

Student Handout - Dichotomous Key for Adult Insects

- 1a. More than three pair of legs..... **not an insect**
 1b. Three pair of legs only **2**
- 2a. With wings..... **6**
 2b. Without wings..... **3**
- 3a. Ant-like with a narrow waist; ranges in size from 1 to 25mm (ants)
 **Hymenoptera (figure 1)**
 3b. Not as above **4**



Figure 1.

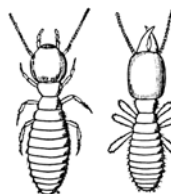


Figure 2.

- 4a. Ant-like with a wide waist; ranges in size from 5 to 20mm (termites)
 **Isoptera (figure 2)**
 4b. Not as above **5**
- 5a. With an 2 antennae-like appendages located at the end of the abdomen which is used .as a "spring"; may be held under the abdomen; ranges in size from 3 to 6mm (springtails) **Collembola (figure 3)**
 5b. Has 3 pair of legs, but no wings, and does not fit any of the above descriptions **Immature insect**



Figure 3.

- 6a. With only a single pair of wings; the second pair of wings modified into a pair of knob-like gyroscopic organs (attached to the end of stalks) known as halteres; ranges in size from 6 to 65mm (flies) **Diptera (figure 4)**
- 6b. With two pair of wings 7

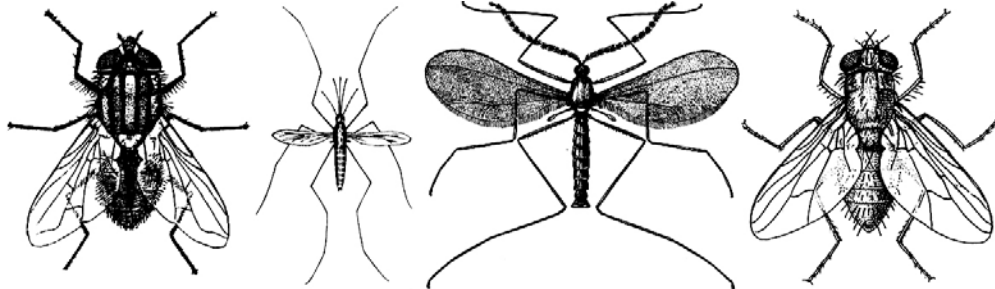


Figure 4.

- 7a. The wings are equal or nearly equal in size with a long slender abdomen; dragonflies range in size from 28 to 150mm, damselflies range in size from 25 to 65mm (dragonflies and damselflies)..... **Odonata (figures 5 and 6)**
- 7b. Not as above 8



Figure 5.



Figure 6.

- 8a. The first pair of wings much larger than second and held straight up over the body; with two or three long, antennae-like appendages at the end of the abdomen; ranges in size from 5 to 35mm (mayflies)
 **Ephemeroptera (figure 7)**
- 8b. Not as above 9

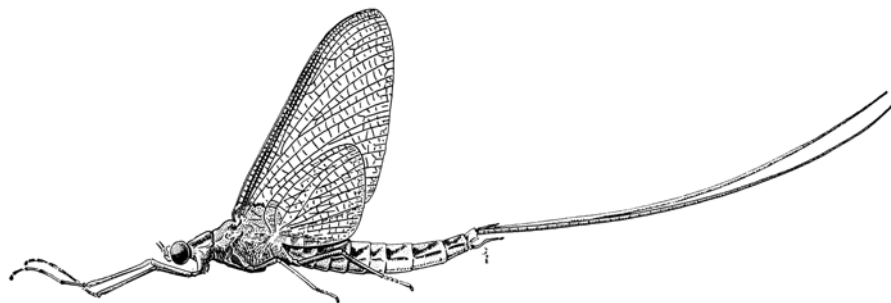


Figure 7.

