Glossary

A

abdominal cavity The largest body cavity in humans and many animals, and holds the bulk of the viscera.

abiotic Physical rather than biological; not derived from living organisms.

abiotic stress Outside (nonliving) factors which can cause harmful effects to plants, such as soil conditions, drought, extreme temperatures.

abomasum The true stomach with typical enzyme action. Food remains here for a relatively short time compared with the time in the rumen.

absorptive cells Simple columnar epithelial cells found in the small intestine.

accessory sex glands Includes prostate gland, two seminal vesicles and two Cowper's glands.

acquired immunity Associated with the presence of antibodies from another immune animal or from exposure to the disease.

active immunity Acquired through direct contact with the specific disease-causing organism that causes the body to develop antibodies to combat invasion.

acute Relatively sudden appearance of symptoms (within 24 hours).

adaptive radiation The evolution of new species or sub-species to fill unoccupied ecological niches.

adenosine diphosphate (ADP) An organic molecule involved in the central part of the metabolism of the cell that generates energy.

adenosine triphosphate (ATP) Molecule involved in the “energy currency” of the cell; energy is released when a phosphate group is broken off forming ADP (adenosine diphosphate).

adipocyte A single fat cell.

adipose tissue Fat cells or fat tissue.

adrenal gland One pair of ductless glands, located above the kidneys, consists of a cortex which produces steroidal hormones and a medulla, which produces epinephrine and noepinephrine.

aerobe A microorganism that grows in the presence of oxygen. (See anaerobe)

afterbirth Placenta that is expelled at birth.

agarose gel electrophoresis A matrix composed of a highly purified form of agar that is used to separate larger DNA and RNA molecules ranging 20,000 nucleotides. (See electrophoresis)

alimentary canal Long winding tube with various enlarged sacs, beginning with the mouth and ending at the anus.

alleles Alternate forms of a gene or DNA sequence, which occur on either of two homologous chromosomes in a diploid organism. (See DNA polymorphism)

allopatric species Related species which cannot interbreed because of geographical separation.

alveoli Milk producing cells.

amino acid An organic compound; any of 20 basic building blocks of proteins--composed of a free amino (NH_2) end, a free carboxyl (COOH) end, and a side group (R).

ampicillin (beta-lactamase) An antibiotic derived from penicillin that prevents bacterial growth by interfering with cell wall synthesis.

amplify To increase the number of copies of a DNA sequence, in vivo by inserting into a cloning vector that replicates within a host cell, or in vitro by polymerase chain reaction (PCR).

anaerobe An organism that grows in the absence of oxygen. (See aerobe)

analogous Organs noted for having different structure and origin but are similar in function.

anaphase A step in mitosis and meiosis where groups of four chromosomes separate.

annuals Plants that complete their life/growing cycle in less than one year and must be planted again.

anterior Situated before or in front.

antibiotic A class of natural and synthetic compounds that inhibit the growth of or kill other microorganisms. (See antibiotic resistance, bacteriocide, bacteriostat)

antibiotic resistance The ability of a microorganism to produce a protein that disables an antibiotic or prevents transport of the antibiotic into the cell.

antibody An immunoglobulin protein produced by B-lymphocytes of the immune system that binds to a specific antigen molecule. (See monoclonal antibodies, polyclonal antibodies)

anticodon A nucleotide base triplet in a transfer RNA molecule that pairs with a complementary base triplet, or codon, in a messenger RNA molecule. (See codon, messenger RNA, RNA)

antigen Any foreign substance, such as a virus, bacterium, or protein, that elicits an immune response by stimulating the production of antibodies. (See antigenic determinant, antigenic switching)

antimicrobial agent Any chemical or biological agent that harms the growth of microorganisms.

appendicular skeleton Refers to the limbs.

arthropod Invertebrate animal with exoskeleton, jointed appendage and segmented body.

asexual reproduction Nonsexual means of reproduction which can include grafting and budding.

autosome A chromosome that is not involved in sex determination.

autotrophic Referring to plants; Self-sufficient; able to produce their own energy.

axial skeleton Refers to the bones of the skull, vertebral column, ribs and sternum.

axion Elongated fiber of the nerve.

B

bacillus A rod-shaped bacterium.

Bacillus thuringiensis (Bt) A bacterium that kills insects; a major component of the microbial pesticide industry.

backcross Crossing an organism with one of its parent organisms.

bacteria Microscopic one-celled organisms that vary in size and shape.

bacteriocide A class of antibiotics that kills bacterial cells.

bacteriophage (phage or phage particle) A virus that infects bacteria. Altered forms are used as vectors for cloning DNA.

bacteriostat A class of antibiotics that prevents growth of bacterial cells.

bacterium A single-celled, microscopic prokaryotic organism: a single cell organism without a distinct nucleus.

base pair (bp) A pair of complementary nitrogenous bases in a DNA molecule--denine-thymine and guanine-cytosine. Also, the unit of measurement for DNA sequences.

biennials Plants that complete their growing cycle in two growing seasons, not necessarily two years but more than one year.

bilateral symmetry The body is divided into equivalent right and left halves by only one plane.

binomial nomenclature (also called binary nomenclature) A formal system of naming species of living things by giving each a name composed of two parts, both of which use Latin grammatical forms.

bioaugmentation Increasing the activity of bacteria that decompose pollutants; a technique used in bioremediation.

biodiversity The wide diversity and interrelatedness of earth organisms based on genetic and environmental factors.

bioenrichment Adding nutrients or oxygen to increase microbial breakdown of pollutants.

biofilms See microbial mats.

biologics Agents, such as vaccines, that give immunity to diseases or harmful biotic stresses.

biomass The total dry weight of all organisms in a particular sample, population, or area.

biome A complex biotic community characterized by distinctive plant and animal species and maintained under the climatic conditions of the region.

bioremediation The use of microorganisms to remedy environmental problems. (See bioaugmentation, bioenrichment)

biotechnology The scientific manipulation of living organisms, especially at the molecular genetic level, to produce useful products. Gene splicing and use of recombinant DNA (rDNA) are major techniques used.

biotic Components of an ecosystem collectively referred to as fauna and flora.

biotic potential The number of offspring (live births, eggs laid, or seeds or spores set in plants) that a species may produce under ideal conditions.

biotic stress Living organisms which can harm plants, such as viruses, fungi, and bacteria and harmful insects. (See abiotic stress)

bP See base pair.

breed A race or variety of an animal species, especially one developed through human influence.

Bt See bacillus thuringiensis.

byproducts Something that is produced during the production or destruction of something else.

