

Glossary of Acronyms and Terms

Glossary of Acronyms

AGS —Advanced Genetic Sciences, Inc.
 APHIS—Animal and Plant Health Inspection Service, U.S. Department of Agriculture
 BSCC —Biological Sciences Coordinating Committee
 BT —*Bacillus thuringiensis*
 CSIRO—Commonwealth Scientific Industrial Research Organization, Australia
 DHHS —U.S. Department of Health and Human Services
 DNA —Deoxyribonucleic acid
 DOE —Department of Energy
 EPA —Environmental Protection Agency
 FDA —Food and Drug Administration
 FIFRA —Federal Insecticide, Fungicide, and Rodenticide Act
 FSIS —Food Safety Inspection Service, U.S. Department of Agriculture
 HP —Histo-lytic proteolytic enzyme
 IBV —Infectious bronchitis virus
 INA —Ice nucleation active
 NAS —National Academy of Sciences
 NEPA —National Environmental Policy Act
 NIAID —National Institute of Allergies and Infectious Diseases
 nif —Nitrogen fixation
 NIH —National Institutes of Health
 NSF —National Science Foundation
 OSHA —Occupational Safety and Health Administration
 OSTP —Office of Science and Technology Policy
 OTA —Office of Technology Assessment
 PAHO —Pan American Health Organization
 PBB —Poly-brominated biphenyls
 PCB —Poly-chlorinated biphenyls
 PL —Public Law
 PMN —Premanufacture Notice
 RAC —Recombinant DNA Advisory Committee, National Institutes of Health
 R&D —Research and development
 RNA —Ribonucleic acid
 S&E —Science and Education Division, U.S. Department of Agriculture
 TMV —Tobacco mosaic virus
 TSCA —Toxic Substances Control Act
 UK —United Kingdom
 U.S.C. —United States Code
 USDA —United States Department of Agriculture
 UV —Ultra-violet

Glossary of Terms

Aerobic Growth or activity that requires the presence of free oxygen.
Algorithm: A step-by-step procedure for solving a problem or modeling a process.
Allele: one of several possible alternate forms of a particular gene (e.g., blue and brown are alleles of the gene for eye color),
Anaerobic: Growth or activity that does not require free oxygen.
Anticodon: A triplet of nucleotides on transfer RNA molecules that binds to the complementary codon on messenger RNA during the polypeptide - producing (translation) process. The amino acid carried by the transfer RNA is inserted into the growing polypeptide chain. See *codon*.
Bacteriophage A virus whose host is a bacterial cell; also called phage.
Baculovirus: A virus of the family Baculoviridae found only in invertebrates, and presently being pursued as a potential biocontrol agent. (See app. A.)
Chloroplast(s): Those structures within plant cells where photosynthesis occurs; contain small circular DNA molecules that replicate independently.
Chromosome(s): The physical structure(s) 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.
Codon: A series of three adjacent nucleotides in a DNA molecule that directs ("codes for") the insertion of a specific amino acid into a growing protein chain.
Conjugation The reproductive process by which DNA is transferred between bacteria during cell-to-cell contact.
Conjugation tube The bridge-like structure by which cell-to-cell contact is maintained during conjugation.
Conjugative plasmid: A plasmid capable of initiating and directing the process of conjugation. (Compare *nonconjugative plasmid*.)
Convergent evolution: The evolution of similar structures or similar life strategies in unrelated species because of adaptation in response to similar selection pressures (e.g., in similar ecological habitats).
Cryptic plasmid A plasmid of undetermined function.
Cultivar Often used to refer to plant strains. See *strain*.
Cytoplasm: The substance within a cell external

