

Aquatic Insect Lab Practical

Adapted from: An original Creek Connections activity.
Creek Connections, Box 10, Allegheny College, Meadville, Pennsylvania 16335.

Grade Level: Basic, intermediate or advanced.

Duration: depends

Setting: classroom

Summary: Student will conduct background academic research on different aquatic insects.

Objectives: Discover that there is a great diversity of aquatic insects each with unique identification characteristics, behaviors, habitat needs, and ecosystem roles.

Vocabulary: macroinvertebrates, stream ecologist, entomologist.

Related Module Resources:

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Materials (Included in Module):

- Aquatic Macroinvertebrate Fact Sheets for individual aquatic insects [Binder]
- Book resources
- Preserved aquatic insect reference collection
- Station numbers [Envelope]
- Station questions [Envelope]

Additional Materials (NOT Included in Module):

- Internet (optional)

ACADEMIC STANDARDS (ENVIRONMENT AND ECOLOGY)

7th Grade

4.3.7.A Identify environmental health issues.

- Identify various examples of long-term pollution and explain their effects on environmental health

4.3.7.B Describe how human actions affect the health of the environment.

- Identify land use practices and their relation to environmental health

4.7.7.A Describe diversity of plants and animals in ecosystems.

- Select an ecosystem and describe different plants and animals that live there

10th Grade

4.1.10.C Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.

- Describe and explain the physical factors that affect a stream and the organisms living there
- Identify terrestrial and aquatic organisms that live in a watershed
- Identify the types of organisms that would live in a stream based on the stream's physical characteristics

4.3.10.C Explain biological diversity as an indicator of a healthy environment.

- Explain species diversity

12th Grade

4.1.10.C Analyze the parameters of a watershed.

- Interpret physical, chemical and biological data as a means of assessing the environmental quality of a watershed
- Apply appropriate techniques in the analysis of a watershed (e.g., water quality, biological diversity, erosion, sedimentation)

4.3.10.C Analyze the need for a healthy environment.

- Explain how human systems affect the environment

4.7.10.A Analyze biological diversity as it relates to the stability of an ecosystem. Examine and explain what happens to an ecosystem as biological diversity changes

BACKGROUND:

Other activities in this module/curricular unit have covered many topics pertaining to aquatic macroinvertebrates. Aquatic insects play an important role in a stream ecosystem because of their unique characteristics and great diversity.

Macroinvertebrates are organisms without internal skeletons that can be seen with the unaided eye (often considered larger than 0.5mm). Reference to the term "aquatic macroinvertebrates" can include arthropods (insects in all life cycle stages, nymph, larva, pupa, or adult or crustaceans or arachnids), mollusks, and worms.

Many of the aquatic insects found in our waterways are going through different stages in their life cycles - either stages from a full, complete metamorphosis or an incomplete metamorphosis. Some insects you find will be larva or nymphs (not adults yet). Some will be adults that hang out in or on top of the water instead of buzzing around your head.

Aquatic macroinvertebrates can be found in a variety of waterways, ranging from small streams tumbling out of the mountains to medium sized creeks curving past a town to a large, slow moving river. They can also be found in standing water like a small pond or lake or even a puddle in a drainage ditch. Habitat needs vary for insects, but there must be enough food, shelter, and protection to survive. The water quality conditions must be sufficient as well. Some aquatic macroinvertebrates can only survive in very clean streams, while some insects can tolerate moderate to high amounts of pollution. The reaction to pollution of aquatic insects is an important investigative tool used by **stream ecologists** (a scientist who studies the interactions between living and non-living things that occur in streams) to determine stream health.

In order to survive in the water, whether as a larva, nymph, or adult, aquatic insects have special body or behavioral adaptations. These adaptations may enable the creature to breath or move more effectively. These adaptations may keep the creature from being washed away or from being pursued by predators. These adaptations may help the insect find enough food to survive. The way aquatic insects eat, move, breath, escape predation all help make each creature different. Sometimes these adaptations help us identify them or distinguish them from a similar species. We can identify aquatic insects using books, pictures, and dichotomous keys.

An **entomologist** is a scientist who studies insects. Entomologists who study aquatic insects recognize that there are many differences and unique characteristics and behaviors for these organisms. These characteristics help to classify the insects into different taxonomic (naming groups), feeding groups, pollution tolerance groups, life cycle categories, and habitat preference groups. In this activity, you will become an entomologist and stream ecologist, applying what you have learned in other aquatic insect activities and experiments. You will participate in a lab practical to test your aquatic macroinvertebrate knowledge.

OVERVIEW:

Students will participate in a lab practical - a hands-on, investigative examination of many topics pertaining to aquatic insects. This lab practical will involve identifying insects, examining body features, classifying insects into various functional groups, making connections between insects and their habitat and water quality needs.

