Appendix D: Microorganisms, Biochemistry and Nomenclature

Appendix D1

Nomenclature of Biochemistry and Microorganisms

Abiotic Factor A physical feature of the environment that interacts with organisms.

ABO Blood Group System One of the blood typing systems that is based on the presence or absence of blood group antigens A and B on red blood cells.

Abortive Infection Viral infection in which viruses enter a cell but are unable to express all of their genes to make infectious progeny.

Abscess An accumulation of pus in a cavity hollowed out by tissue damage.

Absorbance (A^{λ}) A dimensionless number that indicates how well a solution of a substance absorbs light of a given wavelength. It is defined as the negative logarithm of the fraction of light wavelength λ that passes through a sample of the solution; its value depends on the length of the light path, the concentration of the solution, and the extinction coefficient of the substance at that wavelength.

Absorption Process in which light rays are neither passed through nor reflected off an object but are retained and either transformed to another form of energy or used in biological processes.

Accidental Parasite A parasite that invades an organism other than its normal host.

Acetylcholinesterase An enzyme found in cholinergic synapses that breaks down acetylcholine and thus terminates its action on the postsynaptic cell.

Acid A substance that releases hydrogen ions when it is dissolved in water.

Acidic Dye See ► Anionic Dye.

Acidophile An acid-loving organism that grows best in an environment with a pH of 4.0 to 5.4.

Acme (sometimes referred to a fulminating). During the illness phase of the disease process, the time of most intense signs and symptoms.

Acne Skin condition caused by bacterial infection of hair follicles and the ducts of sebaceous glands.

Acquired Immune Deficiency Syndrome (AIDS) An infectious disease caused by the human immunodeficiency virus that destroys the individual's immune system.

Acquired Immunity Immunity obtained in some manner other than by heredity.

Acridine Derivative A chemical mutagen that can be inserted between bases of the DNA double helix, causing frameshift mutations.

Acrobe An organism that uses oxygen, including ones that must have oxygen.

Actinomycetes Gram-positive bacteria that tend to form filaments.

Action Potential A wave of transient depolarization that travels along the membrane of a nerve cell (or any other kind of excitable cell, such as a muscle cell) as a result of fluxes of ions across the membrane. A nerve impulse.

Activated Sludge System Procedure in which the effluent from the primary stage of sewage treatment is agitated, aerated, and added to sludge containing aerobic organisms that digest organic matter.

Activated State With respect to a chemical reaction, a transient high-energy state of a reactant molecule (such as an unfavorable electron configuration or strained conformation) that enables the molecule to undergo the reaction.

Activation Energy The energy required to start a chemical reaction.

Active Immunity Immunity created when an organism's own immune system produces antibodies or other defenses against an agent recognizes as foreign.

Active Immunization Use of vaccines to control diseases by increasing herd immunity through stimulation of the immune response.

Active Site The site on an enzyme molecule where the substrate binds and where the reaction is facilitated. It is often a cleft or pocket in the surface of the enzyme.

Active Transport (1) Movement of molecules or ions across a membrane against a concentration gradient;

requires expenditure of energy from ATP. (2) The transport of a substance across a biological membrane by a mechanism that can work against a concentration (or electrochemical) gradient. It always requires the expenditure of cellular energy. Compare ► Facilitated Transport, Passive Transport.

Acute Disease A disease that develops rapidly and runs it course quickly.

Acute Hemorrhagic Conjunctivitis Eye disease caused by an enterovirus.

Acute Inflammation The relatively short duration of inflammation during which time host defenses destroy invading microbes and repair tissue damage.

Acute Necrotizing Ulcerative Gingivitis (ANUG) A severe form of periodontal disease. *Also known as Trench Mouth.*

Acute Phase Protein Protein, such as C-reactive protein or mannose-binding protein, that forms a nonspecific host-defense mechanism during an acute phase response.

Acute Phase Response A response to an acute illness that produces specific blood proteins called acute phase proteins.

Acute Respiratory Disease (ARD) Viral disease that occurs in epidemics with cold symptoms as well as fever, headache, and malaise, sometimes causes viral pneumonia.

Adenovirus A medium-sized, naked DNA virus that is highly resistant to chemical agents and often causes respiratory infections or diarrhea.

Adenylylation In cells, the transfer of an adenylyl moiety from AT to another molecule. Some enzymes are regulated by reversible adenylylation.

Adherence The attachment of a microorganism to a host's cell surface.

Adhesin A protein or glycoprotein on attachment pili (fimbriae) or capsules that help a microorganism attach to a host cell.

Adipocytes Fat cells; cells that are specialized for storing triacylglycerols and for releasing them to the blood in the form of fatty acids and glycerol as required.

Adrenergic Receptors Cell-surface receptors that bind epinephrine and norepinephrine. There are several different types with somewhat different ligand specificities and effects. (The term comes from *adrenaline*, the old name for epinephrine.)

Adsorption The attachment of the virus to the host cell in the replication process.

Aerobic Respiration Processes in which aerobic organisms gain energy from the catabolism of organic molecules via the Krebs cycle and oxidative phosphorylation.

Aerosol A cloud of tiny liquid droplets suspended in air.

Aerotolerant Anaerobe A bacterium that can survive in the presence of oxygen but does not use oxygen in its metabolism.

Affinity Constant See ► Association Constant.

Aflatoxin Fungal toxin that is a potent carcinogen, found in food made from contaminated grain or peanuts infested with *Aspergillus flavus* and other aspergilli.

African Sleeping Sickness Disease of equatorial Africa caused by protozoan blood parasites of the genus *Trypanosoma. Also known as Trypanosomiasis.*

Agammaglobulinemia Primary immunodeficiency disease caused by failure of B cells to develop, resulting in lack of antibodies.

Agar A polysaccharide extracted from certain marine algae and used to solidify medium for the growth of microorganisms.

Agar Plate A plate of nutrient medium solidified with agar.

Agglutination Reaction A reaction of antibodies with antigens the results in agglutination, the clumping together of cells or other large particles.

Agonist In molecular biology, a substance that mimics the cellular effects of a natural compound (such as a hormone or neurotransmitter) by binding to and activating the same cellular receptor. Compare ► Antagonist.

Agranulocyte A leukocyte (monocyte or lymphocyte) that lacks granules in the cytoplasm and has rounded nuclei.

A Helix A right-hand helix structure of nucleic acid duplexes that has a smaller pitch and a larger diameter than the B-DNA helix. It is the structure adopted by RNA duplexes and RNA-DNA hybrid molecules.

AIDS (Acquired Immune Deficiency Syndrome) An infectious disease caused by the human immunodeficiency virus that destroys the individual's immune system.

Alcoholic Fermentation Fermentation in which pyruvic acid is reduced to ethyl alcohol by electrons from reduced NAD (NADH).

Alditols Compounds that are produced by reducing the carbonyl group on a monosaccharide (that is, reducing $R - CH = O$ to $R - CH_2 - OH$).

Aldose A monosaccharide in which the carbonyl group comes at the end of the chain and thus represents an aldehyde group Compare ► Ketose.

Algae (singular: *alga*) Photosynthesis, eukaryotic organisms in the kingdoms Protista and Plantae.

Alkaline Condition caused by an abundance of hydroxyl ions (OH^-) resulting in a pH of greater than 7.0. *Also known as Basic.*

Alkaliphile A base- (alkaline) loving organism that grows best in an environment with a pH of 7.0 to 11.5.

Alkaloids A large group of nitrogenous basic substances found in plants. Most of them taste bitter, and many are pharmacologically active. The term can also be used for synthetic compounds.

Alkylating Agent A chemical mutagen that can add alkyl groups (—CH^3) to DNA bases, altering their shapes and causing errors in base pairing.

Allele The form of a gene that occupies the same place (locus) on the DNA molecule as another form but may carry different information for a trait.

Allergen An ordinarily innocuous foreign substance that can elicit an adverse immunological response in a sensitized person.

Allergy When the immune system reacts in an exaggerated or inappropriate way to a foreign substance. *Also known as hypersensitivity.*

Allograft A graft of tissue between two organisms of the same species that are not genetically identical.

Allosteric With respect to enzymes, an effect that is produced on the activity of one part of an enzyme (such as an active site) by the binding of an effector to a different part of the enzyme.

Allosteric Site The site at which a noncompetitive inhibitor binds.

Alpha (α) Hemolysin A type of enzyme that partially lyses red blood cells, leaving a greenish ring in the blood agar medium around the colonies.

Alpha (α) Hemolysis Incomplete lysis of red blood cells by bacterial enzymes.

Alternative Pathway One of the sequences of reactions in nonspecific host responses by which proteins of the complement system are activated.

Alternative Splicing The splicing of a eukaryotic RNA transcript in different ways, to include or exclude certain exons from the final mRNA.

***Alu* Elements** DNA sequences about 300 base pairs long that occur in many copies scattered throughout the genome of mammals; the human genome has hundreds of thousands of them. They may serve an unknown function, or they may be purely "parasitic," spreading as mobile elements through the genome.

Alveolus A saclike structure arranged in clusters at the ends of the respiratory bronchioles, having walls one cell layer thick, where gas exchange occurs.

Amantadine An antiviral agent that prevents penetration by influenza A virus.

Ames Test Test used to determine whether a particular substance is mutagenic, based on its ability to induce mutations in auxotrophic bacteria. A strain of the bacterium *Salmonella typhimurium* having a mutation that disables an enzyme necessary for histidine utilization is exposed to the substance in question and plated on a medium lacking histidine. A reversion mutation that activates the mutant enzyme causes the cells to grow on this medium.

Amino Acid An organic acid containing an amino group and a carboxyl group, composing the building blocks of proteins.

Aminoglycoside An antimicrobial agent that blocks bacterial protein synthesis.

Amino Terminus See ► N-Terminus.

Amoebic Dysentery Severe, acute form of amebiasis, caused by *Entamoeba histolytica.*

Amoeboid Movement Movement by means of pseudopodia that occurs in cells without walls, such as amoebas and some white blood cells.

Amphibolic Pathway A metabolic pathway that can yield either energy or building blocks for synthetic reactions.

Amphipathic For a molecule, the property of having both hydrophobic and hydrophilic portions. Usually one end or side of the molecule is hydrophilic and the other end or side is hydrophobic.

