

Biotechnology: The Misunderstood Science

Having been associated with the fields of general science, medical products and horticulture all of my life in one way or other as a vocation or avocation, I have been fascinated watching the evolution of the new science of biotechnology.

The news, written, radio, TV--- is full of happenings in the field of biotechnology; whether it is the Flavor Savor tomato or huge salmon or Roundup resistant corn and soybeans.

From what I have seen, it has to be the most maligned and misunderstood branch of science that has evolved during my lifetime. Like all new things and technologies, people have questions. The key to the misunderstanding, though, is how well the scientists explain and the listener listens. And there are enough shortcomings on both sides to go around.

Biotechnology is the application of scientific knowledge to transfer beneficial genetic traits from one species to another to enhance or protect an organism. Researchers are applying scientific processes at the gene level to affect expressed and inherited traits.

Technology that is new can be scary and create alarm. For example, in the US, when vaccines were first introduced for Smallpox and even polio, some people were concerned that vaccines would cause more harm instead of disease protection. It is good to be cautious with all new technologies and that is why we have the FDA for medicine and foods monitoring and guidelines for production. Keeping our medicine and food supply safe and efficacious is critical to our survival.

But how does biotechnology work and why do we need it? The best answer is to study history and the evolution of how we have developed new crops and breeds of animals and plants. For example, in the field of horticulture, why can't we just breed better plants like we do animals?

Traditional plant breeding involves the transfer of pollen containing the gene for a desired trait from one crop variety to another. Eventually, the desired trait will appear in a new family of plants. But, continually combining genes in this way takes years to yield new varieties and it is less precise and more prone to error because it is trial and error.

Biotechnology helps scientists be more precise and efficient in isolating genes and developing new varieties of plants, taking years away from the lengthy process.

Biotechnology can be applied to produce two varieties of enhancements: transgenic or intraspecies. These words refer to whether scientists are working within one species of plants---intraspecies--- or across several species---transgenic. For example, adding a pest-resistant trait to yellow corn from white corn is called intraspecies, but adding the same pest-resistant trait from the corn to wheat is transgenic.

To put things in perspective, look at history. Christopher Columbus and other explorers introduced corn, native to the Americas to the rest of the world. Spanish explorers also returned with potatoes, which are native to the Andes in South America. Two centuries after their European introduction, potatoes became a staple in Ireland, Germany and other European countries. But neither the corn nor potato looks now like it did in the 15th and 16th centuries, because they have been bred and rebred for traits that allow them to grow bigger and better for their new homes.

It has only been about 126 years since Louis Pasteur learned how to pasteurize milk to help prevent tuberculosis. About the same time, an Austrian monk, botanist and

plant scientist Gregor Mendel studied the principle of heredity with his famous trial of garden peas. He showed that certain traits could be inherited. In fact, many people in the world never knew of Mendel's scientific discovery until Europeans re-discovered his research findings later in 1900.

As late as 1926, in the United States, Henry Wallace applied Mendel's principles of hybridization to develop new, higher-yielding seeds which was later developed into the Pioneer Hi-Bred seed company which produces agricultural seeds for our food today.

A precursor to more advanced cross-breeding and eventually biotechnology, hybridization is the process of crossing plant varieties to produce crops with more favorable traits---or combining genes from two or more varieties of a plant species to produce improved seed.

For example, to get a thornless rose or blackberry, a breeder might cross breed a plant with thorns with a chance thornless one to develop a true thornless variety. The often imprecise process of traditional plant breeding takes years to control for desired traits.

We only discovered DNA in the early 1950's when Watson and Crick, two scientists researched the existence and structure of cellular material. The first real application of the science of biotechnology was actually done by researchers Stanley Cohen and Herbert Boyer. Working with people living with diabetes, they took pieces of human DNA and isolated a gene for insulin using biotechnology and then inserted the gene into bacteria, which allowed the gene to produce a larger quantity of insulin for diabetics. Today, such insulin is mass produced saving millions of lives.

Biotechnology when used with care, has the potential for new drugs designed to help the body do what it can't do on its own when under disease attack, or for crops that can protect themselves from their diseases. The result can be people living with a higher quality of life worldwide.