Lesson Plan: Exploring Organisms

General Description
This activity is designed to teach the process of science and emphasize the importance of asking questions, begin teaching course content without any assumed background, and allow a discussion leader to establish rapport with his/her students.

Objectives
Students will
• ask basic questions (how, why, what, where, when) about organisms that are related to evolutionary and ecological issues.
• perceive themselves as engaged in the process of science by way of asking questions in the learning activity.
• become familiar with the topics that will be covered in L111.
• be motivated to participate in a learning process.
• be able to recognize and remember the names of discussion leader and fellow peers in the discussion section.

Concepts
Organisms, Environment, Ecology, Form/Function, Adaptation, Evolution

Time
about 40 minutes

Prerequisite Skills
None

Materials
• 1 bag of 30 plastic animals
• Overhead with identical handout for students to take away (or posted on a website)
• Student Handout
UTI Instructions: Exploring Organisms

Introduction:
Short introduction to what students will do – big picture description.

Procedure:
1. Introduction [5 minutes]
   Explain to the students that during the session today they are going to be participating in a couple of activities, including one that is similar to “20 Questions”. Because asking questions is an important aspect of biology, this activity is designed to get them to start thinking like biologists. Each student choose an organism out of the bag. They should look at the organism, make sure they know what it is, and then keep it secret from the other students. If they don’t know the organism they selected, they should replace it and select another. Remind them to keep it hidden from other students.

2. Activity #1—What’s my organism? [10 minutes]
   Students will attempt to identify the secret organism of another student through a series of yes/no questions. Instruct students to record the following information in the appropriate place on their handout: the name of the other student, how many questions it took to determine their organism, what was the most informative question they asked. Students should form pairs (actively help them do this to make sure everyone is paired up), introduce themselves, and then begin the game. (If you have an odd number of students, participate in the activity to allow each student to be involved.) One student should ask the other student about his/her secret organism; then they switch roles. If a student is asked a question to which s/he is unsure or does not know the answer, it is okay to say “I don’t know” or “I think it is yes/no, but I’m not sure.” Repeat the 20 Questions game one or two more times.

3. Discussion and reflection on Activity #1 [10 minutes]
   Ask the students what questions were the most informative or helpful. Begin with questions you asked if need be. Write the student questions on the chalkboard as much as possible. Ask students if they can see any ‘natural groupings’ to the questions they identified (i.e. ways that some questions go together or variations on the same theme). Allow them to discuss it with other students for a few minutes. Most of the questions that were asked can be divided into three categories:
   - What does it look like? (Form: color, # limbs, hair, scales, etc.)
   - What does it do? (Function: fly, swim, carnivore, dig, etc.)
   - Where does it live? (Environment: land, water, Africa, forest, etc.)
Note: As much as possible, do not imply that there are only ‘three’ natural groupings. (In fact, there are more. One example is: ‘what is it classified as?’ which forms a natural grouping of questions like ‘is it a mammal?’ or ‘is it a fish?’)

Discuss as a class how these three types of questions relate to the concept of adaptation. Have students, either in groups or on their own, attempt to diagram how these types of questions relate to adaptation on their handout. (You should do the same also.) Note that the idea is to think about the CONCEPTS, not the organism they had. Display Overhead and ask them to compare it to their own diagram. Do they display the same concepts in different ways? Have 3-4 students/groups volunteer to draw their diagram on the chalkboard and explain it. Share your diagram as well.

Note: there is no one correct way to represent the relationships. Thus it is extremely important to wait and show the overhead after they have attempted their own, otherwise they will take the overhead diagram as the ‘correct’ diagram.

4. **Activity #2—Which organisms are similar?** [5 minutes]

Have the students reveal their organisms to each other if they have not already. Then, instruct them break into groups according to the similarities of their organisms. Do not provide guidance on what types of characters should be used to assess similarity—allow the students to choose on their own. When groups of similar organisms have been assembled, have each group discuss how they determined that their organisms were similar.

5. **Discussion and reflection on Activity #2** [10-15 minutes]

Have each group explain how they decided their organisms are similar, and on what types of characters their decision was based. (Also, how are they different?) They should enter their reasons in the appropriate place on their handout. Examples: (i) similar types of locomotion (function); (ii) same type of habitat (ecology/environment); (iii) eat similar types of food. Point out how these are related to the questions raised in Activity #1. Have the students repeat the grouping activity, this time using a different aspect of similarity than they used before. Use the outcome to ask students whether any of these ‘ways of being similar’ is better than others for assessing relationships of similarity. (Put differently, is there a ‘most important reason’ why their organisms are similar?) Students should write their answer on their handout. After students have finished this question, direct them to complete the last question on the handout. Solicit volunteers to share their answers to these last two questions with the rest of the class. **Where possible, create a list on the chalkboard for answers given to these questions.**

6. **Summary** [2-3 minutes]
Use student responses from the last section to briefly summarize the activity. Note how these types of questions—how and why species are similar—are the major focus of organismal biologists. Key points to emphasize:

a. The process of science can be understood as the repeated asking of different questions. Students have been asking the very same questions that organismal biologists (those interested primarily in evolution and ecology) ask. They have been doing biology.

b. Biologists for the last 150 years have thought that the answers to why organisms are similar (and why they are different) are found in a historical process of common descent with modification referred to as evolution (evolution is a persuasive reason why organisms exhibit particular similarities).

c. The questions we have been asking are interrelated. We ask ‘how’ questions about form, function, and environment in order to answer ‘why’ questions about the nature of the adaptations observed in the natural world.
Adaptation can be understood as the ‘fit’ between an Organism (Form/Function) and its Environment (Ecology)
Pre-Activity Worksheet: Exploring Organisms

**General Description**
In the activity you will do this week during your learning/discussion group, you will be examining how biologists examine adaptations. In order to be prepared for this activity, complete this worksheet.

**Reading**
Use the index of your textbook to find every section on adaptation. Read these sections carefully. Pay particular attention to figures 21.19, 22.2, 22.4, and 46.15.

**Definitions**
Write a definition of the following words. Use your text, textbook glossary, and your previous knowledge to create the best definition possible. Remember to connect your definitions to adaptation.

1) morphology

2) function

3) environment

4) selection

**Questions**
Answer the following questions. You will explore your answers to these questions in-depth during learning/discussion group.

1) Name two adaptations of the human body, and describe why these features are adaptations. What environments might lead to these adaptations?

2) Examine the yellow box on pg. 435. What sentences deal with adaptation? Is adaptation a part of the evidence for evolution or a result of evolution?

3) Define adaptation as both a feature and a process.
Exploring Organisms

Activity #1 – What’s my organism?

Round 1
Name of partner:
# of questions:
Most informative question:

Round 2
Name of partner:
# of questions:
Most informative question:

Round 3
Name of partner:
# of questions:
Most informative question:

Use the back of this page for your diagram.

Activity #2 – Which organisms are similar?

Reason why our organisms are similar:

Are some groupings better than others? Why or why not?

What do these two activities tell you about how biologists do biology?
Individual Accountability: Exploring Organisms

Today you have learned that when *doing* biology, some questions are more useful than others. Look at the picture below and decide which of the two questions might provide information that is more informative. Write 2-3 sentences about why the question you have chosen is useful and why the other question is not as useful.

Is the organism aquatic? *or* Does the organism have scales?