A Learning Activity

digital glass

Hungry Birds

Natural Selection in Industrial England

OVERVIEW

Students explore the effects of natural selection on populations with trait variation. Students play a game inspired by the famous peppered moth example in England during the industrial revolution. Students answer questions about evolution by natural selection and discuss possible factors influencing natural selection.

OBJECTIVES

At the conclusion of the lesson, students will be able to:

- Explain that specific characteristics can cause individuals within a population to survive and pass on their genetic information.
- Explain that while natural section works on individuals, it is populations that evolve.
- Make inferences about the relationship between environmental changes and natural selection.

LENGTH OF LESSON

Two hour-long class periods in conjunction with a trip to the museum to play “Hungry Birds.”

GRADES

3 - 6

STANDARDS

Michigan: L.EV.E.1 Environmental Adaptation- Different kinds of organisms have characteristics that help them to live in different environments. (Grade 3)

Michigan: L.EV.E.2 Survival- Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing. (Grade 4)

Texas: §112.14. Science (10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments.

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STANDARDS (Cont.)

Texas: §112.15 (10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environment.

The student is expected to: (A) explore how adaptations enable organisms to survive in their environment such as comparing birds' beaks and leaves on plants.

MATERIALS

Internet connection
Ability to project video

LESSON

1. Discuss with students what they think natural selection is. What is selected? How does selection get made?

2. Have students watch the brief TED-Ed video "Myths and Misconceptions About Evolution." Discuss, emphasizing:

   - Evolution happens to populations, not to specific beings;
   - Evolution happens over time;
   - Adaptations are random, but can impact the likelihood of survival.

3. As who has heard a "Just So" story. Have one child relate a story, or tell one to the class.

4. Explain about "Just So" stories:

   - Stories for children by Rudyard Kipling;
   - Made up stories of the origin of specific animal traits;
   - Examples: The elephant got his trunk when a crocodile pulled on it and stretched it. The camel was given a hump because he was lazy.

Need to be careful we con't tell "just so" stories about evolution.

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LESSON (Cont.)

5. Take students to the science museum. As part of the visit, have them play "Hungry Birds." They should also watch their classmates play a couple of games.

6. Back in the classroom, ask the students to describe their experience with "Hungry Birds."

   - How easy was it to eat moths?
   - Was it easier to see one color moth than the other?
   - Did the number of dark colored moths you were able to eat change over the course of the game?

7. Have them explain how the game relates to the discussion of natural selection.

   - Did any individual moth change color?
   - When the lighter moths became easier to see, and therefore "eat," how do they think that changed the population of moths?
   - Once pollution controls were put in place, and the pollution lifted, the trees turned while again. What color moth would be easiest for the birds to eat, then?

8. Present the following scenario. Finches are small birds. They are found in many places, but the ones we will discuss are found on an island in the Pacific Ocean, called Galapagos. At one point on the island, there was a long drought: little water was available, and the only seeds available for the finches to eat were larger and harder than the seeds they usually ate.

   What changes might you expect to see after a long time of eating larger and harder seeds?

   Students may have a variety of answers, but the correct answer is that the beak size of the finch grew by 10 percent over time. The finches with bigger beaks could eat the harder and bigger seeds, and were more likely to survive and pass along their traits to their offspring.

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LESSON (Cont.)

9. Ask the students to suggest changes they see in the environment today that might have an impact on evolution many generations in the future. Answers may vary. Possible answers:

   - Water pollution is causing many breeds of frogs to go extinct. What changes might you expect in the frogs that remain after many generations?
   - Many birds are migrating earlier each year--and going further in their migration. What changes might you expect if birds are flying longer and longer distances each year?
   - The environment that polar bears live in is disappearing, and polar bears may go extinct. If polar bears were to go extinct, what impact might that have on the environment?

ACTIVITY

1. Distribute the Activity Handout.

2. Have students pick one environmental change from the first column, and one species from the second column.

3. Have them brainstorm what changes the student might expect to see after the species adapts to the environmental change over 100 generations.

DIFFERENTIATION

For students working above grade level:
Have students research the extinction of the Dodo, Spix's macaw, or the Alaotra grebe and make a five minute presentation to the class.

For students working below grade level:
Have students work in small groups to complete the activity.