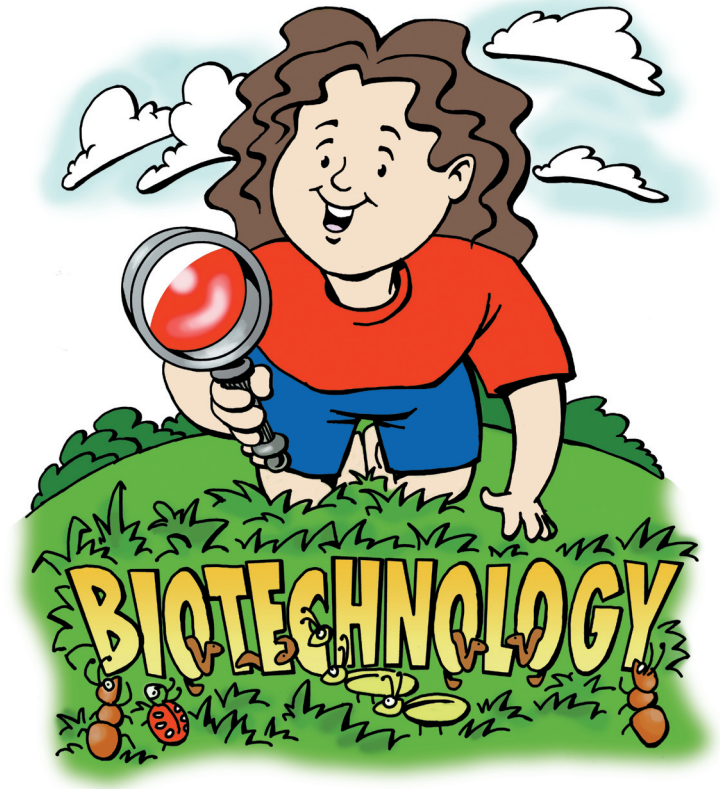
Illinois Ag Mag

An agricultural magazine for kids

Biotechnology and...

- the Environment
- Careers
- Farming
- Nutrition



Biotechnology at Work

Biotechnology allows scientists to look closer at genes and make improvements in them. Your body is composed of millions of individual units called cells. Within each cell are genes that carry all of the information that allows your body to work and determines how you look.

You get your genes from your parents. This is why you may look like your parents. All people, plants and animals inherit traits from their parents through their genes.

One of the first people to study how traits are passed from parents to their young was a monk in Austria named Gregor Mendel. About 150 years ago, he used plants to show how certain things such as flower size and color are passed on from the parent to the offspring.

Biotechnology allows for scientists to study how plants grow and how they react to the environment. As a result, scientists can now insert a specific gene into a plant that will help it adapt to its environment, make it more pest resistant, or even make it more nutritious.

What Is Biotechnology?

Biotechnology (by-o-tek-nawl-a-gee) is a big word, but it is easy to figure out what it means if you just look closer! **Bio** is short for biology, which is the study of all living things. **Technology** is another word for tools. **Biotechnology** then, is a tool that uses biology to make new products. For example, plant biotechnology is a precise way to make seeds with special qualities. These seeds will allow farmers to grow plants that are more nutritious, more resistant to pests and more productive. Plant biotechnology is a tool for looking closer at nature to find solutions that improve the health of the Earth and its people.

Unscramble the letters below to spell the two words that make up the word BIOTECHNOLOGY.

o y l o i b g

_ _ _ _ _ _ _ _ _ _

y c o e t l n o g h

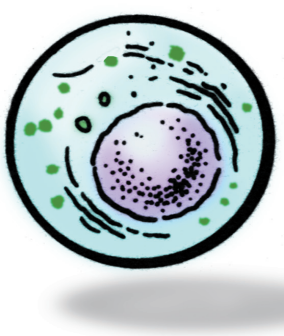
_ _ _ _ _ _ _ _ _ _

What Does a Cell Do?

