

CLASSIFICATION #2: AQUATIC CRITTERS

GOALS

Students use their understanding of dichotomous choice diagrams and their observations of critters from the retention ponds to develop an illustrated taxonomic key to the area.

INTRODUCTION

Students use the animals they collected in their sampling at the retention ponds and their knowledge of dichotomous choice diagrams to produce a taxonomic key of the aquatic animals there. Careful, considered observation and examination underlies such a key and students learn to document just such methods in their notebooks.

OUTCOMES

Students will:

1. carefully examine specimen animals collected from the retention ponds
2. draw each of these specimens, using minute detail (top, bottom and side views), in their science notebooks
3. choose one feature that each of the animals share and “draw it large” if it’s legs, make a close-up drawing of each leg on each animal and compare animals leg structures, number, etc.
3. observe animal behavior and describe it in specific terms
4. organize animals into groups based on their features and behavior
5. provide rationale and evidence for their groupings
6. consult field guides for the scientific names and groupings of the animals

VOCABULARY

locomotion	mandibles	true bug
structure	spiracles	arthropods
abdomen	vertebrate	behavior
thorax	invertebrate	adaptations
proboscis	insect	

PREREQUISITES

Classification #1
Who’s There 1 & 2

TIME REQUIRED

3-5 class periods

MATERIALS

handout of the directions for this activity (1/student)
Hand lenses (1/student)
animal specimens (2+/table group)
colored pencils
centimeter and 0.5 centimeter graph paper
rulers
35 millimeter camera
video camera
scope cam (magnifying camera)
digital camera
computer with video clip capabilities (quick-time, I-movie, etc.)
digital video camera
poster of aquatic animals and water quality

PROCEDURE

1. Tell students, "Today we will be drawing careful diagrams of animal specimens in our notebooks. To do that we must examine them closely from every angle and draw top, side and bottom views of each. Label all of the parts you have drawn. After you have drawn each animal from all three angles and shown all of their parts, pick one feature that they all share and draw it large. That means draw only that body part in extreme close-up for each animal. Be sure to measure carefully and keep your drawings in the same proportion. For example, if an entire back leg is 2 cm long on the animal and you are drawing it large, you might draw it 20 cm long. If your second animal's back leg is 1 cm, you would draw it 10 cm long. At these enlarged sizes, you may notice that the leg has hair-like structures, legs on the same animal are different, legs differ in more ways than merely length. Be sure those differences appear in your drawings. Write the name of the animal on your drawings and name the specific part you are comparing (back-most leg of the backswimmer and the water boatman). State what the animals might use this part for and why it is different from that of the other animal. What might the adaptation be? Why do you think so? Once you have completed these jobs, carefully observe the behavior of your animals and describe it in detail as well. Work with your group to decide on the best language to describe how it is behaving. Don't use words like it looks happy or angry. Tell exactly what it is doing and where. Compare your animals on their behavior as well and write that in your notebooks too. Then decide whether or not your animals should be grouped together as a species and why. Write that in your notebook as well. Finally go to the field guide and find out where scientists group your animals and write the scientific name for each. *Have available sampling equipment (plastic egg cartons, forceps, dishpans, etc.) and microscopes in case students ask to place animals in more confined spaces for drawing or larger ones for observing behavior or to examine parts more closely.*

