Volunteer-based Stream Monitoring- Aquatic Macroinvertebrates

Huron River Watershed Council

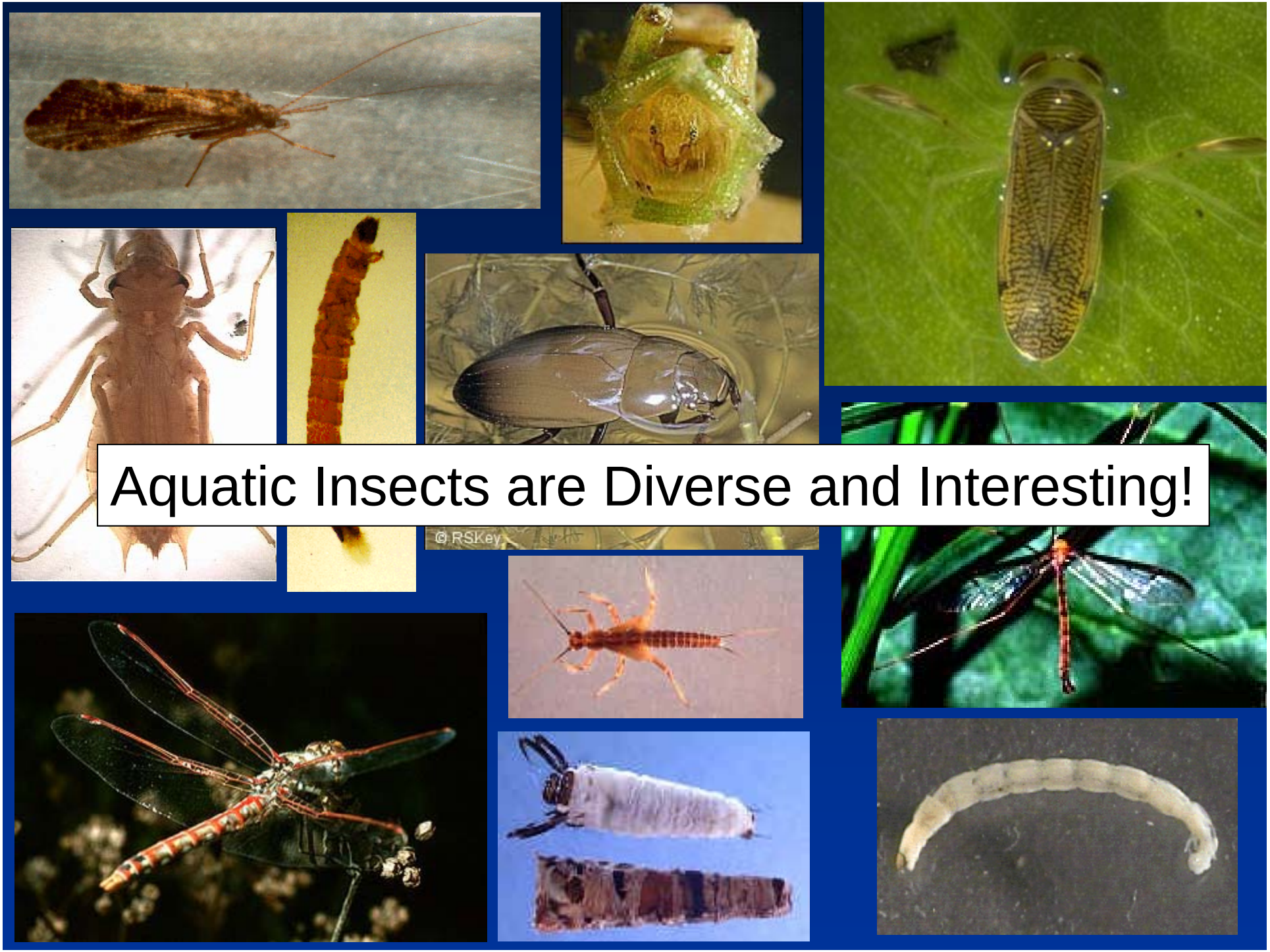
Great Lakes Commission des Grands Lacs

DEQ

Paul Steen

Watershed Ecologist

Huron River Watershed Council

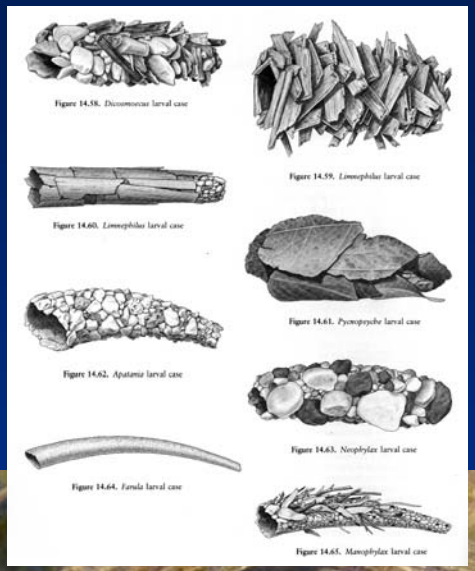

Aquatic Insects are Diverse and Interesting!
© RSKey

3 Reasons to love aquatic bugs

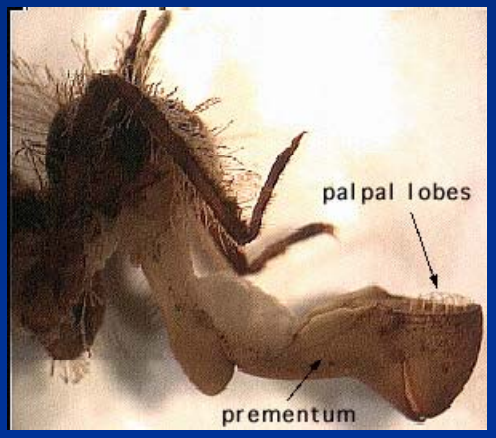
1. You never know what you will find!

3 Reasons to love aquatic bugs

2. Crazy Camouflage!!



3 Reasons to love aquatic bugs



3. Tough little buggers

Why collect bugs?

Good science

- Good indicators of stream conditions
- Diversity = Healthy stream
- Threats to bug diversity
  - Sedimentation
  - Habitat loss
  - Chemical pollution

Good for volunteers

- Easy sampling techniques
- Generally abundant communities
- They are fun!

How do we collect bugs?

- Each team member gets a job- collector, scribe, picker, shuttler, leader, etc.
- Collector works upstream collecting along ~300 foot reach. Collector samples a variety of microhabitats.
- Store in 70% ethanol until identification.

  (avoid rubbing alcohol)
- KEEP THE BUGS

  LONG TERM
- Identification events

How do we collect bugs?