Amphitrichous The presence of flagella at both ends of the bacterial cell.

Ampholyte A substance whose molecules have both acidic and basic groups.

Anabolic Pathway A chain of chemical reactions in which energy is used to synthesize biologically important molecules.

Anabolism Chemical reactions in which energy is used to synthesize large molecules from simple components. *Also known as Synthesis.*

Anaerobe An organism that does not use oxygen, including some organisms that are killed by exposure to oxygen.

Anaerobic Refers to the absence of oxygen or the absence of a need for it; processes that must or can occur without oxygen are called anerobic processes.

Anaerobic Respiration Respiration in which the final electron acceptor in the electron transport chain is an

inorganic molecule other than oxygen, e.g., sulfate, nitrate, etc.

Analytical Study An epidemiological study that focuses on establishing cause-and-effect relationships in the occurrence of diseases in populations.

Anamnestic Response Prompt immune response due to "recall" by memory cells. See ► Secondary Response.

Anaphylactic Shock Condition resulting from a sudden extreme drop in blood pressure caused by an allergic reaction.

Anaphylaxis An immediate, exaggerated allergic reaction to antigens, usually leading to detrimental effects.

Androgens The male sex hormones; specifically, the steroid hormones testosterone, dihydrotestosterone, and androstenedione, which act mainly to promote male sexual development and maintain male sex characteristics.

Angstrom (Å) Unit of measurement equal to 0.0000000001 m, or 10^{-10} m. No longer officially recognized.

Animalia The kingdom of organisms to which all animals belong.

Animal Passage The rapid transfer of a pathogen through animals of a species susceptible to infection by the pathogen.

Anion \▌a-▐n ī - ə n\ *n.* [GK, neut. of *aniōn, prp.* Of *anienai* to go up, fr. *ana-* + *ienai* to go](1834). A negatively charged ion.

Anionic \▐a-(▐)n ī-▌ä-nik\ *adj.* (ca. 1920).

Anionic Dye An ionic compound, used for staining bacteria, in which the negative ion imparts the color. *Also known as Acidic Dye.*

Anomers Stereoisomes of cyclized monosaccharide molecules differing only in the configuration of the substituents on the carbonyl carbon. (This carbon is a center of Chirality in the cyclized but not in the open-chain form of the molecule.)

Antagonism The decreased effect when two antibiotics are administered together.

Antagonist In biochemistry, a substance that counteracts the cellular effects of a natural compound (such as a hormone or neurotransmitter) by binding to the cellular receptor for the compound and blocking its action. Compare ► Agonist.

Anthrax A zoonosis caused by *Bacillus anthracis* that exist in cutaneous, respiratory ("woolsorters disease"), or intestinal forms; transmitted by endospores.

Antibiosis The natural production of an antimicrobial agent by a bacterium or fungus.

Antibiotic A chemical substance produced by microorganisms that can inhibit the growth of or destroy other microorganisms.

Antibodies A set of related proteins that are produced by B lymphocytes and can bind with specificity to antigens. Some types are released into body fluids and mediate humoral immunity; other types are retained on the surface of the B cell or are taken up and displayed by some other cell types.

Antibody A protein in response to an antigen that is capable of binding specifically to that antigen. *Also known as Immunoglobulin.*

Antibody Titer The quantity of a specific antibody in an individual's blood, often measured by means of agglutination, reactions.

Anticodon A three-base sequence in tRNA that is complementary to one of the mRNA codons, forming a link between each codon and the corresponding amino acid.

Antigen A substance that the body identifies as foreign and toward which it counts an immune response. *Also known as Immunogen.*

Antigen Binding Site The site on the antibody to which the antigen ((epitope) binds).

Antigen Challenge Exposure to a foreign antigen.

Antigenic Determinant See ► Epitope.

Antigenic Drift Process of antigenic variation that results from mutations in genes coding for hemagglutinin and neuramindase.

Antigenic Mimicry Self-antigen that is similar to an antigen on a pathogen.

Antigenic Shift Process of antigenic variation probably caused by a reassortment of viral genes.

Antigenic Variation Mutations of influenza viruses that occur by antigenic drift and antigenic shift.

Antigenic Presenting Cell An immunological cell, such as a macrophage, dendritic cell, or B cell, that processes antigen fragments and presents peptide fragments from the antigen on its cell surface.

Antihistamine Drug that alleviates symptoms caused by histamines.

Antimetabolite A substance that is a structural analog of a normal metabolite or otherwise resembles it and that interferes with the utilization of the metabolite by the cell.

Antimicrobial Agent A chemotherapeutic agent used to treat diseases caused by microbes.

Antioxidant A strongly reducing compound, such as ascorbic acid, which counteracts the tendency of a metabolite to undergo oxidation to a potentially toxic or harmful species.

Antiparallel The opposite head-to-tail arrangement of the two strands in a DNA double helix.

Antiport A membrane transport process that couples the transport of a substance in one direction across a membrane to the transport of a different substance in the other direction. Compare ▶ Symport.

Antisense RNA An RNA molecule that is complementary to an mRNA; it can block translation of the mRNA by forming a duplex with it. Gene expression can be regulated by the production of antisense RNAs.

Antiseptic A chemical agent that can be safely used externally on tissues to destroy microorganisms or to inhibit their growth.

Antiserum (plural: *antisera*) Serum that contain a high concentration of antibodies against a particular antigen.

Antitoxin An antibody against a specific toxin.

Antiviral Protein A protein induced by interferon that interferes with the replication of viruses.

Apicomplexan A parasite protozoan such as *Plasmodium*, that generally has a complex life cycle. *Also known as Sporozoan.*

Aplastic Crisis A period during which erythrocyte production ceases.

Apoenzyme The protein portion of an enzyme.

Apolipoproteins The specific proteins that constitute the protein fraction of lipoproteins; they mediate the interactions of lipoproteins with tissues.

Apoptosis Programmed cell death (as distinguished from necrosis) See ▶ Autolysis.

Arachnid An anthropod with two body regions, four pairs of legs, and mount parts that are used in capturing and tearing apart prey.

Archaea One of the three Domains of living things; all members are bacterial.

Archaebacteria A group of prokaryotes that are biochemically distinct from the true bacteria (Eubacteria) and that separated from them early in the history of life. Modern archaebacteria mostly live in extreme environments, such as acid hot springs.

Archaeobacteria Prokaryotic organisms lacking peptidoglycan in their cell walls and differing from eubacteria in many ways.

Arenavirus An enveloped RNA virus that causes Lassa fever and certain other hemorrhagic fevers.

Anthropod Makes up the largest group of living organisms, characterized by a jointed chitinous exoskeleton, segmented body, and joined appendages, associated with some or all of the segments.

Arthus Reaction A local reaction seen in the skin after subcutaneous or intradermal injection of an antigenic substance, immune complex (type III) hypersensitivity.

Artificially Acquired Active Immunity When an individual is exposed to a vaccine containing live, weakened, or dead organisms or their toxins, the host's own immune system responds specifically to defend the body, e.g., by making specific antibodies.

Artificially Acquired Immunity When an individual's immune system is stimulated to react by some man-made process, e.g., given a vaccine or an immune serum.

Artificially Acquired Passive Immunity When antibodies made by other hosts are introduced into a new host, e.g., via mother's milk or shots of gamma globulin.

Ascariasis Disease caused by a large roundworm, *Ascaris lumbricodes*, acquired by ingestion of food or water contaminated with eggs.

Ascomycota See ▶ Sac Fungus.

Ascospore One of the eight sexual spores produced in each ascus of a sac fungus.

Ascus (plural: *asci*) Saclike structures produced by sac fungi during sexual reproduction.

Aseptic Technique A set of procedures used to minimize chances that cultures will be contaminated by organisms from the environment.

Asiatic Cholera Severe gastrointestinal disease caused by *Vibrio cholerae*, common in areas of poor sanitation and fecal contamination of water.

Aspergillosis Skin infection caused by various species of *Aspergillus*, which can cause severe pneumonia in immuno-suppressed patients. *Known also as Farmer's Lung Disease.*

Association Constant (*K*) An equilibrium constant that indicates the tendency of two chemical species to associate with each other; it is equal to the concentration of the associated form divided by the product of the concentrations of the free species at equilibrium. *Known also as Affinity constant.*

Asthma Respiratory anaphylaxis caused by inhaled or ingested allergies or by hypersensitivity to endogenous microorganisms.

Asymmetric Carbon A carbon molecule that carries four different substituents and therefore acts as a center of chirality, meaning that the substance can occur in two different enantiomers (stereoisomers that are nonsuperimposable mirror images of each other).

Atherosclerotic Plaques The protruding masses that form on the inner walls of arteries in atherosclerotic disease. A mature plaque consists partly of lipid, mainly cholesterol esters, which may be free or contained in lipid-engorged macrophages called foam cells, and partly of an abnormal proliferation of smooth-muscle and connective-tissue cells.

Athlete's Foot A form of ringworm in which hyphae invade the skin between the toes, causing dry, scaly lesions. *Also known as Tinea Pedis.*

Atom The smallest chemical unit of matter.

Atomic Force Microscope (AFM) Advanced member of the family of scanning tunneling microscopes, allowing 3-dimensional views of structures from atomic size to about 1 μm.

Atomic Number The number of protons in an atom of a particular element.

Atomic Weight The sum of the number of protons and neutrons in an atom.

Atopy Localized allergic reactions that occur first at the site where an allergen enters the body.

Atrichous A bacterial cell without flagella.

Attachment Pilus Type of pilus that helps bacteria adhere to surfaces. *Also known as Fimbria.*

Attenuation (1) A genetic control mechanism that terminates transcription of an operon prematurely when the gene products are not needed. (2) The weakening of the disease-producing ability of an organism.

Auditory Canal Part of the outer ear lined with skin that contains many small hairs and ceruminous glands.

Autoantibody An antibody against one's own tissue.

Autocatalytic Refers to a reaction that an enzyme catalyzes on part of its own structure, such as cleavage performed by a protease on its own polypeptide precursor.

Autoclave An instrument for sterilization by means of moist heat under pressure.

Autograft A graft of tissue from one part of the body to another.

Autoimmune Disorder An immune disorder in which individuals are hypersensitive to antigens on ells of their own body.