- 9a. With piercing, sucking mouthparts (like a straw).....10
 9b. Mouthparts variable, not as above (no straw) 11
- 10a. Forewings half leathery, half membranous, while hindwings entirely membranous; when wings are folded, it makes an “X” on the back; piercing mouthpart begins at the top of the head; ranges in size from 3 to 40mm (true bugs)
**Hemiptera (figure 8)**
- 10b. Forewings either entirely membranous or entirely leathery; held rooflike over the body; piercing mouthpart begins at the bottom of the head; ranges in size from 2 to 60mm (aphids, scales, leafhoppers, and cicadas)
**Homoptera (figure9)**

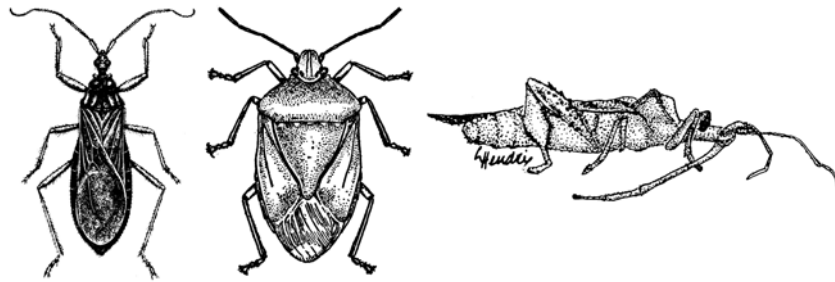


Figure 8.

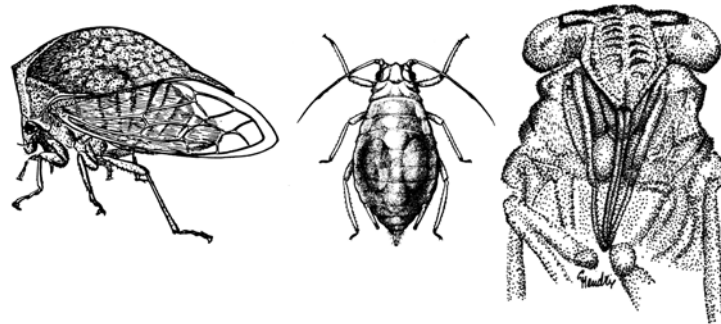


Figure 9.

- 11a. Forewings leathery, but not hard; hindwings membranous and folded under the forewings.....12
 11b. Forewings are membranous or hard wing covers.....15

- 12a. Chewing mouthparts; hind legs often enlarged, adapted for jumping; ranges in size from 9 to 80mm (grasshoppers, katydids, and crickets).....**Orthoptera (figure 10)**
- 12b. Hind legs are not enlarged and adapted for jumping.....**13**

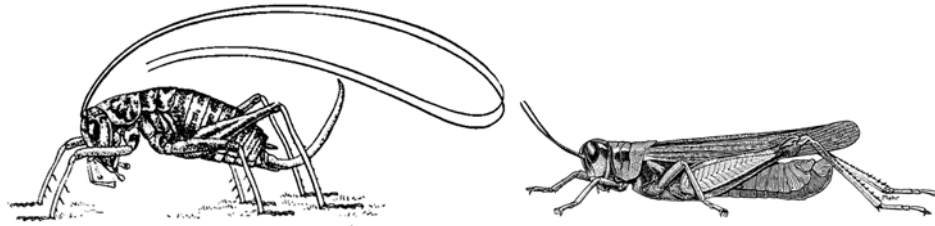


Figure 10.

- 13a. Front legs have many spines and are held in front of them in a bent position that has been described as “prayer like”; with large eyes; up to 150mm in length (praying mantids).....**Mantodea (figure 11)**
- 13b. Front legs without spines and not held in a bent position.....**14**

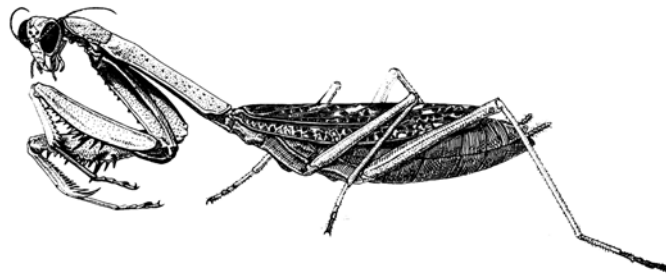


Figure 11.

- 14a. Looks like a stick, twig, or leaf; up to 150mm in length (walking sticks and leaf insects).....**Phasmida (figure 12)**
- 14b. Body is oval and flattened, head is concealed from dorsal (top) view, has long antennae, and runs very fast ; up to 60mm in length (roaches).....
..... **Blattaria (figure 13)**

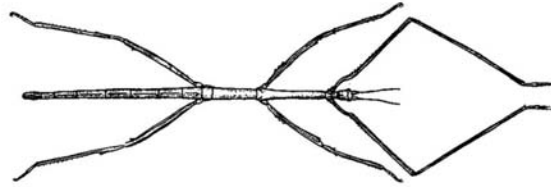


Figure 12.

