

# Biology

## Core Activity

<b>Standard #</b> 3520-05 Students will understand concepts of biological diversity. <b>Objective #</b> 3520-0503 Relate biodiversity to extinction. <b>ILOs:</b> Observe, classify, use references, predictions and estimates. Requires a degree of curiosity and must weigh their observations against known evidence before drawing conclusions. Imagination and creative thinking needed for more complex insight.	<b>Topic:</b> Diversity and Evolution  3520-05
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### Description of Activity

*Activity Title:* What is the Advantage of Being Different?

*Activity Overview:* This is a simple inquiry lesson that requires a minimum of materials and equipment. It is designed to allow students to discover characteristics about organisms through observation and research. To look at an organism closer than perhaps ever done before. This will also enhance observation skills. The students will simply observe organisms closely and then discover things about their characteristics based either on their own inquiry skills or guided by their teacher. The students must have prior knowledge of basic identification characteristics of the specimens used. They must also be familiar with the characteristics of common biomes and ecosystems found near you and typical of the specimens used.

*Duration:* This activity can be done in 45 minutes, several hours, or longer depending on student interest, ability or time available.

### Materials, Facilities and Resources:

Live or preserved specimens of different types of organisms. For example: a plant, animal, and fungus. For a short class use only one specimen. For more than one class period use several specimens from different kingdoms. For more in-depth inquiry have several references available detailing the organisms used for study. These resources could include biology texts, books on plants, animals, physiology, anatomy and evolution. Relevant periodicals should also be on hand. These references should be on the appropriate reading levels for the students using them.

### Teaching and Learning Strategies

1. The different levels of inquiry are achieved by varying degrees of involvement by the teacher. The questions included in the procedures are sample questions that could be used to ensure different inquiry levels. The best questions are those developed by the teacher to fit individual classes. To improve the level of inquiry the students may be challenged to describe the characteristics aliens would need to obtain to survive in earth's varied habitats. (Note: the aliens

would have to be given pre-existing traits by the students as well.)

2. For the students to be completely on their own they must have been taught and have demonstrated their own inquiry skills.

3. These questions are only guides to different levels of inquiry. The students may be put on their own at any time depending on their achievement and ability.

4. Teachers should give hints to move the students along and aid them in their inquiry. This should be done only after the students have been given sufficient time to develop their own answers. Teachers need to keep student interest alive.

5. Students may opt to use the following ideas for additional activities:

A. Compare adaptive traits and advantages for animals or plants living in similar habitats in different parts of the world.

B. Predict what adaptive advantages new species will need in order to survive in inner cities, polluted rivers, or situations that may occur in the future.

C. Determine which breed of dog, cat, or domestic bird or other animal have adaptive advantages that will make the animal most likely to survive as a pet or farm animal.

D. Discover which adaptive advantages are best suited for genetic engineering or manipulation and why.

## **Procedures**

(Caution: Specimens preserved in formalin should NOT be used.)

1. This activity works best in teams of two with one designated as the leader. Teams should also be allowed to interact with other teams to help stimulate ideas.

2. Prerequisite instruction:

A. Students should have experience in recognizing the diversity in structures and systems found among all organisms.

B. Students should know the common characteristics of life found among all organisms.

C. Students should recognize different habitats and environmental pressures.

D. Students should understand the process of natural selection.

E. Students should be made aware of what is expected of them in an open inquiry situation.

3. Place two or more organisms on tables and ask the students to:

A. Identify the biological needs of these organisms.

B. Identify the external structures observed which might help the organism meet its needs.

C. Describe the likely habitat of these organisms based on structural evidence.

D. Describe how the visible structures might fit the organisms to their environment.

E. Describe the internal structures or systems that would be needed to compliment the observed structures?

F. Speculate on changes that would occur in the organism should the environment become drier or wetter than normal.

G. Describe other organisms with similar adaptations.

H. What kinds of environmental changes would move these organisms toward extinction? Name related organisms that are either already extinct or which are approaching extinction today.

## **Invitation to Learn**

*Problem:* The students will recognize the unique advantages possessed by the sample organisms both externally and internally and relate them to multiple habitats.

## **Safe Operating Procedures**

Avoid using specimens preserved in formalin.

## **Summary of Learning**

- 1.How are all of the adaptive advantages recognized in the sample specimens related to the basic characteristics of life?
- 2.What adaptive advantages observed in these specimens would aliens need for survival in the major environmental areas of the world?
- 3.What internal changes must accompany any external changes you suggest?
- 4.What new adaptive advantages must organisms make to adapt to a new environment and avoid extinction?
- 5.Given a cold environment with limited water in winter, describe the specific characteristics a mammal such as a wolf would need to maintain an adaptive advantage.
- 6.Which of the following adaptations is NOT directly related to environmental pressures?
  - A.Whether the animal is homothermic or exothermic.
  - B.Feathers, scales, or hair.
  - C.Beaks, fangs, or claws.
  - D.Lungs, gills or air sacs.
  - E.Production of urea or uric acid.
- 7.Which of the following adaptive characteristics are the most related to desert environments?
  - A.Numerous stoma.
  - B.Well developed fibrous roots.
  - C.This waxy cuticle.
  - D.Numerous and frequent flowers.
  - E.Large broad leaves to capture sunlight.