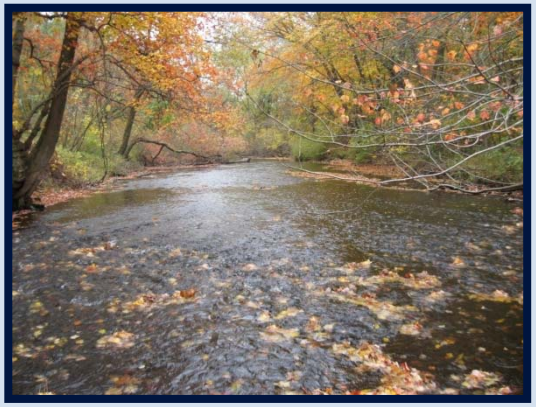
2017 CT Envirothon Aquatics Workshop: *Freshwater Macroinvertebrates*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“Macroinvertebrate”

MACRO: Large enough to be seen with the unaided eye. (The US EPA further defines macro as capable of being retained in a standard number 30-mesh sieve.)

INVERTEBRATE: An animal without a backbone.

Examples: insect larvae, crayfish, worms, clams, and mussels.

Movie: Aquatic Insects as environmental indicators

Aquatic insects as environmental indicators

Michael Plondaya

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https://www.youtube.com/watch?v=b4Gbv6-dktw

1,515 views

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7 0

What is a Biological Assessment?

BIOLOGICAL ASSESSMENTS: Evaluations of the condition of waterbodies using surveys and other direct measurements of resident biological organisms (macroinvertebrates, fish, and plants).

i.e. “Bioassessments”

Benefits of Bioassessments

- Results provide insight regarding the long term health of a waterway
- Results reflect effects of a wide range of pollutants versus chemically testing for one specific pollutant
- Relatively inexpensive method
- Preserved specimens allow verification of results

Aquatic Macroinvertebrates and Water Quality

- Live in wide range of water quality
- Characteristic responses to environmental stresses
- Established collection methodologies
- Ease of capture
- Rapid recovery from repeat sampling
- Life history/Limited mobility

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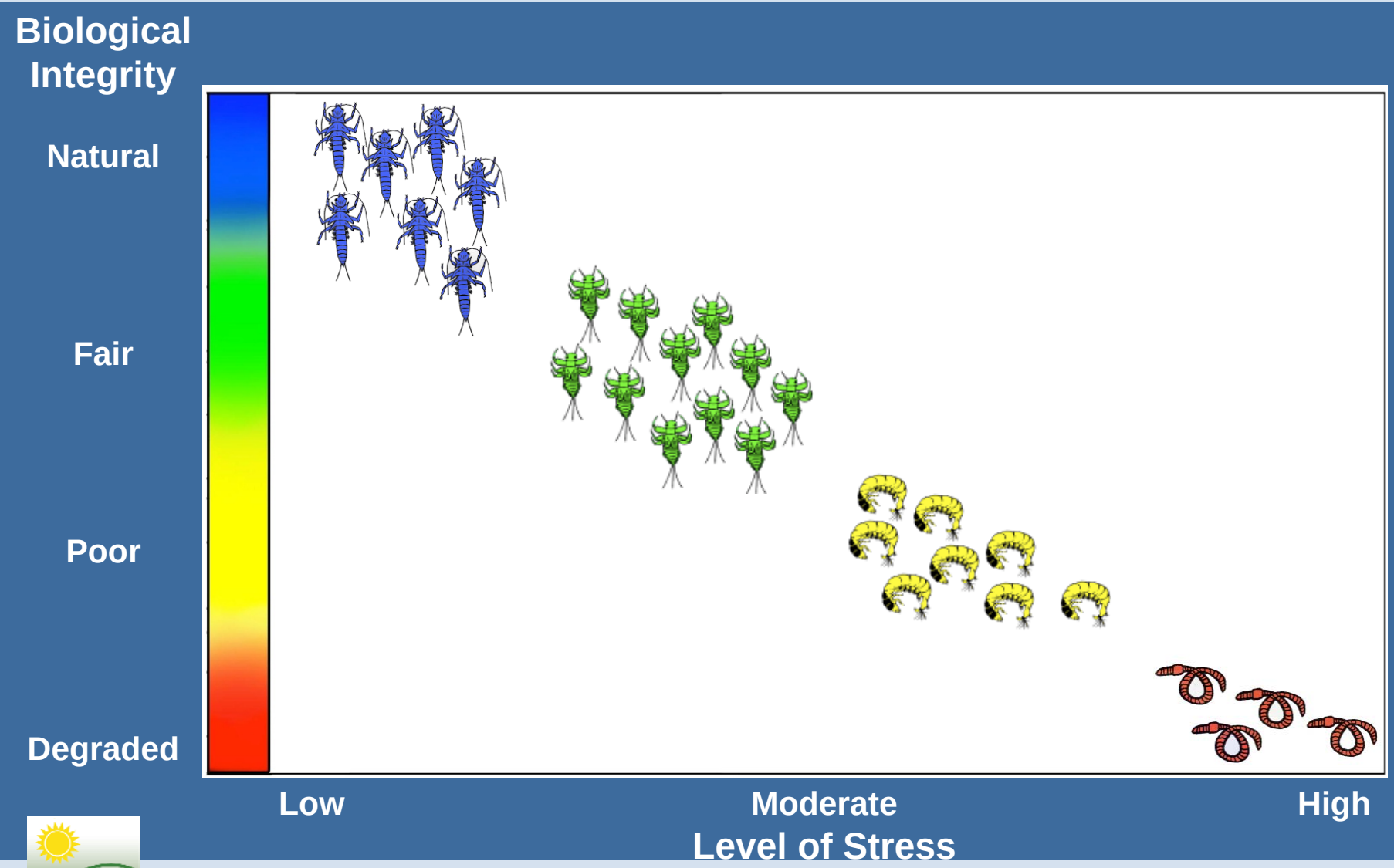
Pollution Tolerance Values

