

Genetic Disorders with Cultural Roots

Instructor: Sara Brassler

Workshop: International Insects

Targeted Grade Level(s): grades 9-12

Content Area(s) Covered: Biology, Ecology, Environmental Science

Anticipated Duration: 1 - 50 minute class period

Rationale:

Students know that insects like mosquitoes can transmit diseases. This lesson looks at the relationship between malaria, sickle cell disease (SCD), and carriers for SCD as well as the cultural dispersal. While examining the cultural implications of this disorder, students will practice the basic genetics of co-dominance using punnett squares.

Objectives:

1. Students should recognize that certain populations have specific genetic disorders that could benefit or harm them in their environment.
2. Students should be able to work out punnett square problems and infer offspring probabilities from the punnett square results.
3. Students should be able to provide advantages and disadvantages of certain disorders in specific environments.

Sunshine State Standards:

SC.G.2.4.2 – knows that changes in a component of an ecosystem will have unpredictable effects on the entire system but that the components of the system tend to react in a way that will restore the ecosystem to its original condition.

SC.G.2.4.4 – knows that the world ecosystems are shaped by physical factors that limit their productivity.

SC.G.2.4.5 – understands that the amount of life any environment can support is limited and that human activities can change the flow of energy and reduce the fertility of the Earth.

SC.G.2.4.6 – knows the ways in which humans today are placing their environmental support systems at risk

SC.D.1.4.4 – knows that Earth's systems and organisms are the result of a long, continuous change over time.

SC.D.2.4.1 – understands the interconnectedness of the systems on Earth and the quality of life.

Resources/Materials Needed:

1. Textbook
2. Overhead projector
3. [Sickle Cell Disease Data Sheet & sample punnett squares](#)
4. [Sickle Cell Disease worksheet](#)
5. Writing utensils (overhead pens and students pencils/pens)

Procedures:

1. Review with students how to complete punnett squares. Remind students about the basics of probability and co-dominance.
2. Introduce Sickle Cell Disease as a genetic disorder. This type of disorder is specific to locations. (See sample overhead). Describe this disorder including what type of disorder it is, how it is transmitted, the phenotypes and genotypes of individuals; comparison of United States and another afflicted country (Nigeria), ratio in population, and advantages/disadvantages of disorder. Discuss.
3. Work out a punnett square so the students can see how the offspring might have the disease (SCD), be a carrier, or have normal red blood cells.
4. Have the students work in small groups or individually to answer questions on the SCD worksheet. (See attachment with sample overhead).

Informal/Formal Assessments:

1. Students could be graded on their correct completion of the punnett squares on the SCD worksheet, showing that they can predict what the possibilities for offspring to show the genetic disorder.
2. Students could be assessed on analyzing the benefits versus harm that can be caused by sickle cell Disease in the specified environment. Could this disorder be more beneficial in an alternate environment?
3. Students could be quizzed on their knowledge with a Review Quiz at the genetics unit.