C

calcification Accumulation of calcium salts in a body tissue; normally occurs in the formation of bone.

cambium A cellular plant tissue which grows by division.

capacitation The process by which spermatozoa undergo changes in the female tract before fertilization.

carbohydrates Compounds composed of carbon (C), hydrogen (H) and oxygen (O).

carcinogen A substance that induces cancer.

carcinoma A malignant tumor derived from epithelial tissue, which forms the skin and outer cell layers of internal organs.

cardiac Part of the stomach nearest the esophagus.

carrying capacity The maximum population of an animal that a given habitat will support without the habitat being degraded over the long term.

castration Consists of removing both testicles in a male.

catalyst A substance that promotes a chemical reaction by lowering the activation energy of a chemical reaction, but which itself remains unaltered at the end of the reaction. (See catalytic antibody, catalytic RNA)

cation A positively charged ion.

caudal Posterior; pertains to the tail or rear of an animal.

cecal fermenters Animals that digest some nutrients by means of the microbes in the cecum rather than by a multi-chambered stomach, for example: rabbits and horses.

cecum Acts like a rumen and is involved with microbial digestion (fermentation).

cell The smallest structural and functional unit of an organism, typically microscopic and consisting of cytoplasm and a nucleus enclosed in a membrane.

cell membrane A double membrane surrounding the cell protoplasm or cytoplasm.

cell plate A partition formed during cell division.

cell walls A rigid layer of polysaccharides lying outside the plasma membrane of the cells of plants, fungi, and bacteria. In the algae and higher plants, it consists mainly of cellulose.

cellulose Insoluble substance that is the main constituent of plant cell walls

centers of origin Usually the location in the world where the oldest cultivation of a particular crop has been identified.

central dogma Francis Crick's seminal concept that in nature genetic information generally flows from DNA to RNA to protein.

centrifugation Separating molecules by size or density using centrifugal forces generated by a spinning rotor. G forces of several hundred thousand times gravity are generated in ultracentrifugation. (See density gradient centrifugation)

centriole See centrosome

centromere The central portion of the chromosome to which the spindle fibers attach during mitotic and meiotic division.

centrosome Near the nucleus and functions in cell division.

cervix The opening into the uterus through which sperm must pass to fertilize the egg.

chemotherapy A treatment for cancers that involves administering chemicals toxic to malignant cells.

chlorophyll A green pigment responsible for the absorption of light to provide energy for photosynthesis.

chloroplasts Double-membrane plastids with chlorophyll, used in photosynthesis, storing starch, and contain genetic information (DNA).

chlorosis Insufficient chlorophyll.

chlorotic Bleached or yellowed leaves.

chromatid Each of the two daughter strands of a duplicated chromosome joined at the centromere during mitosis and meiosis.

chromosome A single DNA molecule, a tightly coiled strand of DNA, condensed into a compact structure in vivo by complexing with accessory histones or histone-like proteins. Chromosomes exist in pairs in higher eukaryotes. (See chromosome walking)

chronic That which develops more slowly, lingers and will frequently reappear.

cilia A short, microscopic, hair like vibrating structure.

citric acid cycle Also called Krebs cycle or the tricarboxylic acid cycle, produces acetyl-CoA from the pyruvate when oxygen is present.

class The largest division of a phylum.

clone An exact genetic replica of a specific gene or an entire organism. (See cloning)

coccygeal Bones that make up tails.

codon A group of three nucleotides that specifies addition of one of the 20 amino acids during translation of an mRNA into a polypeptide. Strings of codons form genes and strings of genes form chromosomes. (See initiation codon, termination codon)

coenzyme (cofactor) An organic molecule, such as a vitamin, that binds to an enzyme and is required for its catalytic activity.

cofactor See coenzyme.

collagen Major insoluble fibrous protein

colony A group of identical cells (clones) derived from a single progenitor cell.

colostrum A thick, milky secretion from the mammary glands rich in antibodies.

combustion Releases energy all at one time, like a fire or an explosion.

commensalism The close association of two or more dissimilar organisms where the association is advantageous to one and doesn't affect the other(s) (See parasitism, symbiosis)

community Refers to different species interacting with one another and with the chemical and physical factors in the environment.

comparative anatomy Study of and comparison of the body parts of different species.

complementary nucleotides Members of the pairs adenine-thymine, adenine-uracil, and guaninecytosine that have the ability to hydrogen bond to one another. (See nucleotide)

complex stomach A large compartmented stomach with a less simple intestinal system.

conjugation The joining of two bacteria cells when genetic material is transferred from one bacterium to another.

Cowper's gland Small glands that open into the urethra at the base of the penis and secrete a constituent of seminal fluid; also called bulbourethral glands.

cranial Applied to the front or head of an animal.

cristae A structure resembling a ridge or crest.

crossing-over The exchange of DNA sequences between chromatids of homologous chromosomes during meiosis.

cross-pollination Fertilization of a plant from a plant with a different genetic makeup.

culture A particular kind of organism growing in a laboratory medium.

cyclic AMP (cyclic adenosine monophosphate) A second messenger that regulates many intracellular reactions by transducing signals from extracellular growth factors to cellular metabolic pathways.

cytogenetics Study that relates the appearance and behavior of chromosomes to genetic phenomenon.

cytoplasm The material or protoplasm within a living cell, excluding the nucleus.

D

dalton A unit of measurement equal to the mass of a hydrogen atom, 1.67×10^{-24} gram/L (Avogadro's number)

dark reaction Takes place at any time; occurs in the second phase of photosynthesis and does not require the presence of light.

daughter cells Cell with identical chromosomes.

death phase The final growth phase, during which nutrients have been depleted and cell number decreases. (See growth phase)

denature To induce structural alterations that disrupt the biological activity of a molecule. Often refers to breaking hydrogen bonds between base pairs in double-stranded nucleic acid molecules to produce in single-stranded polynucleotides or altering the secondary and tertiary structure of a protein, destroying its activity.

density gradient centrifugation High-speed centrifugation in which molecules "float" at a point where their density equals that in a gradient of cesium chloride or sucrose. (See centrifugation)

dentrites A short branched extension of a nerve cell.

deoxyribonucleic acid See DNA, nuclease.

dermatitis Inflammation and redness of skin.

detoxifies Removes toxic substances or qualities.

diabetes A disease associated with the absence or reduced levels of insulin, a hormone essential for the transport of glucose to cells.

diestrus Occurs between metestrus and proestrus and is the longest period of the estrous cycle.

differentiate Process by which a less specialized cell becomes a more specialized cell type.

diffusion The movement of a substance from a place where it is found in high concentration to a place of low concentration. This process continues until the substance is evenly distributed.

digesta Partially digested food

digestible nutrient That portion of a nutrient which may be broken down (digested) and absorbed and used by the body.

digestion The catabolic process (breakdown) in the digestive tract where ingested food is converted into simpler, soluble and diffusible substances that can be assimilated by the body

diploid Number of chromosomes found in the somatic or body cells (2n). Also can be considered as twice the number of chromosomes found in the gametes (sperm or ovum).

diploid cell A cell which contains two copies of each chromosome. (See haploid cell)

disease Any deviation from or interruption of the normal structure or function of any body part, organ, or system that is evident by a characteristic set of symptoms and signs.

distal Refers to the part located the furthest from the center of the body.

distended Swollen

DNA (deoxyribonucleic acid) An organic acid and polymer composed of four nitrogenous bases--adenine, thymine, cytosine, and guanine linked via intervening units of phosphate and the pentose sugar deoxyribose. DNA is the genetic material of most organisms and usually exists as a double-stranded molecule in which two antiparallel strands are held together by hydrogen bonds between adeninethymine and cytosine-guanine.

