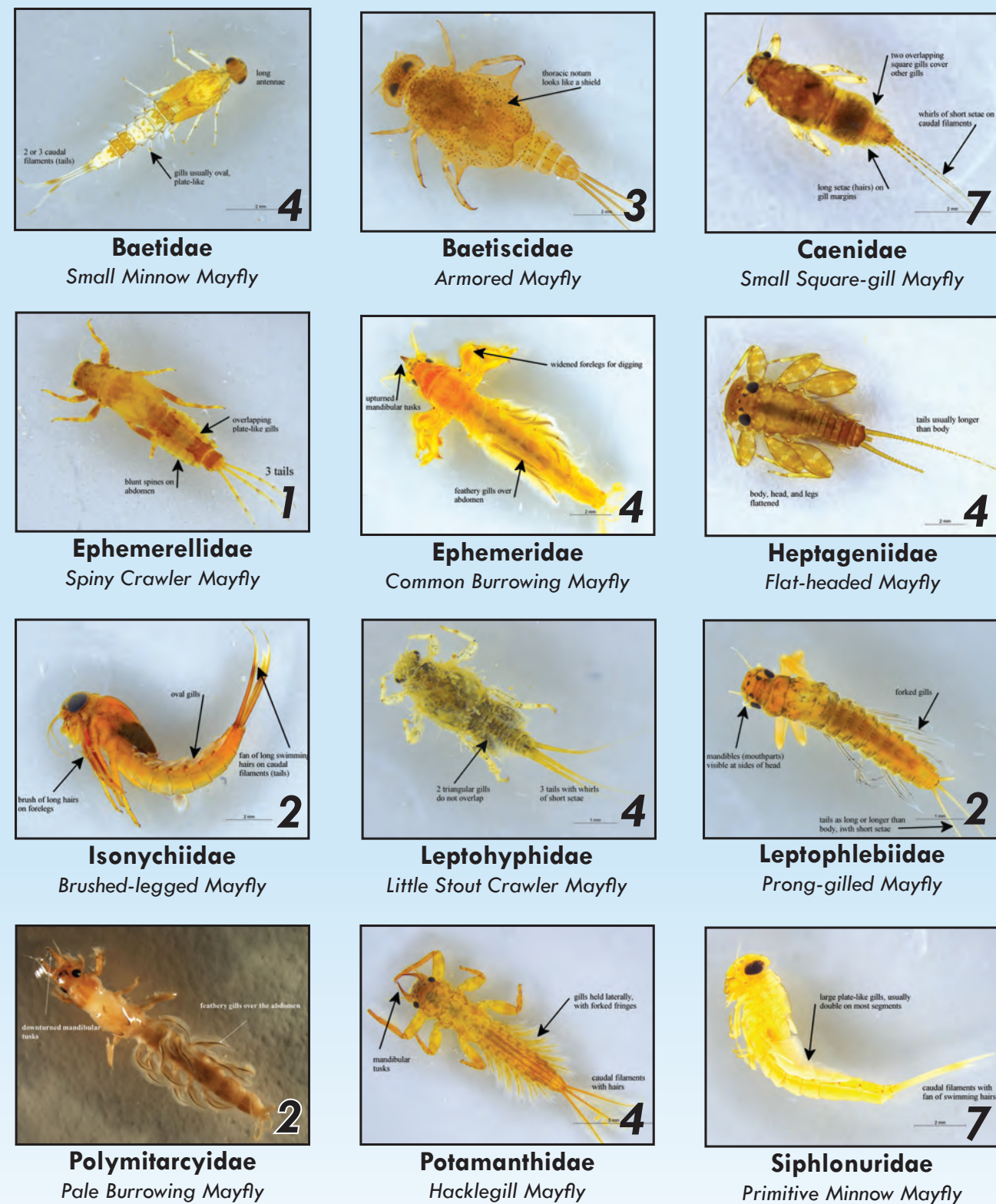
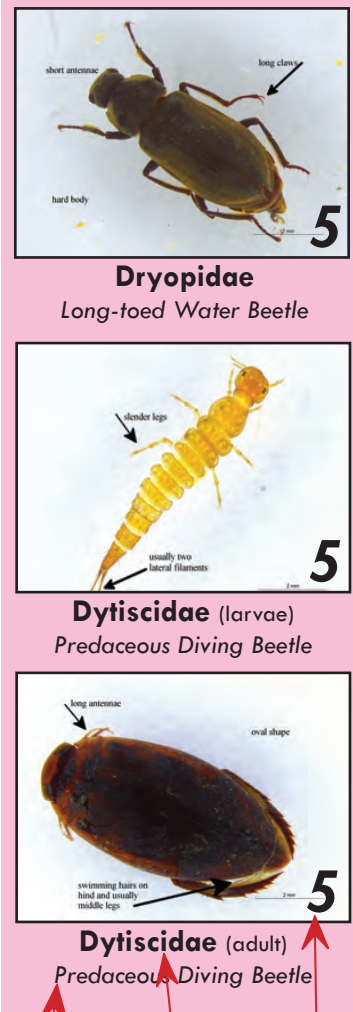


