

Genetic Variation and Mutations

Strand	Life at the Molecular and Cellular Level
Topic	Exploring genetic variation and cell specialization
Primary SOL	BIO.5 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include c) cell specialization; f) genetic variation.

Background Information

Sometimes certain factors change expected patterns of heredity. Such changes are called “**mutations.**” Information is passed on from one generation to the next through DNA. If there is an error in replicating the DNA, the nitrogen base sequence will change. Mutations in an organism can have either harmful or beneficial effects. There are two types of mutations: gene and chromosomal. In a gene mutation, only one single gene is changed, while in a chromosomal mutation, the entire chromosome is changed.

Materials

- Internet access
- Resources about genetic mutations
- Coloring utensils
- Teacher-created scoring guide

Vocabulary

chromosomal mutation, codon, deletion, DNA, duplication, frame shift mutation, gene mutation, inversion, karyotype, mutation, nondisjunction, point mutation, somatic cell, stem cell, translocation

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Before undertaking this lesson, students should have knowledge of DNA, chromosomes, and mutations. This is a postlearning activity, as it wraps together aspects of these three concepts. It would be good to do this lesson before taking up biotechnology, for the concepts discussed here lead right into that topic.

In this lesson, students will choose two activities about genetic mutations that they will do on their own. Before the lesson, create a scoring guide for students to follow when doing their activities. List in the guide items that students must include in their products.

1. Display the following activity choices, and go over it with students, telling them that each of them should choose two activities to do, based on which ones interest them the most.
 - a. You are a comic strip writer. Create a new comic strip about a lead character who has a genetic mutation that has given him or her special super powers. It can be a real mutation or a fictitious mutation. Include the items from the scoring guide in your comic strip.

- b. You are a relative of a family member with a genetic mutation. Create a brochure to raise money for the awareness of this mutation. It can be a real mutation or a fictitious mutation. Include the items from the scoring guide in your brochure.
 - c. You are a children’s book writer. Create a children’s story about two types of genetic mutations that children might encounter. Include the items from the scoring guide in your story.
 - d. You are a student. Create a graphic organizer about two types of genetic mutations that are important to know about. Include the items from the scoring guide in your organizer.
 - e. You are a medical doctor. One of your patients just had a baby whom you have just diagnosed as having a genetic mutation. You need to tell the mother that her baby has this mutation. Write the dialogue between you and the mother. Include the items from the scoring guide in your dialogue.
 - f. You are a teacher. You will be tutoring a child with a genetic mutation. Write a report about the genetic mutation to demonstrate that you understand the mutation and will make the necessary accommodations for the child. Include the items from the scoring guide in your report.
 - g. You are a _____. Construct your own scenario in which you focus on the concepts involved with a genetic mutation. Include the items from the scoring guide in your product.
2. Distribute copies of a teacher-created scoring guide for students to follow as a checklist when completing their activities. Allow them to use the textbook, their notes, other printed resources, and the Internet to complete the activities.
 3. Walk around the classroom and assist students who have questions, comments, or concerns.

Extensions and Connections (for all students)

- Present students with this scenario: “You are a talented scientist in genetic biology. You are trying to get money from a large corporation to fund your research in the field of stem cell technology.” Have students write proposals to this corporation, describing how important stem cell research is, the different types of research, and the benefits of stem cells. Direct them to research this topic in various resources before writing their proposals.