Biotechnology

Technology

The wide concept of " biotech" or " biotechnology" encompasses a wide range of procedures for modifying living organisms according to human purposes, going back domestication of animals, cultivation of plants, and Improvements" to these through breeding programs that employ artificial selection and hyperinflation. Modern usage also Includes genetic engineering as well as cell and tissue culture technologies.

The American Chemical Society defines biotechnology as the application of biological organisms, systems, or processes by various industries to learning about the science of life and the improvement of the value of materials and organisms such as pharmaceuticals, crops, and livestock. [3] As per European Federation of Biotechnology, Biotechnology Is the Integration of natural science and organisms, cells, parts thereof, and molecular analogues for products and services. 4] Biotechnology also writes on the pure biological sciences (animal cell culture, biochemistry, cell biology, embryology, genetics, microbiology, intermolecular biology). Although not normally what first comes to mind, many forms of human- derived agriculture clearly fit the broad deflation of " utilizing a biotechnological system to make products". Indeed, the cultivation of plants may be viewed as the earliest biotechnological enterprise. Agriculture has been theorized to have become he dominant way of producing food since the Neolithic Revolution.

Through early biotechnology, the earliest farmers selected and bred the best suited crops, having the highest yields, to produce enough food to support a growing population. As crops and fields became increasingly large and difficult to maintain, It was discovered that specific organisms and their by-products could effectively fertilize, restore nitrogen, and control pests.

Throughout the history of agriculture, farmers have Inadvertently altered the genetics of their crops through introducing them to new environments ND breeding them with other plants -? one of the first forms of biotechnology.

These processes also were included in early fermentation of beer. [9] These processes were introduced in early Mesopotamia, Egypt, China and India, and still use the same basic biological methods. In brewing, malted grains (containing enzymes) convert starch from grains Into sugar and then adding specific yeasts to produce beer. In this process, carbohydrates in the grains were broken down into alcohols such as ethanol. Later other cultures produced the process of lactic acid fermentation which allowed the fermentation and preservation of other forms of food, such as soy sauce.

Fermentation was also used in this time period to produce leavened bread. Although the process of fermentation was not fully understood until Louis Pasture's work In 1857, It Is still the first use of biotechnology to convert a food source Into another had already used selective breeding. Darwin added to that body of work with his scientific observations about the ability of science to change species. These accounts contributed to Darning's theory of natural selection. [10] For thousands of years, unmans have used selective breeding to improve production of crops and livestock to use them for food.

In selective breeding, organisms with desirable characteristics are mated to produce offspring with the same characteristics. For example, this technique was used with corn to produce the largest and sweetest crops. [11] In the early twentieth century scientists gained a greater understanding of microbiology and explored ways of manufacturing specific products. In 1917,

Chain Wagnerian first used a pure microbiological culture in an industrial process, that of manufacturing corn starch using Colostomies systematically, to reduce acetone, which the United Compassionately needed to manufacture explosives during World War 1. 12] Biotechnology has also led to the development of antibiotics. In 1928, Alexander Fleming discovered the mold Penicillin. His work led to the purification of the antibiotic compound formed by the mold by Howard Floret, Ernst Boris Chain and Norman Heathery - to form what we today know as penicillin. In 1940, penicillin became available for medicinal use to treat bacterial infections in humans. [11] The field of modern biotechnology is generally thought of as having been born in 1971 when Paul Berg's (Stanford) experiments in gene splicing had early success.

Herbert W. Borer (Univac. Calf. At San Francisco) and Stanley N. Cohen (Stanford) significantly advanced the new technology in 1972 by transferring genetic material into a bacterium, such that the imported material would be reproduced. The commercial viability of a biotechnology industry was significantly expanded on June 16, 1980, when the United States Supreme Court ruled that a genetically modified microorganism could be patented in the case of Diamond v. Charitably. [13] Indian-born Amanda Charitably, working forefinger

Electric, had modified a bacterium (of the Pseudonymous genus) capable of breaking down crude oil, which he proposed to use in treating oil spills. (Chartreuse's work did not involve gene manipulation but rather the transfer of entire organelles between strains of the Pseudonymous bacterium. Revenue in the industry is expected to grow by 12. 9% in 2008. Another

factor influencing the biotechnology sector's success is improved intellectual property rights legislation-? and enforcement-? worldwide, as well as strengthened demand for medical and pharmaceutical products to cope with an ageing, and ailing, U.

S. Population. [14] Rising demand for befouls is expected to be good news for the biotechnology sector, with the Department of Energy estimating ethanol usage could reduce U. S. Petroleum- derived fuel consumption by up to 30% by 2030. The biotechnology sector has allowed the U. S. Farming industry to rapidly increase its supply of corn and soybeans -? the main inputs into befouls-? by developing genetically modified seeds which are resistant to pests and drought.

By boosting farm productivity, biotechnology plays a crucial role in ensuring that befoul production targets are met. 1 5] Examples[edit] A rose plant that began as cells grown in a tissue culture Biotechnology has applications in four major industrial areas, including health care (medical), crop (e. G. Biodegradable plastics, vegetable oil, befouls), and environmental uses. For example, one application of biotechnology is the directed use of organisms for the manufacture of organic products (examples included and milk products).