Ephemeroptera | Mayflies



Coleoptera Beetles



Common Name
Family Name
Tolerance Value

Using this guide with the data sheets

Family	Tolerance Value	Number Found	Family Tolerance Score
Dryopidae	5	0	0
Dytiscidae	5	2	10
Elmidae	5	0	0
Gyrinidae	4	0	0
Halplidae	7	0	0
Hydrophilidae	5	3	15
Psephenidae	4	0	0
Order Total		5	25

Order Summary

Order Total	Number Found	Order Tolerance
Coleoptera	5	25
Diptera	6	38
Ephemeroptera	8	28
Hemiptera	5	27
Lepidoptera	2	0
Megaloptera	0	0
Odonata	3	13
Plecoptera	0	0
Trichoptera	6	24
Grand Total	35	155

$$\text{Biotic Index} = \frac{[\text{Grand Total Tolerance}]}{[\text{Grand Total Number Found}]} = \frac{155}{35} = 4.43$$

September 2016

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Bioindicators of Water Quality Quick-Reference Guide

Authors: Julie Speelman and Natalie Carroll | Photographer (unless otherwise noted): Julie Speelman | Design and Layout: Purdue Agricultural Communication

This publication shows aquatic insects that can be used as bioindicators of water quality in Indiana waterways. Bioindicators are biological systems that are sensitive to environmental changes and, therefore, can indicate when pollution is present in the water. A tolerance score is included for each insect in this publication. The tolerance score, ranging from 0–10, represents the insect's sensitivity to pollution and can be used to estimate the quality of the water in which the insect was found. Insects with a score of 0 are intolerant to pollution, meaning they cannot tolerate any water pollution, while insects with a score of 10 are very tolerant of polluted water.

Materials Needed

- dip net
- white plastic pail, bowl, or dishpan (Note: The white color makes it easier to see the insects.)
- 2–3 white styrofoam egg cartons or plastic ice cube trays
- data sheet—available online: http://www.ydae.purdue.edu/natural_resources/Resources/BioindicatorWQ

Instructions

- Locate a body of water (e.g., stream, pond, lake) to sample. The water should only be at most knee deep and allow easy access for obtaining the sample. Make sure you have permission to sample the water.
- Dip the pail in the water to be sampled.
- Collect insect samples from all habitats within a 200-foot section of that body of water, and place them in the pail. Jab your dip net against the vegetation and into mud or sand at the bottom to collect insects. Scrape the underside of rocks and logs into the net.
- Collect insects for 45 minutes.
- Using the ice cube tray, sort the insects that look the same into the different compartments of the tray using your hand or forceps. Be sure to put some water in the ice cube tray first to keep the insects from drying out.
- Use the bioindicator quick reference guide to identify the insects. Record the number of insects from each insect family you identify on the data sheet.
- Place the insects back in the water when you are finished.
- Complete the calculations described in the next section to determine the quality rating.

Biotic Index	Water Quality Rating	Degree of Organic Pollution
0.00–3.75	excellent	organic pollution unlikely
3.76–4.25	very good	slight organic pollution possible
4.26–5.00	good	some organic pollution probable
5.01–5.75	fair	fairly substantial pollution likely
5.76–6.50	fairly poor	substantial pollution likely
6.51–7.25	poor	very substantial pollution likely
7.26–10.0	very poor	severe organic pollution likely

Assessing the Water Quality of a Site

For each insect family group:

- Record the number of insects found for each species listed.
- Multiply the Tolerance Value found on the insect image by the Number Found, and enter the result under Family Tolerance Score. **Note:** If the insect Tolerance Value is “undetermined,” exclude that insect from the analysis.
- Sum the Number Found and Family Tolerance Score columns (Order Totals).