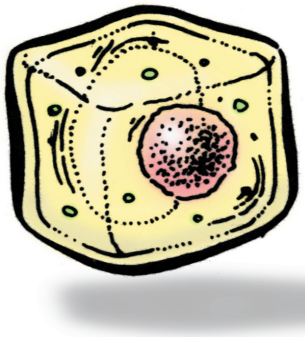
- The cell contains lots of things that help it work.
- The cell has a cover that lets some things in and keeps some things out.
- A **human cell** contains instructions that tell how to build humans. A **plant cell** contains instructions that tell how to build a plant. A bug cell contains instructions that tell how to make a bug.
- The cell has energy inside it.
- The cell has natural defenses that fight invaders such as bacteria.

Used with permission from *Field of Genes* from the National 4-H Council

Human Cell

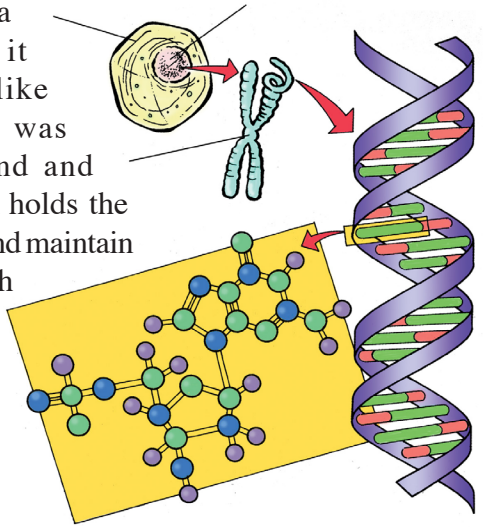


Plant Cell



Genes and DNA

Genes help determine whether your hair is straight, whether your eyes are brown, and whether you can curl your tongue. Yet genes exist in more than just people. Genes make hens white or speckled, give frogs smooth skin, and let roses smell sweet, and are found in all living things. Genes are a segment of DNA. Every cell in your body has about six feet of DNA coiled up inside it. (It's really small!) If you put DNA under a microscope, it would look like a ladder that was twisted around and around. DNA holds the code to make and maintain proteins which help living things grow and function.

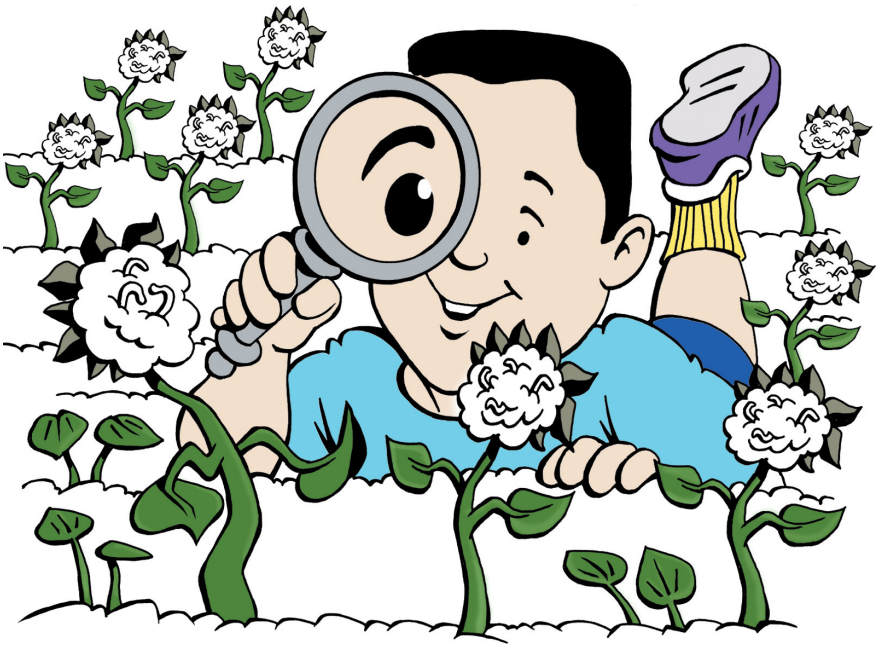


Adapted from *Field of Genes* by the National 4-H Council

Biotechnology and the Environment

Biotechnology can help farmers and the environment in many ways. Bugs and weeds are big problems for farmers. Farmers have many tools to choose from to protect their crops. Sometimes farmers use special chemicals to help control the weeds and bugs when they are really bad. Biotechnology is another option. For example, many farmers grow cotton. Some young insects, or larvae, love to eat cotton plants. To stop the larvae from feasting on cotton plants, scientists have found ways to use biotechnology to help the cotton plant protect itself from insect larvae worms. Farmers who grow these special cotton plants do not need to spray as much insecticide on their crops, and they can still grow as much or more cotton!