Autoimmunity A condition in which the body mounts an immune response against one of its own normal components.

Autoimmunization The process by which hypersensitivity to "self" develops, it occurs when the immune system responds to a body components as if it were foreign.

Autolysis Programmed cell death; the orderly self-destruction of a cell in a multicellular organism. It is the process by which unwanted cells are eliminated in the body. *Known also as Apoptosis.*

Autonomously Replicating Sequences (ARSs) Sequences in yeast chromosomes that, when incorporated into an artificial plasmid, enable the plasmid to replicate efficiently in yeast cells.

Autotroph Organisms that can synthesize their organic compounds entirely from inorganic precursors in particular needing only CO_2 as a carbon source. Compare ▶ Heterotrophs.

Autotrophy "Self-feeding" – the use of CO_2 as a source of carbon atoms for the synthesis of biomolecules.

Auxotrophic Mutant An organism that has lost the ability to synthesize one or more metabolically important enzymes through mutation, therefore requires special substances in its growth medium.

Auxotrophs Microorganism strains that requires as a nutrient a particular substance that is not required by the prototype strain. Usually the requirement results from a mutation that disables an enzyme necessary for the endogenous synthesis of the substance.

Axial Filament A subsurface filament attached near the ends of the cytoplasmic cylinder of spirochetes that causes the spirochete body to rotate like a corkscrew. *Also known as Endoflagellum.*

Axis of Symmetry An imaginary axis through a structure, such that rotating the structure around the axis through an appropriate angle leaves the appearance of the structure unchanged.

Axon A threadlike process extending from a nerve cell by which impulses are transmitted to other nerve cells or to effector cells such as muscle or gland cells. Most nerve cells have one axon; shorter processes that function ion receiving impulses form other neutrons are called dendrites.

Babesiosis A protozoan disease caused by the Apicomplexan *Babesia microti* and other species of *Babesia.*

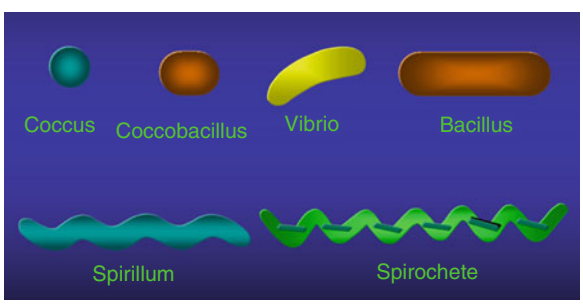
Bacillary Angiomatosis A disease of the small blood vessels of the skin and internal organs caused by the rickettsial organism *Bartonella hensalae.*

Bacillary Dysentery See ▶ Shigellosis.

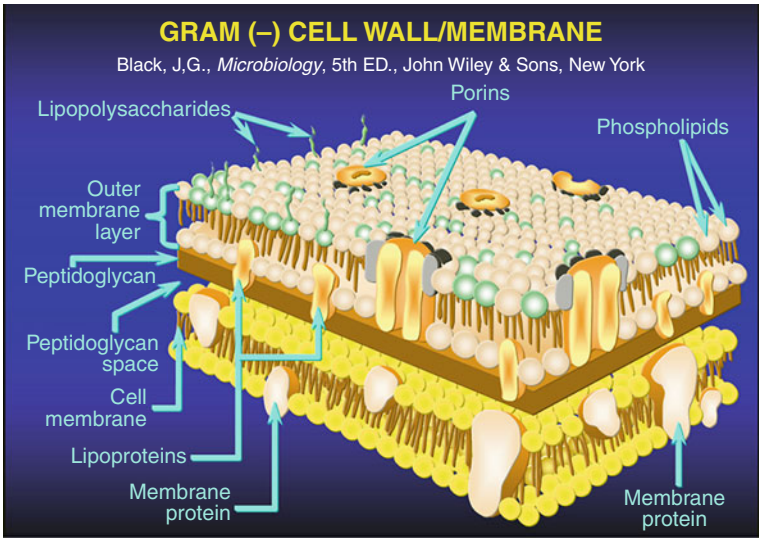
Bacillus (plural: *bacilli*) A rodlike bacterium.

Bacteremia An infection in which bacteria are transported in the blood but do not multiply in transit.

Bacteria (singular: *bacterium*) All prokaryotic organisms.

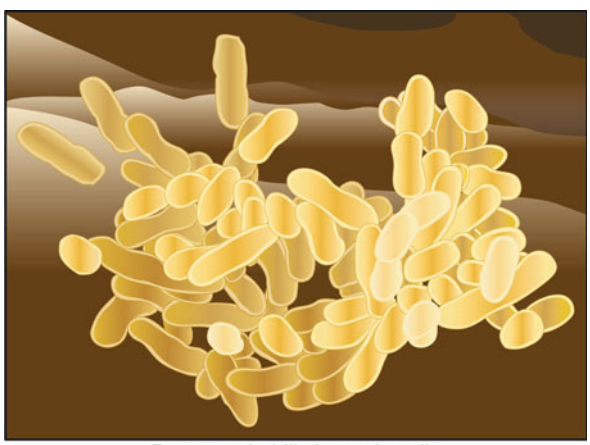


Bacterial cells

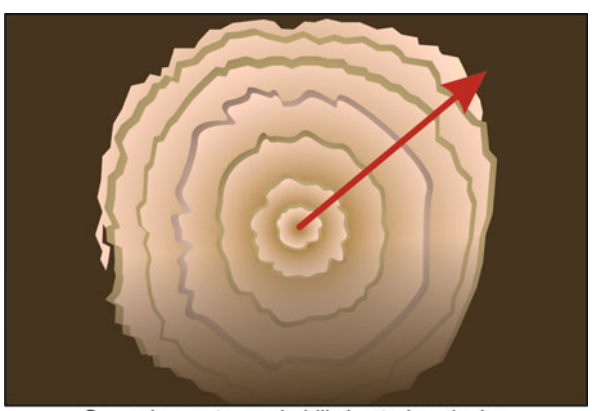


Bacterial (Gram-Neg.) cell wall

Bacteria When spelled with a capital B, it is the name of one of the three Domains of living things; all members are bacterial.



Proteus mirabilis bacteria cells



Swarming proteus mirabilis bacteria colonies

Bacterial Conjunctivitis A highly contagious inflammation of the conjunctiva caused by various bacterial species. *Also known as Pinkeye.*

Bacterial Endocarditis A life-threatening infection and inflammation of the lining and valves of the heart. *Also known as Infective Endocarditis.*

Bacterial Enteritis An intestinal infection caused by bacterial invasion of intestinal mucosa or deeper tissues.

Bacterial Lawn A uniform layer of bacteria grown on the agar surface in a Petri dish.

Bacterial Meningitis An inflammation of the meninges that cover the brain and spinal cord by any one of several bacterial species.

Bactericidal Referring to an agent that kills bacteria.

Bacteriocin A protein released by some bacteria that inhibits the growth of other strains of the same or closely related species.

Bacteriocinogen A plasmid that directs production of a bacteriocin.

Bacteriophage A virus that infects bacteria. *Also known as Phage.*

Bacteriostatic Referring to an agent that inhibits the growth of bacteria.

Bacteroid Irregularly shaped cells usually found in tight packets that develop from *Rhizobium* swarmer cells and form nodules in the roots of leguminous plants.

Balantidiasis Type of dysentery caused by the ciliated protozoan *Balantidium coli.*

Balantitis An infection of the penis.

Barophile An organism that lives under high hydrostatic pressure.

Barotholin Gland A mucus-secreting gland of the female external genitalia.

Bartonellosis Rickettsial disease, caused by *Bartonella bacilliformis*, that occurs in two forms. See also ► Oroyo Fever and ► Verruga Peruana.

Base A substance that absorbs hydrogen ions or donates hydroxyl ions.

Base Analog A chemical mutagen similar in molecular structure to one of the nitrogenous bases found in DNA that causes point mutations.

Basic Dye See ► Cationic Dye.

Basidiomycota See ► Club Fungus.

Basidiospore A sexual spore of the club fungi.

Basidium (plural: *basidia*) A clublike structure in club fungi bearing four external spores on short, slender stalks.

Basophil A leukocyte that migrates into tissues and helps initiate the inflammatory response by secreting histamine.

B Cell See ► B Lymphocyte.

B-DNA A DNA duplex with a specific right-hand helix structure. It is the usual form of DNA duplexes in vivo.

Beer's Law The equation that relates the absorbance of a solution sample at a given wavelength to the length of the light path, the concentration of the dissolved substance, and the extinction coefficient of the substance at that wavelength. See ► Extinction ► Coefficient.

Benign Not harmful.

Beta (β) Hemolysin A type of enzyme that completely lyses red blood cells, leaving a clear ring in the blood agar medium around the colonies.

Beta (β) Hemolysis Complete lysis of red blood cells by bacterial enzymes.

Beta Oxidation A metabolic pathway that breaks down fatty acids into 2-carbon pieces.

Bile Acids A family of amphipathic cholesterol derivatives that are produced in the liver and excreted in the bile; salts of the bile acids emulsify fat in the intestine.

Bilirubin A yellow substance, the product of the breakdown of hemoglobin from red blood cells.

Binary Fission Process in which a bacterial cell duplicates its components and divides into two cells.

Binocular Referring to a light microscope having two eyepieces (oculars).

Binomial Nomenclature The system of taxonomy developed by Linnaeus in which each organism is assigned a genus and specific epithet.

Biochemistry The branch of organic chemistry that studies the chemical reactions of living systems.

Bioconversion A reaction in which one compound is converted to another by enzymes in cells.

Biogenic Amines A set of low-molecular-weight amino acid derivatives that contain a basic amino group and function in the body as intercellular mediators. Examples are serotonin, histamine, and epinephrine.

Biogeochemical Cycle Mechanism by which water and elements that serve as nutrients are recycled.

Biohydrometallurgy The use of microbes to extract metals from ores.

Biological Oxygen Demand (BOD) The oxygen required to degrade organic wastes suspended in water.

Biological Vector An organism that actively transmits pathogens that complete part of their life cycle within the organism.

Bioremediation A process that uses naturally occurring or genetically engineered microorganisms to transform harmful substances into less toxic or nontoxic compounds.