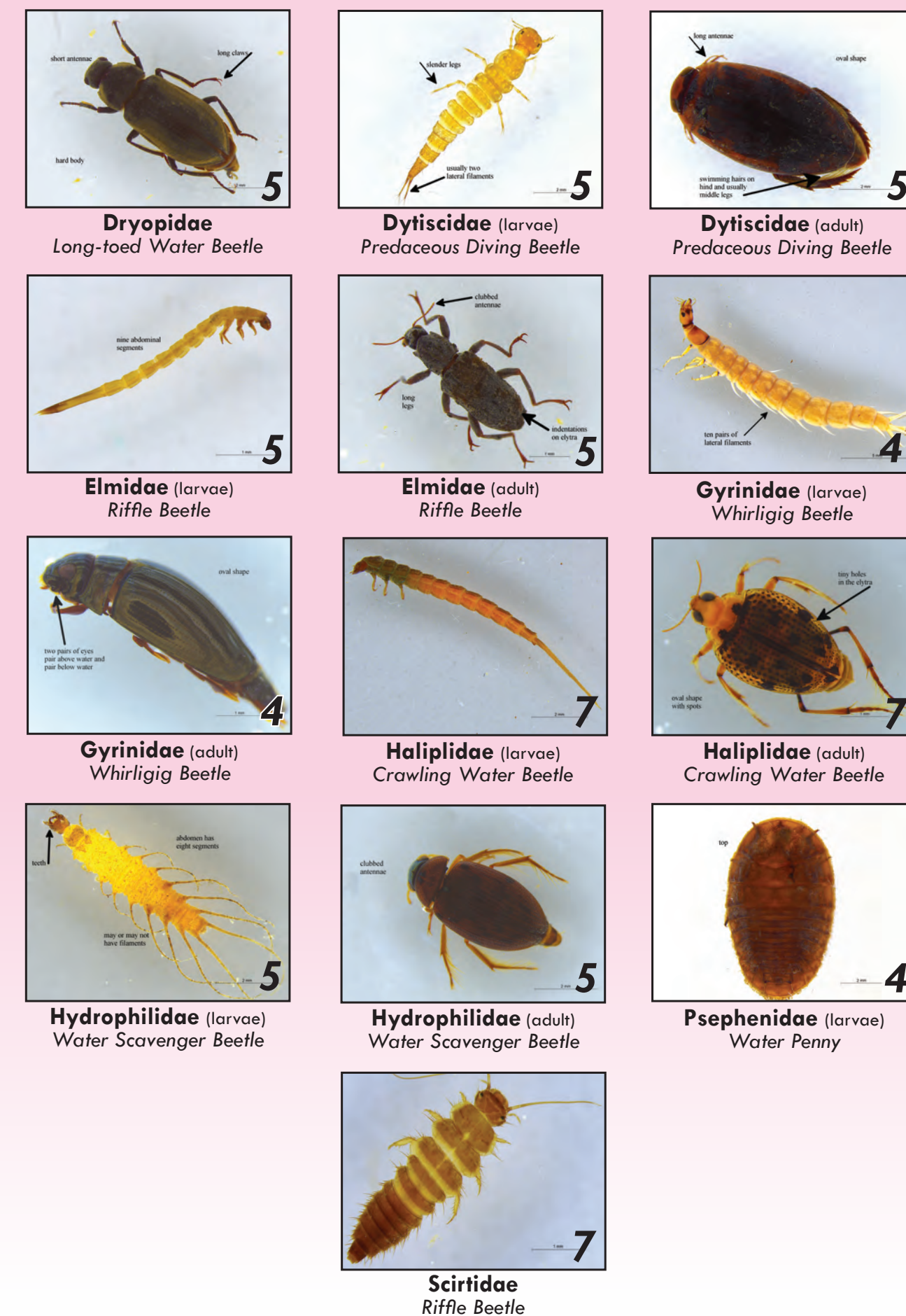
For each insect order:

- Transfer the Order Totals to the Order Summary section.
- Sum the Number Found and Order Tolerance Score columns (Grand Total).
- Determine the Biotic Index by dividing the Grand Total Tolerance Score by the Grand Total Number Found.
- Use the biotic index in the table provided to estimate the water quality rating and degree of organic pollution.