Tolerance Value	Example Organisms
0	Some Stoneflies, Some Caddisflies
1	Some Stoneflies, Some Caddisflies, Some Mayflies
2	Some Stoneflies, Some Caddisflies, Some Mayflies, One True Fly
3	No Stoneflies, Some Caddisflies, Some Dragonflies
4	Many Mayflies, Some Caddisflies, Some Beetles
5	Some Caddisflies, Some Beetles, Fishflies
6	Several True Flies, Some Caddis, Some Crustaceans
7	No Caddis, No True Flies, Gastropods, One Mayfly
8	No Mayflies, Aquatic Earthworms, One Crustacean
9	Several Damselflies
10	Leeches

Using Pollution Tolerance to Determine Stream Health



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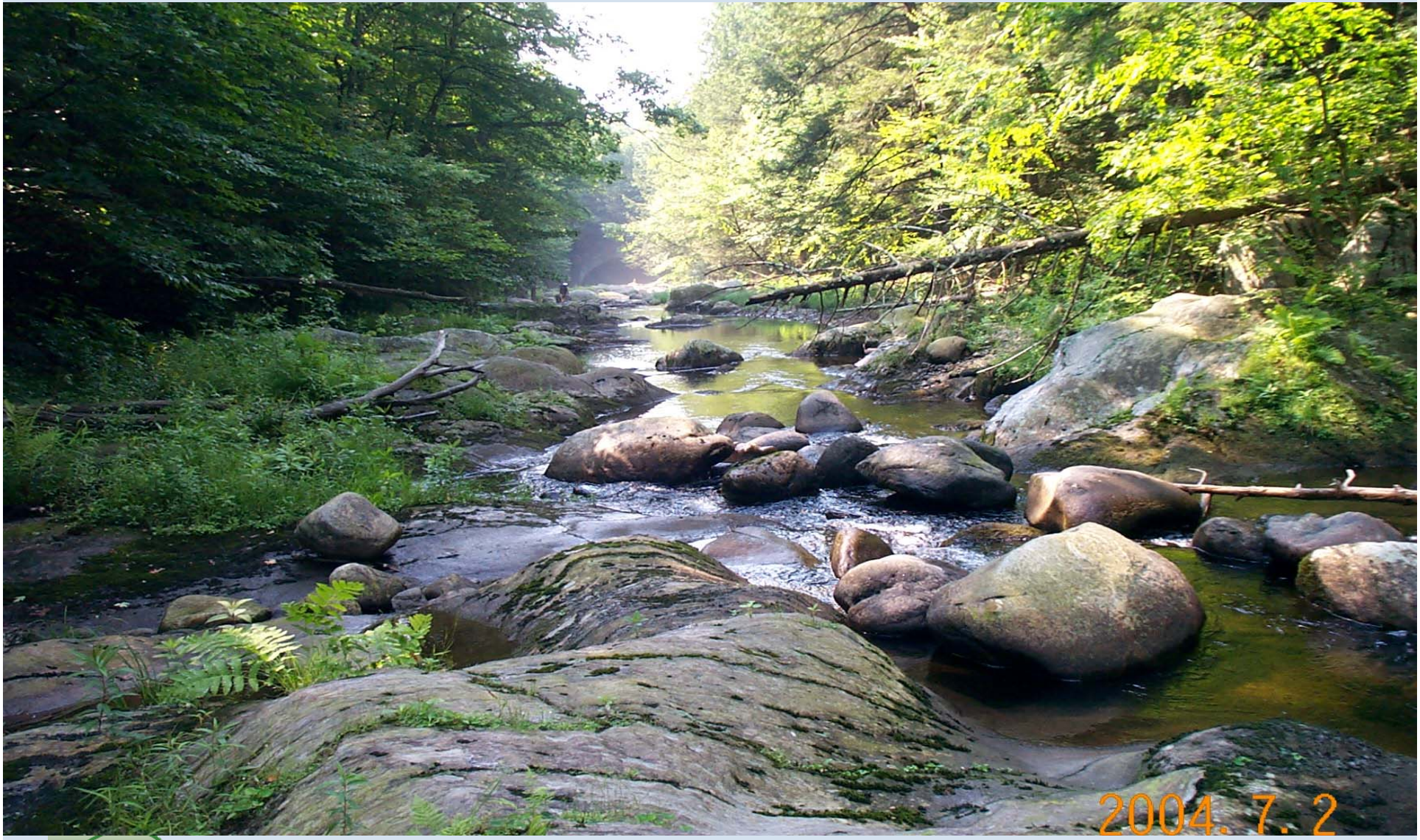
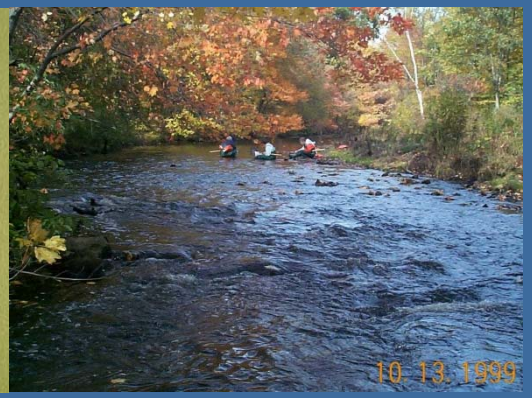
Before we continue - questions?





