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Glossary

- Aerobic.**—Growing only in the presence of oxygen.
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- Alkaloids.**—A group of nitrogen-containing organic substances found in plants; many are pharmacologically active—e.g., nicotine, caffeine, and cocaine.
- Allele.**—Alternate forms of the same gene. For example, the genes responsible for eye color (blue, brown, green, etc.) are alleles.
- Amino acids.**—The building blocks of proteins. There are 20 common amino acids; they are joined together in a strictly ordered “string” which determines the character of each protein.
- Antibody.**—A protein component of the immune system in mammals found in the blood.
- Antigen.**—A large molecule, usually a protein or carbohydrate, which when introduced in the body stimulates the production of an antibody that will react specifically with the antigen.
- Aromatic chemical.**—An organic compound containing one or more six-membered rings.
- Aromatic polymer.**—Large molecules consisting of repeated structural units of aromatic chemicals.
- Artificial insemination.**—The manual placement of sperm into the uterus or oviduct.
- Bacteriophage (or phage).**—A virus that multiplies in bacteria. Bacteriophage lambda is commonly used as a vector in recombinant DNA experiments.
- Bioassay.**—Determination of the relative strength of a substance (such as a drug) by comparing its effect on a test organism with that of a standard preparation.
- Biomass.**—Plant and animal material.
- Biome.**—A community of living organisms in a major ecological region.
- Biosynthesis.**—The production of a chemical compound by a living organism.
- Biotechnology.**—The collection of industrial processes that involve the use of biological systems. For some of these industries, these processes involve the use of genetically engineered microorganisms.
- Blastocyst.**—An early developmental stage of the embryo; the fertilized egg undergoes several cell divisions and forms a hollow ball of cells called the blastocyst.
- Callus.**—The cluster of plant cells that results from tissue culturing a single plant cell.
- Carbohydrates.**—The family of organic molecules consisting of simple sugars such as glucose and sucrose, and sugar chains (polysaccharides) such as starch and cellulose.
- Catalyst.**—A substance that enables a chemical reaction to take place under milder than normal conditions (e.g., lower temperatures). Biological catalysts are enzymes; nonbiological catalysts include metallic complexes.
- Cell fusion.**—The fusing together of two or more cells to become a single cell.
- Cell lysis.**—Disruption of the cell membrane allowing the breakdown of the cell and exposure of its contents to the environment.
- Cellulase.**—An enzyme that degrades cellulose to glucose.
- Cellulose.**—A polysaccharide composed entirely of several glucose units linked end to end; it constitutes the major part of cell walls in plants.
- Chimera.**—An individual composed of a mixture of genetically different cells.
- Chloroplast.**—The structure in plant cells where photosynthesis occurs.
- Chromosomes.**—The thread-like components of a cell that are composed of DNA and protein. They contain most of the cell’s DNA.
- Clone.**—A group of genetically identical cells or organisms asexually descended from a common ancestor. All cells in the clone have the same genetic material and are exact copies of the original.
- Conjugation.**—The one-way transfer of DNA between bacteria in cellular contact.
- Crossing-over.**—A genetic event that can occur during cellular replication, which involves the breakage and reunion of DNA molecules.
- Cultivar.**—An organism developed and persistent under cultivation.