- No set bug number or time limit.
- This differs from DEQ Procedure 51.
- Some rules of thumb:

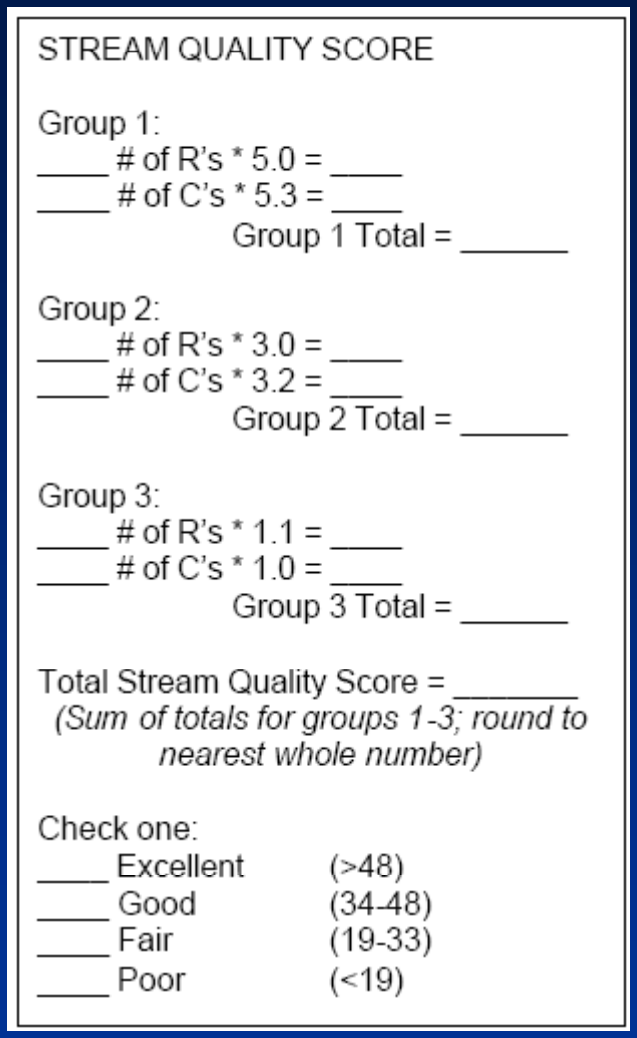
  -Generally, 40 minutes with a single collector-net in the water… be flexible based on amount of walking around and collector experience.

  -BE CONSISTENT so you know what to tell people who ask.

  -HRWC data- at least 50 creatures (100 preferable)

Stream Macroinvertebrate Datasheet

- Collection Information
- Stream Conditions
- Habitats Sampled
- Identification
- Assessment
- Addressing “slop” in the procedures



STREAM QUALITY SCORE

Group 1:
____ # of R's * 5.0 = ____
____ # of C's * 5.3 = ____
Group 1 Total = _____

Group 2:
____ # of R's * 3.0 = ____
____ # of C's * 3.2 = ____
Group 2 Total = _____

Group 3:
____ # of R's * 1.1 = ____
____ # of C's * 1.0 = ____
Group 3 Total = _____

Total Stream Quality Score = _____
(Sum of totals for groups 1-3; round to nearest whole number)

Check one:

____ Excellent	(>48)
____ Good	(34-48)
____ Fair	(19-33)
____ Poor	(<19)

Aquatic Macroinvertebrate Identification

Classification System

Kingdom- Animalia

Phylum- Arthropoda, Mollusca, Annelida

Class- Insecta (Crustacea, Pelecypoda, Gastropoda, Oligochaeta, Hirundea)

Order- i.e. Diptera (true flies)

Family- i.e. Tipulidae (crane flies)

Genus- Do able but takes a lot of effort.

Species- Hope you have your PhD.

Complete Metamorphosis

Flying Adults

Adults

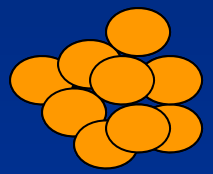
Typically but not always terrestrial

Aquatic Pupae

Midge

(True Fly)

Life Cycle



Eggs

Aquatic Larvae

(many growth instars)

Other groups:

Beetles

Alderflies

Dobsonflies

Caddisflies

Incomplete Metamorphosis

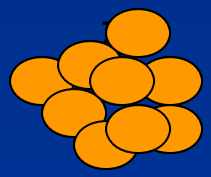
Flying Adults

Nymph (aquatic)

Numerous growth instars

Dragonfly Life Cycle

Adults (typically but not always terrestrial)



Eggs

Other groups:

Mayflies

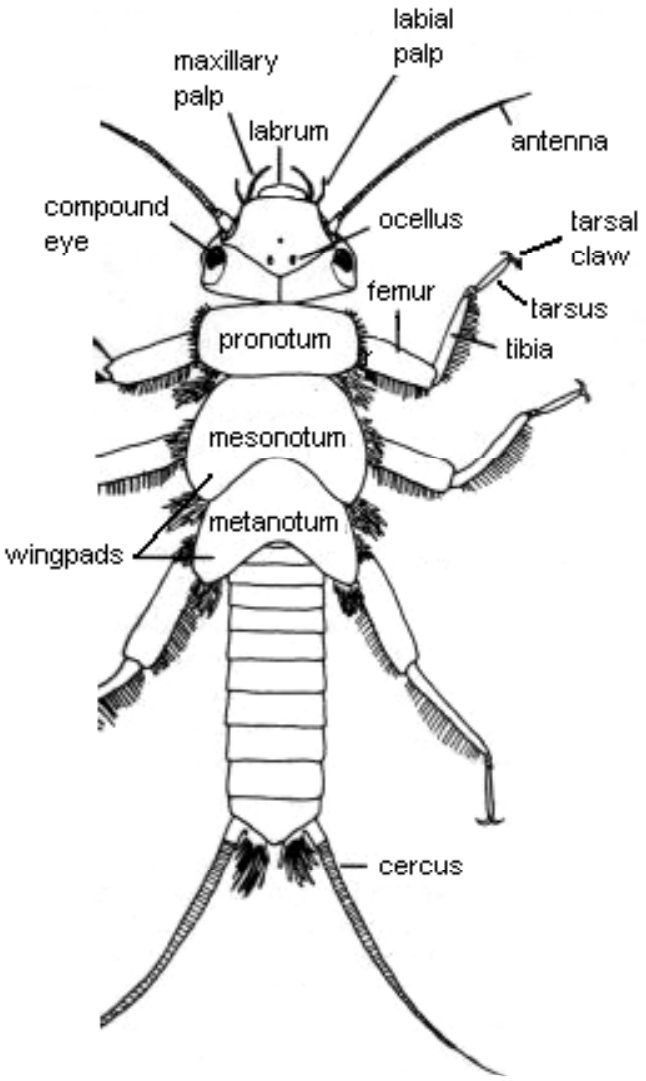
Stoneflies

True Bugs

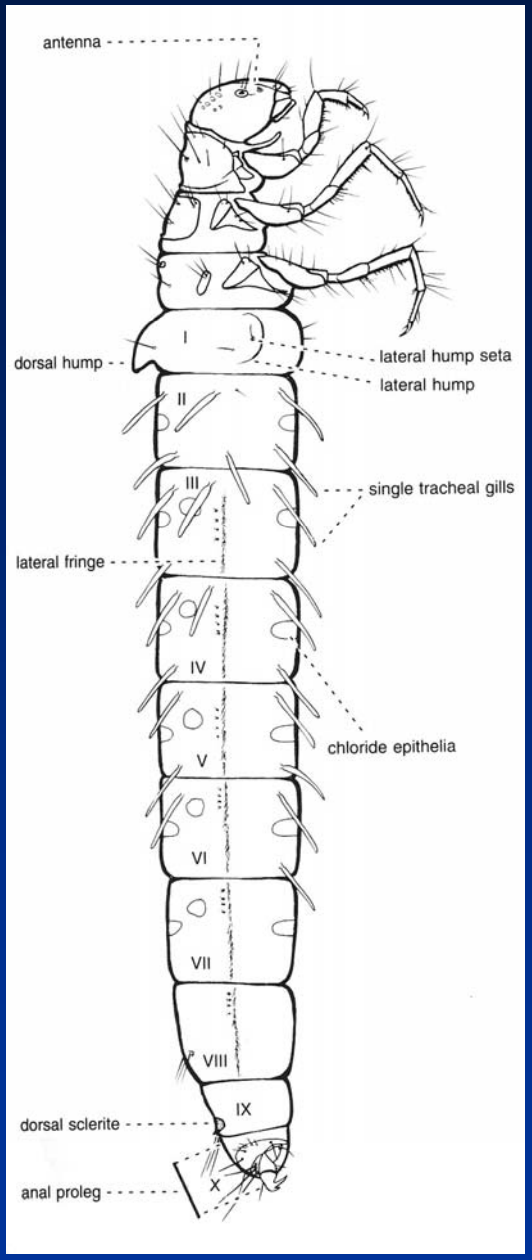
Head

Thorax

Abdomen



Peckarsky, et al. Freshwater Macroinvertebrates of Northeastern North America. 1990.



Wiggins. Larvae of the North America Caddisfly Genera (Trichoptera). 2nd ed. 1998.

Tips for learning identification?

PRACTICE

Consider taking a class at a local college

Find a local expert to coach you.

Let’s meet the bugs!

