

About Biotechnology



D. Shehla Amer
Department of Biological
Sciences and Chemistry

Biotechnology is receiving a lot of attention that not only comes because biotechnology is developing extraordinarily rapidly, but also because its applications have an importance and concrete repercussion on our daily life. By these many applications biotechnology has meanwhile evolved to an extensive field. Biotechnology is the generic technology of the twenty-first century. With its advances, we are the first part of a great journey. The department of Biological Sciences and Chemistry at the University of Nizwa is among the very few institutions in the Sultanate of Oman, in having a diploma and a bachelor's programme in Biotechnology, which places a major emphasis on practical work and on developing a wide range of analytical and manipulating skills appropriate to the biotechnologists. The graduates are trained to be in an ideal position to exploit the opportunities for biotechnology in the Sultanate and abroad in the established or developing biotechnology companies.

What is Biotechnology?

Although the term sounds contemporary, biotechnology is not new. Over 9,000 years ago people discovered that microorganisms could be used to make bread and produce cheese. Although this process of fermentation was not thoroughly understood at the time, its use still constitutes a traditional application of biotechnology. The modern era of scientific biotechnology commenced with the elucidation of the structure of DNA by James Watson and Francis Crick in 1953 for which they along with Maurice H.F. Wilkins, won a Nobel Prize in 1962. This was followed by a series of independent discoveries in chemistry, biochemistry, genetics and microbiology, which together brought about a revolution in biology and led to the first experiments in genetic engineering in 1973. By 1980s, scientists could transfer single genes from one organism to another. This process, much like traditional crossbreeding, allows transferred traits to pass to future generations of the recipient organisms. Biotechnology combines disciplines such as genetics, molecular biology, biochemistry, embryology and cell biology linked to practical disciplines like chemical engineering and information technology.

Biotechnology is considered unique amongst the three principal technologies for the twenty-first century: information technology, material science and biotechnology in being a sustainable technology based on renewable biological resources. Biotechnology refers to a library of advanced scientific tools for the manipulation of biological organisms, systems, or components for the creation of products or modifying a product, to improve plants or animals. Plants, animals and even micro-organisms like bacteria are used to produce some benefit to human health and human environment. Most briefly, biotechnology can be defined as the art of utilizing living organisms and their products for the production of food, drink, medicine or for other benefits to the human race, or other animal species.

APPLICATIONS

Biotechnology has applications in four major industrial areas including health care, crop production and agriculture, new food uses of crops (for example, biodegradable plastics, vegetable oil, biofuels), and environmental uses. The technology encompasses a wide range of fields including the life sciences, chemistry, agriculture, environmental science, medicine, veterinary medicine, engineering and computer sciences to develop tools and products that hold great promise and concern.

Current applications of biotechnology are predominantly practiced in the fields of agriculture and medicine. Modern techniques allow for the production of new and improved foods. Virus resistant crop plants and animals have been developed and advances in insect resistance have been made.

Biotechnological applications in the field of medicine have resulted in new antibiotics, vaccines for malaria and improved ways of producing insulin. Diagnostic tests for detecting serious diseases such as hereditary cancers and Huntington's chorea have been developed as well as ways of detecting and treating AIDS.

Biotechnology is also being applied in the area of pollution control, mining and energy production. Genetically engineered microorganisms and plants are used to clean up toxic wastes from industrial production and oil spills. Biotechnological applications have also been introduced in to the forestry and aquaculture industries. These strategies offer hope for conservation biologists. Genetic methods can be used to identify particular populations of endangered species. Genetic analysis can help botanical gardens and farms improve their breeding programs by determining the genetic diversity of various plants and animal populations.

Biotechnology is generally divided into 3 sub fields: Red Biotechnology is applied to medical processes. To date the most notable impact of biotechnology has been in the medical and pharmaceutical arenas. Using recombinant DNA technology, the biotechnology industry has brought a long and steadily growing list of biopharmaceutical products in the marketplace. Human insulin produced by genetically engineered bacteria was one of the first of these products, followed by human growth hormone, an anti-viral called interferon, the immune stimulant called interleukin-2, two blood clotting factors labeled VIII and IX which is administered to hemophiliacs, erythropoietin and vaccines. Over 200 million people worldwide have benefited from the biomedical biotechnology industry. One of the major discoveries within the biomedical industry has been the use of biotechnology to produce human insulin for the treatment of diabetes. Today, all diabetics worldwide who need to take insulin receive genetically engineered human insulin.