- Cytogenetics.**—A branch of biology that deals with the study of heredity and variation by the methods of both cytology (the study of cells) and genetics.
- Cytoplasm.**—The protoplasm of a cell, external to the cell's nuclear membrane.
- Diploid.**—A cell with double the basic chromosome number.
- DNA (deoxyribonucleic acid).**—The genetic material found in all living organisms. Every inherited characteristic has its origin somewhere in the code of each individual's complement of DNA.
- DNA vector.**—A vehicle for transferring DNA from one cell to another.
- Dominant gene.**—A characteristic whose expression prevails over alternative characteristics for a given trait.
- Escherichia coli.**—A bacterium that commonly inhabits the human intestine. It is a favorite organism for many microbiological experiments.
- Endotoxins.**—Complex molecules (lipopolysaccharides) that compose an integral part of the cell wall, and are released only when the integrity of the cell is disturbed.
- Embryo transfer.**—Implantation of an embryo into the oviduct or uterus.
- Enzyme.**—A functional protein that catalyzes a chemical reaction. Enzymes control the rate of metabolic processes in an organism; they are the active agents in the fermentation process.
- Estrogens.**—Female sex hormones.
- Estrus ("heat").**—The period in which the female will allow the male to mate her.
- Eukaryote.**—A higher, compartmentalized cell characterized by its extensive internal structure and the presence of a nucleus containing the DNA. All multicellular organisms are eukaryotic. The simpler cells, the prokaryotes, have much less compartmentalization and internal structure; bacteria are prokaryotes.
- Exotoxins.**—Proteins produced by bacteria that are able to diffuse out of the cells; generally more potent and specific in their action than endotoxins.
- Fermentation.**—The biochemical process of converting a raw material such as glucose into a product such as ethanol.
- Fibroblast.**—A cell that gives rise to connective tissues.
- Gamete.**—A mature reproductive cell.
- Gene.**—The hereditary unit; a segment of DNA coding for a specific protein.
- Gene expression.**—The manifestation of the genetic material of an organism as specific traits.
- Genetic drift.**—Changes of gene frequency in small population due to chance preservation or extinction of particular genes.
- Genetic code.**—The biochemical basis of heredity consisting of codons (base triplets along the DNA sequence) that determine the specific amino acid sequence in proteins and that are the same for all forms of life studied so far.
- Genetic engineering.**—A technology used at the laboratory level to alter the hereditary apparatus of a living cell so that the cell can produce more or different chemicals, or perform completely new functions. These altered cells are then used in industrial production.
- Gene mapping.**—Determining the relative locations of different genes on a given chromosome.
- Genome.**—The basic chromosome set of an organism—the sum total of its genes.
- Genotype.**—The genetic constitution of an individual or group.
- Germplasm.**—The total genetic variability available to an organism, represented by the pool of germ cells or seed.
- Germ cell.**—The sex cell of an organism (sperm or egg, pollen or ovum). It differs from other cells in that it contains only half the usual number of chromosomes. Germ cells fuse during fertilization.
- Glycopeptides.**—Chains of amino acids with attached carbohydrates.
- Glycoprotein.**—A conjugated protein in which the nonprotein group is a carbohydrate.
- Haploid.**—A cell with only one set (half of the usual number) of chromosomes.
- Heterozygous.**—When the two genes controlling a particular trait are different, the organism is heterozygous for that trait.
- Homozygous.**—When the two genes controlling a particular trait are identical for a pair of chromosomes, the organism is said to be homozygous for that trait.
- Hormones.**—The "messenger" molecules of the body that help coordinate the actions of various tissues; they produce a specific effect on the activity of cells remote from their point of origin.

- Hybrid.**—A new variety of plant or animal that results from cross-breeding two different existing varieties.
- Hydrocarbon.** —All organic compounds that are composed only of carbon and hydrogen.
- Immunoproteins.**— All the proteins that are part of the immune system (including antibodies, interferon, and cytokines).
- In vitro.** -outside the living organism and in an artificial environment.
- In vivo.**—Within the living organism.
- Leukocytes.**—The white cells of blood.
- Lipids.**—Water insoluble biomolecules, such as cellular fats and oils.
- Lipopolysaccharides.**—Complex substances composed of lipids and polysaccharides.
- Lymphoblastoid.**—Referring to malignant white blood cells.
- Lymphokines.**—The biologically active soluble factor produced by white blood cells.
- Maleic anhydride.**—An important organic chemical used in the manufacture of synthetic resins, in fungicides, in the dyeing of cotton textiles, and to prevent the oxidation of fats and oils during storage and rancidity.
- Messenger RNA.**—Ribonucleic acid molecules that serve as a guide for protein synthesis.
- Metabolism.**—The sum of the physical and chemical processes involved in the maintenance of life and by which energy is made available.
- Mitochondria.**—Structures in higher cells that serve as the “powerhouse” for the cell, producing chemical energy.
- Monoclonal antibodies.**—Antibodies derived from a single source or clone of cells which recognize only one kind of antigen.
- Mutants.**—Organisms whose visible properties with respect to some trait differ from the norm of the population due to mutations in its DNA.
- Mutation.**—Any change that alters the sequence of bases along the DNA, changing the genetic material.
- Myeloma.**—A malignant disease in which tumor cells of the antibody producing system synthesize excessive amounts of specific proteins.
- n-alkanes.**—Straight chain hydrocarbons—the main constituents of petroleum.
- Nif genes.**—The genes for nitrogen fixation present in certain bacteria.
- Nucleic acid.**—A polymer composed of DNA or RNA subunits.
- Nucleotides.**—The fundamental units of nucleic acids. They consist of one of the four bases—adenine, guanine, cytosine, and thymine (uracil in the case of RNA)—and its attached sugar-phosphate group.
- Organic compounds.**—Chemical compounds based on carbon chains or rings, which contain hydrogen, and also may contain oxygen, nitrogen, and various other elements.
- Parthenogenesis.**—Reproduction in animals without male fertilization of the egg.
- Pathogen.**—A specific causative agent of disease.
- Peptide.** —Short chain of amino acids.
- pH.**—A measure of the acidity or basicity of a solution; on a scale of 0 (acidic) to 14 (basic): for example, lemon juice has a pH of 2.2 (acidic), water has a pH of 7.0 (neutral), and a solution of baking soda has a pH of 8.5 (basic).
- Phage.**—(See *bacteriophage*.)
- Phenotype.** —The visible properties of an organism that are produced by the interaction of the genotype and the environment.
- Plasmid.**—Hereditary material that is not part of a chromosome. Plasmids are circular and self-replicating. Because they are generally small and relatively simple, they are used in recombinant DNA experiments as acceptors of foreign DNA.
- Plastid.**—Any specialized organ of the plant cell other than the nucleus, such as the chloroplast.
- Ploidy.** —Describes the number of sets of chromosomes present in the organism. For example, humans are diploid, having two homologous sets of 23 chromosomes (one set from each parent) for a total of 46 chromosomes; many plants are haploid, having only one copy of each chromosome.
- Polymer.**—A long-chain molecule formed from smaller repeating structural units.
- Polysaccharide.** —A long-chain carbohydrate containing at least three molecules of simple sugars linked together; examples would include cellulose and starch.
- Progestogens.** —Hormones involved with ovulation.

