

Brunswick School Department
Science
Grade 7: Genetics and Evolution

Adopted:

Unit Overview

In this unit, students will explore heredity, the inheritance of genetic traits. They will examine the role of DNA, the effect of mutations, and the differences between sexual and asexual reproduction. The relationship between genes, alleles, chromosomes, DNA, and traits will be investigated.

Essential Understandings

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.
- Variations of inherited traits between parent and offspring arise from genetic differences that result from the chromosomes (and therefore genes) inherited. In asexual reproduction, offspring receive an exact copy of all genes from one parent. In sexual reproduction, offspring receive one copy of each gene from each parent.
- In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other.
- Genes are located in the chromosomes of cells
- Each chromosome pair has the same genes, but not necessarily the same alleles of the same genes.
- Adaptation by natural selection causes species to change over generations in response to changing conditions.
- Genetic variation is required for evolution to happen.
- Traits that support successful survival and reproduction in a new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.
- Natural selection leads to the increase of certain traits in a population, and the decrease of others.
- Genes chiefly control the production of proteins, which in turn affect the traits of individuals.
- Mutations can result in changes to proteins, which can affect the organism's traits. Some changes are beneficial, others harmful, and some neutral to the organism

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Priority Standards and Performance Indicators

(as based on Next Generation Science Standards)

P.S.S.-2 Demonstrate an understanding of how structure influences function.

a. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Next Generation Science Standards Addressed in this Unit

- MS-LS1-4 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.
- MS-LS4-2 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.
- MS-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
- MS-LS3-1 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.
- MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Examples of Formative / Summative Assessments

- Genetics Pre Assessment
- Labs
- Activities
- Quizzes
- Discussions
- Handouts
- Home work
- Genetics Summative Assessment

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Sample Texts and Materials/Resources

University of Colorado PhET simulations
PBS Learning Media
HHMI Genetics Resources