

# List of Acronyms and Glossary of Terms

## *List of Acronyms*

AAS	—Associate of Applied Science degree	HERAC	—Health and Environmental Research Advisory Committee (DOE)
ABC	—Association of Biotechnology Companies	HHMI	—Howard Hughes Medical Institute
AID	—Agency for International Development	HSWA	—Hazardous and Solid Waste Amendments of 1984
AIDS	—acquired immune deficiency syndrome	IBA	—Industrial Biotechnology Association
ARS	—Agricultural Research Service	IND	—Investigational New Drug
BPEC	—Biotechnology Process Engineering Center (MIT)	IOM	—Institute of Medicine
BS	—Bachelor of Science degree	IPO	—initial public offering
BSCC	—Biotechnology Science Coordinating Committee	IRP	—Installation Restoration Program
CAH	—chlorinated aromatic hydrocarbon	IRS	—Internal Revenue Service
CARB	—Center for Advanced Research in Biotechnology (MD)	ISU	—Iowa State University
CCL	—Commodity Control List	IT	—International Technologies
CERCLA	—Comprehensive Environmental Response, Compensation and Liability Act	ITA	—International Trade Administration
CoCom	—Coordinating Committee on Multilateral Export Controls	ITC	—Investment Tax Credit
CSRS	—Cooperative State Research Service (USDA)	MBI	—Maryland Biotechnology Institute
CSU	—Colorado State University	MCTL	—Militarily Critical Technologies List
DARPA	—Defense Advanced Research Projects Agency	MIT	—Massachusetts Institute of Technology
DBC	—dedicated biotechnology company	MPBC	—Midwest Plant Biotechnology Consortium
DDT	—dichloro diphenyl trichroethane	MRO	—medical research organization
DNA	—deoxyribonucleic acid	MS	—Master of Science degree
DOC	—Department of Commerce	NAS	—National Academy of Sciences
DoD	—Department of Defense	NASA	—National Aeronautics and Space Administration
DOE	—Department of Energy	NBF	—new biotechnology firm
DRR	—Division of Research Resources (NIH)	NBS	—National Bureau of Standards
DURIP	—Defense University Research Initiative Program	NCI	—National Cancer Institute (NIH)
EAA	—Export Administration Act	NCRA	—National Cooperative Research Act of 1984
EAAA	—Export Administration Act Amendments of 1985	NDA	—New Drug Application
EOP	—Executive Office of the President	NEI	—National Eye Institute (NIH)
EPA	—Environmental Protection Agency	NEPA	—National Environmental Policy Act
EPSCoR	—Experimental Program to Stimulate Competitive Research (NSF)	NHLBI	—National Heart, Lung and Blood Institute (NIH)
ERC	—Engineering Research Center (NSF)	NIA	—National Institute on Aging (NIH)
ERTA	—Economic Recovery Tax Act of 1981	NIAID	—National Institute of Allergy and Infectious Diseases (NIH)
FDA	—Food and Drug Administration	NIAMS	—National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIH)
FFDCA	—Federal Food, Drug and Cosmetics Act	NICHHD	—National Institute of Child Health and Human Development (NIH)
FIFRA	—Federal Insecticide, Fungicide, and Rodenticide Act	NIDDK	—National Institute of Diabetes and Digestive and Kidney Diseases (NIH)
FTE	—full-time equivalent	NIDR	—National Institute of Dental Research (NIH)
GAO	—General Accounting Office	NIEHS	—National Institute of Environmental Health Sciences (NIH)
GE	—General Electric Corporation	NIGMS	—National Institute of General Medical Sciences (NIH)
		NIH	—National Institutes of Health

NINCDS	—National Institute of Neurological and Communicative Disorders and Stroke (NIH)	TSCA	—Toxic Substances Control Act of 1976
NLM	—National Library of Medicine (NIH)	UCSF	—University of California, San Francisco
NMR	—nuclear magnetic resonance spectroscopy	UI	—University of Iowa
NOAA	—National Oceanic and Atmospheric Administration	USAMRIID	—U.S. Army Medical Research Institute of Infectious Diseases
NPL	—National Priority List (EPA sites)	USDA	—United States Department of Agriculture
NSF	—National Science Foundation	VA	—Veteran's Administration
NYU	—New York University		
OBER	—Office of Basic Energy Research (DOE)		
OECD	—Organization for Economic Cooperation and Development		
OHER	—Office of Health and Environmental Research (DOE)		
ONR	—Office of Naval Research (DOD)		
OSHA	—Occupational Safety and Health Administration		
OSTP	—Office of Science and Technology Policy (EOP)		
OTA	—Office of Technology Assessment (U.S. Congress)		
PAH	—polynuclear aromatic hydrocarbon		
PCB	—polychlorinated biphenyl		
PCP	—pentachlorophenol		
PHSA	—Public Health Service Act		
PLA	—public licensing application		
PMA	—Pharmaceutical Manufacturers Association		
PPA	—Plant Patent Act		
PTAA	—Patent and Trademark Amendment Act		
PTO	—Patent and Trademark Organization		
PVPA	—Plant Variety Protection Act		
RAC	—Recombinant DNA Advisory Committee (NIH)		
RCRA	—Resources Conservation and Recovery Act of 1976		
RDLP	—Research and Development Limited Partnership		
RIT	—Rochester Institute of Technology		
SAES	—State Agricultural Experiment Stations		
SARA	—Superfund Amendments and Reauthorization Act		
SBIR	—Small Business Innovation Research		
SJSU	—San Jose State University		
SSET	—Science, Engineering, and Technology; NSF program		
SITE	—Superfund Innovative Technology Evaluation		
SUNY	—State University of New York		
SUP	—Sustaining University Program		
TAC	—Technical advisory committee		
TCDD	—chlorinated dioxin		
TCE	—trichloroethylene		
TPA	—tissue-plasminogen activator		
TRA	—Tax Reform Act of 1986		

