Appendixes

Appendix A

Definitions of Biotechnology

The following is a list of definitions of biotechnology used by the governments and organizations of various countries in assessments of the developing field within their jurisdictions. Most of these definitions encompass both old and new biotechnology. *

Australia

[Biotechnology is] '(the devising, optimizing, and scaling-up of biochemical and cellular processes for the industrial production of useful compounds and related applications. This definition envisages biotechnology as embracing all aspects of processes of which the central and most characteristic feature is the involvement of biological catalysts" (2).

"In its broadest sense, biotechnology encompasses industrial processes based on biological systems involving naturally occurring micro-oganisms, micro-organisms that have been modified by genetic engineering, or isolated cells of plants or animals, and the genetic manipulation of cells to produce new strains of plants or animals" (4).

Canada

[Biotechnology is] "the application of biological organisms, systems, or processes to manufacturing or service industries" (9).

[Biotechnology is] "the utilization of a biological process, be it via microbial, plant or animal cells, or their constituents, to provide goods and services" (11).

European Federation of Biotechnology

[Biotechnology is] "the integrated use of biochemistry, microbiology, and engineering sciences in order to achieve technological (industrial) application of the capabilities of micro-organisms, cultured tissue cells, and parts thereof" (3).

Federal Republic of Germany

"Biotechnology deals with the introduction of biological methods within the framework of technical processes and industrial production. It involves the application of microbiology and biochemistry together with technical chemistry and process engineering" (5).

France

"Biotechnology consists of the industrial exploitation of the potential of micro-organisms, animal and plant cells, and subcellular fractions derived from them" (6).

International Unions of Pure and Applied Chemistry (1981)

[Biotechnology is] "the application of biochemistry, biology, microbiology, and chemical engineering to industrial processes and products (including here the products in health care, energy, and agriculture) and on the environment" (3).

Japan

IBiotechnology is] "a technology using biological phenomena for copying and manufacturing various kinds of useful substances" (7).

The Netherlands

[Biotechnology is) "the science of the production processes based on the action of microorganisms and their active components, and of production processes involving the use of cells and tissues from higher organisms. Medical technology, agriculture, and traditional crop breeding are not generally regarded as biotechnology" (10).

Organisation for Economic Co-Operation and Development

Biotechnology consists of "the application of scientific and engineering principles to the processing of materials by biological agents to provide goods and **services" (3).**

Switzerland

The Swiss Government uses the same **definition the** European Federation of Biotechnology **uses (8). (See** definition above.)

United Kingdom

[Biotechnology is] "the application of **biological organisms, systems or processes to manufacturing and service industries" (1).**

● **The distinction between old and new biotechnology as used in this report is noted in *Chapter 1: Executive Summary*.**

Appendix A references

1. Advisory Council for Applied Research and Development, Advisory Board for the Research Councils, The Royal Society, *Biotechnology: Report of a Joint Working Party* (London: H.M. Stationery Office, March 1980).
2. *Biotechnology for Australia,* Report to the Executive of the Commonwealth Scientific and Industrial Research Organisation by a Special Committee of Review, Sydney, Australia, June 1981.
3. Bull, A. T., Holt, G., and Lilly, M. D., *Biotechnology: International Trends and Perspectives* (Paris: Organisation for Economic Co-Operation and Development, 1982).
4. Commonwealth Scientific and Industrial Research Organisation, *Biotechnology Reseamh and Development,* Sydney, Australia, 1981.
5. Deutsche Gesellschaft fiir Chemisches Apparatewesen (German Society for Chemical Engineering), "Biotechnology: A Study of Research and Development," contract report prepared for the Federal Ministry for Education and Science and the Federal Ministry for Research and Technology, Frankfurt, 1974.
6. Delegation Generale a la Recherche Scientifique et Technique (General Delegation of Scientific and Technical Research) (1980), cited in M. Vaquin, "Biotechnology in France," contract report prepared for the Office of Technology Assessment, U.S. Congress, December 1982.
7. Japan External Trade Organization, "Research on Biotechnology in Japan," *Japan Industrial and Technological Bulletin* (Tokyo: Ministry of International Trade and Industry, 1982).
8. Jasanoff, S., '(Public and Private Sector Activities in Biotechnology: Switzerland," contract report prepared for the Office of Technology Assessment, U.S. Congress, January 1983.
9. Miller, J., Fish, K., Basuk, J., et al., *Biotechnology in Canada: Premises and Concerns* (Ottawa: Science Council of Canada, 1981).
10. Netherlands Study Centre for Technology Trends, *Biotechnolo~: A Dutch Perspective* (Delft, The Netherlands: Delft University Press, 1981).
11. Task Force on Biotechnology, *Biotechnology:A Development Plan for Canada* (Ottawa: Minister of State for Science and Technology, 1981).