Prostaglandin.—Refers to a group of naturally occurring, chemically related long-chain fatty acids that have certain physiological effects (stimulate contraction of uterine and other smooth muscles, lower blood pressure, affect action of certain hormones).

Protein.—A linear polymer of amino acids; proteins are the products of gene expression and are the functional and structural components of cells.

Protoplasm.—A cell without a wall.

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

Recessive gene.—Any gene whose expression is dependent on the absence of a dominant gene.

Recombinant DNA.—The hybrid DNA produced by joining pieces of DNA from different sources.

Restriction enzyme.—An enzyme within a bacterium that recognizes and degrades DNA from foreign organisms, thereby preserving the genetic integrity of the bacterium. In recombinant DNA experiments, restriction enzymes are used as tiny biological scissors to cut up foreign DNA before it is recombined with a vector.

Reverse transcriptase.—An enzyme that can synthesize a single strand of DNA from a messenger

RNA, the reverse of the normal direction of processing genetic information within the cell.

RNA (ribonucleic acid).—In its three forms—messenger RNA, transfer RNA, and ribosomal RNA—it assists in translating the genetic message of DNA into the finished protein.

Somatic cell.—One of the cells composing parts of the body (e.g., tissues, organs) other than a germ cell.

Tissue culture.—An *in vitro* method of propagating healthy cells from tissues, such as fibroblasts from skin.

Transduction.—The process by which foreign DNA becomes incorporated into the genetic complement of the host cell.

Transformation.—The transfer of genetic information by DNA separated from the cell.

Vector.—A transmission agent; a DNA vector is a self-replicating DNA molecule that transfers a piece of DNA from one host to another.

Virus.—An infectious agent that requires a host cell in order for it to replicate. It is composed of either RNA or DNA wrapped in a protein coat.

Zygote.—A cell formed by the union of two mature reproductive cells.

Acronyms and Abbreviations

AA	— amino acids	IBCs	— Institutional Biosafety Committees
ACS	— American Cancer Society	ICI	— Imperial Chemical Industries
ACTH	— adrenocorticotrophic hormone	IND	— Investigational New Drug Application (FDA)
AI	— artificial insemination	kg	— kilogram
A IPL	— Animal Improvement Programs Laboratory	l	— liter
APAP	— acetaminophen	lb	— pound
ASM	— American Society for Microbiology	mg	— milligram
bbbl	— barrel(s)		— microgram
bbbl/d	— barrels per day		— micrometer (formerly micron)
BOD5	— 5-day biochemical oxygen demand	MUA	— Memorandum of Understanding and Agreement
BBM	— Biological Response Modifier Program	NCI	— National Cancer Institute
bu	— bushel	NDA	— new drug application (FDA)
CaMV	— cauliflower mosaic virus	NDAB	— National Diabetics Advisory Board
CCPA	— The Court of Customs and Patent Appeals	NDCHIP	— National Cooperative Dairy Herd Program
CDC	— Center for Disease Control	NIAID	— National Institute of Allergy and Infectious Diseases
CERB	— Cambridge Experimentation Review Board	NIAMDD	— National Institute of Arthritis, Metabolism, and Digestive Diseases
DHHS	— Department of Health and Human Services (formerly Health, Education, and Welfare)	NIH	— National Institutes of Health
DHI	— Dairy Herd Improvement	NIOSH	— National Institute of Occupational Safety and Health
DNA	— deoxyribonucleic acid	NSF	— National Science Foundation
DOD	— Department of Commerce	OECD	— The Organization for Economic Cooperation and Development
DOD	— Department of Defense	ORDA	— Office of Recombinant DNA Activities
DOE	— Department of Energy	PD	— predicted difference
DPAG	— Dangerous Pathogens Advisory Group	pH	— unit of measure for acidity/ basicity
EOR	— enhanced oil recovery	ppm	— parts per million
EPA	— Environmental Protection Agency	R&D	— research and development
FDA	— Food and Drug Administration	RAC	— Recombinant DNA Advisory Committee
FMDV	— foot-and-mouth disease virus	rDNA	— recombinant DNA
ftz	— square foot	SCP	— single-cell protein
ft	— foot	T-DNA	— a smaller segment of the the plasmid
FTC	— Federal Trade Commission	Ti	— tumor inducing
g	— gram	TSCA	— Toxic Substances Control Act
gal	— gallon		
GH	— growth hormone		
ha	— hectares		
HEW	— Department of Health, Education, and Welfare		
hGH	— human growth hormone		
HYV	— high-yielding varieties		