Group 1: Sensitive

MiCorps
Monitoring Michigan’s Water Quality

Caddisflies

Phylum: Arthropoda

Class: Insecta

Order: Trichoptera

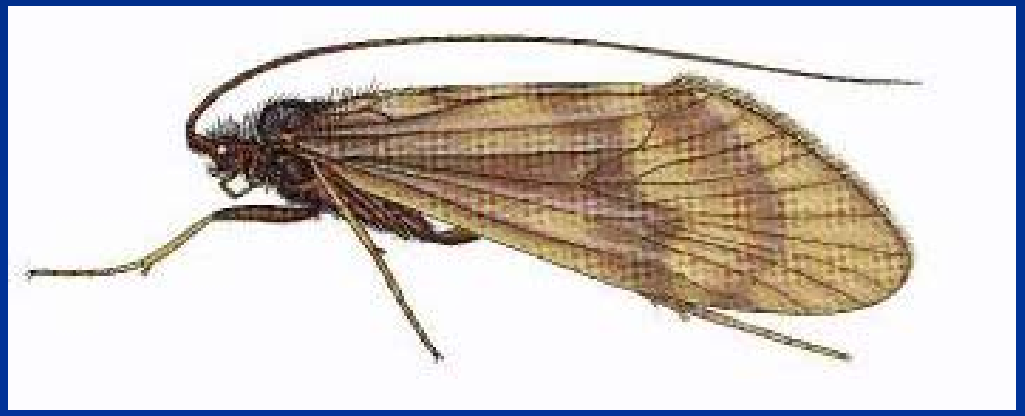


Figure 14.58. *Dicosmoecus* larval case

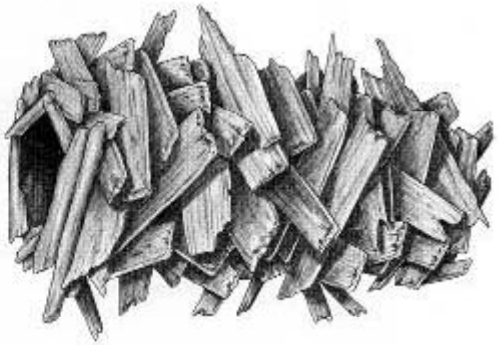


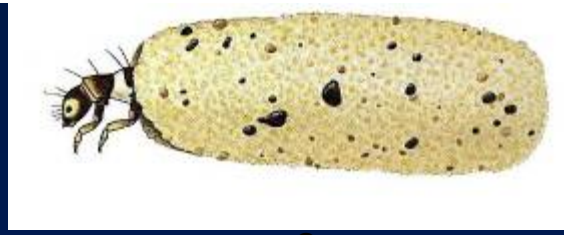
Figure 14.59. *Limnephilus* larval case

Figure 14.60. *Limnephilus* larval case

Figure 14.61. *Pycnopsyche* larval case

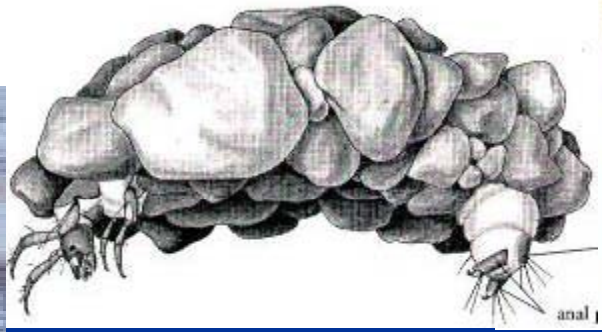
Figure 14.62. *Apatania* larval case

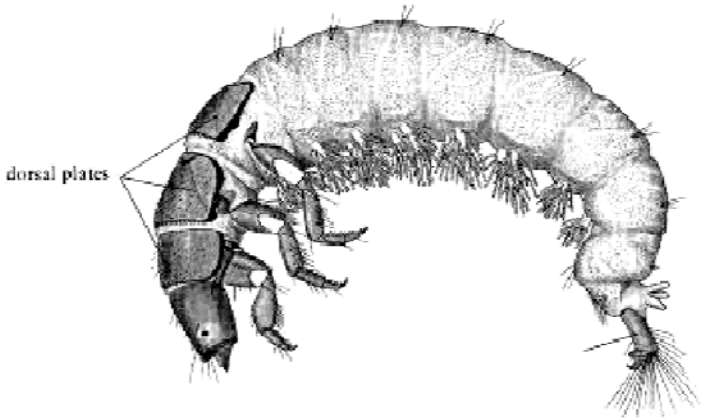
Figure 14.64. *Farula* larval case

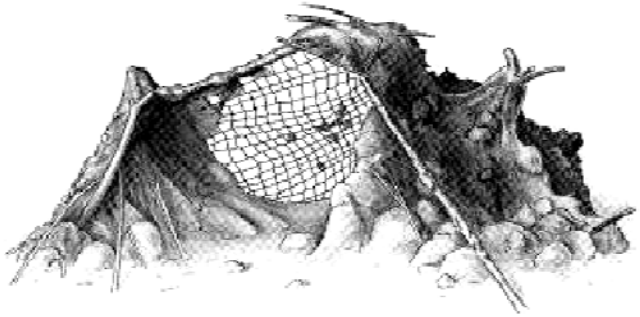


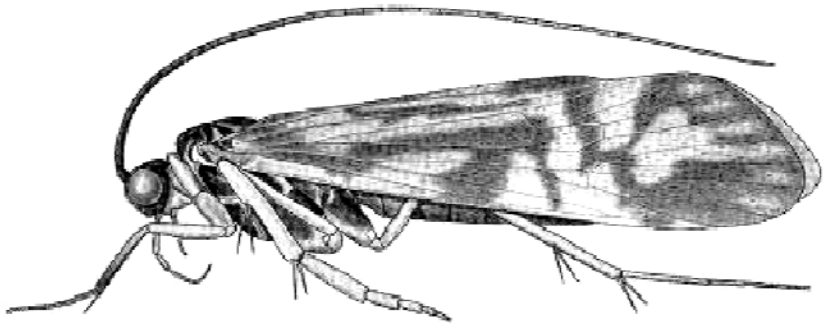
3mm

44mm









Common Net-spinning Caddisfly

NOT a sensitive species

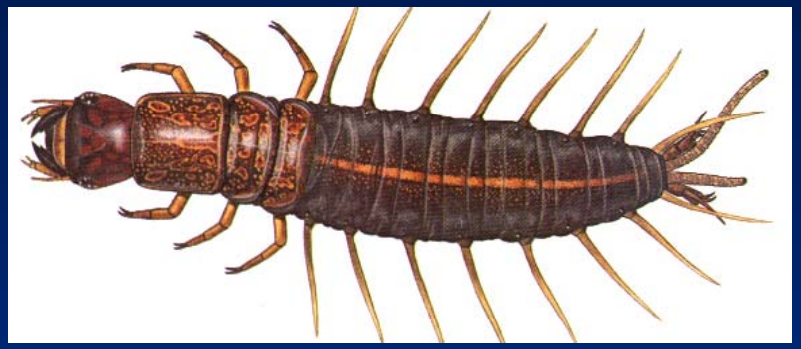
Phylum: Arthropoda

Class: Insecta

Order: Trichoptera

Family: Hydropsychidae

Order Megaloptera: Note the Differences!



Phylum: Arthropoda

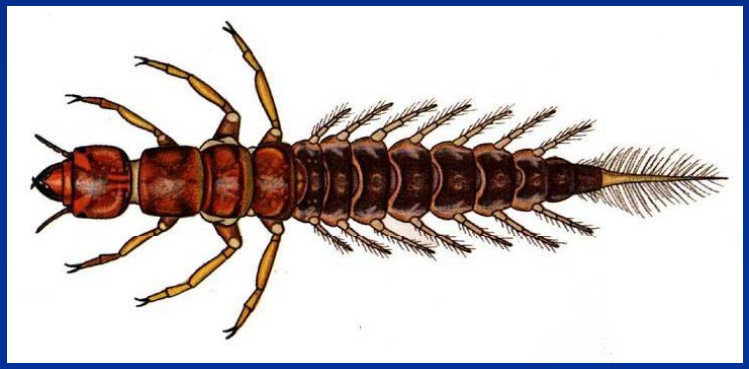
Class: Insecta

Order: Megaloptera

<u>Hellgrammite</u>

(family Corydalidae)

- No distinct, single tail
- Generally larger



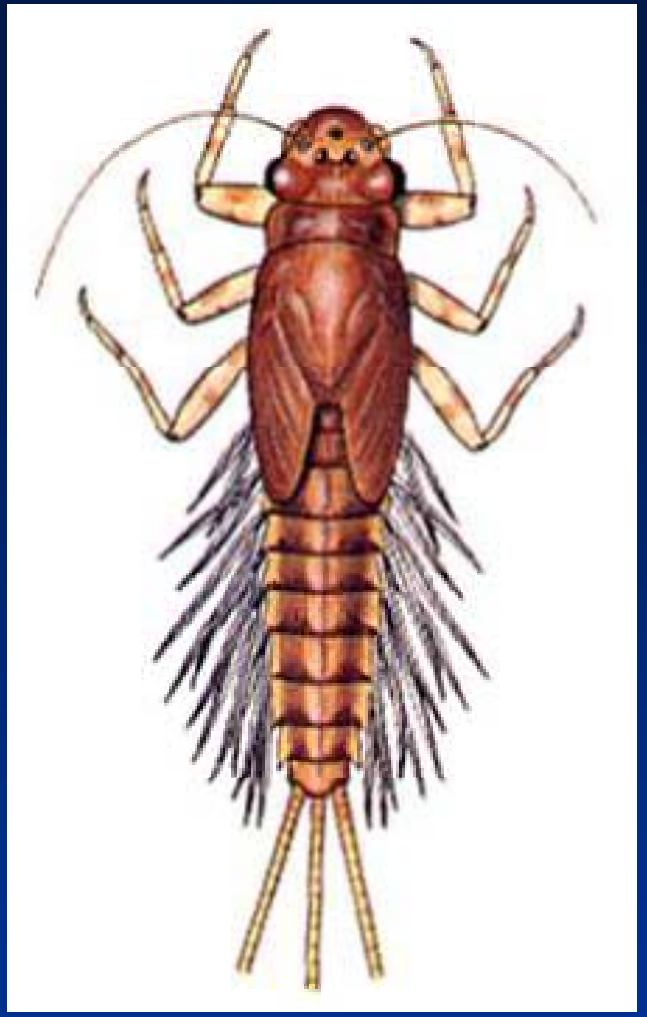
<u>Alderfly</u>

(family Sialidae)

Distinct, single tail

- Generally smaller

Mayflies



Phylum: Arthropoda

Class: Insecta

Order: Ephemeroptera

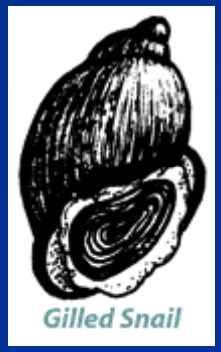
Gilled Snail

Phylum: Mollusca

Class: Gastropoda

Order: various

- Have an operculum or plate-like door that protects the opening of the shell and can be quickly closed to avoid predators.
- Coiled shells that usually open on the right-hand side (coils spin clockwise)