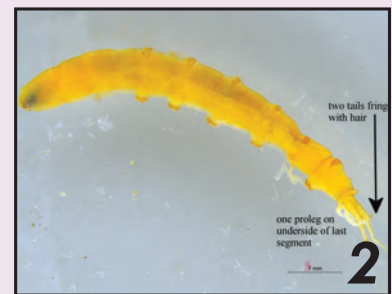
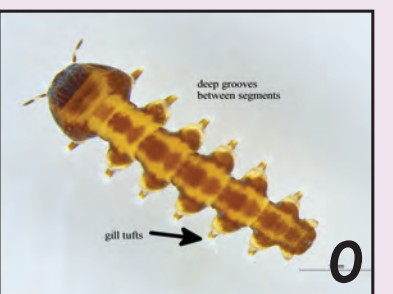


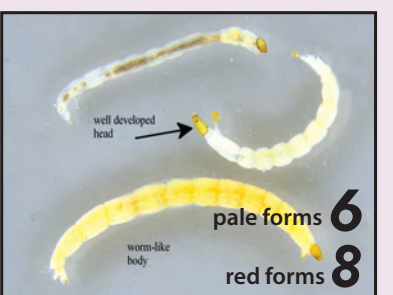
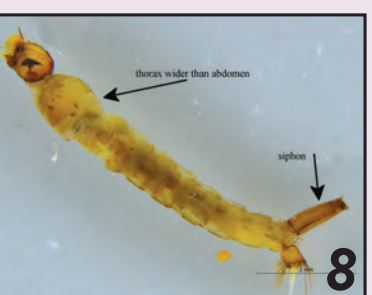
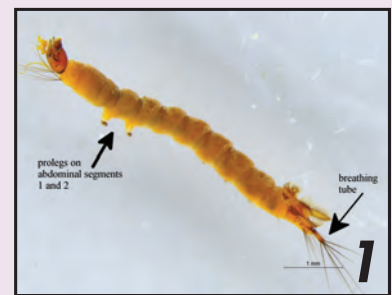

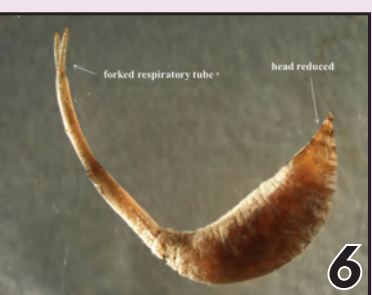
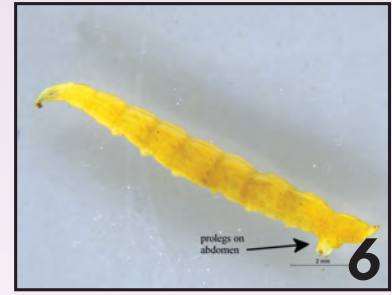


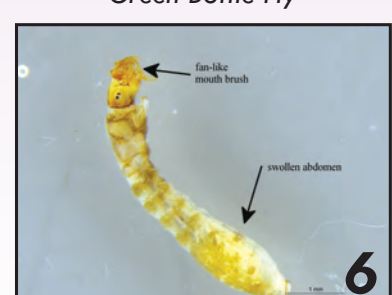
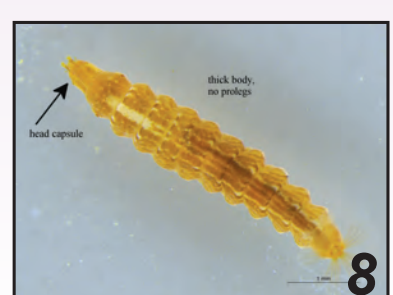

