

# Biotechnology

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# What is biotechnology?

- Using organisms such as bacteria, fungi, and algae to the manufacturing and service industries.
- It refers to the use of living systems to develop products. Allow us to understand fundamental life processes at the cellular and molecular level.
- Using bacteria to eat oil spills is an example of biotechnology.

# Careers in biotechnology

- ◉ Pharmacist
- ◉ Bioengineer
- ◉ Bio scientist
- ◉ Sales representative has to have some understanding of the topic
- ◉ Geno Scientist

# Biotechnology

- With biotechnology we could improve microbes, plants, or animals for human use by making genetic changes.
- Biotechnology allows a single gene to be changed.
- Allows food scientists to improve the key food ingredients – Enzymes.
- Genetically modified microbes are routinely used in industry (including detergents and pollution clean-up)

# How is biotechnology beneficial to everyday life.

## Benefits of food biotechnology:

- Future products developed through biotechnology will provide important consumer benefits, like an enhanced flavor and freshness and reduced saturated fats.
- It increase crop yield, so it can help with famines.
- Soon we will create biodegradable packaging.

# Food

- Lactobacillus is a microbe that is used for thousands of years in preparation of fermented foods, such as cheese, pickles, soy sauce, wine, and yogurt.
- Researches at the University of Georgia have developed a super strain of yeast that can efficiently ferment ethanol from pretreated pine. Pretreated pine is one of the most common trees in North America and Canada.
- This research could help bio fuels replace gasoline as the transportation fuel.
- This 'super yeast' is a directed evolution and adaptation of Saccharomyces cerevisiae.

# How do they improve quality of life.

- The population of the earth will double by the 2050, which means there will be a need for more food.
- Researchers are developing plants that can withstand drought, bad temperature, and pests. These plants will yield more crop.
- Biotechnology can help improve world hunger.

# Quality of life

- Proteins or other molecules of microbes are used to make vaccines, which cause the immune system to develop antibodies.
- Bacteria, such as *E. coli*, are used to create antibiotics and proteins.
- Microbial technology will develop ways to use microbes to benefit the earth and all living things.

# Genetic engineering

- The change of genes is also called recombinant DNA.
- During the process of genetic engineering, pieces of DNA are introduced in a host by a carrier system.
- The new and foreign DNA becomes a permanent feature of the host. It is then copied and passed on to daughter cells and the DNA.
- Genetic engineering is used in production of commercially important products.

# Examples of Genetic Engineering

- The production of human insulin: fight against diabetes.
  - Insulin is a hormone that changes extra blood glucose to glucose.
- Human growth hormone: Somatrophin is used to treat pituitary dwarfism.
- Bacteria can be bioengineered for the production of therapeutic proteins

# How do these microbes interact others in their environment?

- Attack bacteria – they take modified bacteria and take it a new bacteria.
- Microbes can kill you.
- Harm plant life.
- Used to cure diseases.

# Microbes and us

- Most microbes are beneficial to us.
- 90% of microbes are helpful to us!
- Microbes help us do everything from digesting our food to helping us fight off foreign invaders.

# Technologies role in advancements

- As technology advances so does our understanding of these microbes.
- Technology such as the microscopes help us learn more about them.
- Genom sequencers and other devices let us combine the DNA's to make mutated bacteria.

# Microscopes

- Electron microscopes

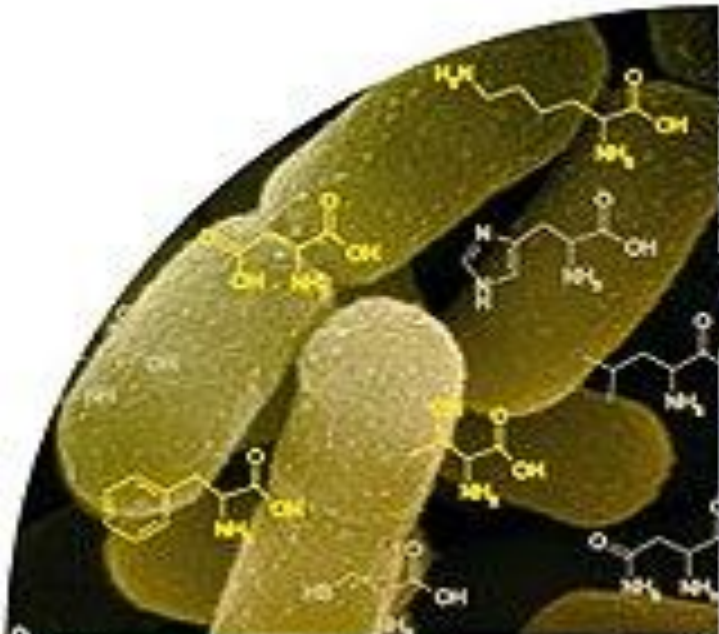
- Scanning electron & Transmission electron microscopes
- Transmission transmits electrons through the organism.
- Scanning provides detailed three dimensional views of the thing being seen.

# Microscopes

- Dark field microscopes allows you to see live specimens more clear.
- Fluorescence microscopes are equipped with an ultraviolet radiation source and filter.
  - They are useful in diagnosing infections.

# Interesting facts

- ◉ Without vaccines, diseases like smallpox, chickenpox, and polio would be a world wide hazard.
- ◉ In the future you should invest in stock companies that are involved in biotechnology.
- ◉ With today's technology you can genetically choose if you want a girl or boy.



- Modern biotechnology is often associated with the use of genetically altered microorganisms such as E. coli or yeast for the production of substances like insulin or antibiotics.
- It can also refer to transgenic animals or transgenic plants.

- Small molecules are manufactured by chemistry but large molecules are created by living cells.
- Examples: bacteria cells, yeast cell, animal cells.

- ◎ [http://www.youtube.com/watch?v=Wm6\\_BBS\\_KE4&feature=related](http://www.youtube.com/watch?v=Wm6_BBS_KE4&feature=related)