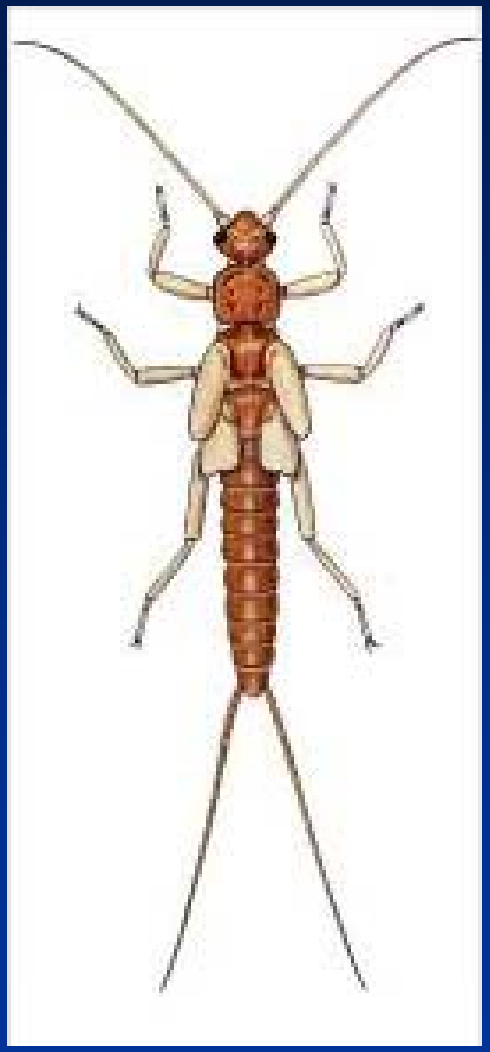
Stonefly

Phylum: Arthropoda

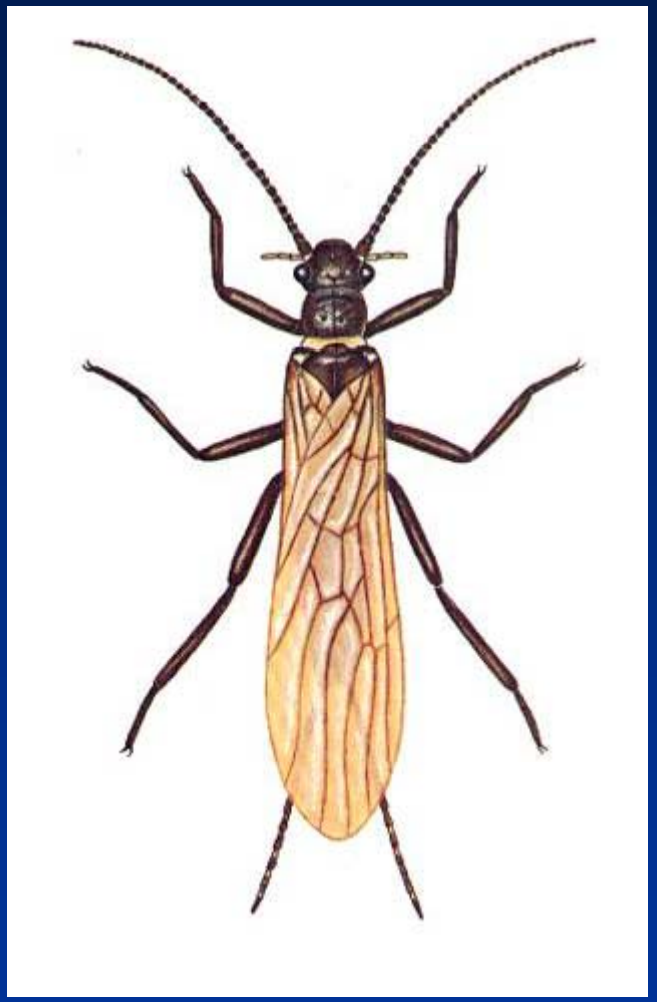
Class: Insecta

Order: Plecoptera

Figure 1 - Abdominal and thoracic gills of *Pteronarcys sp.* larvae (Pteronarcyidae)



Nymph



Adult

Water Penny

Phylum: Arthropoda

Class: Insecta

Order: Coleoptera

Family: Psephenidae

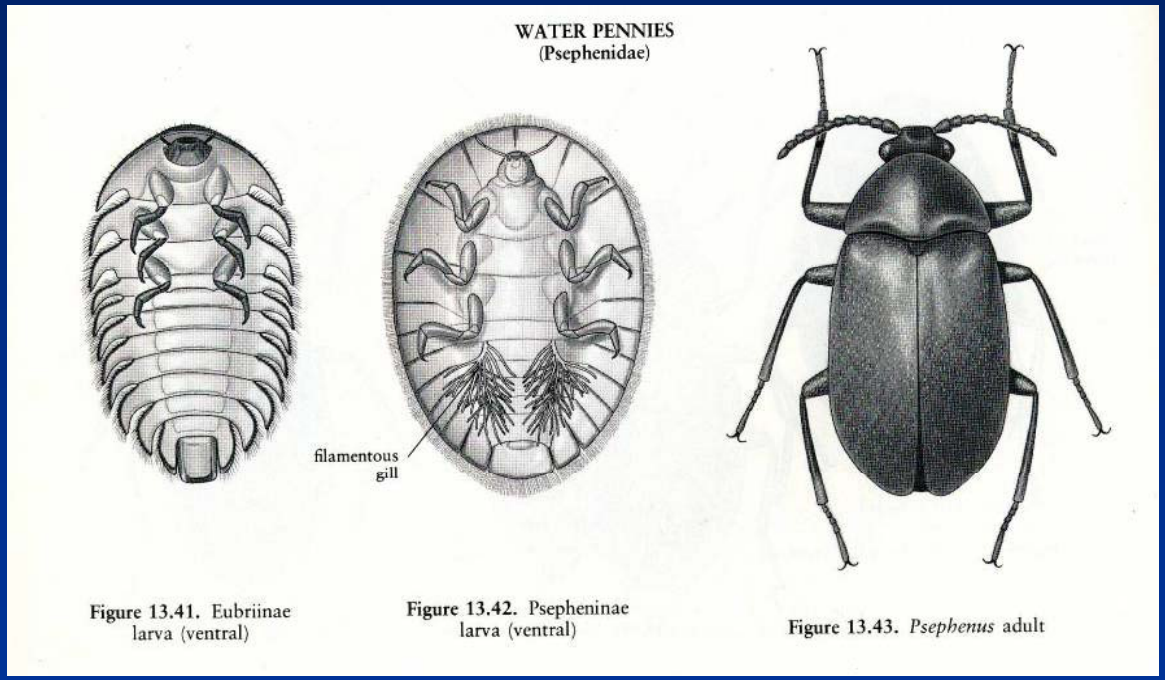


Figure 13.41. Eubriinae larva (ventral)

Figure 13.42. Psepheninae larva (ventral)

Figure 13.43. *Psephenus* adult

Watersnipe Fly

Phylum: Arthropoda

Class: Insecta

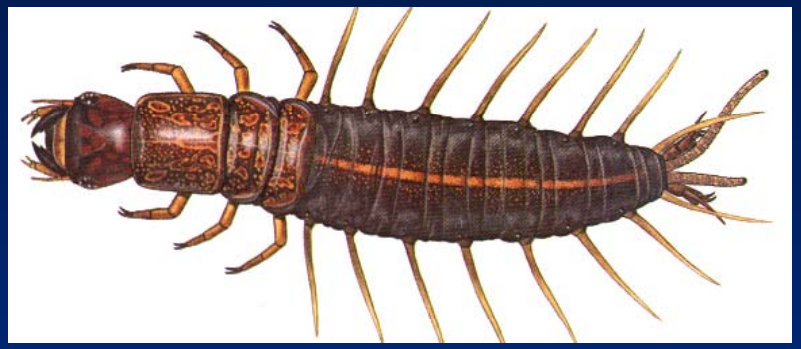
Order: Diptera

Family: Athericidae

Group 2: Somewhat-Sensitive

MiCorps
Monitoring Michigan's Water Quality

Order Megaloptera: Note the Differences!