MACROINVERTEBRATE IDENTIFICATION

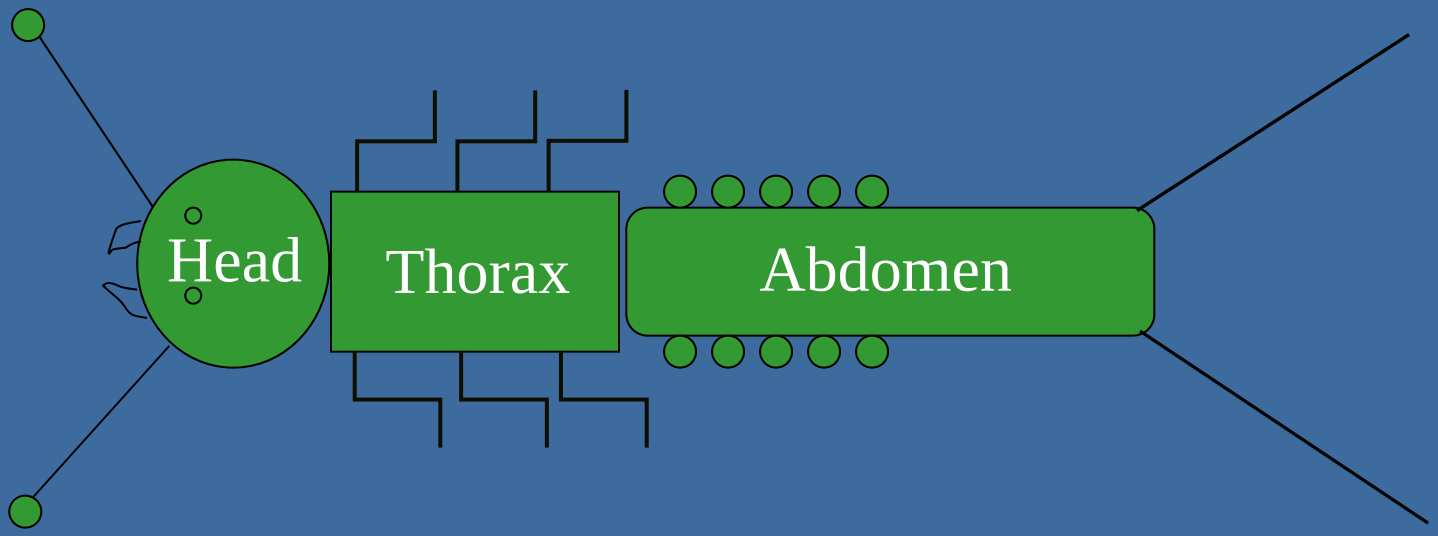