Biosphere The region of the earth inhibited by living organisms.

Biotic Factor An organism in the biosphere.

Blackfly Fever Illness resulting from bites by blackflies, characterized by an inflammatory reaction, nausea, and headache.

Blackwater Fever Malaria caused by *Plasmodium falciparum* that results in jaundice and kidney damage.

Blastomycetic Dermatitis Fungal skin disease caused by *Blastomyces dermatitidis*; characterized by disfiguring, granulomatous, pus-producing lesions.

Blastomycosis Fungal skin disease caused by *Blastomyces dermatitidis* that enters the body through wounds.

Blocking Antibody IgG antibody, elicited in allergy patients by increasing doses of allergen, that complexes with allergen before it can react with IgE antibody.

Blood Agar Type of medium containing sheep blood, used to identify organisms that cause Hemolysis, or breakdown of red blood cells.

Blood-Brain Barrier Formation in the brain of special thick-walled capillaries without pores in their walls that limit entry of substances into brain cells. Physically the barrier consists of tight junctions between endothelial cells; these cells have transporters for polar substances such as glucose that need to enter the brain.

Blood Group Antigens A group of oligosaccharides that are carried in the form of glycoproteins and glycolipids on the surface of cells, including blood cells; they are encoded by a large number of polymorphic gene loci and can provoke an immune response in an individual with different blood group antigens.

B Lymphocyte A lymphocyte that is produced in and matures in bursal-equivalent tissue, it gives rise to antibody-producing plasma cells. *Known also as B Cell.*

Body Tube Microscope part that conveys an image from the objective to the eyepiece.

Bohr Effect The effect of pH on oxygen binding by hemoglobin, by which a decrease in pH causes a decrease in oxygen affinity. The effect promotes both the release of oxygen from hemoglobin in the tissues and the release of CO_2 from the blood to the air in the lungs.

Boil See ► Furuncle.

Bolivian Hemorrhagic Fever A multisystem disease caused by an arenavirus with insidious onset and progressive effects.

Bone Stink Putrefaction deep in the tissues of large carcasses that is caused by several species of *Clostridium*.

Bongkrek Disease Type of food poisoning caused by *Pseudomonas cocovenenans*, named for a native Polynesian coconut dish.

Botulism Disease caused by *Clostridium botulinum*. The most common form, food-borne botulism, results from ingestion of preformed toxin and is, therefore, an intoxication rather than an infection.

Bradykinin Small peptide thought to cause the pain associated with tissue injury.

Brain Abcess A pus-filled cavity caused by microorganisms reaching the brain from head wound or via blood from another site.

Branch Migration During recombination, the migration of a cross-over point (Holiday junction) by simultaneous unwinding and rewinding in both duplexes.

Bread Mold A fungus with complex mycelia composed of aseptate hyphae with chitinous cross walls. *Known also as Zygomycota or Conjugation Fungus.*

Bright-Field Illumination Illumination produced by the passage of visible light through the condenser of a light microscope.

Brill-Zinsser Disease A recurrence of an epidemic typhus infection caused by reactivation of latent organisms harbored in the lymph nodes. *Known also as Recrudescent Typhus.*

Broad Spectrum Referring to the range of activity of an antimicrobial agent that attacks a wide variety of microorganisms.

Bronchial Pneumonia Type of pneumonia that begins in the bronchi and can spread through surrounding tissue toward the alveoli.

Bronchiole A finer subdivision of the air-conveying bronchi.

Bronchitis An infection of the bronchi.

Bronchus (plural: *bronchi*) A subdivision of the trachea that conveys air to and from the lungs.

Brucellosis A zoonosis highly infection for humans, caused by any of several species of *Brucella*. *Also known as Undulant Fever and Malta Fever.*

Bubo Enlargement of infected lymph nodes, especially in the groin and armpit, due to accumulation of pus, characteristic of bubonic plague and other diseases.

Bubonic Plague A bacterial disease, caused by *Yersinia pestis* and transmitted by flea bites, that spread in the blood and lymphatic system.

Budding Process that occurs in yeast and a few bacteria in which a small new cell develops from the surface of an existing cell.

Buffering The ability of a mixture of an acid and its conjugate base at a pH near their pK_a to minimize pH changes caused by an influx of acid or base. The Henderson-Hasselbach equation is useful relating pH, pK and [salt]/[acid].

Bulking Phenomenon in which filamentous bacteria multiple, causing sludge to float on the surface of water rather than settling out.

Bunyavirus An enveloped RNA virus that causes some forms of respiratory distress and hemorrhagic fever.

Burkitt's Lymphoma A tumor of the jaw, seen mainly in African children, caused by the Epstein-Barr virus.

Burst Size The number of new virions released in the replication process. *Known also as Viral Yield.*

Burst Time The time from absorption to release of phages (in the replication process).

Calorie A unit of energy defined as that amount of heat energy that will raise the temperature of 1 gram of water by 1°C. 1 calorie = 4.182 joules.

Calvin Cycle The cycle of photosynthetic dark reactions by which CO_2 is fixed, reduced, and converted to glyceraldehydes-3-phosphate (the precursor of hexose monophosphates).

Cancer An uncontrolled, invasive growth of abnormal cells.

Candidiasis A yeast infection caused by *Candida albicans* that appears as thrust (in the mount) or vaginitis. *Known also as Moniliasis.*

Canine Parvovirus A parvovirus that causes severe disease in dogs.

Canning The use of moist heat under pressure to preserve food.

Capillary A blood vessel that branches from an arteriole.

Capnophile An organism that prefers carbon dioxide gas for growth.

Capsid The protein coating of a virus, which protects the nucleic acid core from the environment and usually determines the shape of the virus.

Capsomere A protein aggregate that makes up a viral capsid.

Capsule (1) A protective structure outside the cell wall, secreted by the organism. (2) A network of connective fibers covering organs such as the lymph nodes.

Carbapenem A bactericidal antibiotic that acts on bacterial cell walls.

Carbohydrate A compound composed of carbon, hydrogen, and oxygen that serves as the main course of energy for most living things.

Carbohydrates In general, substances that have the stoichiometric formula $(CH_2)_n$, where $n \geq 3$, or that are derived from such a substance by the addition of functional groups.

Carbon Cycle Process by which carbon from atmospheric carbon dioxide enters living and nonliving things and is recycled through them.

Carboxyl Terminus See ► C-Terminus.

Carbuncle A massive pus-filled lesion resulting from an infection, particularly of the neck and upper back.

Carcinogen A cancer-producing substance.

Cardiovascular System Body system that supplies oxygen and nutrients to all parts of the body and removes carbon dioxide and other wastes from them.

Carnitine A low-molecular-weight lysine derivative that shuttles fatty acids through the inner mitochondrial membrane to the matrix. The fatty acyl moiety is transferred from CoA to carnitine for transit through the membrane and is then transferred back to CoA; the carnitine released on the matrix side of the membrane is shuttled back for reuse.

Carrier An individual who harbors an infectious agent without having observable clinical signs or symptoms.

Cascade A set of reactions in which magnification of effect occurs, as in the complement system.

Casein Hydrolsate A substance derived from milk protein that contains many amino acids, used to enrich certain media.

Caseous Characterizing lesions with a "cheesy" appearance that form in lung tissue of patients with tuberculosis.

Caspases A family of proteases involved in apoptosis.

Catabolic Pathway A chain of chemical reactions that capture energy by breaking down large molecules into simpler components.

Catabolism The sum of all the metabolic processes by which complex molecules are broken down to simpler ones, including the processes by which molecules are broken down to yield cellular energy. Compare ► Anabolism.

Catabolite Activation In bacteria, a transcriptional control system that induces the synthesis of enzymes for the catabolism of energy substrates other than glucose when glucose levels are low. It involves an activator protein, CRP, that binds cyclic AMP under conditions of low glucose; this complex then binds to DNA sites and promotes transcription of the appropriate genes.

Catabolite Repression Process by which the presence of a preferred nutrient (often glucose) represses the genes coding for enzymes used to metabolize some alternative nutrient.

Catalase An enzyme that converts hydrogen peroxide to water and molecular oxygen.

Caterrhal State Stage of whooping cough characterized by fever, sneezing, vomiting, and a mild, dry persistent cough.

Cathepsins Lysosomal proteases that function in degrading proteins in lysosomes and are also released into the cell at large during cell autolysis (programmed cell death).

Cation \ˈkatˌīən\ n. [Gk *kation*, neut. of *katiōn*, prp. of *katienai* to go down, fr. *kata-cata* + *ienai* to go] (1834) A positively charged ion.

Cationic Dye An ionic compound, used for staining bacteria in which the positive ion imparts the color. *Known also as Basic Dye.*

Cat Scratch Fever A disease caused by *Afipia felis*, or more commonly, *Bartonella (Rochalimaea) hensalae* and transmitted in cat scratches and bites.

Cavitation The formation of a cavity inside the cytoplasm of a cell.

Cell Culture A culture in the form of a monolayer from dispersed cells and continuous cultures of cell suspensions.

Cell-Mediated Immune Response The immune response to an antigen carried out at the cellular level by T cells.

Cell-Mediated Immunity The immune response involving the direction action of T cells to activate B cells or to destroy microbe-infected cells, tumor cells, or transplanted cells (organ transplants).

Cell-Mediated (Type IV) Hypersensitivity Type of allergy elicited by foreign substances from the environment, infectious agents, transplanted tissue, and the body's own malignant cells, mediated by T cells. *Known also as Delayed Hypersensitivity.*

Cell Membrane A selectively permeable lipoprotein bilayer that forms the boundary between a bacterial cell's cytoplasm and its environment.

Cell Strain Dominant cell type resulting from subculturing.

Cell Theory Theory formulated by Schleiden and Schwann that cells are the fundamental units of all living things.

Cellular Slime Mold Fungus like protest consisting of amoeboid, phagocytic cells that aggregate to form a pseudoplasmodium.

Cell Wall Outer layer of most bacterial, algal, fungal, and plant cells that maintains the shape of the cell.

Cementum The hard, bony covering of the tooth below the gumline.

Center of Chirality With respect to organic compounds, a carbon atom that has four different substituents attached to it; such a group cannot be superimposed on its own mirror image and therefore can occur in two enantiomers.