DNA diagnosis The use of DNA polymorphisms to detect the presence of a disease gene.

DNA fingerprint The unique pattern of DNA fragments identified by Southern hybridization (using a probe that binds to a polymorphic region of DNA) or by polymerase chain reaction (using primers flanking the polymorphic region).

DNA sequencing Procedures for determining the nucleotide sequence of a DNA fragment.

dominant An allele is said to be dominant if it expresses its phenotype even in the presence of a recessive allele. (See allele, phenotype, recessive)

dominant gene A gene whose phenotype is when it is present in a single copy.

dormancy A period in which a plant does not grow, awaiting necessary environmental conditions such as temperature, moisture, nutrient availability.

dorsal Upper surface of an animal.

double helix Describes the coiling of the antiparallel strands of the DNA molecule, resembling a spiral staircase in which the paired bases form the steps and the sugar-phosphate backbones form the rails.

E

E. coli A commensal bacterium inhabiting the human colon that is widely used in biology, both as a simple model of cell biochemical function and as a host for molecular cloning experiments.

ecology The study of the interactions of organisms with their environment and with each other.

ecosystem The organisms in a plant population and the biotic and abiotic factors which impact on them. (See abiotic factors; biotic factors)

ecotone A transitional region or zone in which one type of an ecosystem tends to merge with another ecosystem.

electrophoresis The technique of separating charged molecules in a matrix to which is applied an electrical field. (See agarose gell electrophoresis, polycrylamide gell electrophoresis)

electroporation A method for transforming DNA, especially useful for plant cells, in which high voltage pulses of electricity are used to open pores in cell membranes, through which foreign DNA can pass

embryology The study of body before birth.

endocrine glands Organs or glands that secrete regulatory substances directly into the circulation and not through a duct.

endocrinology Science that deals with the study of the endocrine glands and their secretions, the hormones.

endometrium Mucous membrane that lines the uterus

endonuclease See nuclease.

endophyte An organism that lives inside another.

endoplasmic reticulum Structure extending throughout the cytoplasm of a cell. It functions in the transport of cell products and as a surface for protein synthesis by the ribosomes.

Environmental Protection Agency (EPA) The U.S. regulatory agency for biotechnology of microbes. The major laws under which the agency has regulatory powers are the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and the Toxic Substances Control Act (TSCA).

environmental resistance All biotic and abiotic factors that may limit a populations increase.

enzyme Proteins that control the various steps in all biochemical reactions.

EPA See Environmental Protection Agency.

epidermis The outer layer of cells on all parts of a young plant and on some parts of older plants-for example, the leaves and fruits.

epididymis A long, convoluted tube on the backside of the mammalian testis where sperm mature and are stored; it consists of a head, body and tail which joins the vas deferens.

epinephrine Adrenaline

erythrocytes Red blood cells

esophagus Muscular tube that connects the pharynx to the stomach.

essential Necessary

Escherichia coli a Gram-negative, facultatively anaerobic, rod-shaped, coliform bacterium that is commonly found in the lower intestine of warm-blooded organisms.

estrus The time the female has or is about to ovulate and is receptive to the male.

eukaryote An organism whose cells possess a nucleus and other membrane-bound vesicles, including all members of the protist, fungi, plant and animal kingdoms; and excluding viruses, bacteria, and blue-green algae. (See prokaryote)

evolution The long-term process through which a population of organisms accumulates genetic changes that enable its members to successfully adapt to environmental conditions and to better exploit food resources.

excretion Expelling of waste products not useful in an animal's body.

exocrine glands Have a duct and empty their secretions onto another surface either internally or externally on an epithelial (skin) surface.

express To translate a gene's message into a molecular product.

F

fallopian tubes Tubes found at the anterior end of each uterine horn and lead to the ovary; also called oviducts.

fat-soluble vitamins Any vitamin that is soluble in fats – A, D, E; and K; can be stored and accumulated in the liver and other fatty tissues.

FDA See Food and Drug Administration.

feedback mechanism processes that regulate biological systems; negative feedback mechanisms slow down the process of end product accumulation. Though less common, some biological processes are regulated by positive feedback, in which an end-product speeds up its own production.

Federal Plant Pest Act (PPA) See U.S. Department of Agriculture.

Federal Seed Act See U.S. Department of Agriculture.

feral Domestic animals that return to nature and breed.

fertilization The action or process of fertilizing an egg, female animal, or plant, involving the fusion of male and female gametes to form a zygote.

fetus An unborn offspring.

FIFRA The Federal Insecticide, Fungicide and Rodenticide Act. (See Environmental Protection Agency)

follicles A small sac or vesicle.

Food and Drug Administration (FDA) The U.S. agency responsible for regulation of biotechnology food products. The major laws under which the agency has regulatory powers include the Food, Drug, and Cosmetic Act; and the Public Health Service Act.

Food web A population of any given organism is affected by a number of predators and parasites concurrently.

Food, Drug, and Cosmetic Act See Food and Drug Administration.

fundus The part of a hollow organ (such as the uterus or the gallbladder) that is farthest from the opening.

fungi Large group of spore-producing organisms that includes microorganisms such as yeasts and molds.

fungicide An agent, such as a chemical, that kills fungi.

fungus A microorganism that lacks chlorophyll.

furrowing The cell pinches in on all sides until two daughter cells are formed.

G

gamete A haploid sex cell, egg or sperm, that contains a single copy of each chromosome.

gametogenesis Process in which cells undergo meiosis to form gametes

gastric enzymes Enzymes that are secreted in the stomach.

GEM A genetically engineered microorganism.

gene A locus on a chromosome that encodes a specific protein or several related proteins. It is considered the functional unit of heredity. (See dominant gene, fusion gene, gene amplification, gene expression, gene flow, gene pool, gene splicing, gene translocation, recessive gene, regulatory gene)

gene amplification The presence of multiple genes. Amplification is one mechanism through which proto-oncogenes are activated in malignant cells.

gene cloning The process of synthesizing multiple copies of a particular DNA sequence using a bacteria cell or another organism as a host. (See DNA, host)

gene expression The process of producing a protein from its DNA and mRNA-coding sequences.

gene flow The exchange of genes between different but (usually) related populations.

gene frequency The percentage of a given allele in a population of organisms. (See allele).

gene insertion The addition of one or more copies of a normal gene into a defective chromosome.

gene linkage The hereditary association of genes located on the same chromosome.

gene modification The chemical repair of a gene's defective DNA sequence. (See DNA)

gene pool The totality of all alleles of all genes of all individuals in a particular population.

gene splicing Combining genes from different organisms into one organism. (See recombinant DNA)

gene translocation The movement of a gene fragment from one chromosomal location to another, which often alters or abolishes expression.

genetic Of or relating to genes or heredity.

