

## Dichotomous Key to Insect Orders (Adult specimens)

Below you will find a dichotomous key, a tool used by taxonomists and systematists to use morphological characteristics to identify organisms. The particular key only identifies insects down to the order to which they belong. Be sure to take photos of your insects both in the habitat in which it was found (with GPS Coordinates) as described in the procedures for the lab and in the lab on graph paper.

### Key to Insect Orders<sup>1</sup>

Start at # 1 and follow the steps until you have identified your insect to Order.	Insect Order
1. Insect has wings	Go to 2
Insect wingless or with poorly developed wings	Go to 30
2. One pair of wings	Go to 3
Two pairs of wings	Go to 7
3. Body grasshopper-like with enlarged hind legs and pronotum extending back over abdomen	Orthoptera
Insects not like this	Go to 4
4. Abdomen with cerci (“tails”)	Go to 5
Abdomen without cerci	Go to 6
5. Insects < 5 mm long, with relatively long antennae and wing with only one forked vein	Hemiptera
Larger insects with short antennae, many wing veins, and long cerci	Ephemeroptera
6. Forewings forming club-shaped halteres	Strepsiptera
Hindwings forming halteres (may be hidden)	Diptera
7. Forewings hard or leathery	Go to 8
All wings membranous	Go to 14
8. Forewings hard or leathery apart from membranous tip	Hemiptera
Forewings of uniform texture throughout	Go to 9
9. Outer forewings hard and veinless, meeting in center line	Go to 10
Forewings with many veins, overlapping at least a little and often held roof-wise over the body	Go to 11
10. Abdomen ending in a pair of forceps; hard outer wings always short	Dermaptera
Abdomen without forceps; hard outer wings commonly cover whole abdomen	Coleoptera
11. Insects with piercing and sucking beaks (mouthparts)	Hemiptera
Insects with chewing mouthparts; cerci usually present	Go to 12
12. Hind legs modified for jumping	Orthoptera
Hind legs not modified for jumping	Go to 13
13. Body dorso-ventrally flattened	Blattaria
Body not dorso-ventrally flattened; elongated thorax with fore-legs	Mantodea

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<sup>1</sup> Robinson, L. J. and L. H. Spindler. 2015. Bar coding life: Classification of insects. Article 14 in *Tested Studies for Laboratory Teaching*, Volume 36 (K. McMahon, Editor). Proceedings of the 36th Conference of the Association for Biology Laboratory Education (ABLE). <http://www.ableweb.org/volumes/vol-36/v36reprint.php?ch=14>

## Dichotomous Key to Insect Orders (Adult specimens)

modified for grasping

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|--|-----------------------------|
| 14. Tiny insects covered with white powder<br>Insects not like this  | Go to 15<br>Go to 16        |
| 15. Wings held flat at rest; mouthparts adapted for piercing and sucking<br>Wings held roof-wise over body at rest; biting mouthparts  | Hemiptera<br>Neuroptera     |
| 16. Small, slender insects with narrow, hair-fringed wings; often found<br>in flowers<br>Insects not like this   | Thysanoptera<br>Go to 17    |
| 17. Head extending downwards into a beak<br>No such beak   | Mecoptera<br>Go to 18       |
| 18. Wings more or less covered scales; coiled proboscis usually present<br>Wings usually transparent, although often hairy   | Lepidoptera<br>Go to 19     |
| 19. Wings with a network of veins, including many cross veins<br>Wings with relatively few cross veins   | Go to 20<br>Go to 24        |
| 20. Abdomen with long terminal threads<br>Terminal appendages short or absent  | Go to 21<br>Go to 22        |
| 21. Forewings much larger than hind wings; wings held vertically over<br>body at rest; two or three terminal threads<br>Wings more or less equal in size, or hind wings larger; wings folded<br>close to body at rest; two terminal appendages | Ephemeroptera<br>Plecoptera |
| 22. Antennae very short; body at least 25 mm long<br>Antennae longer - greater than width of head  | Odonata<br>Go to 23         |
| 23. Tarsi three-segmented<br>Tarsi five-segmented  | Plecoptera<br>Neuroptera    |
| 24. Wings noticeably hairy<br>Wings not noticeably hairy   | Go to 25<br>Go to 26        |
| 25. All wings more or less alike; front tarsi swollen<br>Hind wings usually broader than forewings; front tarsi not swollen  | Embioptera<br>Trichoptera   |
| 26. Tarsi with four or five segments<br>Tarsi with 1-3 segments  | Go to 27<br>Go to 28        |
| 27. All wings alike<br>Hind wings much smaller than forewings  | Isoptera<br>Hymenoptera     |
| 28. Hind wings similar to or larger than forewings; abdomen with cerci<br>Hindwings smaller than forewings; no cerci   | Plecoptera<br>Go to 29      |
| 29. Tiny insects with at least 12 antennal segments<br>Never more than 10 antennal segments; piercing and sucking beak   | Psocoptera<br>Hemiptera     |
| 30. Insects with slender, twig-like body<br>Insects not like this  | Phasmatodea<br>Go to 31     |
| 31. Insects with grasshopper-like body and long back legs<br>Insects not like this   | Orthoptera<br>Go to 32      |