Phylum: Arthropoda

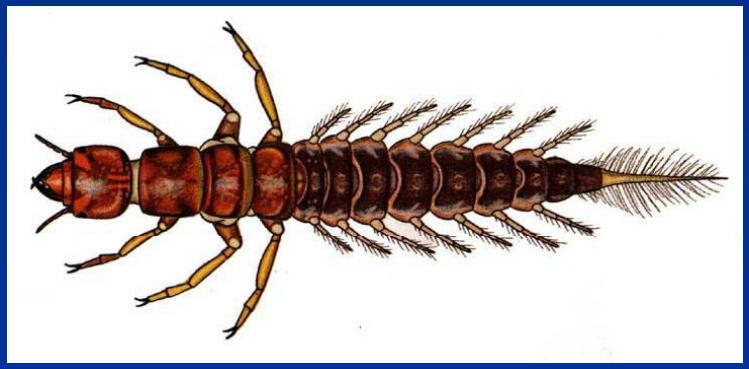
Class: Insecta

Order: Megaloptera

<u>Hellgrammite</u>

(family Corydalidae)

- No distinct, single tail
- Generally larger



<u>Alderfly</u>

(family Sialidae)

Distinct, single tail

- Generally smaller

Beetles

Phylum: Arthropoda

Class: Insecta

Order: Coleoptera

Beetles (order Coleoptera)

Chewing or biting mouthparts

3 Pairs of legs

Generally well sclerotized

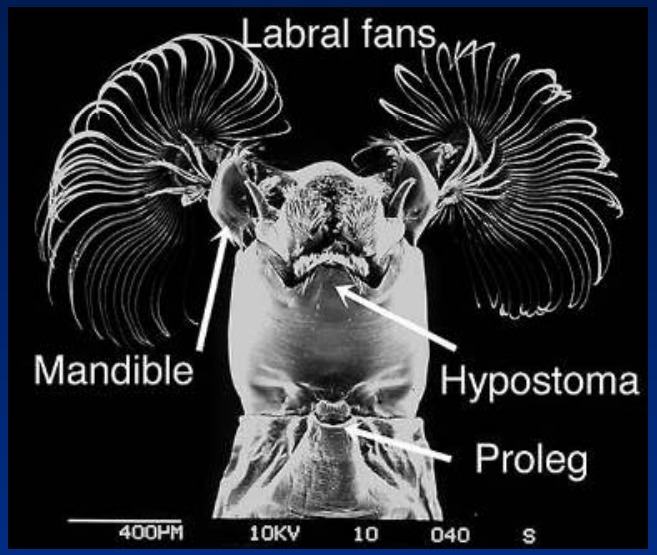
Black Fly

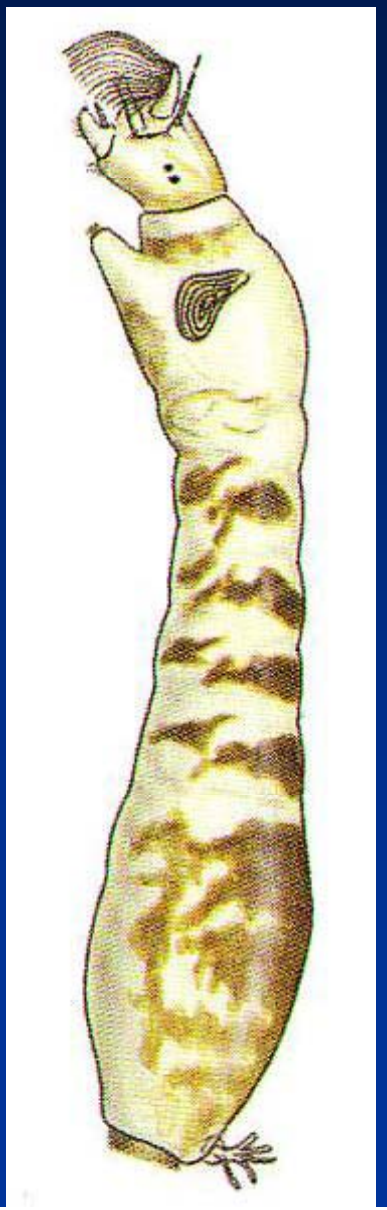
Phylum: Arthropoda

Class: Insecta

Order: Diptera

Family: Simuliidae





Clams & other bivalves (phylum Mollusca, class Pelecypoda)

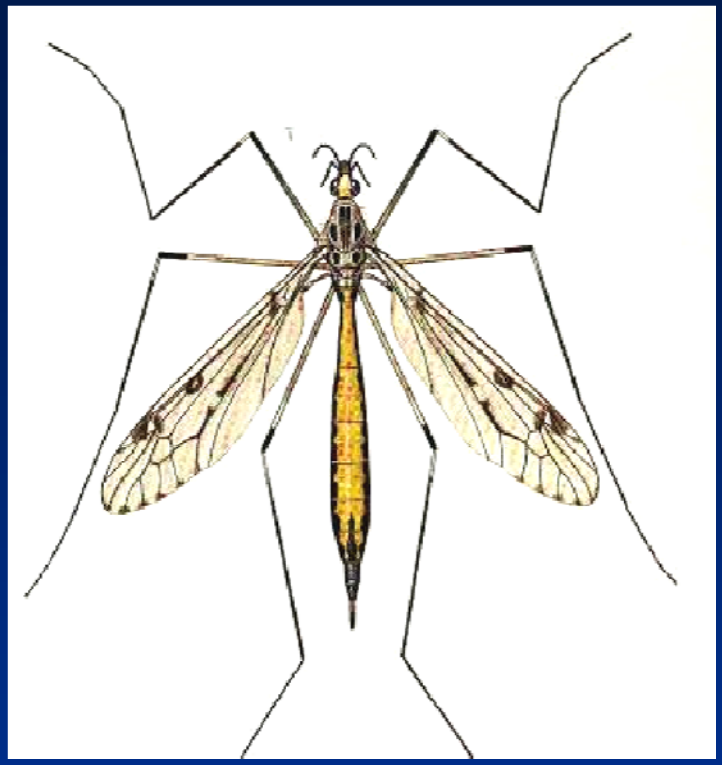
Phylum: Mollusca

Class: Pelecypoda

Order: various

Please ask that your volunteers do not take these from the river

Crane Fly



Huge Diversity in sizes

(one useful character:

mandibles on horizontal plane)

