

Biotechnology History by Suheila Abdul-Karrim

The use of biotechnology has been present in our society since historical times. The first people that realised that they could plant crops and breed animals learned that they could use biotechnology.

When the first bakers found that they could make soft, spongy bread rather than a thin cracker, they were acting as students of biotechnology. The first animal breeders were involved in biotechnology manipulations by mating appropriate pairs of animals to provide a superior quality breed.

The first biotechnologists used yeast cells to raise bread dough and to ferment alcoholic beverages. They also used bacterial cells to make cheeses and yogurts.

Thus, biotechnology involves using living cells and materials produced by these cells to create products that benefit society. These include agricultural, environmental and pharmaceutical products. Since biotechnology uses the basic ingredients of life, it is a cutting-edge technology used to modify human health and the human environment.

With the use of biotechnology over the years, several ideas have come from biotechnologists. These range from growing crops that are more nutritious and naturally pest-resistant in order to feed a rapidly growing world population, to sources of human therapeutic drugs.

Through history we have learned a significant amount about the different organisms that early biotechnologists used so effectively. Our new understanding of these living cells and their products provide us with the ability to control the functions of various cells.

With the use of techniques such as gene splicing and recombinant DNA, genetic elements of two or more living cells can actually be combined. An example of a result of this would be to cause bacterial cells to produce human molecules by taking lengths of DNA from one organism and transferring it into the cells of another organism. In so doing, therapeutic molecules that did not exist before can be synthesized.

While the US is currently the world leader in the research, development, and commercialization of biotechnology products, it is only in recent years in South Africa that biotechnology has come to the fore.

While the focus was mainly on first generation applications which led to well – developed industries in brewing, food production and a high-profile wine industry, recent activities have generated an interest in pharmaceutical markets.

With the advent of government prioritisation of biotechnology, industries based in the chemical, biochemical and pharmaceutical markets have progressed rapidly. Government support of health biotechnology began growing in 2000 and this led to the adoption of the National Biotechnology Strategy in 2001. This is a policy framework put together to create incentives for the biotechnology sector.

Within this framework, biotechnology is identified as potentially contributing to national priorities of access and affordability of health care, food security, job creation and environmental protection. The Department of Science and Technology (situated in Pretoria) is responsible for administering this strategy. The strategy addresses funding, regulatory, legal issues as well as human resource development.

The strategy also identifies a gap between research endeavours in academic and other public research institutions and the market. Two mechanisms have been encouraged to bridge this gap.

The first is to achieve development of therapeutic products through an international public-private partnership. These partnerships should serve as a means toward developing the process of innovation in health biotechnology.

The second mechanism is government supporting the creation of three biotechnology innovation centres regionally. These centres “act as nuclei for the development of biotechnology platforms, from which a range of businesses offering new products and services can be developed.”²

South Africa has formed three innovation centres, with the Cape Biotechnology Initiative in Cape Town and the East Coast Biotechnology Consortium (EcoBio) specifically targeting health biotechnology R&D. The third innovation centre is Biopad in Johannesburg, which mainly focuses on agricultural biotechnology.

The government-run Innovation Fund (in Pretoria), National Research Foundation (NRF, Pretoria), Technology and Human Resource for Industry Program (THRIP, Pretoria) and Godisa Trust (in Pretoria) are all active in funding R&D, research capacity building and technology transfer.

The Medicines Control Council (Pretoria) and the Companies and Intellectual Property Registration Office (Pretoria), oversee the regulatory and intellectual property (IP) system.

According to several respondents, the biotechnology strategy has created awareness in government departments and agencies of the role of biotechnology in meeting health and socioeconomic needs.

While progress is being made there are drawbacks being experienced by the South African biotechnology industry. There is limited capital investment despite interest being shown by other South African venture capital firms. Limited public funding and inadequate levels of private investment make it difficult to narrow the gap between research ideas and commercialisation.

Also, with one of South Africa’s national imperatives being to improve its public health, its first intervention would be to address the most urgent public health need, HIV-AIDS, Tuberculosis and other pandemic diseases prevalent in the environment. However, treatment and prophylactics for these pandemics require considerable investment in R&D innovation and development.

Given the situation, a further prioritisation of goals by both public and private sectors would probably be required so as to utilise the scientific excellence of the country. In so doing, the health biotechnology industry can function at its full potential.

By functioning at full potential biotechnology we will bring to market life-saving health care products and microbial pesticides, & will soon offer healthier foods, disease-and insect-resistant crops, additional energy resources, environmental clean-up techniques, and more.

References

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