Weeds can be a problem for farmers too. Weeds crowd out farm crops and rob them of water, light, and nutrients they need to grow. Some farmers plow their fields to destroy these weeds, but plowing can cause soil erosion. Thanks to biotechnology, a farmer can manage the weeds without having to plow. This saves energy as well as the soil! Giving farmers more choices to control harmful bugs and weeds helps their farms and the environment.



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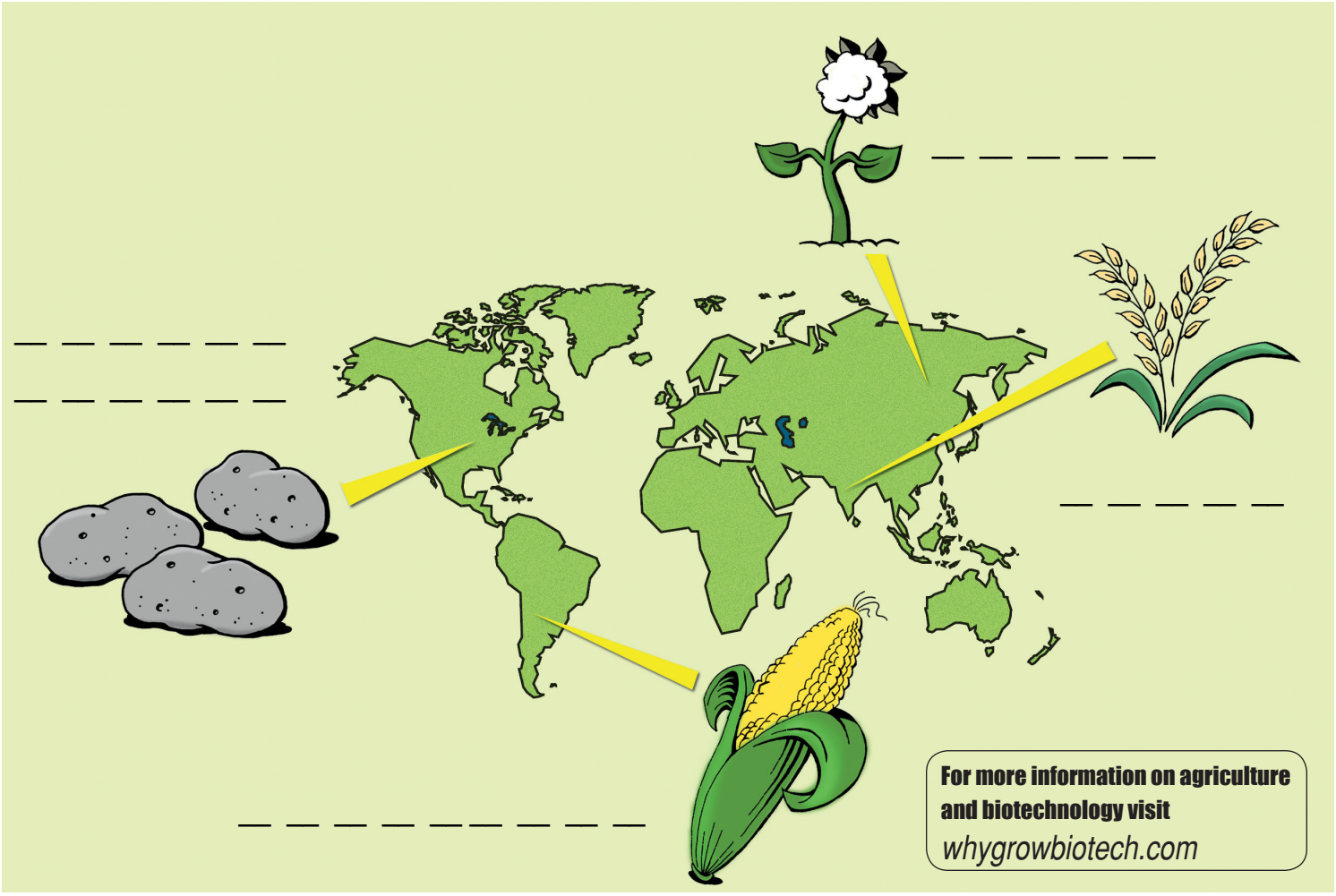
Helping Farms Around the World