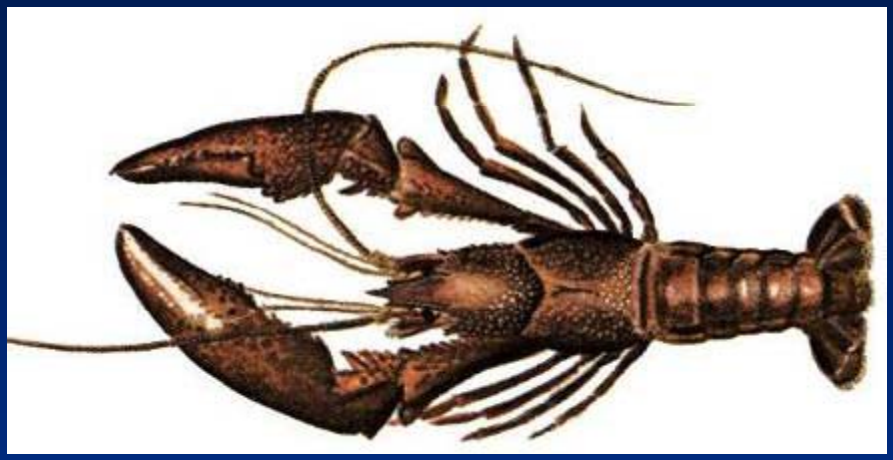
Phylum: Arthropoda

Class: Insecta

Order: Diptera

Family: Tipulidae

Crayfish- Don’t collect these either

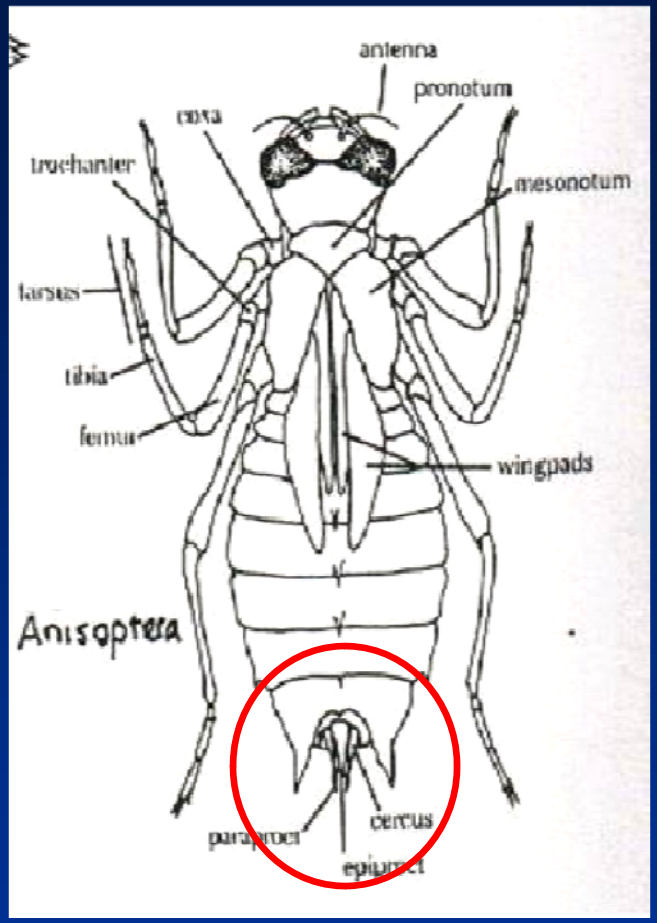


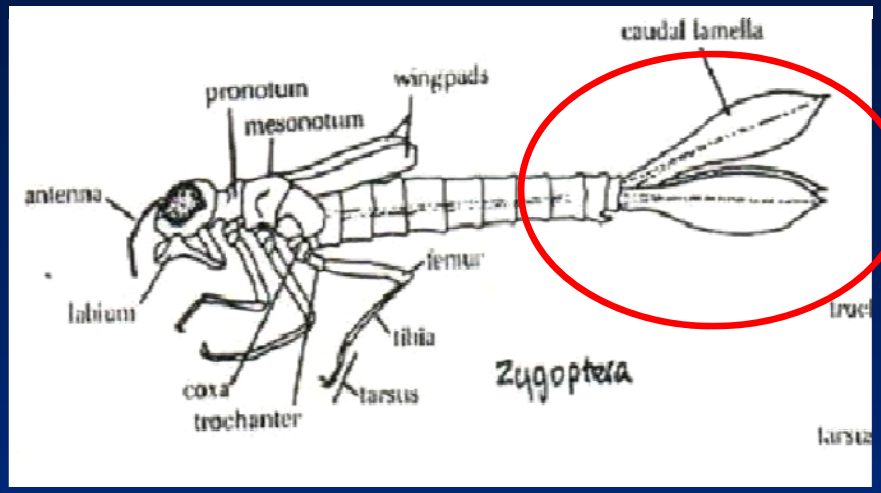
Phylum: Arthropoda

Class: Insecta

Order: Decapoda

Dragonflies & Damselflies





- Slender body
- Three tails
- •Don't confuse with mayfly

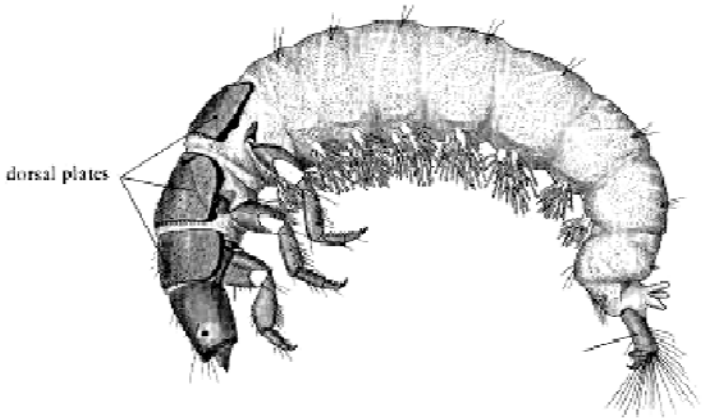
- Stout body
- No tails

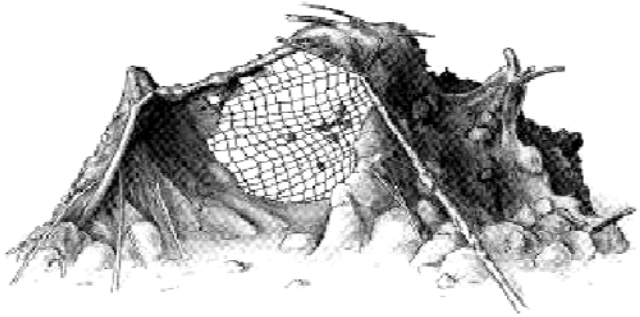
Phylum: Arthropoda

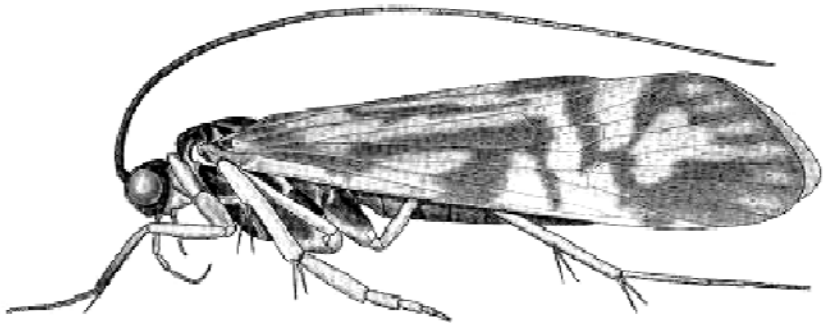
Class: Insecta

Order: Odonata

Suborder: Anisoptera & Zygoptera







Common Net-spinning Caddisfly

NOT a sensitive species

Phylum: Arthropoda

Class: Insecta

Order: Trichoptera

Family: Hydropsychidae

Scuds, Sideswimmers

Phylum: Arthropoda

Class: Crustacea

Order: Amphipoda

Sowbugs

Phylum: Arthropoda

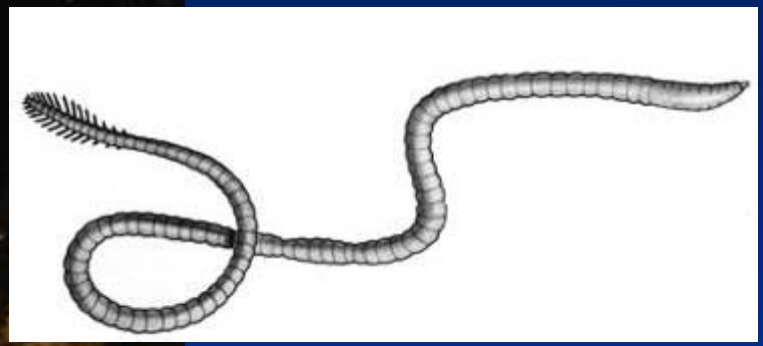
Class: Crustacea

Order: Isopoda

Group 3: Tolerant

MiCorps
Monitoring Michigan's Water Quality

Aquatic Worms (class Oligochaeta)



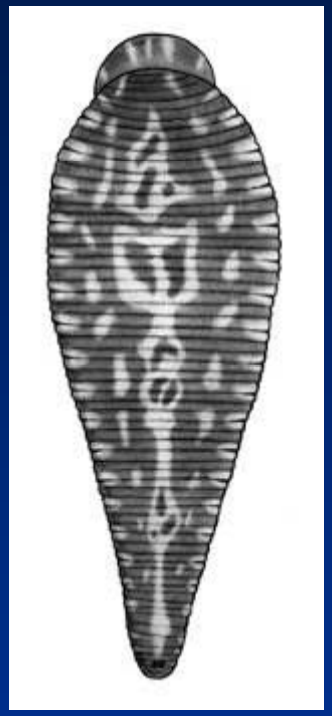
Note the segments!