genetic assimilation Eventual extinction of a natural species as massive pollen flow occurs from another related species and the older crop becomes more like the new crop. (See gene flow)

genetic code The three-letter code that translates nucleic acid sequence into protein sequence. The relationships between the nucleotide base-pair triplets of a messenger RNA molecule and the 20 amino acids that are the building blocks of proteins. (See base pair, nucleic acid, nucleotide)

genetic disease A disease that has its origin in changes to the genetic material, DNA. Usually refers to diseases that are inherited in a Mendelian fashion, although noninherited forms of cancer also result from DNA mutation.

genetic drift Random variation in gene frequency from one generation to another.

genetic engineering The manipulation of an organism's genetic endowment by introducing or eliminating specific genes through modern molecular biology techniques. A broad definition of genetic engineering also includes selective breeding and other means of artificial selection.

genetic linkage map A linear map of the relative positions of genes along a chromosome. Distances are established by linkage analysis, which determines the frequency at which two gene loci become separated during chromosomal recombination. (See mapping)

genetic marker A gene or group of genes used to "mark" or track the action of microbes.

genitalia Male and female anatomy.

genome The genetic complement contained in the chromosomes of a given organism, usually the haploid chromosome state.

genotype The structure of DNA that determines the expression of a trait. (See phenotype)

genus A category including closely related species. Interbreeding between organisms within the same category can occur.

GEO Genetically engineered organism.

germ Part of the grain kernel which usually contains available protein.

germ cell Reproductive cell. (See somatic cell)

germ cell (germ line) gene therapy The repair or replacement of a defective gene within the gamete-forming tissues, which produces a heritable change in an organism's genetic constitution.

gestation Time from conception to birth.

gizzard An organ found in the digestive tract of a chicken.

glycogen Storage form of starch in body.

glycolysis A metabolic pathway that is found in the cytoplasm of cells in all living organisms.

GMO Genetically modified organism.

gonadotropins Any of a group of hormones secreted by the pituitary that stimulate the activity of the gonads.

gonads An organ that produces gametes; a testis or ovary.

green revolution Advances in genetics, petrochemicals, and machinery that culminated in a dramatic increase in crop productivity during the third quarter of the 20th century.

gross anatomy That which can be seen with the naked eye.

growth curve See growth phase.

growth factor A serum protein that stimulates cell division when it binds to its cell-surface receptor.

growth phase (curve) The characteristic periods in the growth of a bacterial culture, as indicated by the shape of a graph of viable cell number versus time. (See death phase, Lag phase, Logarithmic phase, Stationary phase)

guard cell Each of a pair of curved cells that surround a stoma.

H

haploid Having a single set of unpaired chromosomes.

hardware stomach Reticulum

helminths A parasitic worm; a fluke, tapeworm, or nematode.

hemophilia An X-linked recessive genetic disease, caused by a mutation in the gene for clotting factor VIII (hemophilia A) or clotting factor IX (hemophilia B), which leads to abnormal blood clotting.

herbicide Any substance that is toxic to plants; usually used to kill specific unwanted plants.

hereditary Passing to offspring through genes.

heterochromatin Dark-stained regions of chromosomes thought to be for the most part genetically inactive.

heterotrophic Deriving sustenance from other living creatures.

heterozygous A term designating an individual that possesses unlike genes for a particular trait; an animal that carries a gene with two different alleles (Rr).

heterozygous genotype An organism that has both the dominant and the recessive gene.

HGH See human growth hormone.

hierarchical order A series of ordered groupings within a system, such as the arrangement of plants and animals into classes, orders, families, etc.

histology The study of tissue.

homeostatic mechanism Physiologic control system that uses negative feedback to maintain dynamic balance.

homeostasis A state of equilibrium, as in an organism or cell, maintained by self-regulating processes.

homologous Body parts and body organs – in different species that have a similar structure, but different uses

homologous chromosomes Chromosomes that have the same linear arrangement of genes--a pair of matching chromosomes in a diploid organism. (See chromosomes)

homozygote An organism whose genotype is characterized by two identical alleles of a gene. (See allele, genotype)

homozygous Have two of the same gene – one on each homologous chromosome.

host An organism that contains another organism.

host-specific Only live in certain types of animals

human genome project A project coordinated by the National Institutes of Health (NIH) and the Department of Energy (DOE) to determine the entire nucleotide sequence of the human chromosomes. (See NIH)

human growth hormone (HGH, somatotrophin) A protein produced in the pituitary gland that stimulates the liver to produce somatomedins, which stimulate growth of bone and muscle.

hybrid The offspring of two parents differing in at least one genetic characteristic (trait).

hybridoma A hybrid cell, composed of a B lymphocyte fused to a tumor cell, which grows indefinitely in tissue culture and is selected for the secretion of a specific antibody of interest.

hydrogen bond A relatively weak bond formed between a hydrogen atom (which is covalently bound to a nitrogen or oxygen atom) and a nitrogen or oxygen with an unshared electron pair.

hydrologic cycle The movement of water from points of evaporation and transpiration, condensation and precipitation and back to points of evaporation and transpiration, and condensation and precipitation to start the cycle again.

hydrolysis A reaction in which a molecule of water is added at the site of cleavage of a molecule to two products.

hydrolyze Decompose by reacting with water.

hypothalamus A portion of the brain found in the floor of the third ventricle. It regulates reproduction, hunger and body temperature and has other functions.

I - J

immune response Generate antibodies to protect against specific diseases.

immunoglobulins Any of a class of proteins present in the serum and cells of the immune system, that function as antibodies.

implantation A attachment of the fertilized egg to the uterine wall.

in situ Refers to performing assays or manipulations with intact tissues.

in vivo Refers to biological processes that take place within a living organism or cell.

incomplete dominance A condition where a heterozygous off-spring has a phenotype that is distinctly different from, and intermediate to, the parental phenotypes. (See Heterozygote, Phenotype)

ingesta Substances taken into the body as nourishment.

insulin A peptide hormone secreted by the islets of Langerhans of the pancreas that regulates the level of sugar in the blood.

interferon A family of small proteins that stimulate viral resistance in cells.

interphase Resting phase between successive mitotic divisions of a cell, or between the first and second divisions of meiosis.

interstitial fluid Fluid between cells; bathes and surrounds the cells of multicellular animals

introgression Backcrossing of hybrids of two plant populations to introduce new genes into a wild population.

invasiveness Ability of a plant to spread beyond its introduction site and become established in new locations where it may provide a deleterious effect on organisms already existing there.

invertebrates Animals lacking a backbone.

ion A charged particle.

isotope One of two or more forms of an element that have the same number of protons (atomic number) but differing numbers of neutrons (mass numbers). Radioactive isotopes are commonly used to make DNA probes and metabolic tracers.

K

karyotype All of the chromosomes in a cell or an individual organism, visible through a microscope during cell division.

kingdom First and largest division of living things – plants and animals.

