Students Identify and Photograph Macroinvertebrates ... and You Can, Too!

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(Delaware-Chenango-Madison-Otsego Board of Cooperative Educational Services)

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3.14.15

Happy Pi Day!
Happy Birthday

“Everything should be made as simple as possible, but no simpler.”

Albert Einstein
Aquatic Macroinvertebrate Digital Card Project

DCMO BOCES - Harrold Campus
Visual Communications Program
Security and Law Enforcement Program
Conservation and Equipment Technology Program

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Aquatic Macroinvertebrates
Digital Card Project

Project Overview
Photographic Techniques
Macroinvertebrate Identification
???
The Setting
February 2002 - before the cleanup
(within the watershed of the Trout Creek sampling location)

After 15 years, site still toxic
What is a Macroinvertebrate?
Not Macroinvertebrates
Am I a macroinvertebrate?
What is an Aquatic Macroinvertebrate?
I’m an aquatic macroinvertebrate!
Collecting Aquatic Macroinvertebrates
Doing the “Macro Shuffle”
Security and Law Enforcement Students finding and separating the macro-invertebrates
Security and Law Enforcement students identifying the macroinvertebrates
Guide to Aquatic Invertebrates of the Upper Midwest
Identification Manual for Students, Citizen Monitors, and Aquatic Resource Professionals

http://edengelman.com/Macro/UMNguidebook.html
ORDER EPHEMEROPTERA
Mayflies

Mayfly larvae are found in a variety of locations including lakes, wetlands, streams, and rivers; however, they are most common and diverse in lotic habitats. They are common and abundant in running rills and pools, at lake margins and in some cases lake bottoms. All mayfly larvae are aquatic with terrestrial adults. In most mayfly species the adult only lives for 1-2 days. Consequently, the majority of a mayfly's life is spent in the water as a larva. The adult lifespan is so short there is no need for the insect to feed and therefore the adult does not possess functional mouthparts. Mayflies are often an indicator of good water quality because most mayflies are relatively intolerant of pollution. Mayflies are also an important food source for fish.

Ephemeroptera Morphology

Most mayflies have three caudal filaments (tail) (Figure 4.1) although in some taxa the terminal filament (middle tail) is greatly reduced and there appear to be only two caudal filaments (only one geast actually lacks the terminal filament). Mayflies have gills on the dorsal surface of the abdomen (Figure 4.1), but the number and shape of these gills vary widely between taxa. All mayflies possess only one coxal gill at the end of each leg (Figure 4.1). Characters such as gill shape, gill position, and thoracic claw shape are used to separate different mayfly families.

Figure 4.1: Dorsal view of ephemeropteran larva.
8(7').  Head and body flattened (Figs. 4.26, 4.27) .........................  Heptageniidae  p. 58

Figure 4.26: Heptageniidae larva, Lateral View.

Figure 4.27: Head of *Stenonema exiguum* (Heptageniidae) larva, Dorsal View.

8'.  Head and body not flattened (Fig. 4.28) .......................................................... 9

Figure 4.28: *Baetis* sp. (Baetidae) larva, Lateral View.

http://wrc.umn.edu/prod/groups/cfans/@pub/@cfans/@wrc/documents/asset/cfans_asset_115805.pdf
### Heptageniidae

<table>
<thead>
<tr>
<th>Common Name:</th>
<th>Flathead Mayflies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding Group:</td>
<td>Scrapers</td>
</tr>
<tr>
<td>Tolerance Value:</td>
<td>4 (Moderate)</td>
</tr>
<tr>
<td>Habitat:</td>
<td>Flathead mayflies are most common in slow to fast flowing streams where they occur on the surface of rocks, logs, vegetation, and leaves.</td>
</tr>
<tr>
<td>Size:</td>
<td>Small to large (5-20 mm)</td>
</tr>
<tr>
<td>Characteristics:</td>
<td>Body, head, and legs (femora) flattened; mouthparts not visible from dorsal view; gills present on abdominal segments 1-7; only short setae present on caudal filaments.</td>
</tr>
<tr>
<td>Notes:</td>
<td>Flathead mayflies are very common in streams in the Upper Midwest. They are well adapted for swift flowing waters. Their bodies, head, and legs are flattened which reduces drag by forcing water over the organism. Most of these mayflies feed on algae and microorganisms growing on rocks. One genus of heptageniid mayfly has only two tails, but can be separated from stoneflies by the presence of a single tarsal claw at the end of each leg.</td>
</tr>
</tbody>
</table>

![Figure 4.47: *Stenonema exiguum* (Heptageniidae) larva, Dorsal View.]
If you can’t figure out the identity of the macroinvertebrate that you are viewing, take clear pictures of it and email it to someone who may be able to help!

Life is like a Camera

Just focus on what’s important.
Capture the good times.
Develop from the negatives.
And if things don’t turn out.
Just take another shot.
John Shaw's Closeups in Nature

The photographer's guide to techniques in the field
Macroinvertebrate Bathing Station
Tools to handle macroinvertebrates: spoon, spatula, soldering flux brushes, pipettes, watercolor brushes
Lens and glass cleaning supplies
Micro-aquarium
Building a micro-aquarium.
Camera stand made from steel rods, rod clamps, and automotive brake rotor.

Light stand from “J” bolts, and test tube clamp, with wood base.
OLYMPUS TG-3 DIGITAL CAMERA on a OBEN BD-0 TABLE TOP BALL HEAD

The camera and Table-Top Ball Head is supported by a shop-made rod with flattened end with hole to accept the Ball Head held by a lab type clamp in a brake rotor stand.
Tripod with home-made camera bracket
Points of interest should be parallel to the LCD Screen/Viewfinder/Film
Parallel

Not Parallel
Image taken with OLYMPUS TG-3 Point and Shoot Camera with Focus Stacking

Northern Case-Maker Caddisflies
By using compact fluorescent lighting for your photography vs incandescent bulbs, you reduce the risk of overheating your live samples.
Spectra

Daylight

3,000K CFL

Incandescent

5,000K CFL
Next Step: Design a Template
Visual Communications students designing and crafting the cards using Photoshop, InDesign and exporting files in pdf format.
Important note: The following macroinvertebrate identification cards are a preliminary draft. For the workshop presentation on March 15, the images shown here were linked to the preliminary draft pdf of each macroinvertebrate card.

The final digital cards will be available before the end of this school year (June, 2015). If you would like a set of the digital cards email Ed Engelman at engelmae@dcmoboces.com
You will be notified when they become available and will be provided a link to the download site(s).
Special Cards

GILLS
A
B
C
D
E
F
G

NOT GILLS

LEGS
A
B
C
D
E
F
G

NOT LEGS BUT LOOK LIKE LEGS

Range of Sizes: [Photographs are not to scale]
EPHEMEROPTERA
Mayflies
PLECOPTERA
Stoneflies
TRICHOPTERA
Caddisflies
TRICHOPTERA (Continued)
Caddisflies
ODONATA
Dragonflies & Damselflies
MEGALOPTERA
Fishflies, Alderflies, Dobsonflies

[Image of a Hellgramite larva]
COLEOPTERA
Aquatic Beetles
Non-Insect Macroinvertebrates
DIPTERA
Aquatic and Semiaquatic True Flies
Thank you
Questions?