

Science

SCI.III.4.2

Grade: 7

Strand III: Using Scientific Knowledge in Life Science

Standard 4: Evolution - All students will compare ways that living organisms are adapted (suited) to survive and reproduce in their environments and explain how species change through time

Benchmark 2: Explain how new traits might become established in a population and how species become extinct

Constructing and Reflecting:

SCI.I.1.MS.1 - Generate scientific questions about the world based on observations.

SCI.II.1.MS.1 - Evaluate the strengths and weaknesses of claims, arguments, or data.

SCI.II.1.MS.2 - Describe limitations in personal knowledge.

SCI.II.1.MS.3 - Show how common themes of science, mathematics, and technology apply in real-world contexts.

SCI.II.1.MS.5 - Develop an awareness of and sensitivity to the natural world.

Vocabulary / Key Concepts

- environmental change
- variation in populations
- reproductive success

Context

Examples of inheritable and non-inheritable variations, such as:

- white-eyed fruit fly
- scars

Examples of variations due to new gene combinations, such as:

- hybrid organisms

Knowledge and Skills

The world is constantly changing and species must adapt in order to survive. Natural selection will determine which new traits are successfully passed on to the next generation. A new trait may allow an individual to survive long enough to reproduce and pass on the new trait to its offspring. This adaptation ensures the reproductive success of the species.

Students will debate the possible reasons why a given species may become extinct, such as:

- An organism fails to adapt
- Human impact on the environment
- Asteroids

Students will hypothesize the possible changes species may undergo, such as:

- Behavioral: mating rituals, migratory patterns
- Physical: color, height, structure

Reproductive Success: the ability to reproduce offspring from one generation to the next

Resources

Coloma Resources:

Silver Burdett – Earth Science 1987 as classroom resources

It's Tough to be a Predator (attached)

Other Resources:

- [Teachers' Domain](#) – 6-8 Life Science – [Genetic Inheritance](#) – video clips, images and documents – excellent site! (1st link is for free signup, 2nd to information)
- DiscoverySchool – [Genetics](#)
- [Genetic Science Learning Center](#) – University of Utah – excellent DNA extraction activity included!
- Michigan Teacher Network [Resources](#)
- [AIMS](#) – Critter Experiment
- Bill Nye: Evolution, Archaeology
- *Breakthroughs: Strategies for Thinking - Where Have All the Condors Gone?* – Zaner-Bloser, Inc.
- *Project Wild*

Instruction

Begin by finding out what students know about moths. With a partner, students will brainstorm at least 10 questions they have about moths. Have the partners share their questions with the class and organize the questions into common categories. Then, ask them to think about how moths may adapt to survive. Look at the class list of questions. Ask students to focus on the questions related to successful moth adaptations.

Next, share the scenario of a real-world occurrence that happened with the peppered moth in England.

Scenario:

In the early 1800's, the majority of the moths were light-colored, allowing them to blend into the light-colored tree bark. By the late 1800's, the peppered moth population had adapted their coloring to a darker color. With an expansion of local industries, air pollution covered tree bark with dark soot. Moths adapted their coloring to a darker hue in order to survive. As clean up began and pollution was reduced, the light colored moth population began increasing.

Students will cut out equal numbers of black, red, white and newspaper moths and glue them down on a piece of newspaper. Students will review each other's pictures to see which color moths are most easily seen.

Students will create their own model of a moth species they think would best survive in this newspaper environment. Students will present their models and explain the traits the moths have acquired.

Optional Assessment

Assessment I

Students will create butterflies to place within the school building. Some of the butterflies should show characteristics to make them hard to find. Some of the butterflies have characteristics that allow them to become extinct. At the end of the week, successful students will have several left in the hard to find category and few left in the easy to find category.

Assessment

Optional Assessment

Assessment II

The teacher will give the students the following imaginary newspaper article:

Scientists Discover New Organisms Living in a Student's Bedroom

Scientists believe the new organism was first introduced when the student was attending elementary school. Over time, scientists noticed that newer generations of offspring appeared to have developed /adapted several new traits. It is felt that these traits developed as a result of the changing bedroom environment.*

Students should work in pairs and imagine that they are the student in the scenario. They should select an organism they think might be found in one of their bedrooms after they graduate from 8th grade. They should construct a model of the organism and present it to the class. They should explain which new traits were acquired and the reasons for these adaptations.

* Possible traits: heavier outer layer/coating, changes in coloring, loss of hearing, longer legs, change in diet, change in sleeping pattern.
(Give students rubric before activity.)

Scoring Rubric

Criteria: Completeness of model

Apprentice - Develops a model that lacks adaptive traits.

Basic - Develops a model that shows one adaptive trait.

Meets - Develops an accurate model that clearly shows one to three logical adaptive traits.

Exceeds - Develops an in-depth model that clearly shows numerous logical adaptive traits.

Criteria: Completeness of explanation

Apprentice - Proposes a sketchy explanation for the acquisition of new traits.

Basic - Proposes a brief explanation for the acquisition of new traits.

Meets - Formulates a clear explanation for the acquisition of new traits.

Exceeds - Formulates a detailed explanation for the acquisition of new traits.

Criteria: Completeness of presentation

Apprentice - Presents information in an incomplete, difficult to understand manner.

Basic - Presents information in a fairly interesting, easy to understand, creative manner.

Meets - Presents information in an interesting, easy to understand, creative manner.

Exceeds - Presents information in an interesting, easy to understand, creative manner with additional visuals.

Teacher Notes:

Refer to: III.4.MS.1: Describe how scientific theory traces possible evolutionary relationships among present and past life forms.

SCIENCE INTEGRATION ACTIVITY

Protective camouflage comes in many forms. Camouflage can be a result of an animal's shape or color. The peppered moth, as described in Merrill Earth Science on page 450, is an example of coloration. As the forest coloration changed from a light color to a dark color because of air pollution and soot during the industrial revolution, the camouflage needs changed.

Every species has variation within the species that allows some members to survive if the environment changes. The peppered moth illustrates this variation.

Getting Started

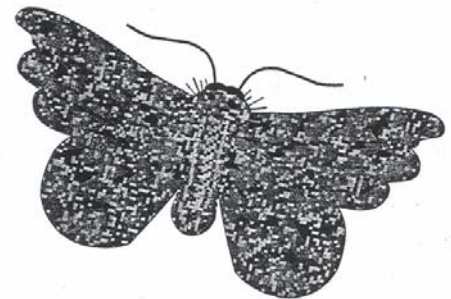
In this activity you'll role-play hungry birds looking for a meal. You will make dark- and light-colored moths out of construction paper, place them on different backgrounds, and try to "catch" moths to eat. One forest will be made of black construction paper representing a forest without lichens (alga and fungus growing together) after the industrial revolution.

The other forest will be of white construction paper representing a forest with lichens before the industrial revolution and air pollution and soot that covered the bark of trees.

CAUTION: Be careful in carrying and working with scissors.

Hypothesizing

Make a hypothesis that describes how the color of the moths will affect the predator's ability to find them on



TRY IT!

You will need:

- 2 sheets of white and black construction paper
- Scissors
- Pencil
- Ruler
- Tape or glue