Central Nervous System The brain and spinal cord.

Centromere The region of a chromosome where the two sister chromatids are attached together. It is also the site of attachment for spindle fibers during mitosis and meiosis.

Cephalosporin An antibacterial agent that inhibits cell wall synthesis.

Cercaria A free-swimming fluke larva that emerges from the snail or mollusk host.

Cerumen Earwax.

Ceruminous Gland A modified sebaceous gland that secrets cerumen.

Cervix An opening at the narrow lower portion of the uterus.

C_4 Cycle A cycle in some plants that minimizes the wasteful effects of photorespiration by using an enzyme other than rubisco to perform the initial fixation of CO_2. This enzyme is found in mesophyll cells, where it fixes CO_2 into a four-carbon compound (hence C_4). This fixed carbon is shuttled into sheltered bundle-sheath cells, where it is released as CO_2 and enters the Calvin cycle.

Chagas' Disease Disease caused by *Trypanosoma cruzi* that occurs in the southern United States and is endemic to Mexico; transmitted by several kinds of reduviid bugs.

Chancre A hard, painless, nondischarging lesion; a symptom of primary stage syphilis.

Chancroid Sexually transmitted disease caused by *Haemphilus ducreyi* that causes soft, painful skin lesions on the genitals, which bleed easily.

Chaotropic The property of being able to disrupt the hydrogen bonding structure of water. Substances that are good hydrogen bonders, such as urea or guanidine hydrochloride, are chaotropic. Concentrated solutions of these substances tend to denature proteins because they reduce the hydrophobic effect.

Chaperonins Proteins that are involved in managing the folding of other proteins. Some of them help proteins to fold correctly; some prevent premature folding; and some prevent polypeptides from associating with other polypeptides until they have folded properly.

Chemical Bond The interaction of electrons in atoms that form a molecule.

Chemical Cross-Linking A technique for investigating the mutual arrangement of components in a complex. The complex is exposed to a reagent that can form chemical cross-links between adjacent components and is then disaggregated and analyzed. Components that are linked together can be assumed to be neighbors in the complex.

Chemical Equilibrium A steady state in which there is no net change in the concentrations of substrates or products.

Chemically Nondefined Medium See ▶ Complex Medium.

Chemical Potential ($\bar{G}$) In a system, the free energy that resides in a chemical component per mole of the component present. For example, in a system consisting of a moles of component A and b moles of component B, the total free energy G would be the sum of the free energy in the two components: $G = a\bar{G}_A + b\bar{G}_B$. *Known also as Partial Molar Free Energy.*

Chemiosmosis Process of energy capture in which a proton gradient is created by means of electron transport and then used to drive the synthesis of ATP.

Chemiosmotic Coupling The coupling of an enzyme-catalyzed chemical reaction to the transport of a substance across a membrane either with or against its concentration gradient. The outstanding example is the coupling of ATP synthesis to the movement of protons across a membrane in response to a proton gradient.

Chemoautotroph An autotroph that obtains energy by oxidizing simple inorganic substances such as sulfides and nitrates.

Chemoheterotroph A heterotroph that obtains energy from breaking down ready-made organic molecules.

Chemolithotroph See ▶ Chemoautotroph.

Chemostat A device for maintaining the logarithmic growth of a culture by the continuous addition of fresh medium.

Chemotaxis The process by which bacteria sense a concentration gradient of a particular substance in the medium and move either up or down the gradient.

Chemotherapeutic Agent Any chemical substance used to treat disease. *Known also as a Drug.*

Chemothrapeutic Index The maximum tolerable dose of a particular drug per kilogram body weight divided

by the minimum dose per kilogram body weight that will cure the disease.

Chemotherapy The use of chemical substances to treat various aspects of disease.

Chickenpox A highly contagious disease, characterized by skin lesions, caused by the varicella-zoster herpes virus; usually occurs in children.

Chigger Dermatitis A violent allergic reaction caused by chiggers, the larvae of *Trombicula* mites.

Childbed Fever See ► Puerperal Fever.

Chiral With respect to a molecule or other object, the property of being nonsuperimposable on its mirror image. An atom that makes a molecule chiral, such as a carbon with four different substituents, is called a chiral atom or center of chirality.

Chitin A polysaccharide found in the cell walls of most fungi and the exoskeltons of anthropods.

Chlamydias Tiny, nonmotile, spherical bacteria; all are obligate intracellular parasites with a complex life cycle.

Chloramphenicol A Bacteriostatic agent that inhibits protein synthesis.

Chlorination The addition of chlorine to water to kill bacteria.

Chloroplast A chlorophyll-containing organelle found in eukaryotic cells that carry out photosynthesis.

Chloroquine An antiprotozoan agent effective against the malaria parasite.

Chocolate Agar Type of medium made with heated blood, so named because it turns a chocolate brown color.

Chromatin The filamentous material of eukaryotic chromosomes, consisting of DNA with associated histones and other proteins. During interphase it is dispersed and fills most of the nucleus; during nuclear division it condenses into compact chromosomes.

Chromatophore The internal membranes of photosynthetic bacteria and cyanobacteria.

Chromophore A chemical group that absorbs light at characteristic wavelengths.

Chromosomal Resistance Drug resistance of a microorganism due to a mutation in chromosomal DNA.

Chromosome A structure that contains the DNA of organisms.

Chromosome Mapping The identification of the sequence of genes in a chromosome.

Chronic Amebiasis Chronic infection caused by the protozoan *Entamoeba histolytica.*

Chronic Disease A disease that develops more slowly than an acute disease, is usually less severe, and persists for a long, interdeterminate period.

Chronic Fatigue Syndrome (previously called Chronic EBV Syndrome). Disease of uncertain origin, similar to mononucleosis, with symptoms including persistent fatigue and fever.

Chronic Inflammation A condition in which there is a persistent, indecisive standoff between an inflammatory agent and the phagocytic cells and other host defenses attempting to destroy it.

Chylomicron A type of lipoprotein that is produced in the intestinal villi and serves to transport dietary lipids in the circulation.

Cilium (plural: *cilia*) A short cellular projection used for movement that beats in coordinated waves.

Ciliate A protozoan that moves by means of cilia that cover most of its surface.

Circular Dichroism The property of absorbing right circularly polarized light and left circularly polarized light to different extents. Stereoisomers exhibit circular dichroism. Also, some types of secondary structure, such as α helices and β sheets in proteins, exhibit a predictable circular dichroism at specific wavelengths.

Circular Dichroism Spectrum (CD Spectrum) An absorption spectrum obtained using circularly polarized light; it gives the circular dichroism of the substance over a range of wavelengths.

***Cis*-Dominant** Refers to a mutation in a genetic regulatory element that affects the expression of appropriate genes *only* on the same chromosome, not on another homologous chromosome present in the same call. *Cis*-dominance demonstrates that a regulatory element does not code for a diffusible factor.

Cistron The smallest unit of DNA that must be intact to code for the amino acid sequence of a polypeptide; thus, the coding part of a gene, minus 5′ and 3′ untranslated sequences and regulatory elements.

Citric Acid Cycle A cycle of reactions that takes place in the mitochondrial matrix and results in the oxidation of acetyl units to CO_2 with the production of reducing equivalents and ATP. It is a central pathway in oxidative respiration. Other substrates besides acetyl-CoA can enter the cycle at intermediate points. *Known also as Tricarboxylic Acid Cycle and Krebs Cycle.*

Classical Pathway One of the two sequences of reactions by which proteins of the complement system are activated.

Clathrate Structure The cagelike structure of organized water molecules that forms around a hydrophobic molecule in solution. The structure has lower entropy than liquid water, which helps explain why hydrophobic substances dissolve poorly in water.

Clonal Deletion The process in which the binding of lymphocytes to self antigens triggers a genetically programmed destruction of those lymphocytes.

Clonal Selection Theory A model (proved correct) describing how the body is ale to produce specific immune response against a vast array of antigens. The B and T cells produced by the body have randomly generated antigen specificities. When a particular antigen enters the body, it induces proliferation only in B and T cells that happen to be specific for it. Thus, the antigen selects the cells that will mount an immune response against it and stimulates them to undergo Clonal proliferation.

Clone A group of genetically identical cells, organisms, or DNA sequences descending from a single parent cell.

Club Fungus A fungus, including mushrooms, toadstools, rusts, and smuts, that produces spores on basidia. *Known also as Basidiomycota.*

Cluster of Differentiation Marker An antigen found on the cell surface of B and T cells that an be used to distinguish the cells from one another.

Coagulase A bacterially produced enzyme that accelerates the coagulation (clotting) of blood.

Coarse Adjustment Focusing mechanism of a microscope that rapidly changes the distance between the objective lens and the specimen.

Coated Pit A cell membrane pit that is lined on its cytosolic side by a meshwork of the protein clathrin. Coated pits participate in the mechanism of receptor-mediated Endocytosis, in which surface receptors that have bound specific Extracellular substances are gathered into coated pits, which pinch off to become cytoplasmic vesicles.

Coccidioidomycosis Fungal respiratory disease caused by the soil fungus *Coccidioides immitis. Known also as Valley Fever.*

Coccus (plural: *cocci*). A spherical bacterium.

Codon A sequence of three bases in mRNA that specifies a particular amino acid in the translation process.

Coelom The body cavity between the digestive tract and body wall in higher animals.

Coenzyme An organic small molecule that binds to an enzyme and is essential for its activity but is not permanently altered by the reaction. Most coenzymes are derived metabolically from vitamins.

Cofactor An inorganic ion necessary for the function of an enzyme.

Colicin A protein released by some strains of *Escherichia coli* that inhibits growth of other strains of the same organism.

Coliform Bacterium Gram-negative, nonspore-forming, aerobic or facultatively anaerobic bacterium that ferments lactose and produces acid and gas, significant numbers may indicate water pollution.

Colloid A mixture formed by particles too large to form a true solution dispersed in a liquid.

Colonization Growth of microorganisms on epithelial surfaces such as skin or mucous membranes.

Colony A group of descendants of an original cell.

Colony Hybridization A technique that is used to screen bacteria for the presence of a specific recombinant DNA sequence. Colonies of the bacteria are transferred to a filter, treated to lyse the cells and denature the DNA, and then exposed to a labeled DNA probe that is complementary to part of the sequence in question. Colonies that bind the probe possess the sequence.

