

**Bio/Diversity Project  
 Genetic Diversity**

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Grade Level: 7<sup>th</sup> grade – 8<sup>th</sup> grade

<b>Common Core Standard:</b>	<p><i>Strand 2, Concept 1: Identify individual, cultural, and technological contributions to scientific knowledge.</i></p> <ul style="list-style-type: none"> <li><i>PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.</i></li> </ul> <p><i>Strand 4, Concept 4: Identify structural and behavioral adaptations.</i></p> <ul style="list-style-type: none"> <li><i>PO 3. Determine characteristics of organisms that could change over several generations.</i></li> </ul>
<b>Content Objective:</b> Genetic Diversity	<ul style="list-style-type: none"> <li><i>Students will be able to (SWBAT) identify or deduce the traits necessary for survival in a certain environment (adaptations) by creating their own animals.</i></li> <li><i>SWBAT explain the role that mutations have on genetic variability.</i></li> <li><i>SWBAT explain how genetic diversity relates to biodiversity.</i></li> </ul>
<b>Language Objective:</b> (Optional)	N/A

<b>Vocabulary</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>Adaptation</li> <li>DNA</li> <li>Dominant trait</li> <li>Gene</li> <li>Genetic variation</li> <li>Heritable trait</li> <li>Mendelian genetics: (3) Principles of Inheritance</li> <li>Mutation</li> <li>Natural Selection</li> <li>Recessive trait</li> <li>RNA</li> </ul>	<ul style="list-style-type: none"> <li>Crayons, markers, colored pencils</li> <li>Paper (one piece for every group of four)</li> <li>Presentation on Smart Board</li> </ul>
<p><b>Guiding Questions:</b></p> <ul style="list-style-type: none"> <li>What are genes, DNA, and RNA?</li> <li>What is an adaptation?</li> <li>What role do mutations play in genetic variability?</li> <li>Why is genetic diversity important? How does it relate to biodiversity?</li> </ul>	

**Introductory Activity:**

“Scientist of the Day” PowerPoint presentation (optional): Rosalind Franklin was a chemist and x-ray crystallographer – she used x-rays to study small compounds and molecules, including coal, graphite (“lead” in pencils), and DNA, RNA, and viruses. Even though it was her research that led to the discovery of the structure of DNA, she was not awarded the Nobel Prize along with three of her male colleagues. She died at age 37, four years before her colleagues received the award, and the Nobel Committee does not include deceased people in their Nobel Prizes.

**Engagement/Introductory Activity:**

Ask students to observe and record the number of different hair colors they see in the classroom. Data can be recorded like this:

Hair Color	Red	Black	Brown	Blonde
Frequency				

Explain that this is an example of genetic diversity. Hair color is a heritable trait. Explain what a heritable trait is and give a brief introductory lecture on Mendelian genetics (recessive/dominant traits). Information can be found here: <http://www.nature.com/scitable/topicpage/gregor-mendel-and-the-principles-of-inheritance-593>

Share the story of the Peppered Moth to introduce the concepts of and to illustrate the link between genetic mutations, adaptations, and natural selection.

**Exploratory Activity:**

Provide a description or a picture of a habitat and have students draw an animal that would survive in that environment (it can be real or made up). Have them list the specific traits that the animal has that they think would help it survive and the advantages that the trait provides in that specific environment.

Ex: Cold, mountainous region where it snows eight months out of the year.

Trait	Advantage
Fur	Keeps animal warm in the cold

**Explain:**

Have students share their animals and their justifications for including certain traits with the class.

**Extension Activity/Questions:**

Wrap-up by discussing the results: were all of the traits that the students came up with suitable adaptations? Explain why some were or were not.

If time permits, ask the students:

- Do you think that animals who live in the desert would also be able to live in the temperate forest at the top of the local sky island mountains, like Mt. Lemmon in the Santa Catalinas, Rincon Peak in the Rincon Mountains, or Mt. Wrightson in the Santa Ritas?
- Why or why not?

Tie this discussion back to genes, mutations, and genetic inheritance. Re-emphasize the objective(s) of the day.

**Evaluation Activity:**

Have students answer the following questions independently or in pairs. (You can ask some or all of these questions depending on how much time you have or on the level of the class).

- What is DNA/RNA?
- What is an adaptation?
- What role do mutations play in genetic variability?
- Why is genetic diversity important? How does it relate to biodiversity?