Also available: mobile flashcards (\$3 to download, PDF format for phones)

https://edustore.purdue.edu/item.asp?Item_Number=4-H-1018-M

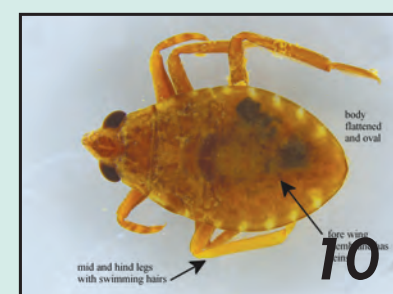
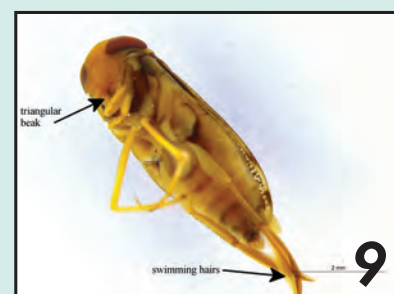
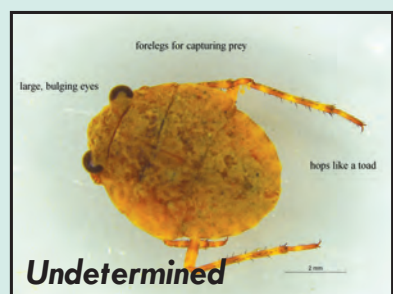
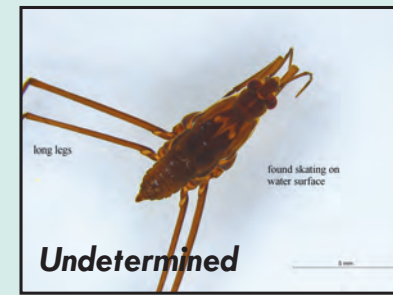
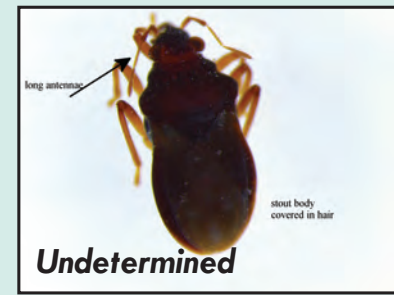
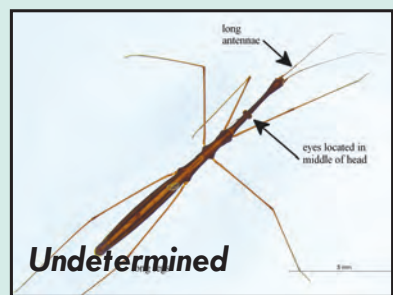
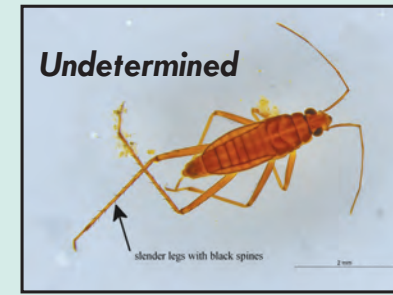
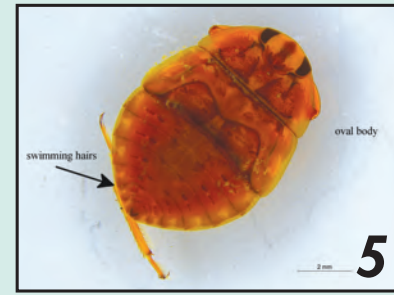
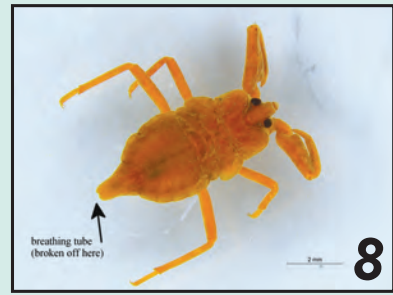