L

lag phase The initial growth phase, during which cell number remains relatively constant prior to rapid growth. (See growth phase)

legume A member of the pea family that possesses root nodules containing nitrogen-fixing bacteria.

lethargic Sluggish

leucoplasts Organelles in cells, used for the storage of oil. starch and proteins.

leukocytes White blood cells.

ligaments Strong white fibrous tissues that connect bone to bone.

ligate The process of joining two or more DNA fragments.

light reaction Of plants; occurs only during the daylight, and is driven by the energy of sunlight.

lineage A chart that traces the flow of genetic information from generation to generation.

linkage The frequency of coinheritance of a pair of genes and/or genetic markers, which provides a measure of their physical proximity to one another on a chromosome.

liposomes Membrane-bound vesicles constructed in the laboratory to transport biological molecules.

locus (plural = loci) A specific location or site on a chromosome.

log phase See Logarithmic phase.

logarithmic phase (log or exponential growth phase) The steepest slope of the growth curve--the phase of vigorous growth during which cell number doubles every 20-30 minutes. (See Growth phase)

lumbar group Lower back.

lymphatic system Filters pathogens and other undesirables out of the body's lymphatic system.

lysis The destruction of the cell membrane.

lysosomes Small bodies where large numbers of enzymes are stored.

M

macrominerals Minerals a body needs in larger amounts, includes: calcium, phosphorus, magnesium, sodium, potassium, chloride and sulfur.

malignant Having the properties of cancerous growth.

mandible Lower jaw or jawbone.

mapping Determining the physical location of a gene or genetic marker on a chromosome. (See Continuous map, Genetic map, Physical map)

marrow Soft center of the bone; one place red blood cells are manufactured by the body.

mastication Chewing and crushing of food in preparation for swallowing.

meiosis The reduction division process by which haploid gametes and spores are formed, consisting of a single duplication of the genetic material followed by two mitotic divisions.

meristems Contain actively dividing cells that form new tissues

messenger rna (mRNA) The class of RNA molecules that copies the genetic information from DNA, in the nucleus, and carries it to ribosomes, in the cytoplasm, where it is translated into protein. (See RNA)

metabolism The biochemical processes that sustain a living cell or organism.

metacarpal bones Extend from the knee to fetlock.

metaphase Second stage of cell division, between prophase and anaphase, during which the chromosomes become attached to the spindle fibers.

metestrus Period immediately following estrus.

microbe A microorganism.

microbial mats (biofilms) Layered groups or communities of microbial populations.

microinjection A means to introduce a solution of DNA, protein, or other soluble material into a cell using a fine microcapillary pipet.

microminerals A mineral that is needed in the diet in relatively small amounts. The quantity needed is so small that such a mineral is often called a trace mineral; for example: iron, iodine, zinc and selenium.

micronutrients Required in small amounts.

microtubules Organelles made from tubulin, compose centrioles and cilia.

milk-ejection reflex An example of endocrine gland activity.

milk-letdown Release of milk into the teat cisterns.

mitochondria Double-membrane bound and are the site of respiration and the production of respiratory energy, converting foods into usable energy—production of adenosine triphosphate (ATP)—through aerobic respiration.

mitosis The replication of a cell to form two daughter cells with identical sets of chromosomes.

molecular biology The study of the biochemical and molecular interactions within living cells.

molecular genetics The study of the flow and regulation of genetic information between DNA, RNA, and protein molecules.

monoclonal **antibodies** Immunoglobulin molecules of single-epitope specificity that are secreted by a clone of B cells.

monoculture The agricultural practice of cultivating crops consisting of genetically similar organisms.

monogastric An animal, having a single compartment in its stomach, which swallows its food after chewing and does not regurgitate.

monogenic Controlled by or associated with a single gene.

monorchid A male with one fertile testicle.

motility Ability to move under their own power.

mottled Spotted or blotched.

mouth Initial opening of the alimentary canal.

mRNA See Messenger RNA.

mutagen Any agent or process that can cause mutations. (See Mutation)

mutation An alteration in DNA structure or sequence of a gene. (See Point mutation)

mutualism A specific type of symbiosis between man and animal. In this situation the two species benefit from each other. See symbiosis.

mycorrhizae Fungi that form symbiotic relationships with roots of more developed plants.

N

nanometers One billionth of a meter.

nasal cavity Cavity in which the olfactory organs of vertebrate animals are located.

National Institutions of Health (NIH) A nonregulatory agency which has oversight of research activities that the agency funds.

National Science Foundation (NSF) A nonregulatory agency which has oversight of biotechnology research activities that the agency funds.

natural immunity Refers to the protection an animal has when it is born.

natural selection The differential survival and reproduction of organisms with genetic characteristics that enable them to better utilize environmental resources.

necrotic Dead

neurons A nerve cell which transmits messages from one part of the body to another.

NFE Nitrogen-Free Extract

NIH See National Institutes of Health.

nitrogen fixation The conversion of atmospheric nitrogen to biologically usable nitrates.

nitrogenous Contains the element nitrogen.

nitrogenous bases The purines (adenine and guanine) and pyrimidines (thymine, cytosine, and uracil) that comprise DNA and RNA molecules.

nodule The enlargement or swelling on roots of nitrogen-fixing plants. The nodules contain symbiotic nitrogen-fixing bacteria. (See Nitrogen fixation)

nomenclature The giving and using of names.

non-ruminant Simple-stomached or monogastric animal.

nontarget organism An organism which is affected by an interaction for which it was not the intended recipient.

NSF See National Science Foundation.

nuclease A class of enzymes that degrades DNA and/or RNA molecules by cleaving the phosphodiester bonds that link adjacent nucleotides.

nucleic acids The two nucleic acids, deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), are made up of long chains of molecules called nucleotides. (See DNA, RNA, Nucleotides)

nucleoside A building block of DNA and RNA, consisting of a nitrogenous base linked to a five carbon sugar. (See Nucleoside analog)

nucleotide A building block of DNA and RNA, consisting of a nitrogenous base, a five-carbon sugar, and a phosphate group. Together, the nucleotides form codons, which when strung together form genes, which in turn link to form chromosomes

nucleus The membrane-bound region of a eukaryotic cell that contains the chromosomes.

nutrient (1) A substance that nourishes the metabolic processes of the body; (2) the end product of digestion.

nutrient cycling The first basic principle of ecosystem sustainability.

nutrition Science dealing with the utilization of feed/food by the body and all body processes which transform feed/food into body tissues and activities.

O

Occupational Safety and Health Act See Occupational Safety and Health Administration.

Occupational Safety and Health Administration (OSHA) One of the U.S. agencies responsible for regulation of biotechnology. The major law under which the agency has regulatory powers is the Occupational Safety and Health Act.

omasum One of the stomach components of ruminant animals that has many folds.

oncogene A gene that contributes to cancer formation when mutated or inappropriately expressed

oncogenesis The progression of cytological, genetic, and cellular changes that culminate in a malignant tumor.

oocyte Ovulated while in the metaphase of meiosis II.

oogenesis Process by which eggs, or ova, are produced.

open pollination Pollination by wind, insects, or other natural mechanisms.

organelles A cell structure that carries out a specialized function in the life of a cell.