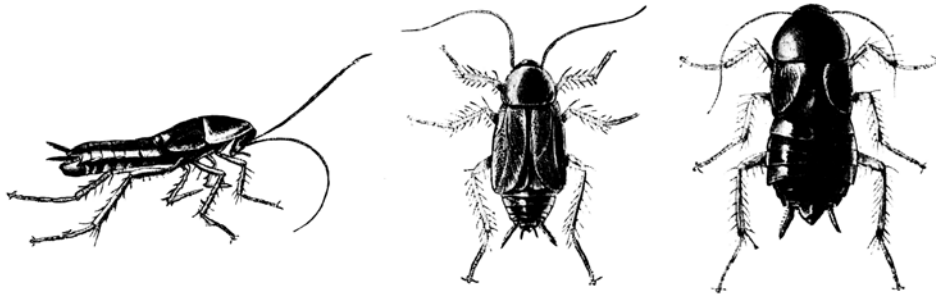


Figure 13.

- 15a. Very small, wings are membranous and have a fringe of long hairs along the entire margins of the wings; mouth modified and forms a cone which is off-center, usually seen without wings; up to 4mm in length (thrips).....
..... **Thysanoptera (figure 14)**
- 15b. Wings not as above16

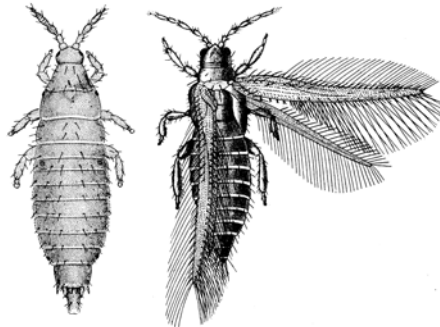


Figure 14.

- 16a. Wings are entirely membranous and of the same length; ranges in size from 5 to 20mm (termites)..... **Isoptera (figure 15)**
- 16b. Wings not as above17



Figure 15.

- 17a. Wings entirely membranous and flat, back against the body, with the forewings narrower than the hindwings; two short, antennae-like appendages located at the end of the abdomen; ranges in size from 6 to 64mm (stoneflies) **Plecoptera (figure 16)**
- 17b. Not as above17

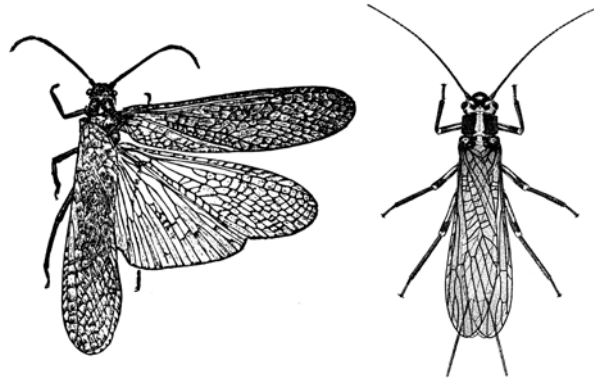


Figure 16.

- 18a. Two pairs of membranous wings with many crossveins; wings held roof-like over the body and long antennae (in some species, males will have developed large pincher-like mandibles); ranges in size from 9 to 70mm (alderflies, dobsonflies, fishflies, snakeflies, lacewings, antlions, and owlflies).....
**Neuroptera (figure 17)**
- 18b. Not as above**19**

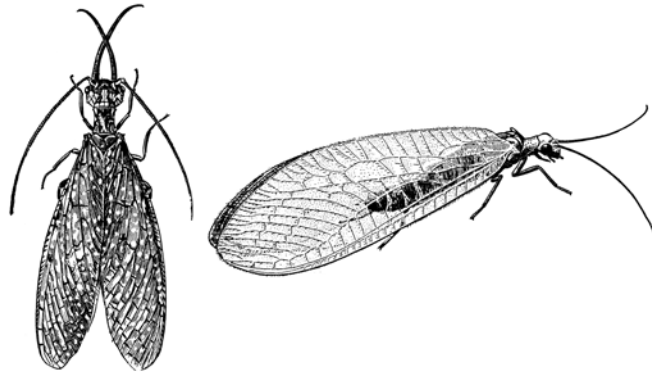


Figure 17.

