

SYNOPSIS:

In this thought provoking program, we see how scientists are using nature’s blueprint... DNA... to genetically engineer pharmaceuticals to cure hereditary and acquired diseases. With the help of sheep, scientists found a way to manufacture Factor 9, which gives blood its clotting ability and hopes for a cure of hemophilia. The accidental discovery of a method for making Hepatitis B vaccine with the help of caterpillars is also presented in this report.

CURRICULUM UNITS:

- Agriculture
- Biology
- Genetics
- Health
- Science
- Zoology

CAREER OPPORTUNITIES:

- Animal Husbandry
- Biologist
- Botanist
- Entomology
- Genetic Engineer
- Immunologist
- Laboratory
- Research
- Lab Animal Technician
- Medical Doctor
- Veterinarian
- Virologist

SUGGESTED TEACHING STRATEGIES:

- 1) Have students build a DNA model out of colored beads, wire and B wooden dowel, or construction paper.
- 2) Have students bring in photos of parents and other family members. Compare the facial characteristics to determine what traits were passed on from the mother and father to the children.
- 3) Ask students to investigate the relationship between the genetic code (DNA base sequences) and the amino acid sequence in a protein.

ISSUES AND CRITICAL THINKING:

- 1) Have students do research to find out about some of the most recent advancements in commercial applications of genetic engineering. There are several companies working in this area. Many have annual reports and brochures that are available to the public.
- 2) Discuss some of the legal and moral issues associated with genetic engineering. For example: What could happen if a new life form was created in the lab and accidentally released to the outside world? Should scientists be allowed to experiment with humans?
- 3) Discuss how DNA is being used as a tool in law enforcement and forensic medicine. How is it used in the location and identification of lost or missing persons. What are the advantages of DNA identification over fingerprinting or simple blood type tests.
- 4) Many people are being faced with this problem: if a DNA test was available to determine that you would someday suffer from an incurable hereditary disease, would you want to take the test to know for sure, or would you rather live your life not knowing and hope that you would not come down with it?

GLOSSARY:

Biotechnology- The brunch of science that deals with the application of technology and engineering to solving problems related to living things.

Capsid- The outer protein shell of a virus particle.

Crossbreeding- The practice of combining the most desirable qualities of living plants or animals to form a new variation.

DNA- An abbreviation for deoxyribonucleic acid, the hereditary substance that chromosomes are made of. It carries the genetic information necessary for the replication of the cell and directs the building of proteins. DNA is the blueprint by which nature builds every living organism, from plants to people.

Genes- A unit of hereditary material which is related to a particular characteristic, such as hair color. Genes are segments of the DNA molecules.

Genome- The complete blueprint for a person.

Genetic engineering- A faster and more predictable method of creating a variation in a living cell by splitting and recombining genes.

Hemophilia- A genetic disease where the body does not produce the factors needed to make blood clot.

Hepatitis B- A viral disease that attacks the liver and is generally transmitted by contact with the blood of an infected person.

Nucleotides- The genetic building blocks formed from a combination of a sugar, one of four nitrogenous bases and a phosphate.

Plasmids- Circular forms of DNA that can be cut apart, joined with genes from a different organism, and then resealed.

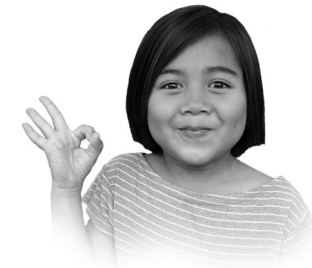
Transgenic- The transfer of a gene from one plant species or animal species to another species.

**Wonders of Biology – Animals,
Insects, Plants & Fungi**



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BIOLOGY: CHANGING NATURES BLUEPRINT



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