

CLASSROOM ACTIVITY

Malaria: Natural Selection and New Medicine

The malaria parasite and its human hosts are locked in an evolutionary arms race. The parasite kills more than a million people every year. Humans fight back with gradual genetic adaptations and better drugs. The parasite then adapts to evolve drug resistance. Watch as immunologist Dyann Wirth and her team at the Harvard School of Public Health study the evolutionary adaptations of Senegalese people and their malaria parasites in the field and in the lab. The scientists are seeking signs of natural selection at a molecular level to help fight malaria in a smarter way.

CLASS DISCUSSION

Establish Prior Knowledge

Call on students to share what they know about malaria, areas where it is found, and how it is transmitted.

If necessary, direct them to the World Health Organization website: <http://www.who.int/topics/malaria/en/>

(Possible responses include: Malaria is a disease caused by a parasite which is transmitted by the bites of infected mosquitoes. The parasites invade the liver and red blood cells. Malaria is most prevalent in tropical and sub-tropical areas of the world.) Explain that while there are drugs to treat malaria, the disease is becoming resistant to the drugs. Tell students that, in the video they will see, they'll learn how scientists are using genetics to understand the parasite's drug resistance.

Exploration

Have students read the synopsis and watch the video. Use the following questions to guide a class discussion.

- Why is malaria considered one of the most important infectious diseases in the world?
(Answer: There are over 300 million new cases each year and about 1 million annual deaths from the disease.)
- What is the purpose of the study in Senegal?
(Answer: The purpose is to detect and understand drug sensitivity in the parasites that have come directly from the patients.)
- What do scientists find when they analyze the genomes of humans and of the parasite?
(Answer: They find what genes and genetic changes have protected humans from the parasite and what genetic changes are protecting the parasite from the drugs.)
- How are some blood disorders, such as sickle cell anemia, beneficial?
(Answer: They prevent the malaria parasite from invading the red blood cells.)
- Scientists say that there is an effective human immune response to the malaria parasite. Why then is the parasite still infecting people?
(Answer: The parasite is constantly changing.)

Wrap-Up

Use the following question to wrap up your discussion:

- How would a malaria vaccine, similar to the yearly influenza vaccine, work?
(Answers may include: As the malaria parasite mutates and becomes resistant to a vaccine, another vaccine would be developed to combat this new mutation.)