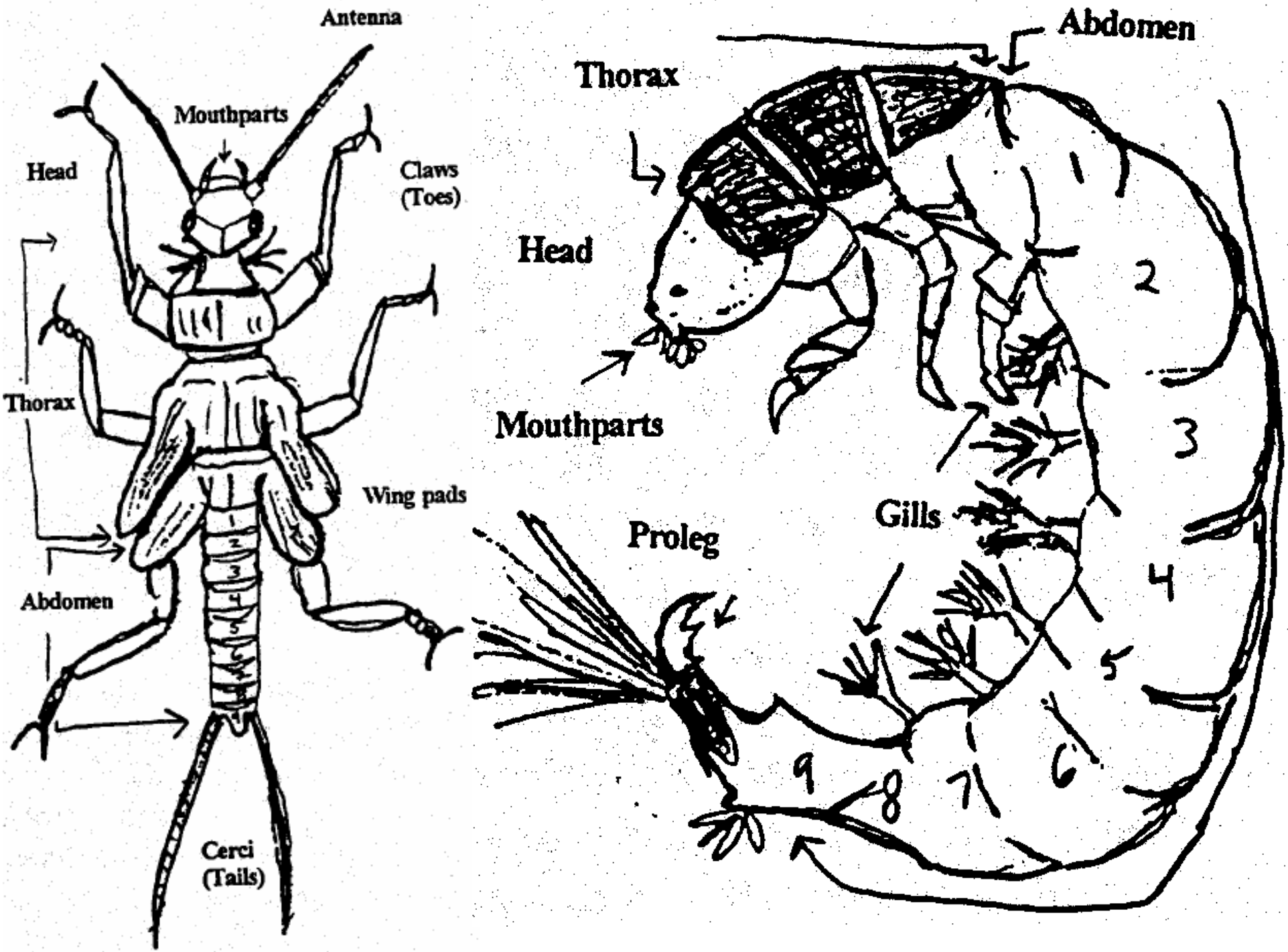


Macroinvertebrate Anatomy