OSHA See Occupational Safety and Health Administration.

osmosis Passage (diffusion) of water across a membrane as a result of different concentrations on the two sides of the membrane; movement of water from area of higher concentration to area of lower concentration.

osteoblasts Cells that form layers of bone in the early stages of ossification (bone formation).

ova Plural of ovum, meaning eggs.

ovaries Plural of ovary; female reproductive gland in which the eggs are formed and progesterone and estrogenic hormones are produced.

oviduct A duct leading from the ovary to the horn of the uterus.

ovule Contains the female gametes.

ovum A female gamete; egg produced by a female.

oxidative phosphorylation Occurs in the mitochondrial cristae. It comprises the electron transport chain that establishes a proton gradient (chemiosmotic potential) across the inner membrane by oxidizing the NADH produced from the Krebs cycle.

oxytocin A hormone released by the pituitary gland that causes increased contraction of the uterus during labor and stimulates the ejection of milk into the ducts of the mammary glands

P - Q

paired structures Similar right and left structures.

paleontology The study of the fossil record of past geological periods and of the phylogenetic relationships between ancient and contemporary plant and animal species.

palisade cells Plant cells found within the mesophyll in leaves, right below the upper epidermis and cuticle.

papillae Any small, nipple-like process or projection.

parasites An organism that lives a part of its life cycle in or on, and at the expense of, another organism. Parasites of farm animals live at the expense of the farm animals.

parasitism The close association of two or more dissimilar organisms where the association is harmful to at least one. (See Commensalism, Parasitism, Symbiosis)

parenchyma Cells with thin cell walls and with large vacuoles. In leaves, parenchyma cells contain chloroplasts for photosynthesis.

parent cell A cell that is the source of other cells.

parturition Process of giving birth.

passive immunity Acquired by transferring of antibodies from an immunized animal to an unimmunized one.

pathogen Organism which can cause disease in another organism.

pathogenic Infectious agents causing diseases

PCR See Polymerase chain reaction.

pedigree A diagram mapping the genetic history of a particular family.

pelvic cavity Contains the terminal part of the digestive system and all of the internal portions of the urogenital system not in the abdominal cavity.

perennials A plant or plant part that lives for more than two years.

pericardium A double-walled sac containing the heart and the roots of the great vessels.

peristaltic movement Muscular contractions that move food through the intestines.

peroxisomes Organelles in the plant cell that use oxygen to carry out catabolic reactions.

persistence Ability of an organism to remain in a particular setting for a period of time after it is introduced.

pesticide A substance that kills harmful organisms (for example, an insecticide or fungicide).

phage (particle) See Bacteriophage.

phalanges Corresponds to the hand of humans.

pharynx A short, funnel shaped muscular sac between the mouth and esophagus.

phenotype The observable characteristics of an organism, the expression of gene alleles (genotype) as an observable physical or biochemical trait. (See Genotype)

pheromone A hormone-like substance that is secreted into the environment.

phloem One of the two components of the vascular system whose primary function is the transport of manufactured products.

phosphatase An enzyme that hydrolyzes esters of phosphoric acid, removing a phosphate group.

phospholipid A class of lipid molecules in which a phosphate group is linked to glycerol and two fatty acyl groups. A chief component of biological membranes. (See Inositol phospholipid)

phosphorylation The addition of a phosphate group to a compound.

photosynthates Products of photosynthesis are carbohydrates such as sugars and starches (CHOs) and other complex compounds referred to collectively.

photosynthesis Process in a plant of making sugars for growth and respiration from the raw products of water, carbon dioxide, and, sunlight releasing oxygen.

phylum Each new group within a kingdom.

physical map A map showing physical locations on a DNA molecule, such as restriction sites, and sequence-tagged sites. (See Mapping)

physiology Science that pertains to the functions of organs, organ systems, or the entire animal.

placenta Vascular organ that unites the fetus to the uterus.

Plant Pest Act (PPA) See U.S. Department of Agriculture.

Plant Variety Act (PVA) See U.S. Department of Agriculture.

plasmid (p) A circular DNA molecule, capable of autonomous replication, which typically carries one or more genes encoding antibiotic resistance proteins. Plasmids can transfer genes between bacteria and are important tools of transformation for genetic engineers

plasmolemma Plasma membrane or cytoplasmic membrane.

pleiotrophy The effect of a particular gene on several different traits.

point mutation A change in a single base pair of a DNA sequence in a gene. (See Mutation)

polar bodies Minute cell produced and ultimately discarded in the development of an oocyte.

polyacrylamide gel electrophoresis Electrophoresis through a matrix composed of a synthetic polymer, used to separate proteins, small DNA, or RNA molecules of up to 1000 nucleotides. Used in DNA sequencing. (See Electrophoresis)

polyclonal antibodies A mixture of immunoglobulin molecules secreted against a specific antigen, each recognizing a different epitope.

polygenic Controlled by or associated with more than one gene.

polymer A molecule composed of repeated subunits.

polymerase chain reaction (PCR) A procedure that enzymatically amplifies a DNA polymerase. (See Polymerase)

polymorphisms Variant forms of a particular gene that occur simultaneously in a population.

polypeptide (protein) A polymer composed of multiple amino acid units linked by peptide bonds.

polyploid A multiple of the haploid chromosome number that results from chromosome replication without nuclear division.

polysaccharide A polymer composed of multiple units of monosaccharide (simple sugar).

polyvalent vaccine A recombinant organism into which has been cloned antigenic determinants from a number of different disease-causing organisms. (See Vaccine)

population A local group of organisms belonging to the same species and capable of interbreeding.

posterior Toward the rear end of an animal.

posterior pituitary Back portion of the pituitary.

predisposing Inclined to.

primary cell A cell or cell line taken directly from a living organism, which is not immortalized.

primary energy trap Not related to the food chain. To be alive is to be a primary energy trap.

primer A short DNA or RNA fragment annealed to single-stranded DNA, from which DNA polymerase extends a new DNA strand to produce a duplex molecule.

prion See Proteinaceous infectious particle.

proestrus Phase of the estrous cycle just before heat (estrus).

prokaryote A bacterial cell lacking a true nucleus; its DNA is usually in one long strand; cells with no nucleus. (See Eukaryote)

pronuclei Either of a pair of gametic nuclei, in the stage following meiosis but before their fusion leads to the formation of the nucleus of the zygote.

pronucleus Either of the two haploid gamete nuclei just prior to their fusion in the fertilized ovum.

prophase First stage of cell division, before metaphase, during which the chromosomes become visible as paired chromatids and the nuclear envelope disappears.

protease An enzyme that cleaves peptide bonds that link amino acids in protein molecules.

protein A polymer of amino acids linked via peptide bonds and which may be composed of two or more polypeptide chains. (See Polypeptide)

protein kinase An enzyme that adds phosphate groups to a protein molecule at serine, threonine, or tyrosine residues.

proteolytic The ability to break down protein molecules.

protoplasm Viscid or semi-liquid and jello-like substance which makes up the living cell.

protoplast Refers to the inside of the cell or the cellular contents.

protozoa One-celled, mobile organisms with a nucleus.

proventriculus Acts as the true stomach of a bird.

proximal Nearest; the position that is closest to the point of attachment for a limb or bone.

ptyalin A form of amylase found in the saliva of humans and some other animals.

puberty Age at which the reproductive organs become functionally operative.