2. Distribute 2 or more different animal specimens to each table group. *Hopefully you have enough animals to provide all different specimens. If that's the case, this activity can be continued on subsequent days so that every child draws every animal. However, it's not necessary. Each table group can draw two animals and the results combined for the class. If you make both paper copies of the drawings for each student and a transparency copy for the whole class, the same goals can be met without tedium. If you have a pinned collection of animals, these work even better for drawing--they don't move. But, you will still need the live ones for studying behavior.*
3. Distribute the directions for the activity to each student and have a transparency of same on the overhead so you can all keep track of where students are in the activity. Do not distribute the field guides until table groups have completed all of the steps to that point.
4. Allow students sufficient time to do a good job with drawing and describing. Circulate to monitor and encourage. Some students will complain that they cannot draw well. Insist that they can because this is not an exercise in talent. It is an exercise in close observation--the hand draws exactly what the eye sees. If they look closely and draw exactly what they see, they will have an outstanding diagram. Make suggestions about what they are doing well and what they can do to improve, as they are drawing. Once they "finish," they won't want to redo. *Distinguishing between drawing and diagram seems to help students focus on the intent of the task rather on their artistic talent. If you have had students copy a drawing of an upside down object early on, refer back to that activity and their success. Because we do so much drawing in all of my classes, this is a week one, priority activity. Liken this activity to that one--merely copying.*
5. Distribute graph paper for "draw large" diagrams. The grids help students use proportion and measurement better.
6. Once all steps have been completed, tell the class, "Each table group will present their drawings and observations to the class and we will discuss our findings."
7. Set students up to photograph and tape their animals. *All of my students learn to operate all of the equipment, (videotaping, digital camera operation, computer interface, etc.). A digital camera is really terrific at this point because students can see immediately if their shot is usable. Also, the photos can be saved on the computer and pulled together to make a key. Digital video, if you have the equipment, lets you do the same thing with the behavior of the organisms. Access to this type of equipment also lets you keep records from year to year, share your key with other schools, and update records easily. If you don't have this equipment, a regular 35 millimeter camera and a video camera can keep a record of your animals and let you develop an illustrated taxonomic key.*
8. As a large group, organize your animals into a key of the area of study and publish it as a chart or computer presentation (ala power point).
9. *The final step in this series of activities is to compare the animals in your site's key to those in other aquatic environments in terms of health of the system. This brings you*

full-circle back to the outdoor aquatic system you've been studying and sets you up to develop the indoor aquatic environments that are "sustainable". Introduce the DNR poster of aquatic animals and their indication of the health of freshwater environments.

10. Ask students, "What animals do you see on this poster that we also found in our samples at the pond? What animals didn't we find? What might that mean? What about the number of each kind of animal that we found? From the information on this poster and our samples, what can you say about our pond? How do we know? What evidence do we have? What evidence don't we have? What do we need? What kind of adaptations do animals need for each of these environments?"

STUDENT HANDOUT #3: CLASSIFICATION OF POND CRITTERS

1. Draw careful diagrams of animal specimens in your notebook.
 - a. examine animals closely from every angle
 - b. draw top, side and bottom views of each.
 - c. label all of the parts
2. Pick one feature that all the share and draw it large.
 - a. draw only that body part in extreme close-up for each animal on different pieces of paper
 - b. measure carefully and keep your drawings in the same proportion. For example, if an entire back leg is 2 cm long on the animal and you are drawing it large, you might draw it 20 cm long. If your second animal's back leg is 1 cm, you would draw it 10 cm long.
 - c. notice that the leg has hair-like structures, legs on the same animal are different, legs differ in more ways than merely length.
 - d. note all differences in your diagrams
 - e. write the name of the animal on your drawings
 - f. name the specific part you are comparing (back-most leg of the backswimmer and the water boatman)
 - g. state what the animals might use this part for
 - h. state why it is different from that of the other animal
 - i. what might the adaptation be?
 - k. why do you think so?
3. Carefully observe the behavior of you animals
 - a. describe it in detail
 - b. work with your group to decide on the best language
 - c. tell how it is behaving (don't use words like it looks happy or angry)
 - d. tell exactly what it is doing and where.
4. Compare your animals on their behavior
 - a. what is similar and different and write that in your notebooks
 - b. decide whether or not your animals should be grouped together as a species and why. Write that in your notebook as well.
5. Go to the field guide and find out where scientists group your animals and write the scientific name for each
6. Photograph and tape your animals.
7. As a large group, organize your animals into a key of the area of study and publish it as a chart or computer presentation (ala power point).
9. Compare the animals in your site's key to those in other aquatic environments in terms of health of the system. Is our site healthy?