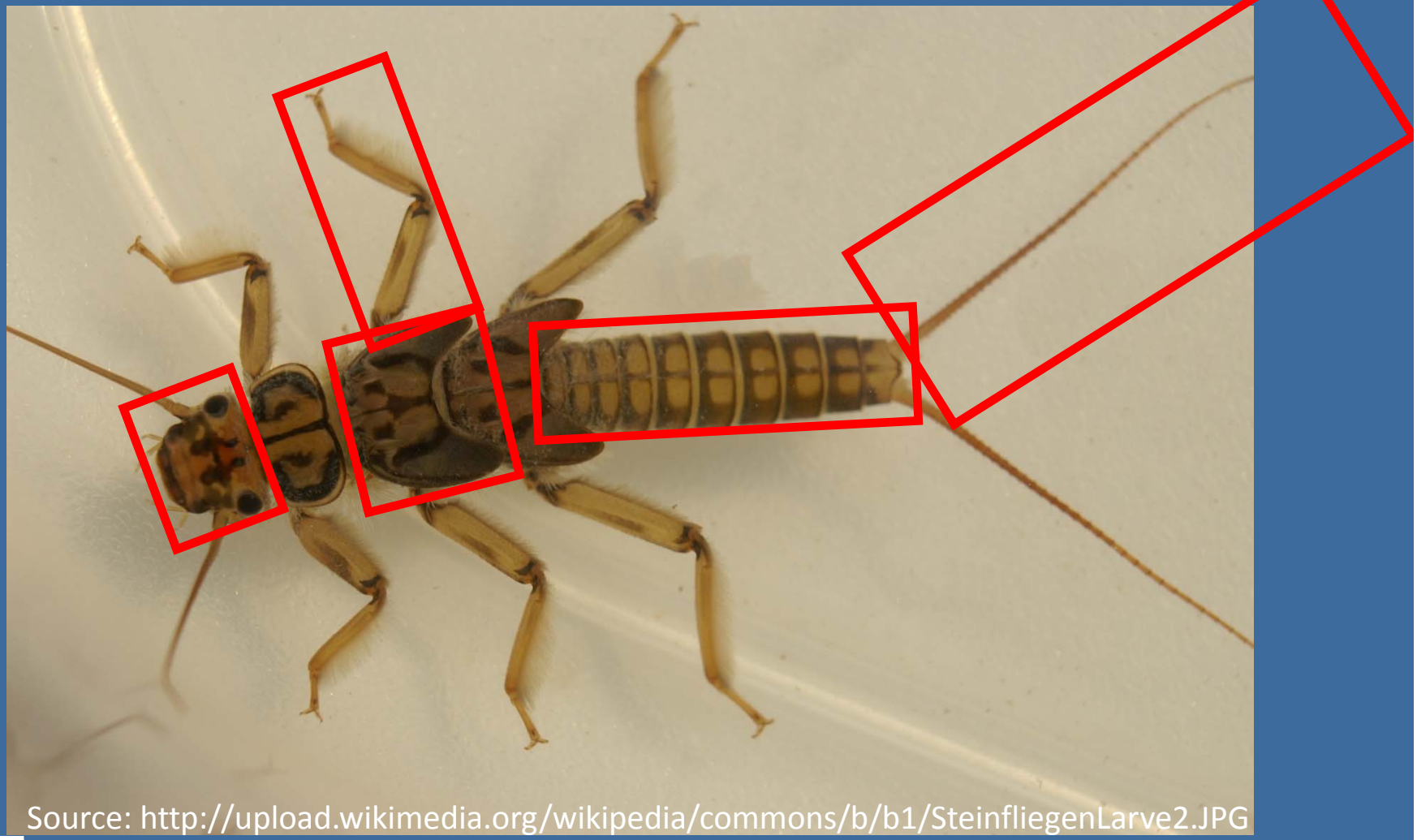
To use the key you must be familiar with insect anatomy.

