



Careers in Biotechnology

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Introduction

Have you ever had the dream to help people live longer, healthier lives, to help stop world famine, or to play a part in alleviating cancer or heart disease? These are just some of the things that you can do in a biotechnology career. Throughout this presentation you will learn about biotechnology, the different areas of biotechnology, and what to do if you are interested in a career in biotechnology.



What is Biotechnology?





“In the years to come, the contributions of [the biotechnology] industry will help us to win the war on terror, will help us fight hunger around the world and will help us to save countless lives with new medicines.”

--President George W. Bush



History of Biotechnology

- Dates back to earliest recorded times.
- 3 Scientists who paved the way for modern biotechnology
 - **Gregor Mendel**
 - **Charles Darwin**
 - **Louis Pasteur**
- Other scientists build on their work.
- Everyone's future will be touched by biotechnology: the foods we eat, the way diseases are treated, and even the way babies are born.



What is Biotechnology

- Biotechnology offers a tool that can make a planet unimaginably better than it is now.
 - **Live longer, healthier lives**
 - **Stop famine**
 - **Have plenty of food grown with less pesticides**
 - **Perform heart transplant with heart grown from own cells**
 - **Alleviate cancer and heart disease**
 - **Advances in medicine**
- Biotechnology is where scientists use living things to achieve practical purposes.



Benefits of Biotechnology

- Revolutionize medicine
- Extend lifespans
- Feed the hungry
- Provide a variety of better foods
- Make the environment cleaner



Areas of Biotechnology

- Human Health Care
 - Diagnostics
 - Therapeutics
 - Regenerative medicine
 - Vaccines
 - Genomics and Proteomics
 - Approved biotechnology drugs
- Agriculture and Animal Health Care
 - Forest biotechnology
 - Animal biotechnology
 - Crop biotechnology
- Energy and Environmental Management
 - Biomass from chemicals, wastes, residues, and fuel crops
 - Enhanced oil recovery and nonfossil fuel sources
 - Chemicals and solvents
 - Decomposition and detoxification of chemicals
 - Biosensors and biochips
 - Improved microbial systems for environmental control of air, water, and soil
 - Extraction of low-grade metals and recovery of valuable metals
 - Hydrogen and carbon dioxide production



Areas of Biotechnology cont.

- **Food Biotechnology**
 - Improving raw materials, processing, and testing for food safety
- **Biodefense**
 - **Contributions to policy**
 - **Strategic asset**
 - Importance of vaccines
 - Monoclonal antibodies
 - DNA- or RNA-based therapeutics
 - Detection diagnostics
- **Industry and environment**
 - **Industrial sustainability**
 - **Biocatalysts**
 - **Renewable energy**
 - **Green plastics**
 - **Nanotechnology**
 - **Environmental technology**
 - **Industrial enzymes**



Job Information





Job Information

- Research biologists form the mainstay of the industry and specialize in many kinds of research
- Nearly one-third are molecular biologists and immunologists
- Bioprocess engineers, biochemists, and microbiologists develop methods of producing in large quantities



Job Descriptions

Lab Assistant I, II, and III

- Perform a wide variety of research/laboratory task and experiments under general supervision: making detailed observations, analyzing data, and interpreting results in written reports.
- Maintaining laboratory equipment and keeping an inventory of supplies.
- Carries out routine day-to-day laboratory procedures.
- Moving from lab assistant I to a II requires work experience.
- A lab assistant III is the level at which a lab manager or a person with only a bachelor's degree stops.



Job Descriptions cont.

Research Associate I, II, III, IV, and V

- Research associate I is responsible for research and development for products and projects usually in a project team.
- They make detailed observations, analyzes data, and interprets results.
- May exercise technical creativity and discretion in the design, execution, and interpretation of experiments that contribute to projects.
- Also manage people, particularly lab assistants.
- Years of experience and excellence ratings on your experiments will propel you up the ladder.
- To anticipate successful career growth plan on earning a Ph.D.



Job Descriptions cont.

Postdoctoral Research Scientist I and II

- Responsible for the design, development, execution, and implementation of scientific research, usually involving a large research team.
- Investigates the feasibility of applying a wide variety of scientific principles and theories to patented inventions.
- Contributes to the scientific literature in the field and to professional conferences.
- Educational prerequisite is a Ph.D. in a scientific discipline.
- Hiring companies are going to expect this level to have experience in research.



Job Descriptions cont.

Associate Scientific Director

- At this level, the hands-on work diminishes and more supervisory and paperwork duties take over.
- Organize and manage groups of people.
- Establish what their personnel will work on.
- Determine which directives are or are not panning out.
- Decide whom to hire or fire or promote.



Job Descriptions cont.

Project Managers

- Responsible for providing oversight to maximize the effective use of resources.
- Facilitates information flow between research team members, project leaders, senior management, and corporate clients.
- Goal is to maintain positive interaction with the client and initiate and coordinate the decision-making process.
- Direction given is administrative and not technical.
- Must have previous know-how in overseeing projects.



Biotechnology Job Distribution

- 33% employed in research, testing, and medical laboratories
- 33% employed in medical devices and equipment
- 25% employed in drugs and pharmaceuticals
- 8% employed in agricultural feedstock and chemicals



Education Information





Educational Programs

- Variety of paths
- Talk to a professional in area of interest
- Look for an education program that gives you a diversity of scientific skills



Websites for Information

- <http://www.accessexcellence.org/RC/CC/#words>
- <http://www.biotechinstitute.org/>
- <http://www.biotechcareercenter.com/>
- http://www.biotech.iastate.edu/ed_resources/Careers.html



Summary

Throughout this presentation, you have learned a little of the history of biotechnology, the different areas and recommended career paths for a biotechnology career. This is just a start to give you some information about biotechnology. Now it is your turn to go out and learn more about it and reach your dreams.



Resources

Brown, S. S. (2007). *Opportunities in biotechnology careers*. New York: McGraw-Hill.

Creative Media Applications. (2002). *A student's guide to biotechnology: Words and terms*. Westport, Ct: Greenwood Press.

Fumento, M. (2003). *Bioevolution: How biotechnology is changing our world*. San Francisco: Encounter Books.