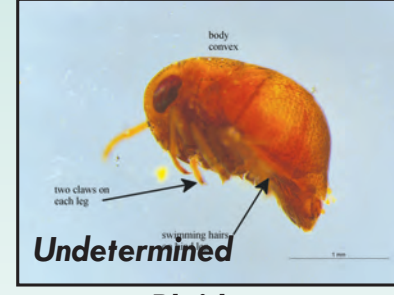

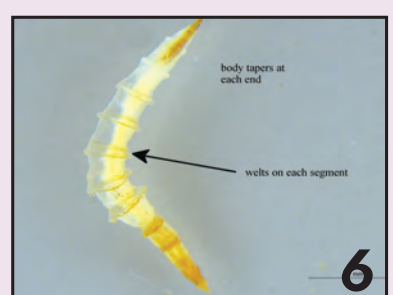
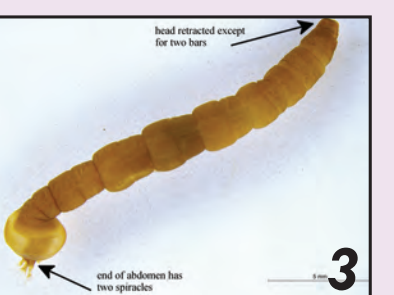
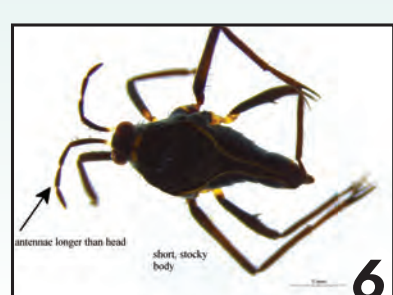
Coleoptera | Beetles




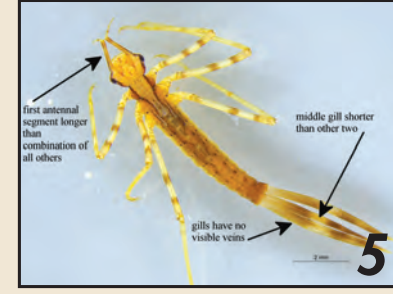
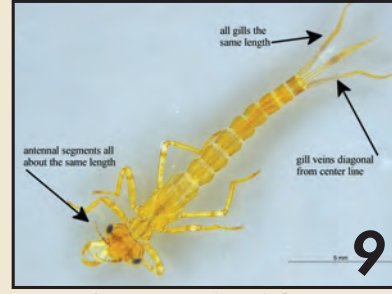



Diptera | Flies

 Athericidae Aquatic Snipe Fly	 Blephariceridae Net-winged Midge	 Ceratopogonidae Biting Midge
 Chaoboridae Phantom Midge	 Chironomidae Non-biting Midge	 Culicidae Mosquito
 Dixidae Dixid Midge	 Empididae Aquatic Dance Fly	 Ephydriidae Shore Fly
 Muscidae House Fly, Stable Fly, Green Bottle Fly	 Psychodidae Moth Fly	 Sciomyzidae Marsh Fly
 Simuliidae Black Fly	 Stratiomyidae Soldier Fly	 Syrphidae Raitailed Maggot

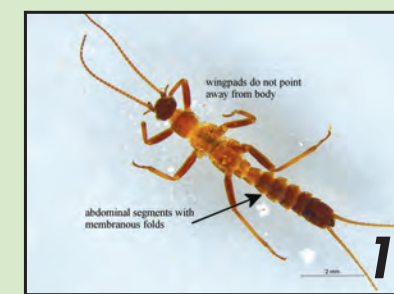
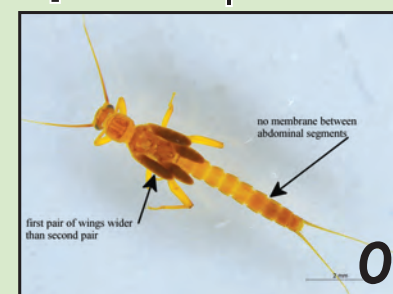

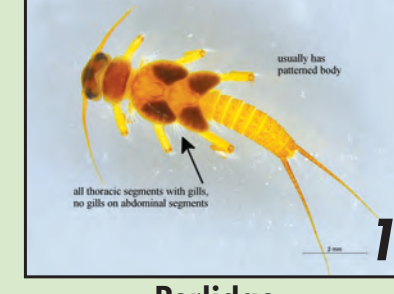
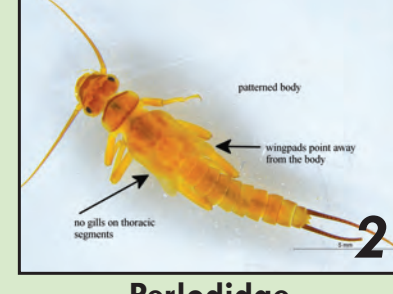