- 19a. Forewings and hindwings with distinctive black, horizontal banding; face elongated like a horse with chewing mouthparts at its tip; male sexual organ looks like the tip of a scorpion's tail; ranges in size from 5 to 25mm (scorpion flies)
**Mecoptera (figure 18)**
- 19b. Not as above **20**



Figure 18.

- 20a. Forewings short, leathery; meeting in a straight line down the middle of the back; with a pair of large forceps-like appendages at the end of the abdomen; ranges in size from 5 to 25mm (earwigs) **Dermaptera (figure 19)**
- 20b. Not as above **21**

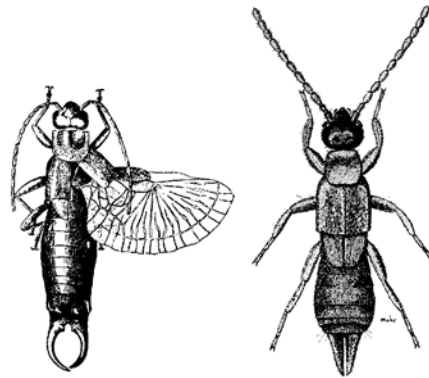


Figure 19.

- 21a. Forewings thickened into a hard shell-like cover; meeting in a straight line down the middle of the back; hindwings are membranous and folded underneath the forewings; ranges in size from 0.25mm to 200mm (beetles).....
..... **Coleoptera (figure 20)**
- 21b. Forewings not thickened into hard coverings **22**

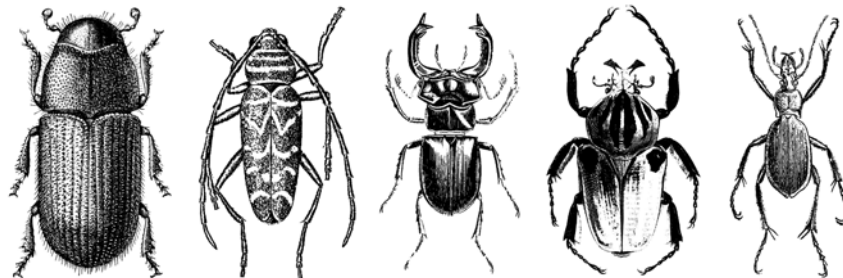


Figure 20.

- 22a. With long siphoning mouthparts (that can be curled up like a party favor); wings covered in overlapping scales; ranges in size from 10 to 150mm (butterflies, moths, and skippers) **Lepidoptera (figure 21)**
- 22b. With chewing mouthparts, wings not covered by overlapping scales **23**



Figure 21.

- 23a. Moth-like insect wings covered with hair and held roof-like over the body; ranges in size from 7 to 25mm (caddisflies) **Trichoptera (figure 22)**
- 23b. Wings membranous and not covered with hairs, hindwings are smaller than forewings; abdomen constricted into a narrow waist (females have a modified ovipositor that they use as a stinger); ranges in size from 3 to 55mm (wasps, bees, and ants)..... **Hymenoptera (figure 23)**

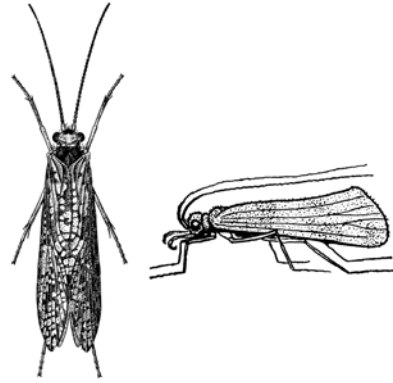


Figure 22.



Figure 23.

Student Frequency Table

Order	
Blattaria	
Coleoptera	
Collembola	
Dermaptera	
Diptera	
Ephemeroptera	
Hemiptera	
Homoptera	
Hymenoptera	
Isoptera	
Lepidoptera	
Mantodea	
Mecoptera	
Neuroptera	
Odonata	
Orthoptera	
Phasmida	
Plecoptera	
Trichoptera	
Thysanoptera	
Unknown Immature	
Other	

References

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- Borror, Donald J., Charles A. Triplehorn, and Norman F. Johnson. 1989. *An Introduction to the Study of Insects*. Harcourt Brace College Publishers, New York.
- Castner, James L. 2000. *Photographic Atlas of Entomology and Guide to Insect Identification*. Feline Press, Pittsburg, Kansas.
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Image References for the Handout

Images used in this key are either public domain images from the following sources or original images drawn for SC LIFE by Carrie Hendrix.

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