Perrella & Hardy
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HU GK-12 Activity

TITLE: Insect Adaptations

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DCPS STANDARDS: E.3.11

GOALS:

1. Scholars will be able to identify morphological and behavioral adaptations that increase organisms' fitness.
2. Scholars will be able to determine the impact of increased fitness on ecosystem equilibrium.

OBJECTIVES:

1. Given a collection of insects, scholars will describe physical adaptations that increase fitness in that organism's niche.
2. Given a presentation of short video clips, scholars will identify behavioral adaptations allow insects to survive in a given niche.
3. Given a taxonomic key, scholars will identify insect specimens to order.

PREREQUISITE KNOWLEDGE:

Background

All living things need space in which to live. The living space, called a habitat is where organisms forage and reproduce. Habitats provide food, water, and shelter, which are needed for animals to survive. Animals however, cannot survive based on the sheer presence of these necessary resources. They must be able to successfully sequester these materials in substantial quantities. Thus, animals depend on their physical features to help them obtain food, keep safe, build homes, withstand weather, and attract mates. These physical features are called physical adaptations. Physical adaptations result from the process of evolution in which physical adaptations that benefit survival are selected for. The evolutionary process does not happen overnight it takes many generations. Organisms that have shorter life spans evolve quicker because they reproduce younger and the number of generations per time is very short. This idea can be easily observed by looking at different species of insects. Insects aren't the only organisms that have evolved. The shape of a bird's beak, the number of fingers, color of the fur, the thickness or thinness of the fur, the shape of the nose or ears are all examples of physical adaptations that have developed through the process of evolution. Many physical adaptations help different animals to survive by allowing them to live in specialized niches.

Figure 1. Sample insect collection in an Schmitt box.

ESSENTIAL QUESTIONS:

1. How does an organism adapt to its niche?
2. Why would you expect evolution to take place more rapidly on land than at the bottom of the ocean?

LABORATORY MATERIALS:

Insect collection box, slides with photographs of insects, short video clips of insects being insects, pinned insect specimens, paper, pencils, projector, and laptop computer.

DIFFERENTIATING INSTRUCTION:

English language limited scholars will be paired with bilingual scholars for this activity. Learning disabled scholars will be given a separate worksheet that will help them understand the overall concept of adaptations. Accelerated scholars will be required to use the taxonomic key to identify insect specimens to family.

RATIONALE:

This activity is designed to demonstrate the concept of species survival and adaptation. Scholars will observe the physical and behavioral characteristics that enhance species' survival. This activity will require connecting ideas from several different units. The impact of greater survivorship will on ecosystems will also be addressed.

RESEARCH ACTIVITY:

Separate the class into three groups; Spanish-speaking scholars, learning disabled scholars, and accelerated learning scholars. Spanish-speaking scholars and accelerated learning scholars will complete the same activity. Spanish speaking scholars will not need to have multiple translations because they will be describing the insects viewed in their native language.

Find the niches within habitats and you will discover organisms specially adapted for that niche.

1. Given a photograph of an insect inhabiting a specific niche, scholars will write down their observations about the physical adaptations that allow that insect to survive in the habitat.

2. If time permits, scholars will write out a taxonomic key separating the organisms into groups they come name.

EVALUATION AND ASSESMENT:

1. Choose 5 insects to discuss the impact on an ecosystem if:
    a. The species is removed
    b. The species are allowed to reproduce prolifically
2. Each scholar will submit a description of the special adaptation a given insect has and how this characteristic contributes to its survival.
3. Scholars will calculate the diversity of all the organisms they observed today
    a. Diversity = species richness + species evenness using the following equation:
        i. $D = \sum (n / N)^2$
            1. n = the total number of organisms of a particular species
            2. N = the total number of organisms of all species

REFERENCES

E. H. Simpson, "Measurement of diversity", Nature163 (1949) 688.