Colorado Tick Fever Disease caused by an orbivirus carried by dog ticks, characterized by headache, backache, and fever.

Colostrum The protein-rich fluid secreted by the mammary glands just after childbirth, prior to the appearance of breast milk.

Commensal An organism that lives in or on another organism without harming it and that benefits from the relationship.

Commensalism A symbiotic relationship in which one organism benefits and the other one neither benefits nor is harmed by the relationship.

Common-Source Outbreak An epidemic that arises from contact with contaminated substances.

Communicable Infectious Disease Infectious disease that can be spread from one host to another. *Known also as a Contagious Disease.*

Community All the kinds of organisms present in an environment.

Competence Factor A protein released into the medium that facilitates the uptake of DNA into a bacterial cell.

Competitive Inhibitor A molecule similar in structure to a substrate that competes with the substrate by binding to the active site. The inhibitor can reversibly occupy the active site but does not undergo the reaction.

Complementary Base Pairing Hydrogen bonding between adenine and thymine (or uracil) bases or between guanine and cytosine bases.

Complement A set or more than 20 large regulatory proteins that circulate in plasma and when activated form a nonspecific defense mechanism against many different microorganisms. *Known also as a Contagious Disease.*

Complement Fixation Test A complex serologic test used to detect small quantities of antibodies.

Complement System See ► Complement.

Completed Test The final test for coliforms in multiple-tube fermentation in which organisms from colonies grown on eosin methylene blue agar are used to inoculate broth and agar slants.

Complex Medium A growth medium that contains certain reasonable well-defined materials but that varies slightly in chemical composition from batch to batch. *(Known also as a Chemically Nondefined Medium).*

Complex Virus A virus, such as bacteriophage or poxvirus, that has an envelope or specialized structures.

Compound A chemical substance made up of atoms of two or more elements.

Compound Light Microscope A light microscope with more than one lens.

Compromised Host An individual with reduced resistance, being more susceptible to infection.

Concatemer A DNA molecule that consists of a tandem series of complete genomes. Some phage genomes form concatemers during replication as part of a strategy for replicating the full length of a linear DNA duplex.

Condenser Device in a microscope that converges light beams so that they will pass through the specimen.

Condyloma See ► Genital Wart.

Confirmed Test Second stage of testing for coliforms in multiple-tube fermentation in which samples from the highest dilution showing gas production are streaked into eosin methylene blue agar.

Confocal Microscopy A light-microscopy technique that allows high resolution in thick samples.

Congenial Rubella Syndrome Complication of German measles causing death or damage to a developing embryo infected by virus that crosses the placenta.

Congenital Syphilis Syphilis passed to a fetus when treponemes cross the placenta from mother to child before birth.

Conidium (plural: *conidia*) A small, asexual, aerial spore organized into chains in some bacteria and fungi.

Conjugation (1) The transfer of genetic information from one bacterial cell to another by means of conjugation pili. (2) The exchange of information between two ciliates (protests).

Conjugation Pilus A type of pilus that attaches two bacterial together and provides a means for the exchange of genetic material. *Known also as Sex Pilus.*

Conjuctiva Mucous membranes of the eye.

Consensus Sequence For a group of nucleotide or amino acid sequences that show similarity but are not identical (for example, the sequences for a family of related regulatory gene sequences), an artificial sequence that is compiled by choosing at each position the residue that is found there mot often in the sequences under study.

Consolidation Blockage of air spaces as a result of fibrin deposits in lobar pneumonia.

Constitutive With respect to gene expression, refers to proteins that are synthesized at a fairly steady rate at all times instead of being induced and repressed in response to changing conditions.

Constitutive Enzyme An enzyme that is synthesized continuously regardless of the nutrients available to the organism.

Consumer An organism that obtains nutrients by eating producers or other consumers. *Known also as Heterotroph.*

Contact Dermatitis Cell-mediated (type IV) hypersensitivity disorder that occurs in sensitized individuals on second exposure of the skin to allergens.

Contact Transmission A mode of disease transmission effected directly, indirectly, or by droplets.

Contagious Disease See ► Communicable Infectious Disease.

Contamination The presence of microorganisms on inanimate objects or surfaces of the skin and mucous membranes.

Continuous Cell Line Cell culture consisting of cells that can be propagated over many generations.

Continuous Reactor A device used in industrial and pharmaceutical microbiology to isolate and purify a microbial product often without killing the organism.

Control Variable A factor that is prevented from changing during an experiment.

Convalescent Stage The stage of an infectious disease during which tissues are repaired, healing takes place, and the body regains strength and recovers.

Comb's Antiglobulin Test An immunological test designed to detect anti-Rh antibodies.

Cooperative Transition A transition in a multipart structure such that the occurrence of the transition in one part of the structure makes the transition likelier to happen in other parts.

Copy Number The number of copies per cell of a particular gene or other DNA sequence.

Core The living part of an endospores.

Cori Cycle The metabolic cycle by which lactate produced by tissues engaging in anaerobic glycolysis, such as exercising muscle, is regenerated to glucose in the liver and returned to the tissue via the bloodstream.

Cornea The transparent part of the eyeball exposed to the environment.

Coronavirus Virus with clublike projections that causes colds and acute upper respiratory distress.

Cortex A laminated layer of peptidoglycan between the membranes of the endospores septum.

Corynebacteria Club-shaped, irregular, non-spore-forming, Gram-positive rods.

Coryza The common cold.

Countable Number A number of colonies on an agar plate small enough so that one can clearly distinguish and count them (30 to 300 per plate).

Counterion Atmosphere A cloud of oppositely charged small ions (*Counterions*) that collects around a macroion dissolved in a salt solution. Counterion atmospheres partly shield macroions from each other's charges and thus affect their interactions.

Covalent Bond A bond between atoms created by the sharing of pairs of electrons.

Cowpox Disease caused by the vaccinia virus and characterized by lesions, inflammation of lymph nodes, and fever, virus is used to make vaccine against smallpox and monkeypox.

Crepitant Tissue Distorted tissue caused by gas bubbles in gas gangrene.

Creutzfeldt-Jakob Disease (CJD) A transmissible spongiform encephalopathy of the human brain caused by prions.

Crista (Cristae) A fold in the inner mitochondrial membrane that project into the mitochondrial matrix. The enzymes of the electron transport chain and oxidative phosphorylation are located mainly on the Cristae.

Cross-Reaction Immune reaction of a single antibody with different antigens that are similar in structure.

Cross-Resistance Resistance against two or more similar antimicrobial agents through a common mechanism.

Croup Acute obstruction of the larynx that produces a characteristic high-pitched barking cough.

Cruiform In a DNA duplex, a structure that can be adopted by a palindromic sequence, in which each strand base-pairs with itself to form an arm that projects from the main duplex and terminates in a hairpin loop. The two arms form a "cross" with the main duplex.

Crustacean A usually aquatic anthropod that has a pair of appendages associated with each body segment.

Cryoelectron Microscopy A variation of electron microscopy in which samples are frozen in a glassy ice matrix.

Cryptococcois Fungal respiratory disease caused by a budding, encapsulated yeast, *Filobasidiella neoformans*.

Cryptosporidiosis Disease caused by protozoans of the genus *Cryptosporidium*, common in AIDS patients.

C-Terminus The end of a polypeptide chain that carries an unreacted carboxyl group. *Known also as Carboxyl Terminus*. See also ► N-Terminus.

Curd The solid portion of milk resulting from bacterial enzyme addition and used to make cheese.

Curie The basic unit of radioactive decay; an amount of radioactivity equivalent to that produced by 1 g of radium, mainly 2.22×10^{12} disintegrations per minute.

Cyanobacteria Photosynthetic, prokaryotic, typically unicellular organisms that are members of the kingdom Monera.

Cyanosis Blush skin characteristic of oxygen-poor blood.

Cyclic Photophosphorylation In photosynthesis, Photophosphorylation (light-dependent ATP synthesis) that is linked to a cyclic flow of electrons from photosystem II down an electron transport chain and back to photosystem II; it is not coupled to the oxidation of H_2O or to the reduction of $NADP^+$. Compare ► Noncyclic Photophosphorylation.

Cyclins Proteins that regulate the cell cycle by binding to and activating specific nuclear protein kinases. Cyclin-dependent kinase activations occur at three points during the cell cycle, thus providing three decision points as to whether the cycle will proceed.

Cyst A spherical, thick-walled cell that resembles an endospores, formed by certain bacteria.

Cysticercus An oval white sac with a tapeworm head invaginated into it. *Known also as a Bladder Worm.*

Cystitis Inflammation of the bladder.

Cytochrome An electron carrier functioning in the electron transport chain; heme protein.

Cytokine One of a diverse group of soluble proteins that have specific roles in host defenses.

Cytokinesis The division of a eukaryotic cell to form two cells. It usually accompanies nuclear division, although nuclear division can occur without cytokinesis.

Cytomegalovirus One of a widespread and diverse group of herpsviruses that often produces no symptoms in normal adults but can severely affect AIDS patients and congenitally infected children.

Cytopathic Effect (CPE) The visible effect viruses have on cells.

Cytoplasm The semifluid substance inside a cell, excluding, in eukaryotes, the cell nucleus.

Cytoplasmic Streaming Process by which cytoplasm flows from one part of a eukaryotic cell to another.

Cytoskelton An organized network of rodlike and fiberlike proteins that pervades a cell and helps give it its shape and motility. The cytoskelton includes action filaments, microtubules, and a diverse group of filamentous proteins collectively called intermediate filaments.

Cytosol The fluid medium that is located inside a cell but outside the nucleus and organelles (for eukaryotes) or the Nucleoid (for prokaryotes). It is a semiliquid concentrated solution or suspension.

Cytotoxic Drug A drug that interferes with DNA synthesis, used to suppress the immune system and prevent the rejection of transplants.

Cytotoxic (Type II) Hypersensitivity Type of allergy elicited by antigens on cells, especially red blood cells, that the immune system treats are foreign.

Cytotoxin Toxin produced by cytotoxic cells that kills infected host cells.

Dark-Field Illumination In light microscopy, the light that is reflected from an object rather than passing through it, resulting in a bright image on a dark background.