### *Glossary of Terms*

**Amino Acid:** Any of a group of 20 molecules that are linked together in various combinations to form proteins. Each different protein is made up of a specific sequence of these molecules with the unique sequence coded for by DNA.

**Antibody:** A protein molecule, also called immunoglobulin, produced by the immune system in response to exposure to a foreign substance. An antibody is characterized by a structure complementary to the foreign substance, the antigen, that provoked its formation and is thus capable of binding specifically to the foreign substance to neutralize it. See *antigen* and *monoclonal antibodies*.

**Antigen:** A molecule introduced into an organism and recognized as a foreign substance, resulting in the elicitation of an immune response (antibody production, lymphokine production, or both) directed specifically against that molecule. See *antibody* and *monoclonal antibodies*.

**B lymphocyte** A specialized white blood cell involved in the immune response of vertebrates that originates in the bone marrow and produces antibody molecules after challenge by an antigen. In hybridoma technology, these cells contribute antibody-producing capability to a hybridoma.

**Bioaugmentation:** A strategy involved in bioremediation that increases the activity of an organism to break down or metabolize a pollutant. This involves reseeded a waste site with bacteria as they die.

**Bioenrichment:** A strategy involved in bioremediation that enables an organism to survive and break down or metabolize a pollutant. This involves enhancing the site with nutrients or oxygen required by the micro-organism so they survive and grow.

**Biomass:** The entire assemblage of living organisms, both animal and vegetable, of a particular region, considered collectively.

**Bioprocess engineering:** Process that uses complete living cells or their components (e.g., enzymes, chloroplasts) to effect desired physical or chemical changes.