Public Health Service Act See Food and Drug Administration.

PVA The Plant Variety Act. See U.S. Department of Agriculture.

pylorus Opening from the stomach into the duodenum (small intestine).

R

race Considered simply a subdivision of a species which breeds true except for minor variations.

rancid Spoiled.

receptor cells Other cells that will respond to a hormone in a target gland or organ.

recessive gene Characterized as having a phenotype expressed only when both copies of the gene are mutated or missing.

recombinant A cell that results from recombination of genes.

recombinant DNA The process of cutting and recombining DNA fragments from different sources as a means to isolate genes or to alter their structure and function.

recruitment Process of survival through early growth stages to become part of a breeding population.

regulatory gene A gene whose protein controls the activity of other genes or metabolic pathways.

reproductive glands Include the testes and ovaries; produce germ or “sex" cells for reproduction and the hormones testosterone and progesterone.

respiration Process of converting sugars into carbon dioxide, water, and energy. Often, the energy is in the form of heat.

reticulum One of the stomach structures of ruminant animals that is lined with small honeycomb appearing compartments.

retrovirus A member of a class of RNA viruses that utilizes the enzyme reverse transcriptase to reverse copy its genome into a DNA intermediate, which integrates into the hostcell chromosome. Many naturally occurring cancers of vertebrate animals are caused by retroviruses.

reverse genetics Using linkage analysis and polymorphic markers to isolate a disease gene in the absence of a known metabolic defect, then using the DNA sequence of the cloned gene to predict the amino acid sequence of its encoded protein.

rhizobia Bacteria in a symbiotic relationship with leguminous plants that results in nitrogen fixation. (See Nitrogen fixation)

rhizosphere The soils region on and around plant roots.

ribosomal RNA (rRNA) The RNA component of the ribosome. (See RNA)

ribosome Cellular organelle that is the site of protein synthesis during translation. (See Organelle, Translation)

ribosome-binding site The region of an mRNA molecule that binds the ribosome to initiate translation.

RNA (ribonucleic acid) An organic acid composed of repeating nucleotide units of adenine, guanine, cytosine, and uracil, whose ribose components are linked by phosphodiester bonds

RNA polymerase Transcribes RNA from a DNA template.

rosetting Circular arrangement of leaves.

rRNA See Ribosomal RNA.

rumen The large fermentation pouch of the ruminant animal in which bacteria and protozoa break down fibrous plant material that is swallowed by the animal; sometimes referred to as the paunch.

ruminant A mammal whose stomach has four parts (rumen, reticulum, omasum, and abomasum). Cattle, sheep, goats, deer, and elk are ruminants.

rumination Regurgitation of undigested food and chewing it a second time, after which it is again swallowed.

S

salivary glands Exocrine glands that secrete juices in the mouth that are mixed with the food.

salmonella A genus of rod-shaped, gram-negative bacteria that are a common cause of food poisoning.

scientific name A two-part name; the first part of the name identifies the genus to which the species belongs; the second part identifies the species within the genus.

sclerenchyma cells Thick cell walls, which make plant fibers.

scurvy Swollen and painful joints and bleeding gums in humans and brittleness of bones.

secondary energy trap What an organism uses to help it obtain food (camouflage, stick, gun, etc.) or to help it conserve energy (shelter, fur, etc.).

secondary sex characteristics Those that begin to show with the onset of puberty.

secretion Production of substances useful for the cells in other parts of the body.

secretory cells Produce products that are subsequently deposited in either the blood stream or a special duct to an organ, where they are used.

self-pollination Pollen of one plant is transferred to the female part of the same plant or another plant with the same genetic makeup.

semen Fluid containing the sperm that is ejaculated by the male. Secretions from the seminal vesicles, the prostate gland, the bulbourethral glands, and the urethral glands provide most of the fluid.

seminal fluid Semen

seminiferous tubules Minute tubules in the testicles in which sperm are produced. They comprise about 90% of the mass of the testes.

sequencing Putting the amino acids in correct order; determining genetic make-up.

Sertoli cells Serve a protective and nutritional role for the germ cells (spermatogonia or sex cells).

sex-linked inheritance Phenotypic expression of an allele related to the chromosomal sex of the individual.

sexual reproduction The process where two cells (gametes) fuse to form one hybrid, fertilized cell. See Asexual reproduction, Gamete, Hybrid.

sieve tube cells Long, slender tubes with porous ends (occur only in angiosperms).

sigmoid flexure S-shape of the retracted penis in livestock.

simple stomach Extensive intestinal system with an enlarged cecum.

sinuses Hollow walled spaces.

smooth muscle cells Spindle-shaped cells that are not striated; they contain one centrally located nucleus per cell.

somatic Body cells.

somatic cell Any nongerm cell that composes the body of an organism and which possesses a set of multiploid chromosomes (diploid in most organisms). (See Gamete, Somatic cell gene therapy)

somatic cell gene therapy The repair or replacement of a defective gene within somatic tissue. (See Somatic cell)

somatotrophin See Human growth hormone.

species A classification of related organisms that can freely interbreed.

spermatogenesis Process by which spermatozoa are formed.

spermatogonia Sperm producing cells.

spermatozoa Viable male sex cells.

spore A form taken by certain microbes that enables them to exist in a dormant stage. It is an asexual reproductive cell. (See Asexual reproduction, Dormant)

steroids Artificially produced drug similar to the natural hormone that controls inflammation and regulates water balance.

stomata Pores on the bottom of a leaf through which carbon dioxide enters the plant and water vapor exits.

stop codon See Termination codon.

striated muscle cells Voluntary muscle cells that produce movement; connected to bones and contraction causes movement.

stringency Reaction conditions--notably temperature, salt, and pH--that dictate the annealing of single-stranded DNA/DNA, DNA/RNA, and RNA/RNA hybrids. At high stringency, duplexes form only between strands with perfect one-to-one complementarity; lower stringency allows annealing between strands with some degree of mismatch between bases.

subspecies A subdivision or smaller part of a group of animals (those in a species).

subunit vaccine A vaccine composed of a purified antigenic determinant that is separated from the virulent organism. (See Vaccine, Enzyme)

superior Above or over.

supernatant The soluble liquid and action of a sample after centrifugation or precipitation of insoluble solids.

symbiosis The close association of two or more dissimilar organisms where both receive an advantage from the association.

symbiotic relationship Domestication of animals is an example of a symbiotic relationship. Man provides food and shelter to the animals, and they provide meat, milk and fiber for man.

sympatric species Those which can interbreed, but in practice do not because of differences in behavior, breeding, food sources, etc.,

synapsis The pairing of homologous chromosome pairs during prophase of the first meiotic division, when crossing over occurs.

