

**From the Teacher: J. Haut**  
**Class: Enhanced Biology &**  
**Enhanced SEA Biology**  
**Period: 2, 4, and 5**  
**Assignment: Week 5**

## Natural Selection in Action

The work in this packet provides additional learning opportunities to further your understanding of natural selection and evolution. Should you continue studies in the life sciences, it will be expected that you have knowledge of this topic.

My office hours are 10AM-12PM, M-F. You can email me at [jhaut@tusd.net](mailto:jhaut@tusd.net), post a question in Teams, or call me at (209) 625-9540 with questions. Please continue to check your email regularly.

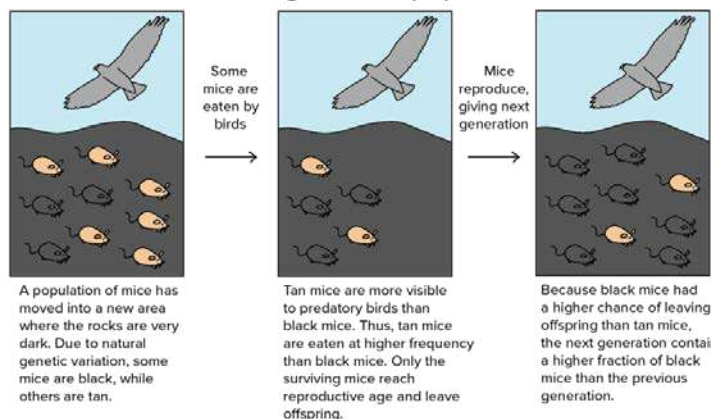
### Week 5

Charles Darwin developed a theory of evolution to explain the unity and diversity of life, based on the idea of shared common ancestors (Khan Academy, n.d.). His theory was based on the mechanism of natural selection, which explains how populations can evolve in such a way that they become better suited to their environments over time.

The light-colored mice are more easily seen by predators and are therefore preyed upon more. Dark mice are better adapted to their environment and better able to survive and reproduce.

Individuals have variations within their heritable traits. Some variations make an individual better suited to survive and reproduce in their environment.

Natural selection acting on mice population over time.



If this continues over generations, these favorable adaptations (the heritable features that aid survival and reproduction) will become more and more common in the population.

The population will not only evolve (change in its genetic makeup and inherited traits) but will evolve in such a way that it becomes adapted, or better-suited, to its environment.

Khan Academy. (n.d.). Evolution and natural selection review (article). Retrieved April 26, 2020, from <https://www.khanacademy.org/science/high-school-biology/hs-evolution/hs-evolution-and-natural-selection/a/hs-evolution-and-natural-selection-review>

Adaptations are physical traits that help organisms survive longer than those without it. They have more offspring that are born with this same adaptation, paving the way for natural selection. A beneficial or neutral adaptation can quickly become harmful when the environments change. The environment greatly affects an organism's ability to survive, and even a small change can be harmful to some organisms.

Some examples:

- The panda's "thumb" is actually an enlarged bone of the wrist. Pandas eat bamboo. It is difficult to handle and break the hard stalks, so an enlarged wrist bone helps to grasp the bamboo. In another environment where the food source is not plants, an extra 'finger' would have little benefit, perhaps even be cumbersome. The hands of pandas have been beneficial only because of their need for a better grip on bamboo.
- The Kokapo is a flightless bird of New Zealand. There were no ground predators of birds. As a result, the many ground dwelling birds lost the ability to fly making their wings small and useless. Eventually, mankind brought cats and weasels. The Kokapo was easy prey and is now nearly extinct. The inability to fly quickly caught up to them when the environment changed, showing how adaptation of bad wings was harmful in a different environment.

- The penguin has evolved into flightless birds. Cumbersome and ineffective on land, they are masters of the water. In Antarctica, the sea is the best place to get food. It has gradually lost its ability to fly, got insulating blubber, and gained mutated legs that are great for swimming but terrible for walking. If not for this environment, it would be very vulnerable and helpless.

**Activity:**

1. Choose two of the island environments from the four described below.
2. Design a squirrel for each island that has adapted to that island’s specific environmental conditions. Include at least 5 adaptations.
3. Draw each squirrel with its adaptations in its island environment.
4. Include labels of the adaptations and why they are beneficial to the squirrel.

Island Environments:

<p style="text-align: center;"><b>ISLAND 1</b></p> <ul style="list-style-type: none"> <li>• Fairly flat, few hills, ground is soft dirt</li> <li>• Small bushes and shrubs grow in the center</li> <li>• No animal life on land; water is full of fish</li> <li>• Surrounded by a coral reef; keeps out predators</li> <li>• Sandy beach with no algal growth</li> <li>• Fresh water is available</li> </ul>	<p style="text-align: center;"><b>ISLAND 2</b></p> <ul style="list-style-type: none"> <li>• Rocky shoreline with many tide pools along the beach</li> <li>• Wave action is somewhat sheltered by rock outcrops.</li> <li>• Tide pools contain barnacles, oysters, sea urchins &amp; crabs</li> <li>• Algae grows thick along rocky shoreline</li> <li>• Algae is thing in the tide pools where the animals feed</li> <li>• The current is strong along rocky outcrops where the algae grows best</li> <li>• Fresh water is available</li> </ul>
<p style="text-align: center;"><b>ISLAND 3</b></p> <ul style="list-style-type: none"> <li>• Desert-like</li> <li>• A few species of cactus live on bare rocks</li> <li>• A large cactus-eating tortoise lives here</li> <li>• A very large bird nest on the rocks.</li> <li>• They protect their eggs from the sun by standing over the nests with outspread wings</li> <li>• The nests are found on the windy side of the island which is somewhat cooled by offshore breezes.</li> </ul>	<p style="text-align: center;"><b>ISLAND 4</b></p> <ul style="list-style-type: none"> <li>• Extinct volcano, with plant life changing with altitude moving up the volcano</li> <li>• Grasses grow at the base.</li> <li>• Further up the slope the grasses give way to low shrubs</li> <li>• Half way up, the island becomes quite lush; tropical plants and trees dominate the landscape</li> <li>• At high altitude, there is frequent rain showers</li> <li>• A raptor (meat-eating) bird preys upon the smaller birds.</li> <li>• Other birds fish the waters about one mile offshore</li> <li>• Both nest in trees</li> </ul>

**Show & Tell:**

Share your drawings with a family member and compare and contrast your squirrels from the different islands. Explain how natural selection resulted in the traits of your different squirrel populations.

**Additional Learning Opportunities:**

- PBS Triumph of Life - The Four Billion Year War <https://youtu.be/kVwB908J4W0>
- Radiolab: Dinopocalypse! <https://youtu.be/ZYogtBEzuiQ>
- Greatest Discoveries with Bill Nye: Evolution, video 1 <https://www.youtube.com/playlist?list=PL7C0B7D5EECAA7D65>
- Greatest Discoveries with Bill Nye: Evolution, video 2 <https://youtu.be/BVjBSlcmKHU>
- The Evolution of Ouch Mouth. <https://youtu.be/VNp7tuZyWBY>