ADAPTATION to environmental change

LEARNING EXPERIENCE: We will see how adaptation to environmental change is crucial to the survival of a species, and how such adaptations, over time, can change the appearance of that species. This is important to the understanding of biological evolution because adaptation of a species, via natural selection, is how evolutionary change is accomplished. Students use a computer game to simulate adaptations within a population through a series of environmental challenges.

OBJECTIVE: We will be able to explain that adaptations within populations can help a species to survive, while the failure of a population to adapt may lead to extinction.

MATERIALS AND PREPARATION: Computer with internet access

LESSON:

Focusing question: What are adaptations? How are they important to a population of organisms? What is the significance of adaptation in a changing environment, and what might be expected to happen if organisms cannot adapt to environmental changes?

Focus: Adaptations are features that allow organisms to be successful in their environments—that is, the organisms successfully survive and leave healthy offspring. Over time, such features are likely to spread and increase in a population, as natural selection will favor the individuals that have the best adaptations to the environment. However, if environmental conditions change (for example, it becomes hotter or colder; or a new species appears to compete with or prey upon the existing organisms), then natural selection might favor individuals with different features that better fit the new circumstances.


It may take several rounds to get the hang of it. Are you a successful survivor? What features of your population seem to increase the chances of its survival? What strategies on your part lead to success in this game? How will populations in real life differ from this simulation?

Reflect: What were some of the environmental challenges our species encountered? How did our species adapt? What could we observe to be successful strategies? What were not? Think of some factors that might increase the chances of successful adaptation by a species (e.g., greater variation in the population; slow rather than fast environmental change).

ASSESSMENT: Ask your student to teach you what he learned. Can he explain how adaptations affect the outcome of environmental challenges faced by populations of organisms? What happens if organisms cannot adapt to meet these challenges quickly enough? What evidence did he see in this lesson to lead him to these responses?
EXTENSIONS: The environment is undergoing a major change now, in the form of rapid small but significant rises in the average temperature of the earth. What are some possible changes that might be expected from this rise in temperature? What examples can we find of organisms that are already facing changes in their environments? What kinds of adaptations do you hypothesize might help these organisms survive the changes? What do you hypothesize will happen if these organisms cannot adapt to the changes in their world?

SCIENCE GRADE LEVEL EXPECTATIONS Addressed (WA State EALRs):

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<thead>
<tr>
<th>Students know that:</th>
<th>Students are expected to:</th>
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<tr>
<td>6-8 INQE Model</td>
<td>• Create a model or simulation to represent the behavior of objects, events, systems, or processes. Use the model to explore the relationship between two variables and point out how the model or simulation is similar to or different from the actual phenomenon.</td>
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<td>6-8 LS3E Adaptations are physical or behavioral changes that are inherited and enhance the ability of an organism to survive and reproduce in a particular environment.</td>
<td>• Give an example of a plant or animal adaptation that would confer a survival and reproductive advantage during a given environmental change.</td>
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<td>6-8 LS3F Extinction occurs when the environment changes and the adaptive characteristics of a species, including its behaviors, are insufficient to allow its survival.</td>
<td>• Given an ecosystem, predict which organisms are most likely to disappear from that environment when the environment changes in specific ways.</td>
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