It is through red biotechnology based research that antibiotics for different infections and vaccines for boosting the immune system against disease have been developed ways along with means to detect and treat many genetic disorders and diseases. Biotechnology advances have led to developments in gene therapy, which has the potential to treat the cause of the disease rather than the symptoms. Red biotechnology also helps in reproductive technologies like in vitro fertilisation, DNA profiling, forensics and in transplantation technology.

White biotechnology, relatively new (a symbol for clean and durable technology) or industrial biotechnology refers to industrial production and processes as well as the use of biomass or renewable new material. White biotechnology also known as grey biotechnology is the technology applied to industrial processes involving the creation of useful chemicals for the industrial sector through organisms like moulds or yeast.

It is with the help of white biotechnology that the environment is helped in the control of pest animals and plants. The environmental benefits offered by biotechnology are enormous, particularly in the fields of waste treatment and bioremediation of contaminated sites water and air, pest control, treatment of industrial effluents and emissions and acid mine drainage.

Biotechnology has helped in cleaning up oil spills, protect endangered species by storing DNA samples to be used for future research and to help remove any excess nutrients there may be in the soil and water.

Green Biotechnology also known as agricultural biotechnology focuses at genetically acquired characteristics of plants for application in agriculture and in the food chain. An example is designing of transgenic plants to grow under specific environmental conditions or in the presence (or absence) of certain agricultural chemical. One hope is that green biotech might produce plants and animal species that are environment friendly and more productive. Development of varieties of wheat that are disease resistant by cross breeding different types of wheat is also an example of green biotechnology. Another promising area in agriculture is the health care of animals, primarily in the development and production of pharmaceuticals, therapeutics and diagnostics for disease detection and treatment.

CAREER OPPORTUNITIES

There are many exciting opportunities for scientists and non-

scientists in the biotechnology sector. It is apparent that biotechnology does and will have a strong impact on our world. Anyone looking for a career in biotechnology can choose from a wide variety of scientific disciplines ranging from molecular genetics to chemistry. Almost every aspect of human life is touched by biotechnology. Complementing the creative endeavors of researchers and engineers are the efforts to commercialise biotechnology products with the input of business management and marketing personnel. The body of knowledge captured in the diploma and Bachelor degree programmes offered at the University of Nizwa is the knowledge base needed by iwork ready graduates preparing for vigorous careers in biotechnology sector. Graduates may find employment as a Biotechnologist, Forensic scientist, DNA scientist, Biologist, Microbiologist, Virologist, Geneticist and QC laboratory supervisor.

Biotechnology is expected to contribute massively to global economy largely through the introduction of recombinant DNA technology to production of biopharmaceuticals. In the future, biotechnology will concentrate on the complexities and interrelatedness of biology with such targets as the human genome project, genetic medicine, gene and cell therapy, tissue engineering, vaccines, managing ageing at the level of programmed cell death and genes that control cell division, neurobiotechnology, agri-industrial biotechnology, drug delivery and novel diagnostics. Biotechnology is set to make an indelible contribution to human health and welfare well in to the foreseeable future.

Remember:

* "There are no gains without pains"

* "Have you somewhat to do tomorrow, do it today."

(Benjamin Franklin)

* When there is a will there is away



To learn English there are some advice to follow;

1- The more you read, the more you learn. So, keep on reading and try to pick up the difficult words and write them down with their meanings and use them in your daily life.

2- When you are reading do not give up, just try and keep reading.

3- Use the dictionary always, to see how to pronounce the word, and, to look for any difficult word and write them in your note book.

4- Try to talk in English with anybody who knows English and use the words that you have learned while talking.

5- Sum up what you have read and, extract the main idea from it.

6- Watch English movies and listen to English news and programs.

7- Use the internet for any information. Install any useful programs for learning English.

8- Read in a loud voice to hear every single word.

Cheer up



English Society
Written by: Fatma Ahmed
Al Balushi
Munira Khamis Al Yousufi