Another example is using naturally present bacteria by the mining industry in bleaching. Biotechnology is also used to recycle, treat waste, clean up sites contaminated by industrial activities (premeditation), and also to produce biological weapons. A series of derived terms have been coined to identify several branches of biotechnology; for example: Bioinformatics is an

interdisciplinary field which addresses biological problems using computational techniques, and makes the rapid organization as well as analysis of biological data possible.

The field may also be referred to as computational biology, and can be defined as, " conceptualizing biology in terms of molecules and then applying informatics techniques to understand and organize the information associated with these molecules, on a large Bioinformatics plays a key role in various areas, such as functional genomics, structural genomics, and proteomics, and forms a key component in the biotechnology and pharmaceutical sector. Blue biotechnology is a term that has been used to describe the marine and aquatic applications of biotechnology, but its use is relatively rare.

Green biotechnology is biotechnology applied to agricultural processes. An example would be the selection and domestication of plants via misappropriation. Another example is the designing of transgenic plants to grow under specific environments in the presence (or absence) of chemicals. One hope is hat green biotechnology might produce more environmentally friendly solutions than traditional industrial agriculture. An example of this is the engineering of a plant to express a pesticide, thereby ending the need of external application of pesticides.

An example of this would be Bet corn. Whether or not green biotechnology products such as this are ultimately more environmentally friendly is a topic of considerable debate. Red biotechnology is applied to medical processes. Some examples are the designing of organisms to produce antibiotics, and

the engineering of genetic cures threatening manipulation. White biotechnology, also known as industrial biotechnology, is biotechnology applied to industrial processes. An example is the designing of an organism to produce a useful chemical.

Another example is the using of enzymes as industrial catalysts to either produce valuable chemicals or destroy hazardous/polluting chemicals. White biotechnology tends to consume less in resources than traditional processes used to produce industrial goods. [citation needed] The investment and economic output of all of these types of applied biotechnologist is termed as " becoming". Medicine[edit] In medicine, modern biotechnology finds applications in areas such s pharmaceutical drug discovery and production, pharmacologists, and genetic testing (or genetic screening).

DNA microfarad chip - some can do as many as a million blood tests at once Pharmacologists (a combination of pharmacology and genomics) is the technology that analyses how genetic makeup affects an individual's response to drugs. [17] It deals with the influence of genetic variation on drug response in patients by drugs efficacy or toxicity. [18] By doing so, pharmacologists aims to develop rational means to optimize drug therapy, with respect to the patients' genotype, to ensure maximum efficacy with minimal adverse effects. 19] Such approaches promise the advent of " personalized medicine"; in which drugs and drug combinations are optimized for each individual's unique genetic makeup. [20][21] Computer-generated image of insulin hexameters highlighting the threefold symmetry, the zinc ions holding it together, and the housemistresses involved in zinc binding. Biotechnology has contributed to the discovery and manufacturing of

traditional small molecule pharmaceutical drugs as well as drugs that are the product of biotechnology - pharmaceutics.

Modern biotechnology can be used to manufacture existing medicines relatively easily and cheaply. The first genetically engineered products were medicines designed to treat human diseases. To cite one example, in 1978 Genetic developed synthetic humankind insulin by Joining its gene with a plasmid vector inserted into the bacterium Escherichia coli. Insulin, widely used for the treatment of diabetes, was previously extracted from the pancreas of abattoir animals (cattle and/or pigs).

The resulting genetically engineered bacterium enabled the production of vast quantities of synthetic human insulin at relatively low cost. 22][23] Biotechnology has also enabled emerging therapeutics like gene therapy. The application of biotechnology to basic science (for example through the Human Genome Project) has also dramatically improved our understanding of biology and as our scientific knowledge of normal and disease biology has increased, our ability to develop new medicines to treat previously untreatable diseases has increased as well. 23] Genetic testing allows the genetic diagnosis of vulnerabilities to inherited diseases, and can also be used to determine a child's parentage (genetic mother and father) or in general a person's ancestry. In addition to studying chromosomes to the level of individual genes, genetic testing in a broader sense includes biochemical tests for the possible presence of genetic diseases, or mutant forms of genes associated with increased risk of developing genetic disorders. Genetic testing identifies changes in chromosomes, genes, or proteins. 24]Most of the time, testing is used to find changes that are

associated with inherited disorders. The results of a genetic test can confirm or rule out a suspected genetic condition or help determine a person's chance of developing or passing on a genetic disorder. As of 2011 several hundred genetic tests were in use. [25][26] Since genetic testing may open up ethical or psychological problems, genetic testing is often accompanied by genetic counseling. Agriculture[edit] Genetically modified crops (" GM crops", or " biotech crops") are plants used in agriculture, the DNA of which has been modified with genetic engineering techniques.

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In most cases the aim is to introduce a new trait to the plant which does not occur naturally in the species. Examples in food crops include resistance to certain pests,[27] diseases,[28] stressful environmental conditions, 29] resistance to chemical treatments (e. G. Resistance to aerobic[30]), reduction of spoilage,[31] or improving the nutrient profile of the crop. [32] Examples in non-food industrially useful goods,[35] as well as for premeditation. [36][37] Farmers have widely adopted GM technology.