PROCEDURE:

Teacher Preparation:

1. Locate the following:
 - a) aquatic insect identified reference collection
 - b) aquatic insect unidentified reference collection
 - c) live aquatic insects (optional)

- d) microscopes, magnifying glasses
 - e) Aquatic Macroinvertebrate Fact Sheets for individual aquatic insects
 - f) Dichotomous keys and/or other identification guides/resources.
2. Use the Lab Practical Questions / Answers Chart to set up various stations in your classroom/lab. Station # labels are included in the module. The chart includes a Question # (actually a letter) and the question. These two columns will be included as part of the lab station at a lab table or desk. These have already been copied and cut out for you and are included in the module. For the teachers only reference, the chart also includes the answer and the materials needed to set up that particular station. NOTE: You do not have to use all of the stations/all of the questions. Pick and choose. Make up your own. Whatever. This is why the questions are labeled with letters instead of station numbers. You can eliminate some questions or reorder them. Whatever. Just make sure you write down what question (letter) goes with each station for you answer key.
 3. Set up the lab stations prior to class. Some stations will need a microscope. Some can use either a scope or just a magnifying glass. Some need no magnifying device. You may elect to pre-focus any specimens under the scopes.
 4. Photocopy the blank answer sheet at the end of this activity write up for students to fill in their responses.
 5. This activity can be used as a review activity or as an examination/ part of an examination.

Student Activity:

1. Tell students that they will go from station to station in numerical order (you may elect to have a map of the station locations drawn on the chalkboard). The students will rotate when the teacher announces to “rotate.” Students DO NOT rotate at their own pace. If done early, wait until “rotate” has been announced.
2. The students will have a certain amount of time at each station to read the question, investigate the materials at that station, and write an answer on their answer sheet for that particular station number. The teacher will have to decide on a sufficient amount of time to spend at each station based on the amount of the time in the class period, the level of knowledge of the student, and the number of stations. Indicate to students that you will give them X minutes at the end of the last station to go back to any station they want to further investigate, double check an answer, or to finish an answer.
3. Tell students to ignore the question letter (this is for the teacher’s reference only). They should only care about the station number, making sure their answer is written under the correct station number, and that they find the next station number when they rotate.

4. This is a silent activity. Students should raise their hands if there is problem or a clarification needs to be made. You may decide whether or not it is up to the student to correctly focus a microscope; this might be one of the skills you expect them to know how to do.
5. Have students take their place at a station and begin the activity. Adjust time at each station if necessary based on your initial observations. Keep track of time so that you don't run out of time at the end of the period.

DISCUSSION:

If not being done as an exam, discuss stations that students had the most difficulty with? Answer any questions the students had.

Did any questions make students have to make connections or apply their knowledge in ways they would not have expected?

If applicable, is it easier to identify live specimens or pickled specimens?

EVALUATION:

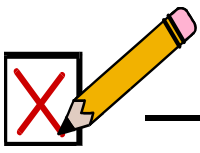
- Correctly filled out answers on their answer sheet.

EXTENSIONS AND MODIFICATIONS:

- Use either as a review activity or as an examination/part of an examination.
- Add more questions about specimens if desired. Or add stations with general information questions, background questions to make it a more varied examination.
- Do a lab practical for other curricular units/themes. Plants, mammals, plankton, leaves, rocks, etc.
- Once students have experienced a lab practical, in future curricular units that you plan to have a practical with, students could contribute questions to be used. You could select out appropriate and good questions to use.

NOTES (PLEASE WRITE ANY SUGGESTIONS YOU HAVE FOR TEACHERS USING THIS ACTIVITY IN THE FUTURE):

Activity Version: May 2003



TEST : AQUATIC INSECTS LAB PRACTICAL

NAME: _____ CLASS: _____

STATION #	Your Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

STATION #	Your Answer
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

STATION #	Your Answer
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

STATION #	Your Answer
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	

Station #1	Station #5
Station #2	Station #6
Station #3	Station #7
Station #4	Station #8

Station #9	Station #13
Station #10	Station #14
Station #11	Station #15
Station #12	Station #16

Station #17	Station #21
Station #18	Station #22
Station #19	Station #23
Station #20	Station #24

Station #25	Station #29
Station #26	Station #30
Station #27	Station #31
Station #28	Station #32

Station #33	Station #37
Station #34	Station #38
Station #35	Station #39
Station #36	Station #40

MISSING FROM THIS DOCUMENT:

“Aquatic Insect Lab Practical - Questions CHART”

**This is a separate document on the hard drive.
Include it and splice it in when you photocopy the
activity.**