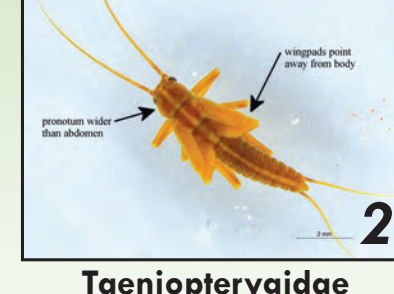
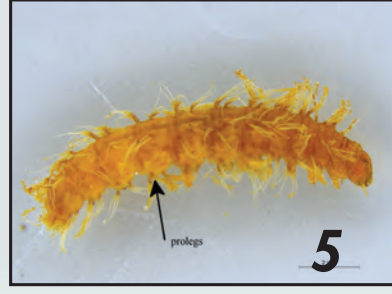
Hemiptera | Aquatic Bugs

 Belostomatidae Giant Water Bug	 Corixidae Water Boatman	 Undetermined Toad Bug
 Undetermined Water Strider	 Undetermined Velvet Water Bug	 Undetermined Water Measurer
 Undetermined Water Treader	 Undetermined Creeping Water Bug	 Nepidae Water Scorpion
 Undetermined Backswimmer	 Undetermined Pygmy Backswimmer	 Undetermined Shore Bug
 Tabanidae Horse Fly, Deer Fly	 Tipulidae Crane Fly	 Veliidae Broad-shouldered Water Strider

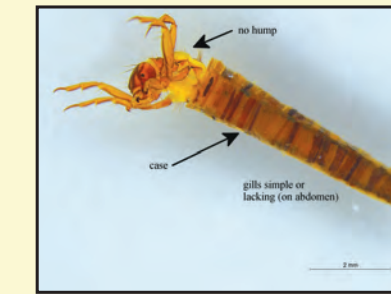
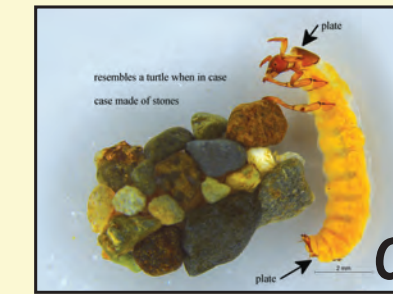



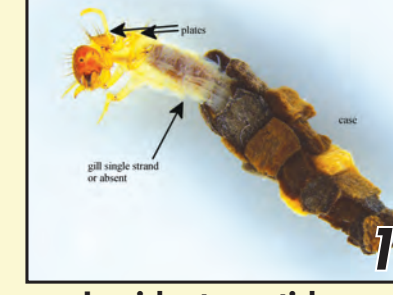





Odonata | Damselflies and Dragonflies

 Aeshnidae Darter	 Calopterygidae Broad-winged Damselfly	 Coenagrionidae Narrow-winged Damselfly
 Gomphidae Club-tailed Dragonfly	 Lestidae Spread-winged Damselfly	 Libellulidae Common Skimmer


Plecoptera | Stoneflies

 Capniidae Small Winter Stonefly	 Leuctridae Roll-winged Stonefly	 Nemouridae Brown Stonefly
 Perlidae Common Stonefly	 Perlodidae Patterned Stonefly	 Pteronarcyidae Giant Stonefly
 Taeniopterygidae Winter Stonefly	 Pyralidae Aquatic Caterpillar	

Trichoptera | Caddisflies

 Brachycentridae Humpless Casemaker Caddisfly	 Glossosomatidae Saddle Casemaker Caddisfly	 Helicopsychidae Snail Casemaker Caddisfly
 Hydropsychidae Common Net Spinner Caddisfly	 Hydroptilidae Micro Caddisfly	 Lepidostomatidae Lepidostomatid Casemaker
 Leptoceridae Long Horned Casemaker	 Limnephilidae Northern Casemaker Caddisfly	 Philopotamidae Finger Net Caddisfly
 Corydalidae Dobsonfly	 Phryganeidae Giant Casemaker Caddisfly	

Megaloptera | Alderflies, Dobsonflies, and Fishflies

 Sialidae Alderfly
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