Dark Reactions Part of photosynthesis in which carbon dioxide gas is reduced by electrons form reduced NADP (NADPH) to form various carbohydrate molecules, chiefly glucose. These photosynthetic subprocesses do not depend *directly* on light energy; specifically, the synthesis of carbohydrate from CO_2 and H_2O. Compare ► Light Reactions.

Dark Repair Mechanism for repair of damaged DNA by several enzymes that do not require light for activation; they excise defective nucleotide sequences and replace then with DNA complementary to the unaltered DNA strand.

Daughter Cell One of the two identical products of cell division.

Deaminating Agent A chemical mutagen that can remove an amino group (—NH_2) from a nitrogenous base, causing a point mutation.

Death Phase See ► Decline Phase.

Debridement Surgical scraping to remove the thick crust or scab that forms over burnt tissue (eschar).

Decimal Reduction Time (DRT; also called D Value) The length of time needed to kill 90 percent of the organisms in a given population at a specified temperature.

Decline Phase (1) The fourth of four major phases of the bacterial growth curve in which cells lose their ability to divide (due to less supportive conditions in the medium) and thus die. *Known also as Death Phase.* (2) In the stages of a disease, the period during which the host defense finally overcome the pathogen and symptoms begin to subside.

Decomposer Organism that obtains energy by digesting dead bodies or wastes of producers and consumers.

Defined Synthetic Medium A synthetic medium that contains known specific kinds and amounts of chemical substances.

Definitive Host An organism that harbors the adult, sexually reproducing form of a parasite.

Degranulation Release of histamine and other preformed mediators of allergic reactions by sensitized mast cells and basophils after a second encounter with an allergen.

Dehydration Synthesis A chemical reaction that builds complex organic molecules.

Delayed (Type IV) Hypersensitivity See ► Cell-Mediated (Type Iv) Hypersensitivity.

Delayed Hypersensitivity (T_{DH}) Cells Those T cells (inflammatory T_H1) that produce lymphokines in cell-mediated (Type IV) hypersensitivity reactions.

Deletion The removal of one or more nitrogenous bases from DNA, usually producing a frameshift mutation.

Delta Hepatitis See ► Hepatitis D.

Denaturation For a nucleic acid or protein, the loss of tertiary and secondary structure so that the polymer becomes a random coil. For DNA, this change involves the separation of the two strands. Denaturation can be induced by heating and by certain changes in chemical environment. It can also be stated as the disruption of hydrogen bonds and other weak forces that maintain the structure of a globular protein, resulting in the loss of its biological activity.

Dengue Fever Viral systemic disease that causes severe bone and joint pain *Known also as Breakbone Fever.*

Denitrification The process by which nitrates are reduced to nitrous oxide or nitrogen gas.

Dental Caries The erosion of enamel and deeper parts of teeth. *Known also as Tooth Decay.*

Dental Plaque A continuously formed coating of microorganisms and organic matter on tooth enamel.

Deoxyribonucleic Acid (DNA) Nucleic acid that carries hereditary information from one generation to the next.

Depurination Cleavage of the glycosidic bond between C-1′ of deoxyribose and a Purine base in DNA. Used in Maxam-Gilbert sequence analysis.

Dermal Wart A fungal skin disease.

Dermatophyte A fungus that invades keratinized tissue of the skin and nails.

Dermis The thick inner layer of the skin.

Descriptive Study An epidemiologic study that notes the number of cases of a disease, which segments of

the population are affected, where the cases have occurred, and over what time period.

Desensitization Treatment designed to cure allergies by means of injections with gradually increasing does of allergen.

Deuteromycota See ► Fungi Imperfecti.

Diabetes Melllitus A disease caused by a deficiency in the action of insulin in the body, resulting either from low insulin levels or from inadequate insulin levels combined with unresponsiveness of the target cells to insulin. The disease is manifested primarily by disturbances in fuel homeostasis, including hyperglycemia (abnormally high blood glucose levels).

Dialysis The process by which low-molecular-weight solutes are added to or removed from a solution by means of diffusion across a semipermeable membrane.

Diapedsis The process in which leukocytes pass out of blood into inflamed tissues by squeezing between cells of capillary walls.

Diarrhea Excessive frequency and looseness of bowel movements.

Diastereomers Molecules that are stereoisomers but not enantiomers of each other. Isomers that differ in configuration about two or more asymmetric carbon atoms and are not complete mirror images.

Diatom An alga or plantlike protest that lacks flagella and has a glasslike outer shell.

Dichotomous Key Taxonomic key used to identify organisms, composed of paired (either-or) statements describing characteristics.

Dielectric Constant A dimensionless constant that expresses the screening effect of an intervening medium on the interaction between two charged particles. Every medium (such as a water solution or an intervening portion of an organic molecule) has a characteristic dielectric constant.

Difference Spectrum With respect to absorption spectra, a spectrum obtained by loading the sample cuvette with the substances under study and a reference cuvette with an equimolar sample of the same substances in a known state (for example, fully oxidized) and recording the difference between the two spectra.

Differential Medium A growth medium with a constituent that causes an observable change (in color or pH) in the medium when a particular chemical reaction occurs, making it possible to distinguish between organisms.

Differential Stain Use of two or more dyes to differentiate among bacterial species or to distinguish various structures of an organism; for example, the Gram stain.

Diffraction Phenomenon in which light waves, as they pass through a small opening, are broken up into bands of different wavelengths.

Diffraction Pattern The pattern that is produced when electromagnetic radiation passes through a regularly repeating structure; it results because the waves scattered by the structure interact destructively in most directions (creating dark zones) but constructively in a few directions (creating bright spots). For the pattern to be sharp, the radiation wavelength must be somewhat shorter than the repeat distance in the structure. See also ► X-Ray Diffraction.

Diffusion Coefficient (D) A coefficient that indicates how quickly a particular substance will diffuse in a particular medium under the influence of a given concentration gradient.

DiGeorge Syndrome Primary immunodeficiency disease caused by failure of the thymus to develop properly, resulting in a deficiency of T cells.

Digestive System The body system that converts ingested food into material suitable for the liberation of energy or for assimilation into body tissues.

Dikaryotic Referring to fungal cells within hyphae that have two nuclei, produced by plasmogany in which the nuclei have not united.

Dilution Method A method of testing antibiotic sensitivity in which organisms are incubated in a series of tubes containing known quantities of a chemotherapeutic agent.

Dimer Two adjacent pyrimidines bonded together in a DNA strand, usually as a result of exposure to ultraviolet rays.

Dimorphism The ability of an organism to alter its structure when it changes habitats.

Dinoflagellate An alga or plantlike protest, usually with two flagella.

Diphtheria A severe upper respiratory disease caused by *Corynebacterium diphtheriae*, can produce subsequent myocarditis and polyneuritis.

Diphtheroid Organism found in normal throat cultures that fails to produce exotoxin but is otherwise indistinguishable from diphtheria-causing organisms.

Dipicolonic Acid Acid found in the core of endospores that contributes to its heat resistance.

Diploid For a cell or an organism, the possession of two homologous sets of chromosomes per nucleus (with the possible exception of sex chromosomes, which may be present in only one copy). Compare ► Haploid.

Diploid Fibroblast Strain A culture derived from fetal tissues that retains fetal capacity for rapid, repeated cell division.

Direct Contact Transmission Mode of disease transmission requiring person-to-person body contact.

Direct Fecal – Oral Transmission Direct contact transmission of disease in which pathogens from fecal matter are spread by unwashed hands to the mouth.

Direct Microscopic Count A method of measuring bacterial growth by counting cells in a known volume of medium that fills a specially calibrated counting chamber on a microscope slide.

Disaccharide A carbohydrate formed by the joining of two monosaccharides.

Disease A disturbance in the state of health wherein the body cannot carry out all its normal functions. See also ► Epidemiology and ► Infectious Disease.

Disinfectant A chemical agent used on inanimate objects to destroy microorganisms.

Disinfection Reducing the number of pathogenic organisms on objects or in materials so that they pose no threat of disease.

Dismutation A reaction in which two identical substrate molecules have different fates; particularly, a reaction in which one of the substrate molecules is oxidized and the other reduced.

Disk Diffusion Method A method used to determine microbial sensitivity to antimicrobial agents in which antibiotic disks are placed on an inoculated Petri dish, incubated, and observed for inhibition of growth.

Dispersion Forces Weak intermolecular attractive forces that arise between molecules that are close together, because the fluctuating electron distributions of the molecules become synchronized so as to produce a slight electrostatic attraction. These forces play a role in the internal packing of many biomolecules.

Disseminated Tuberculosis Type of tuberculosis spread throughout body, not seen in AIDS patients, usually caused by *Mycobacterium avium-intercellulare*.

Dissociation Constant For an acid, the equilibrium constant K_a for the dissociation of the acid into its conjugate base and a proton. For a complex of two biomolecules, the equilibrium constant K_d for dissociation into the component molecules.

Distillation The separation of alcohol and other volatile substances from solid and nonvolatile substances.

Divergent Evolution Process in which descendants of a common ancestor species undergo sufficient change to be identified as separate species.

DNA Gyrase An enzyme that is able to introduce negative superhelical turns into a circular DNA helix.

DNA Hybridization Process in which the double strands of DNA of each of two organisms are split apart and the split strands from the two organisms are allowed to combine.

DNA Polymerase An enzyme that moves along behind each replication fork, synthesizing new DNA strands complementary to the original ones.

DNA Replication Formation of new DNA molecules.

DNA Tumor Virus An animal virus capable of causing tumors.

Domain A portion of a polypeptide chain that folds on itself to form a compact unit that remains recognizably distinct within the tertiary structure of the whole protein. Large globular proteins often consist of several domains, which are connected to each other by stretches of relatively extended polypeptide. A new taxonomic category above the kingdom level, consisting of the Archaea, Bacteria, and Eukarya.

Donovan Body A large mononuclear cell found in scrapings of lesions that confirms the presence of granuloma inguinale.

DPT Vaccine Diphtheria, killed whole cell pertussis and tetanus vaccine.

Dracunculiasis Skin disease caused by a parasitic helminth, the guinea worm *Dracunculus medinensis*.

Droplet Nucleus A particle consisting of dried mucus in which microorganisms are embedded.