Someday, farmers could produce more food, help the environment, and produce more nutritious food. For example, the farmer in China could grow cotton and use less insecticide. The farmer in India could grow healthier rice. The farmer in the United States could grow potatoes that protect themselves from harmful insects. The farmer in Argentina could grow corn that protects itself from insects.

Can you name these different countries pictured below? They are all mentioned above!

Biotechnology and Farming

Biotechnology is one of the many tools farmers can use to improve their crops. It could have tremendous potential for improving the environment and the food supply for people around the world. While farmers have been breeding plants to create better crops for centuries, biotechnology takes the process a giant step further. Agricultural biotechnology is a precise way to make seeds with special qualities. These seeds could allow farmers to grow plants that are more nutritious, more resistant to pests and more productive.



Career Corner

Michael Williams

Chief Policy Advisor
Illinois Department of Agriculture

Describe your job.

As chief policy advisor, my duties are two fold. First, I watch out for issues or problems that will affect grain and livestock farmers, agricultural businesses, and rural communities in Illinois. Secondly, I make and implement recommendations on how those issues or problems should be dealt with by the Department. Issues can include: biotechnology, food and animal health and safety, soil and water conservation, and marketing of our farmer's agricultural products.

How did you become interested in biotechnology?

I have always had an interest in science, chemistry, physics, and mathematics. Biotechnology is a combination of all of these and more. Being raised on a family farm made it easy for me to apply all my interests in these subjects to everyday activities around the farm. That same interest is still with me today as biotechnology is the "new" science of tomorrow and includes all of these.

What changes have you seen in biotechnology since being involved in the field?

In medicine, look at all the new drugs and surgery procedures that have been invented and used. We are able to treat or cure a number of illnesses and diseases that were thought to be uncurable 20 years ago. In agriculture, we have seen new plants that can increase yields, and use less pesticides, water and fertilizer to feed a growing world population. What I do see is more and more new inventions and products that will change the way we live, how long we will live, and the quality of our lives as we move forward in time.

Dannette C. Ward

Senior Scientist & Science Information Specialist
Monsanto

Please describe your job.

When I was a research scientist, I was involved in adding beneficial genes to crops such as soybeans. These genes made the plants safe from insects and weeds. Now I am using my scientific background to help teachers and students understand biotechnology.

How did you become interested in biotechnology?

Science has always been my favorite subject. I grew up on a farm so I saw many of the farmers struggle with insect control, weeds, and loss of crops due to lack of rain. I wanted to combine my love of science with the need to find a solution to the farmers' problems. This was my way of giving back to the farming community I still call home.

What type of things did you learn in school that help you with your job today?

As a science major, I learned to ask questions, develop opinions, set up experiments, analyze the results, and then present my findings to other scientists. Being able to communicate my research findings was just as important as the experimental results.

What suggestions would you give to young people interested in pursuing a career in biotechnology?

The exciting thing about science is that you continue to learn throughout your career. It is also important to be passionate about your career. For me, the benefits of biotech are beginning to be realized and I am excited that I was a part of it from the beginning.

ANSWERS: BIOTECHNOLOGY AND FARMING: **Potatoes:** United States; **Cotton:** China; **Rice:** India; **Corn:** Argentina

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