- to the nuclear membrane; pertaining to or contained in the cytoplasm.
- Disarmed transposon:** A transposon altered in a manner rendering it incapable of movement, most often by deletion of the transposase gene, which encodes the enzyme necessary for excision. (Compare *transposon*.)
- 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.
- Dominant:** An allele or characteristic whose expression prevails over alternatives for a given trait. (Compare *recessive*.)
- Endogenous:** Developing or originating within the organism, or arising from causes within the organism.
- Endotoxin:** Poison produced by some gram-negative bacteria, present in the cellular membrane, and released only upon cell rupture; composed of complex lipopolysaccharide (fat-like molecule + sugar molecule) and more heat-stable than protein exotoxins. (Compare *exotoxin*.)
- Episome:** A DNA molecule that may exist either as an integrated part of a chromosomal DNA molecule of the host or as an independently replicating DNA molecule (plasmid) free of the host chromosome.
- Epistasis:** The interaction of genes at different loci resulting in the masking of a character.
- Epizootic:** A disease affecting many animals of one kind at the same time; analogous to the term epidemic in human populations.
- Eukaryote:** An organism with membrane-bound, structurally discrete nuclei and well-developed organelles. Eukaryotes include all organisms except viruses, bacteria, and blue-green algae. (Compare *prokaryote*.)
- Exotic** Describing a species not originating in the place where it is found; a nonnative, introduced species.
- Exotoxin:** A poison excreted by some gram-negative or gram-positive organisms; composed of protein. (Compare *endotoxin*.)
- Extrachromosomal DNA** DNA not associated with the chromosome(s) (e.g., plasmid DNA or organelle (mitochondria or chloroplast) DNA).
- Feral:** Pertaining to organisms in the wild.
- F factor:** See *fertility factor*.
- Fertility factor:** An episome capable of transferring a copy of itself from its host bacterial cell (an F + cell) to a bacterial cell not harboring an F factor (an F – cell). When the F factor is integrated into the host chromosome (the resulting cell is called an Hfr cell), the factor is capable of mobilizing transfer of the bacterial chromosome to an F – cell.
- Gamete:** A mature reproductive cell (haploid set of chromosomes) capable of fusing with a similar cell of opposite sex to yield a zygote; also called a sex cell.
- Gene:** The fundamental unit of heredity; an ordered sequence of nucleotide base pairs to which a specific product or function can be assigned.
- Gene family** A group of related genes exhibiting a high degree of homology in function and nucleotide base sequence.
- Gene pool:** The sum total of genes in a breeding population.
- Gene probe:** A molecule of known structure and/or function used to locate and identify a specific region or nucleotide sequence of a genome; usually a piece of complementary DNA that has been labeled with a tracer substance, such as a dye or radioactive label.
- Genetic code:** The manner in which DNA or RNA represents, through chemical subunits, information that is translated into protein. The genetic code is read in groups of three nucleotides called codons, each of which specifies a single amino acid. See also *codon, nucleotide*.
- Genetic variance:** The fraction of the phenotypic variance due to differences in the genetic constitution of individuals in a population. (Compare *phenotypic variance*.)
- Genome:** The genetic content encoded in a haploid organism's genes; in eukaryotes, a haploid set of chromosomes.
- Genotype:** The sum total of genetic information contained in an organism; the genetic constitution of an organism with respect to one or a few loci under consideration. (Compare *phenotype*.)
- Germ line:** The earliest, primitive stage of development; pertaining to tissues or cell lineages producing gametes. (Compare *somatic*.)
- Gram-negative/positive:** A classification of bacteria based on differential staining utilizing the Gram-Wiegert procedure. Primarily as a result of an organism's cell membrane structure, gram-negative organisms stain red and gram-positive organisms stain purple.
- High copy number plasmid:** A plasmid present in multiple copies within a single host bacterium. Copy number (single, low, and high) is dependent on both plasmid and host cell factors.
- Homologous sequence:** Nucleic acid segments having an identical or nearly identical linear order of nucleotide base pairs.
- Homology** Degree of relatedness in appearance, function, or structure.

Horizontal transfer: The passage of genetic material from one organism to another via nonsexual mechanisms.

Host: In the context of recombinant DNA technology, the organism used for growth and reproduction of virus, plasmid, or other foreign DNA source.

Hybridization: A procedure in which single-stranded nucleic acid segments are allowed to bind to homologous sequences, forming hybrid double-stranded helices; also, a process (e.g., in plants, producing offspring resulting from a cross between two genetically unlike entities); the formation of new cells resulting from fusion of whole cells or cell parts of different genotypes.

Ice-minus (ice-): A bacterium lacking a functional gene coding for a protein that promotes the formation of ice crystals by providing a physical nucleus around which ice crystallizes. The gene has been deleted from strains of *Pseudomonas syringae* *Pseudomonas fluorescens*, and *Erwinia herbicola*, the organisms around which debate recently has focused.

Iceplus (ice+): A bacterium with an intact, functional ice-nucleating gene.

Introgression: The entry or introduction of a gene or genes from one population into another (most often in nature via sexual reproduction, or hybridization).

IS (insertion sequence): One of a class of different nucleotide sequences found in bacteria that are capable of spontaneous movement from one chromosomal location to another. Chromosomal material may be mobilized during IS movement; movement may result in mutation at the original and/or new site(s) of insertion. (Compare *transposable element*.)

Line: See *strain* and *cultivar*.

Locus (pi. loci): The physical location on a chromosome occupied by a particular gene or its alleles.

LTR (long terminal repeat): One of a class of nucleotide sequences (300-1200 base pairs in length) associated with tumor viruses and cellular oncogenes that promote gene activity and are similar to transposons. (Compare *transposable element*.)

Meiosis The process by which chromosomes are duplicated then divided during the formation of haploid cells (gametes).

Mendelian: Referring to a trait that is controlled by a single gene, and that shows a simple dominant/recessive pattern of inheritance.

Mendelian genetics: Classical method of observing inheritance of a trait (s) in the offspring of crosses between individuals differing in that trait(s); results in accordance with Mendel's laws.

Mitochondrion/dria: Those structures within eu-

karyotic cells where energy is produced and stored; contains small circular DNA molecules that replicate independently.

Natural selection: The process of differential reproductive success by which genes in a population increase or decrease in frequency with the passage of generations, depending on their contribution to the survival of offspring in which they are carried; arguably the most important of the several mechanisms by which evolution takes place, discovered by Darwin and first described in 1858-59.

