

## Anchoring phenomenon: Why do elk have such huge antlers?



Supplementary video of elk fighting  
[https://www.youtube.com/watch?v=dg4VeesS6\\_I](https://www.youtube.com/watch?v=dg4VeesS6_I)

POGIL<sup>®</sup> Activities that support the anchoring phenomenon:

**LSActivity 8 – Seeing the Past: Imagining How Species Change Over Time?**

*Phylogenetic trees provide a visual map to help us see that DNA mutations can result in changes in elk populations over time.*



**LSActivity 10 – Factors That Influence the Process of Evolution**

*Genetic variation among elk, competition for limited resources, and the ability for elk with beneficial mutations to reproduce, resulted in change in the elk population over time.*



**LSActivity 11 – Animal Arms Races**

*There are specific evolutionary factors that result in development of extreme weapons in animals.*



**OPTIONAL/ENRICHMENT**

**LSActivity 7 – Looking Closer at Making Proteins**

*DNA mutations occur because of inherited and environmental factors. Types of mutations include substitution, insertion, and deletion.*

<b>POGIL® Activity</b>	<b>NGSS Performance Expectation</b>	<b>Learning Outcomes</b>
<p>LSActivity 8</p>	<p><b>MS-LS4-1</b> Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.</p> <p><b>MS-LS4-2</b> Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.</p>	<p><b>Seeing the Past: Imagining How Species Change Over Time</b></p> <ol style="list-style-type: none"> <li>1. I can identify which species are extinct and which are still living, based on analysis of various forms of evolutionary trees for the same set of species.</li> <li>2. I can create an accurate evolutionary tree, based on data about the presence/absence of fossil species and living species in layers of sedimentary rock.</li> </ol>
<p>LSActivity 10</p>	<p><b>MS-LS1-4</b> Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.</p> <p><b>HS-LS4-2</b> Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to</p>	<p><b>Factors That Influence the Process of Evolution</b></p> <ol style="list-style-type: none"> <li>1. I can analyze the horns on different types of beetles, identifying positive (beneficial) and negative (detrimental) mutations with respect to fighting ability, flying ability, dung odor detection, and seeing burrows.</li> <li>2. I can identify at least three of the four factors that influence the process of evolution.</li> <li>3. I can construct an explanation based on evidence (from dung beetle research) to support the concept that the process of evolution is affected by competition for limited resources, reproductive success, and beneficial mutations.</li> </ol>

	<p>mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.</p>	
<p>LSActivity 11</p>	<p><b>MS-LS4-4</b> Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.</p> <p><b>MS-LS1-4</b> Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.</p> <p><b>HS-LS4-2</b> Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.</p>	<p><b>Animal Arms Races</b></p> <ol style="list-style-type: none"> <li>1. I can distinguish between non-defensible and defensible resources.</li> <li>2. By analyzing and interpreting evidence about types of competition strategies, the defensibility of resources, and the competition for mates, I can predict which animals are likely to develop extreme weapons.</li> <li>3. I can explain how extreme weapons affect the probability of successful reproduction.</li> </ol>
<p>OPTIONAL</p>		

<p>LSActivity 7</p>	<p><b>MS-LS3-1</b> Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.</p> <p><b>HS-LS1-1</b> Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.</p>	<p><b>Looking Closer at Making Proteins</b></p> <p>1. I can describe the basic process of how a protein molecule is made in our cells.</p> <p>2. I can identify and name three different types of mutations that occur in strands of DNA.</p>
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