthropods (Insects and Insect Relatives)
- #312 Insect Anatomy and Growth
- #313 Insect Orders
- #314 Key #1—Key to Insects Associated with Gardening
- #315 Key #2—Key to Insect Orders
- #316 Worksheet: Identifying Insects
- #317 Homework: Identifying Insects

Author: David Whiting, Consumer Horticulture Specialist (retired), Colorado State University Extension.
Line drawings from USDA. Photographs by David Whiting. Revised by Mary Small, Colorado State University Extension.

- Colorado Master Gardener *GardenNotes* are available online at www.cmg.colostate.edu.
- Colorado Master Gardener training is made possible, in part, by a grant from the *Colorado Garden Show, Inc.*
- Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.
- Extension programs are available to all without discrimination.
- No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.
- Copyright 2005-2017. Colorado State University Extension. All Rights Reserved. *CMG GardenNotes* may be reproduced, without change or additions, for nonprofit educational use.

Revised July 2017