Nonconjugative plasmid: A plasmid incapable of initiating or directing the process of conjugation. (Compare *conjugative plasmid*.)

Nontransferable plasmid: See *nonconjugative plasmid*.

Nucleic acid: A macromolecule composed of sequences of nucleotide bases; DNA or RNA.

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.

Nucleus The membrane-enclosed structure in eukaryotes that contains the chromosomes.

Organelle: A structure in the cytoplasm of a cell that is specialized in its ultrastructure and biochemical composition to serve a particular function (e.g., mitochondria, endoplasmic reticulum, chloroplast).

P element: A transposable DNA sequence present in the fruit fly, *Drosophila*. (Compare *transposon*.)

pathogenic: Able to cause disease; often utilized to express inactivation or lethality.

Phage: See *bacteriophage*.

Phenotype: The observable characteristics of an organism produced by the interaction of the genotype and the environment. (Compare *genotype*.)

Phenotypic variance: The variation among genetically identical individual organisms in external appearance caused by the interaction of environment with the genotype during development. (Compare *genetic variance*.)

Phylogenetic: Referring to genetic similarities between different organisms as a result of descent from a common ancestor in evolutionary history.

Plasmid: An extrachromosomal, circular piece of DNA found in the cytoplasm and capable of replicating and segregating independently of the host chromosome. (Compare *conjugative*; *cryptic*; *high copy number*; *nonconjugative*; *nontransferable plasmid*.)

Pleiotropy: The production of diverse phenotypic effects produced by a mutation in a single gene.

Polymerase An enzyme that assembles a number of similar or identical subunits into a macromolecule (e.g., DNA polymerase and RNA polymerase).

Primary producer: A-I organism (plant or micro-

organism) that uses photosynthesis to convert solar energy into chemical energy that can be used by nonphotosynthetic organisms (e.g., humans).

Prokaryote: An organism lacking organelles and whose DNA is not enclosed within membrane-bound, structurally discrete nuclei. Bacteria, viruses, and blue-green algae are prokaryotes. (Compare *eukaryote*.)

Recessive: An allele or characteristic whose expression occurs only in the absence of a dominant trait. (Compare dominant.)

Recombinant DNA Hybrid DNA sequences assembled in vitro from different sources; or hybrid DNA sequences from the same source assembled in vitro in a novel configuration.

Recombination: The formation of a new association of genetic material; usually applied to the process of meiosis, during a stage of which the genetic material packaged into gametes is mixed and reconstituted in any of an enormous number of possible combinations.

Replicon: A genetic element possessing sequences specifying the initiation and control of the process by which DNA is precisely duplicated.

Retrovirus: A family of viruses whose genetic material is RNA and is further characterized by the presence of reverse transcriptase in the virion; also called tumor virus.

Reverse transcripts= An enzyme capable of directing the production of a single-strand DNA copy from an RNA template.

Rhizosphere: A region of the soil closely surrounding plant roots that is affected by root excretions.

RNA (ribonucleic acid): A molecule existing in three forms—messenger RNA, transfer RNA, and ribosomal RNA—responsible for translating the genetic information encoded in DNA into a protein product; the hereditary material of some viruses.

Selective advantage: An organism's increased probability of reproduction and producing offspring, conferred by its genetic characteristics.

Selective pressure: The influence of factors extrinsic to an organism (i.e., environmental factors) on its ability to compete with other organisms for reproductive success.

Sibling species: Independent, reproductive popula-

tions that are genetically distinct from one another yet very closely related, and often difficult or impossible to distinguish by morphological or other criteria.

Somatic; Pertaining to all diploid cells of an organism except the germ line. (Compare *germ line*.)

Species: Taxonomic category subordinate to a genus composed of individuals with common characteristics that distinguish them from other groups of the same taxonomic level; in sexually reproducing organisms, a group of interbreeding natural populations that are genetically distinct from other such groups.

Strain: A pure culture of organisms within a species, characterized by one or more particular physical or genetic properties. See *cultivar*.

Toxin: See **endotoxin** and exotoxin.

Transduction: The transfer of genetic material from one cell to another by means of a virus or bacteriophage.

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

Transposable element: A class of DNA sequences capable of insertion into a genome at numerous positions, and of moving from one area of a genome to another area or another genome.

Transposase: Enzyme that assists movement of DNA during the process of transposition.

Transposon: A type of transposable element incapable of autonomous existence, often shuttling genetic material back and forth between cell chromosomes, between smaller replicons, and between chromosomes and replicons.

Triplet: Three consecutive bases along a nucleic acid chain. See *codon*, *anticodon*.

Vector: A DNA molecule used to introduce foreign DNA into host cells.

Vertical transfer: The passage of genetic material from one organism to another through the germ line, i.e., sexual mechanisms; in bacteria, through genome replication and cell division.

Virus: Any of a large group of organisms containing genetic material but unable to reproduce outside a host cell.