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32. Small, soft-bodied insects living on plants, often under protective shield or scale  
Insects not like this
33. Minute, soil-living insects, < 2 mm long without antennae  
Insects not like this
34. Insects with cerci or other abdominal appendages  
Insects without other appendages
35. Abdominal appendages long and conspicuous  
Abdominal appendages short or hidden under body
36. Abdominal appendages forming pincers  
Abdominal appendages not forming pincers
37. Tarsi three-segmented  
Tarsi one-segmented
38. Abdomen with three long terminal appendages  
Abdomen with only two terminal appendages
39. Tiny jumping insects, head points downwards forming a beak  
No sign of beak
40. Small or minute insects with a forked “tail” under rear of abdomen, which enables them to spring out of harm’s way; generally found in soil or decaying vegetation  
Insects not like this
41. Tarsi usually four-segmented  
Tarsi three-segmented; front tarsi swollen
42. Parasites in fur or feathers; insects generally flattened side-to-side or dorsoventrally  
Insects not parasitic and not usually flattened
43. Jumping insects flattened from side-to-side  
Insects flattened dorsoventrally
44. Insects of moderate size; head partly withdrawn into thorax  
Small, minute insects; head not withdrawn into thorax
45. Antennae very short; very “leggy” insects with strong claws well-suited to clinging to a host mammal  
Antennae long; body somewhat circular with less prominent legs and claws
46. Prothorax distinct; biting mouthparts  
Thoracic segments fused into one unit; sucking mouthparts
47. Abdomen with pronounced “waist”; antennae often elbowed  
No such features
48. Body > 5 mm long, with flattened hairs and scales; vestigial wings  
Body usually < 5 mm long, bald or occasionally scaly; vestigial wings
- Hemiptera  
Go to 33  
Protura  
Go to 34  
Go to 35  
Go to 42  
Go to 36  
Go to 39  
Go to 37  
Go to 38  
Dermaptera  
Diplura  
Tysanura  
Diplura  
Mecoptera  
Go to 40  
Collembola  
Go to 41  
Isoptera  
Embiopoda  
Go to 43  
Go to 47  
Siphonaptera  
Go to 44  
Go to 45  
Go to 46  
Diptera  
Hemiptera  
Mallophaga  
Anoplura  
Hymenoptera  
Go to 48  
Lepidoptera  
Go to 49

## Dichotomous Key to Insect Orders (Adult specimens)

rarely present

- |   |            |
|---|------------|
| 49. Head as wide or nearly as wide as body; biting mouthparts; insects often found among dried materials                                    | Psocoptera |
| Head narrower than body; sucking mouthparts; abdomen often with a pair of tubular outgrowths near hind end; insects found on growing plants | Hemiptera  |

### *Insect Identification Glossary*

**Abdomen:** The third or hind-most region of the body of an insect, containing the insect's stomach.

**Anterior:** of or near the head end, or towards the front plane of the body.

**Cerci** ('tails'): segmented paired appendages located at the tip of the abdomen.

**Dorsal:** referring to the back or upper side of an organism.

**Dorso-ventrally:** extending from the back to the belly.

**Forceps:** "pincers", or structures shaped like forceps ("tweezers"), at the tip of the abdomen, which are used in defense and courtship to capture and hold prey.

**Halteres:** from the Greek word dumbbells, small knobbed structures homologous to wings and flapped to maintain stability while flying.

**Proboscis:** a mouthpart of an insect, usually long and skinny. Mosquitos have a proboscis to suck blood; butterflies and moths have a coiled up proboscis which they unravel to suck nectar from flowers.

**Pronotum:** the dorsal plate of the prothorax.

**Prothorax:** the anterior division of the thorax of an insect, bearing the first pair of legs.

**Tarsi:** the last (distal) part of the leg of an insect, usually divided into segments, corresponding to a jointed "foot."

**Thorax:** The second or middle region of the body of an insect, between the head and the abdomen, bearing the true legs and wings (if present).

**Vestigial:** not fully developed in mature animals.

To what order does your insect belong, based on the morphological-based taxonomic key?

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