2.2.1 Microevolution at Work

> **Overview**
>
> Microevolution is the change in allele frequency in a population over a relatively short period of time. Because all alleles in a population constitute its genetic gene pool, any genetic variation can form the raw material for evolution. Genetic variation occurs through several different mechanisms: natural selection, mutation, genetic drift, and gene flow. Natural selection happens when organisms having traits that better enable them to adapt to specific environmental pressures (predation, climate changes, competition for food and mates) survive and reproduce in greater numbers than others, ensuring the continuation of favorable traits in succeeding generations. Through mutation, entirely new genetic material is introduced into a population that can have a negative or positive effect, or no effect at all. Genetic drift greatly affects small populations when numbers of individuals reduce drastically and genetic variation among the remaining population narrows. Both genetic drift and gene flow can occur due to migration. When a small number of individuals migrate, they bring with them only a portion of the possible gene pool. As individuals move into new territory, they bring genes to share among new populations.

Learning Objectives
- The natural history of many organisms can shed light on the mechanisms by which microevolution occurs.
- Only natural selection selects for traits that specifically improve adaptive ability of organisms over time; the other mechanisms for microevolution are nonadaptive and spontaneous.

Student Activity: Microevolution at Work

Materials
Access to the Internet
Table from this activity

Advance Preparation
Read *Section 2: Evolution*.
Divide into four teams, one team for each of the four agents of evolutionary change.

Process and Procedures
1. Meet with your team. Discuss what you understand about the agent of change that your team will be researching. Use the reading from *Section 2: Evolution* to guide your discussion.

2. After meeting with your team in class, for homework, research specific examples of organisms that have changed through evolution by the mechanism your team is

studying. Make a list of organisms, websites you visited, and information that you can share in class with your team.

3. The following day, meet with your team and share your findings. How many different populations of organisms did you collectively identify? Make sure that you have at least one type of organism for each member of your team. Then, divide them up among team members. When you leave class, be sure you know which population of organisms is yours to research in depth.

4. Learn as much as you can about the evolutionary history of your population of organisms. How did the mechanics of evolutionary change alter the organisms? What traits were advantageous? What traits put the organisms at a disadvantage? Why?

5. Use the following chart to organize the information you learn when you research your population. Leave the parts of the table blank that refer to mechanisms that other teams are studying. You will fill these in later.

Examples of Organisms Affected by Various Agents of Evolution

	Natural Selection	Mutation	Genetic Drift	Gene Flow
Organism Name				
Source (website/journal)				
Evolution Story				

6. When your teacher requires it, be ready to share your table in a new jigsaw team made up of members of all four original teams (each jigsaw team should have at least one

representative from the Natural Selection team, the Mutation team, the Genetic Drift team and the Gene Flow team). In your new jigsaw team, discuss the population of organisms that each new member researched and fill in the remaining sections of your table. Make sure that you understand why each population was chosen to represent one of the four agents of evolutionary change by discussing the evolution story in depth.

Assessment

Evolutionary change rarely happens as the result of only one agent. Most changes are the result of a combination of gene pool adjustments that, over time, affect the survival of the population of organisms. Write about a fictional population of organisms that has changed because of two or more agents of evolution acting upon it. Be specific as you describe the physical characteristics of the organisms, the environment in which they live, and the ultimate genetic change (and how it happened) and how it affected their survival.

Expected Outcomes

What's the take-away?

Microevolution is fueled by variations in genetic gene pools. Genetic variation occurs through a variety of mechanisms: natural selection, mutation, genetic drift, and gene flow. Each living organism has its own evolutionary story that usually involves a combination of mechanisms over time.

What does the student work product look like?

Chart: Examples of Organisms Affected by Agents of Evolution

Using information gained during individual research and group discussions, each student will create a chart that shows examples of organisms that have been impacted by the four mechanisms of genetic variation (natural selection, mutation, genetic drift, genetic flow).

Assessment

Individual student responses should describe a fictional population that has been impacted by two (or more) mechanisms. For example, a population of birds could be impacted by natural selection and mutation. Natural selection: The beaks of a population of birds changed overtime to a longer and pointy shaped-bill that better enabled them to hunt for food in the tidal marshes they inhabit. Passing on this trait provides an advantage that positively impacts the survival of the individual bird, helping to continue the species. Mutation: A mutation of a color change could draw unwanted attention from predators, resulting in a shorter life. Passing on this trait provides a disadvantage that negatively impacts the survival of the individual bird, which does not help to continue the species.