Start with the Basics:

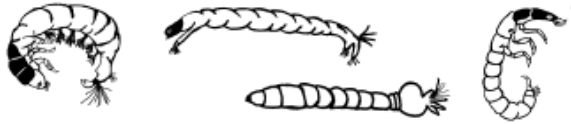


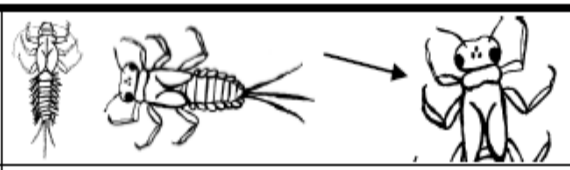
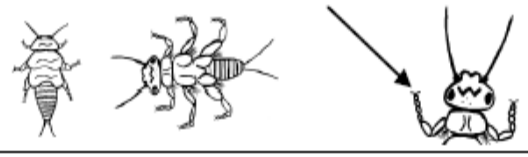

Antenna
Mouthparts
Head
Claws
(Toes)
Thorax
Wing pads
Abdomen
Cerci
(Tails)
Abdomen
Thorax
Head
Mouthparts
Gills
Proleg
1
2
3
4
5
6
7
8
9

Macroinvertebrate Anatomy



Source: http://upload.wikimedia.org/wikipedia/commons/b/b1/SteinfliegenLarve2.JPG

1	Which body type does the organism have?	**a.** Flattened (NOT cylindrical or worm-like), with large segmented legs ……. Go to #2	
		b. Cylindrical, fleshy or worm-like, and may or may not have legs or tails ……. Go to #32	
		c. Round, triangular, or another shape ……. Go to #53	
		d. Body is inside of stick or stone case/shelter ……. Go to #55	

2	The organism has a flattened (not cylindrical) body, longer than it is wide, with large segmented legs **AND**	a. 2-3 long *hair-like* tails, with 1 hook/toe at the end of each leg ……. Go to #3	
		b. 2 long *hair-like* tails, with 2 hooks/toes at the end of each leg ……. Go to #11	
		c. Any of the following: No tails; 1 hair-like tail; Wide, paddle-like tails; or Hooks at the end of the body ……. Go to #19	

11	Does the organism have a tuft of fluffy gills at the base of each leg?	Yes.....Go to #12	
		No.....Go to #13	

12	Is the organism jet-black?	Yes..... ***Pteronarcyidae*** (Go to #102) [Giant Stonefly/0/Occasional]	
		No..... ***Perlidae*** (Go to #100) [Common Stonefly/1/Probable]	

Plecoptera Order

Common Name: Stoneflies

Trivia: All stoneflies are very intolerant of organic pollutants. They have two tails and two tarsal claws (toes) at the end of each leg. They are all dorsally flattened. Stoneflies prefer to live in very fast moving water under rocks and in organic debris. All stoneflies indicate high water quality.

100

Family: Perlidae
Pollution tolerance: 1 (low)
Feeding group: Predator
Location in stream: Burrowed in substrate

Common Name: Common Stonefly
Probability: Probable
Type of stream: Moderate to fast flows, High gradient
Location in key: #12

Trivia: This stonefly is very common in the streams of CT. The nymph can grow to 1.5 inches long and comes in a variety of brown color patterns. Perlid stoneflies have a tuft of gills where the leg meets the body, which may look like hairy armpits. When these organisms are in an oxygen-stressed environment, they will try to physically move water over their gills by doing push-ups.

Let's Try It! Macro ID Practice

Each Team Should Have:

- ✓ Ice cube dish w/ 6 specimens
- ✓ Petri dish
- ✓ Water bottle
- ✓Tweezers
- ✓ Magnifying glass
- ✓ Microscope*
- ✓ Identification keys (3 versions)

Answer Key

Container A = Hydropsychidae

Container B= Tipulidae

Container C= Ephemerellidae

Container D= Corydalidae

Container E= Psephenidae

Container F= Philopotamidae

Container 1= Perlidae

Container 2= Rhyacophilidae

Container 3= Baetidae

Container 4=Elmidae (adult)

Container 5=Aeshnidae

Container 6= Limnephilidae

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