**Bioreactor:** A vessel used for bioprocessing.

**Biosynthesis:** Production, by synthesis or degradation, of a chemical by a living organism.

**Biotechnology:** Commercial techniques that use liv-

- ing organisms, or substances from those organisms, to make or modify a product, and including techniques used for the improvement of the characteristics of economically important plants and animals and for the development of micro-organisms to act on the environment. In this report, biotechnology includes the use of novel biological techniques—specifically, recombinant DNA techniques, cell fusion techniques, especially for the production of monoclonal antibodies, and new bioprocesses for commercial production.
- Cell culture:** The propagation of cells removed from organisms in a laboratory environment that has strict sterility, temperature, and nutrient requirements; also used to refer to any particular individual sample.
- Cell fusion:** Joining of the membrane of two cells, thus creating a hybrid cell that contains the nuclear material from parent cells. Used in making hybridomas.
- Chemostats:** Growth chamber that keeps a bacterial culture at a specific volume and rate of growth by continually adding fresh nutrient medium while removing spent culture.
- Chromosome:** The physical structure within a cell's nucleus, composed of DNA-protein complex, and containing the hereditary material—i.e., genes; in bacteria, the DNA molecule in a single, closed circle (no associated protein) comprising a cell's genome.
- Cloning:** The process of asexually producing a group of cells (clones), all genetically identical to the original ancestor. In recombinant DNA technology, the process of using a variety of DNA manipulation procedures to produce multiple copies of a single gene or segment of DNA.
- Cobalamins:** A cobalt-containing complex common to members of the vitamin B<sub>12</sub> group.
- Cometabolism:** Process by which a substrate is metabolized by a cell while the cell utilizes another substrate as its energy source. Also called fortuitous degradation.
- Congeners:** A family of related materials.
- Cytoplasm:** Cellular material that is within the cell membrane and surrounds the nucleus.
- Dicot (dicotyledon):** Plant with two first embryonic leaves and nonparallel veined mature leaves. Examples are soybean and most flowering plants.
- DNA (deoxyribonucleic acid):** The molecule that is the repository of genetic information in all organisms (with the exception of a small number of viruses in which the hereditary material is ribonucleic acid—RNA). The information coded by DNA determines the structure and function of an organism.
- Enzyme:** A protein that acts as a catalyst, speeding the rate at which a biochemical reaction proceeds, but not altering its direction or nature.
- Eukaryote(ic):** Cell or organism with membrane-bound, structurally discrete nucleus, and other well-developed subcellular compartments. Eukaryotes include all organisms except viruses, bacteria, and blue-green algae. See *prokaryote*.
- Fermentation:** An anaerobic process of growing micro-organisms for the production of various chemical or pharmaceutical compounds. Microbes are normally incubated under specific conditions in the presence of nutrients in large tanks called fermenters.
- Gene:** The fundamental physical and functional unit of heredity; an ordered sequence of nucleotide base pairs that produce a specific product or have an assigned function.
- Gene expression:** The process by which the blueprint contained in a cell's DNA is converted into a product.
- Gene therapy:** Insertion of normal DNA directly into cells to correct a genetic defect.
- Genome:** All the genetic material in the chromosomes of a particular organism; its size is generally given as its total number of base pairs.
- Germplasm:** The total genetic variability, represented by germ cells or seeds, available to a particular population of organisms.
- Hybrid:** An offspring of a cross between two genetically unlike individuals.
- Hybridoma:** A cell produced by fusing a myeloma cell (a type of tumor cell that divides continuously in culture and is "immortal") and a lymphocyte (an antibody-producing cell). The resulting cell grows in culture and produces the specific antibody produced by the parent Lymphocyte (a monoclonal antibody).
- In vitro:** Literally, "in glass." Refers to a process, test, or procedure in which something is measured, observed, or produced outside a living organism after extraction from the organism. See *in vivo*.
- In vivo:** Literally, "in the living." Refers to a process taking place in a living cell or organism. See *in vitro*.
- In vivo genetic transfer:** The gene of a useful enzyme from one organism is transferred into a pathway of another organism via natural genetic processes such as transduction, transformation, and conjugation (facilitated by transmissible plasmids or transposons).
- Liposomes:** A structure with a lipid membrane like that of a cell that can be filled with specific substances and then used as a delivery vehicle to transport those substances to the interior of a target cell by fusion with the cell's own membrane. One of several potential delivery vehicles for use in gene therapy.
- Monoclonal antibodies:** Identical antibodies that recognize a single, specific antigen and are produced by a clone of specialized cells. Commercial quanti-

ties of these molecules are now produced by hybridomas.

**Monocot (monocotyledon):** Plant with single first embryonic leaves, parallel-veined leaves, and simple stems and roots. Examples are cereal grains such as corn, wheat, rye, barley, and rice.

**Mutagenesis** The induction of mutation in the genetic material of an organism; researchers may use physical or chemical means to cause mutations that improve the production of capabilities of organisms.

**Myeloma:** A malignant tumor of an antibody-producing cell. In hybridoma technology, some of these tumor cells have been adapted to cell culture, and these cells contribute immortality to a hybridoma cell line.

**Nitrogen fixation:** A biological process (usually associated with plants) whereby certain bacteria convert nitrogen in the air to ammonia, thus forming a nutrient essential for growth.

**Nucleic acid hybridization:** Matching of either DNA or RNA (depending on the organism) from an unknown organism with DNA or RNA from a known organism. This method is used in tropical disease research for identifying species and strains of organisms.

**Nucleotide (base):** The unit of nucleic acids. The molecules consist of one of four bases—adenine, guanine, cytosine, or thymine/uracil (DNA/RNA) attached to a phosphate-sugar group. The sugar group is deoxyribose in DNA; in RNA it is ribose.

**Prokaryote(ic):** An organism (e.g., bacteria, virus, blue-green algae) whose DNA is not enclosed within a nuclear membrane. See *eukaryote*.

**Protein:** A polypeptide consisting of amino acids. In their biologically active states, proteins function as catalysts in metabolism and as structural elements of cells and tissues.

**Protoplasm fusion:** A means of achieving genetic transfer by joining two protoplasts or joining a protoplasm with any of the components of another cell.

**Recombinant DNA:** A broad range of techniques involving the manipulation of the genetic material of organisms; often used synonymously with genetic engineering; also used to describe a DNA molecule constructed by genetic engineering techniques and composed of DNA from different individuals or species.

**Somatic cell genetics:** Genetics involving any cell in the body except reproductive cells and their precursors,

**Somoclonal variation:** Genetic variation produced from the culture of plant cells from a pure breeding strain; the source of the variation is not known.

**Tissue culturing** In vitro growth in nutrient medium of cells isolated from tissue.

**Transformation:** Introduction and assimilation of DNA from one organism into another via uptake of naked DNA.

**Vadose:** The unsaturated zone of the ground above the permanent water table.

**Xenobiotics:** Industrial chemicals that have a chemical structure not found in natural compounds, which may resist degradation by micro-organisms.