Phylum: Annelida

Class: Oligochaeta

Order: various

Leeches



Many, many striations (surficial only)

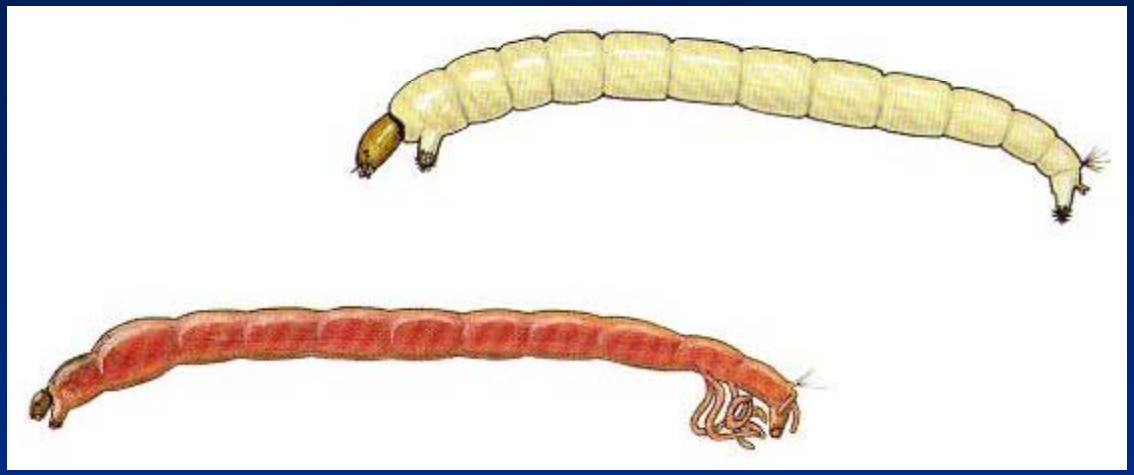
2 suckers- front and back

Phylum: Annelida

Class: Hirundae

Order: various

Midges



Phylum: Arthropoda

Class: Insecta

Order: Diptera

Family: Chironomidae

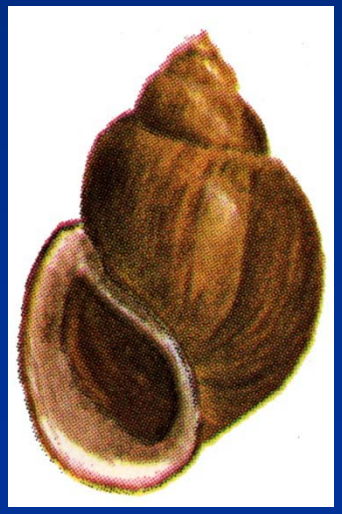
Miscellaneous Snails

- Do not have a plate-like covering over the shell opening.
- Has shell that spirals with opening usually on your left side (counter-clockwise), or shell that is coiled in one plane, or shell that is dome or hat shaped with no coils.

Phylum: Mollusca

Class: Gastropoda

Order: various

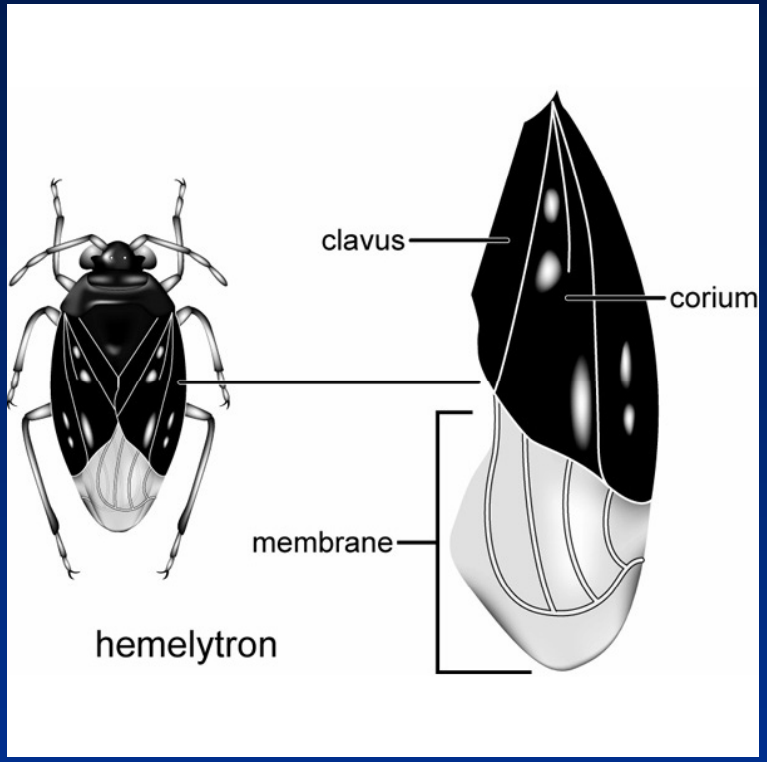


Left-handed snail

Planorbidae

Limpets

True Bugs



Tube-like sucking mouthparts

(except in water boatman)

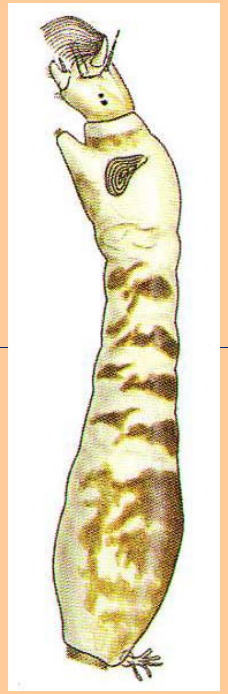
Wings hardened near the base and membranous everywhere else

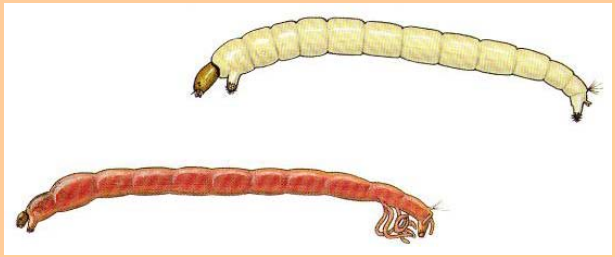
Phylum: Arthropoda

Class: Insecta

Order: Hemiptera

Other True Flies





Already seen…

Phylum: Arthropoda

Class: Insecta

Order: Diptera