synovial fluid Secreted by the synovial membrane; helps lubricate the joint.

synthesized Formed

T

taming On the path to domestication, but a tamed animal is not a domestic animal.

taxonomy Science of classification and the arrangement of plants and animals into groups based on their natural relationships are called.

telomere The end of a chromosome.

telophase Final phase of cell division, between anaphase and interphase, in which the chromatids or chromosomes move to opposite ends of the cell and two nuclei are formed.

temporal bone Either of a pair of compound bones forming the sides and base of the skull.

tendons Tough, fibrous connective tissue at ends of muscle bundles that attach muscle to bones or cartilage structures.

termination codon Any of three mRNA sequences (UGA, UAG, UAA) that do not code for an amino acid and thus signal the end of protein synthesis. Also known as stop codon. (See Codon)

terminator region A DNA sequence that signals the end of transcription.

territoriality A behavioral characteristic exhibited by many animal species, especially birds and mammalian carnivores, to mark and defend an area (territory) against other members of the same species.

testosterone Male sex hormone that stimulates the accessory sex glands, causes the male sex drive, and causes the development of masculine characteristics.

tetracycline An antibiotic that interferes with protein synthesis in prokaryotes.

tetrad A group of four similar chromatids formed by the splitting longitudinally of a pair of homologous chromosomes during meiotic prophase.

thoracic cavity Chest cavity

thoracic limbs Arms or front legs (including the scapula, arm, radius, ulna, manus, carpus and digits).

thrombocytes Platelets in the blood.

thyroid gland A large ductless gland in the neck that secretes hormones regulating growth and development through the rate of metabolism.

thyroxine Main hormone produced by the thyroid gland, acting to increase metabolic rate and so regulating growth and development.

tibia Corresponds with the shin bone of humans.

tissue Large groups of organized cells of similar structure that perform specific functions

tongue A tool of prehension that is used to grasp the food or to guide it in the mouth and on to the throat.

tonoplast A membrane that bounds the chief vacuole of a plant cell.

Toxic Substances Control Act (TSCA) See Environmental Protection Agency.

tracheids Elongated, conductive cells, the contents of which are non-living.

trait See Phenotype.

transcription The process of creating a complementary RNA copy of DNA.

transfer DNA See T-DNA.

transfer RNA (tRNA) See tRNA.

transgene See Transgenic.

transgenic An organism in which a foreign DNA gene (a transgene) is incorporated into its genome early in development. The transgene is present in both somatic and germ cells, is expressed in one or more tissues, and is inherited by offspring in a Mendelian fashion. See Transgenic animal, Transgenic plant.

transgenic animal Genetically engineered animal or offspring of genetically engineered animals. The transgenic animal usually contains material from at least one unrelated organism, such as from a virus, plant, or other animal. (See Transgenic)

transgenic plant Genetically engineered plant or offspring of genetically engineered plants. The transgenic plant usually contains material from at least one unrelated organisms, such as from a virus, animal, or other plant. (See Transgenic)

transition-state intermediate In a chemical reaction, an unstable and high-energy configuration assumed by reactants on the way to making products. Enzymes are thought to bind and stabilize the transition state, thus lowering the energy of activation needed to drive the reaction to completion.

translation The process of converting the genetic information of an mRNA on ribosomes into a polypeptide. Transfer RNA molecules carry the appropriate amino acids to the ribosome, where they are joined by peptide bonds.

translocation The movement or reciprocal exchange of large-chromosomal segments, typically between two different chromosomes.

transpiration Process of water exiting the plant through the stomata.

tRNA (transfer RNA) The class of small RNA molecules that transfer amino acids to the ribosome during protein synthesis. (See Transfer RNA)

trypsin A proteolytic enzyme that hydrolyzes peptide bonds on the carboxyl side of the amino acids arginine and lysine.

TSCA Toxic Substances Control Act (See Environmental Protection Agency)

tumor virus A virus capable of transforming a cell to a malignant phenotype. (See Virus)

turbinates Cartilaginous bone (not hard) covered by highly vascular (many blood vessels) mucosa which serves to clean and warm the air as the animal breathes in.

turgor Stiffness in the cells.

U

U.S. Department of Agriculture (USDA) The U.S. agency responsible for regulation of biotechnology products in plants and animals. The major laws under which the agency has regulatory powers include the Federal Plant Pest Act (PPA), the Federal Seed Act, and the Plant Variety Act (PVA). In addition, the Science and Education (S&E) division has nonregulatory oversight of research activities that the agency funds.

urea Often used as a protein substitute in ruminants. It is a source of nitrogen which the rumen "bugs" can use to make bacterial protein.

urethra Begins at the opening of the bladder and is continuous with the penis.

urogenital system Refers to the urinary tract and the accompanying genitalia (male and female anatomy).

USDA See the U.S. Department of Agriculture.

uterine horns Two branches of the uterus.

uterus That portion of the female reproductive tract where the young develop during pregnancy.

V

vaccine A preparation of dead or weakened pathogen, or of derived antigenic determinants, that is used to induce formation of antibodies or immunity against the pathogen. (See Polyvalent vaccine, Subunit vaccine)

vacuoles A space or vesicle within the cytoplasm of a cell, enclosed by a membrane and typically containing fluid.

vagina Copulatory portion of the female's reproductive tract. The vestibule portion serves for passage of urine during urination; also serves as a canal through which young pass when born.

variety A subdivision of a species and is usually fertile with any other member of the species.

vas deferens Duct that carries sperm from the epididymis to the urethra.

vasectomy Removal of a portion of the vas deferens. As a result, sperm are prevented from traveling from the testicles to become part of the semen.

vector Living carriers of genetic material (such as pollen) from plant to plant, such as insects.

ventral Lower or abdominal surface of an animal.

ventral cavity Contains most of the viscera or guts.

vertebrates Animals with a backbone.

vesicles An air-filled swelling in a plant.

villi Projections of the inner lining of the small intestine.

virulence The degree of ability of an organism to cause disease.

virus An infectious particle composed of a protein capsule and a nucleic acid core, which is dependent on a host organism for replication. A double-stranded DNA copy of an RNA virus genome that is integrated into the host chromosome during lysogenic infection. (See Coat protein, DNA, Genome, Host, Nucleic acid, RNA, Tumor virus)

vulva External genitalia of a female mammal.

W

water-soluble vitamins Carried to the body's tissues but are not stored in the body; the B-vitamins and vitamin C.

weed An undesirable plant.

wild type An organism as found in nature; the organism before it is genetically engineered.

X - Y

x-linked disease A genetic disease caused by a mutation on the X chromosome. In X-linked recessive conditions, a normal female "carrier" passes on the mutated X chromosome to an affected son.

x-ray crystallography The diffraction pattern of X-rays passing through a pure crystal of a substance.

xylem conducts water and dissolved nutrients, amino acids, proteins, and remobilized sugars from roots to aerial portions of the plants.

Z

Zona pellucida A protective covering around the ova, egg.

zygote Cell formed by the union of two gametes.