Droplet Transmission Contact transmission of disease through small liquid droplets.

Drug See ► Chemotherapeutic Agent.

Drug Resistance Factors Bacterial plasmids that carry genes coding for resistance to antibiotics.

DTaP Vaccine Diphtheria, tetanus, and acellular pertussis vaccine.

D Value See ► Decimal Reduction Time.

Dyad A set of paired chromosomes in eukayotic cells that are prepared to divided by mitosis or meiosis.

Dyad Axis A two-fold axis of symmetry.

Dysentery A severe diarrhea that often contains mucus and sometimes blood or pus.

Dysuria Pain and burning on urination.

Eastern Equine Encephalitis Type of viral encephalitis seen most often in the eastern United States, infects horses more frequently than human.

Ebola Virus A filovirus that causes hemorrhagic fevers.

Eclipse Period Period during which viruses have absorbed to and penetrated host cells but cannot yet be detected in cells.

Ecology The study of relationships among organisms and their environment.

Ecosystem All the biotic and Abiotic components of an environment.

Ectoparasite A parasite that lives on the surface of another organism.

Eczema Herpecticum A generalized eruption caused by entry of the herpevirus through the skin, often fatal.

Edema An accumulation of fluid in tissues that causes swelling.

Editing See ▶ RNA Editing.

Ehrlichiosis A tick-borne disease found in dogs and human and caused by *Ehrlichia canis* and *E. chaeffeenis*.

Einstein One mole of photons.

Electrolyte A substance that is ionizable in solution.

Electron A negatively charged subatomic particle that moves around the nucleus of an atom.

Electron Acceptor An oxidizing agent in a chemical reaction.

Electron Donor A reducing agent in a chemical reaction.

Electron Micrograph A "photograph" of an image taken with an electron microscope.

Electron Microscope Microscope that uses a beam of electrons rather than a beam of light and electromagnets instead of glass lenses to produce an image.

Electron Spin Resonance A form of spectroscopy that is sensitive to the environment of unpaired electrons in a sample. *Known also as Electron Paramagnetic Resonance or EPR.*

Electron Transport Processes in which pairs of electrons are transferred between cytochromes and other compounds.

Electron Transport Chain (1) A series of compounds that pass electrons to oxygen (the final electron acceptor). Known also as *Respiratory Chain*. (2) A sequence of electron carriers of progressively higher reduction potential in a cell that is linked so that electrons can pass from one carrier to the next. The chain captures some of the energy released by the flow of electrons and uses it to drive the synthesis of ATP.

Electrophoresis (1) Process used to separate large molecules such as antigens or proteins by passing an electrical current through a sample on a gel. (2) A method for separating electrically charged substances in a mixture. A sample of the mixture is placed on a supporting medium (a piece of filter paper or a gel), to which an electrical field is applied. Each charged substance migrates toward the cathode or the anode at a speed that depends on its net charge and its frictional interaction with the medium. See also ▶ Gel Electrophoresis.

Electroporation A brief electric pulse produces temporary pores in the cell membrane, allowing entrance of vectors carrying foreign DNA.

Element Matter composed of one kind of atom.

Elementary Body An infectious stage in the life cycle of chlamydias.

Elephantiasis Gross enlargement of limbs, scrotum, and sometimes other body parts from accululation of fluid due to blockage of lymph ducts by the helminth *Wuchereria bancrofti*.

Elongation Factors Nonribosomal protein factors that are necessary participants in the chain-elongation cycle of polypeptide synthesis; they interact with the ribosome-mRNA complex or with other major cycle participants.

Enamel The hard substance covering the crown of a tooth.

Enantiomers Stereoisomers that are nonsuperimposable mirror images of each other. The term *optical isomers* comes from the fact that the enantiomers of a compound rotate polarized light in opposite directions. *Known also as Optical Isomers.*

Encephalitis An inflammation of the brain caused by a variety of viruses or bacteria.

Endemic Referring to a disease that is constantly present in a specific population.

Endemic Relapsing Fever Tick-borne cases of relapsing fever caused by several species of *Borrelia*.

Endemic Typhus A flea-borne typhus caused by *Rickettsia typhi*.

Endergonic In a nonisolated system, a process that is accompanied by a positive change in free energy (positive ΔG) and therefore is thermodynamically not favored. Compare ▶ Exergonic.

Endocrine Glands Glands that synthesize hormones and release them into the circulation. The hormone-producing gland cells are called endocrine cells.

Endocytosis Process in which vesicles form by invagination of the plasma membrane to move substances into eukaryotic cells.

Endoenzyme An enzyme that acts within the cell producing it.

Endoflagellum See ▶ Axial Filament.

Endogenous Infection An infection caused by opportunistic microorganism already present in the body.

Endogenous Pyrogen Pyrogen secreted mainly by monocytes and macrophages that circulates to the hypothalamus and causes an increase in body temperature.

Endometrium The mucous membrane lining the uterus.

Endonuclease An enzyme that cleaves a nucleic acid chain at an internal phosphodiester bond.

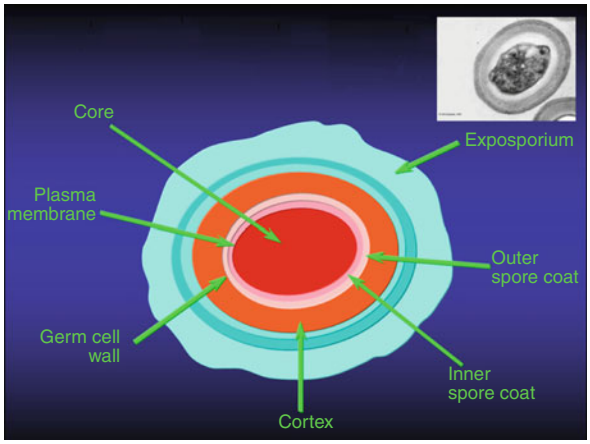
Endoparasite A parasite that lives within the body of another organism.

Endoplasmic Reticulum A highly folded membranous compartment within the cytoplasm that is responsible for a great variety of cellular tasks, including the glycosylation and trafficking of proteins destined for

secretion or for the cell membrane or some organelles. It also functions in lipid synthesis, and the enzymes of many pathways of intermediate metabolism are located on its surface.

Endorphins A class of endogenous brain peptides that exert analgesic effects in the central nervous system by binding to opiate receptors. They are produced by cleavage of the large polypeptide pro-opiomelanocortin.

Endospore A resistant, dormant structure, formed inside some bacteria, such as *Bacillus* and *Clostridium*, that can survive adverse conditions.



Endospore (Spore) composition
Block, S., Disfection, Sterilization, and preservation 5th Ed., Lippincott, Williams & Wilkins, New york, 2001.

Endospore Septum A cell membrane without a cell wall that grows around the core of endospores.

Endosymbiotic Theory Holds that the organelles of eukaryotic cells arose from prokaryotes that came to live, in a symbiotic relationship, inside the eukayote-to-be cell.

Endotoxin A toxin incorporated in Gram-negative bacterial cell walls and released when the bacterium dies. *Known also as lipopolysaccharide.*

End-Product Inhibition See ► Feedback Inhibition.

Energy See ► Internal Energy.

Energy Charge A quantity that indicates the state of a cell's energy reserves. It is equal to the cell's reverses of the free energy sources ATP and ADP (taking into account that ADP stores less free energy than ATP) divided by the total supply of ATP and its breakdown products ADP and AMP: ([ATP] + ½[ADP])/([ATP] + [ADP] + (AMP]).

Enhancer Sequence A DNA sequence that is distant from a gene but to which a protein factor that affects the gene's transcription can bind to exert its action. It is possible that DNA looping brings enhancer-bound proteins into proximity with the gene's promoter.

Enrichment Medium A medium that contains special nutrients that allow growth of a particular organism.

Enteric Bacteria Members of the family Enterobacteriaceae, many of which are intestinal, small facultatively anerobic Gram-negative rods with peritrichous flagella.

Enteric Fever Systemic infection, such as typhoid fever, spread throughout the body from the intestinal mucosa.

Enteritis An inflammation of the intestine.

Enterocolitis Disease caused by *Salmonella typhimurium* and 5 *paratyphi* that invade intestinal tissue and produce bacteremia.

Enterohemorrhagic Strain of *Escherichia Coli* One that causes bloody diarrhea and is often fatal; often from contaminated food.

Enteroinvasive Strain Strain of *Escherichia coli* with a plasmid-borne gene for a surface antigen (K antigen) then enables it to attach to and invade mucosal cells.

Enterotoxicosis See ► Food Poisoning.

Enterotoxigenic Strain Strain of *Escherichia coli* carrying a plasmid that enables it to make an enterotoxin.

Enterotoxin An exotoxin that acts on tissues of the gut.

Enterovirus One of the three major groups of picornaviruses that can infect nerve and muscle cells, the respiratory tract lining, and skin.

Enthalpy (*H*) A thermodynamic quantity (function of state) that is equal to the internal energy of a system plus the product of the pressure and volume: $H = E + PV$. It is equal to the heat change in constant-pressure reactions, such as most reactions in biological systems.

Entropy (*S*) A thermodynamic quantity (function of state) that expresses the degree of disorder or randomness in a system. According to the second law of thermodynamics, the entropy of an opens system tends to increase unless energy is expended to keep the system orderly.

Envelope A bilayer membrane found outside the capsid of some viruses, acquired as the virus buds through one of the host's membrane.

Enveloped Virus A virus with a bilayer membrane outside its capsid.

Enzyme A protein catalyst that controls the rate of chemical reaction in cells.

Enzyme Induction A mechanism whereby the genes coding for enzymes needed to metabolize a particular nutrient are activated by the presence of that nutrient.

Enzyme-Linked Immunosorbent Assay (ELISA) Modification of radioimmunoassay in which the antiantibody, instead of being radioactive, is attached to an enzyme that causes a color change in its substrate.

Enzyme Repression Mechanism by which the presence of a particular metabolite represses the genes coding for enzymes used in its synthesis.

Enzyme-Substrate Complex A loose association of an enzyme with its substrate.

Eosinophil A leukocyte present in large numbers during allergic reactions and worm infections.

Epidemic Referring to a disease that has a higher than normal incidence in a population over a relatively short period of time.

Epidemic Keratoconjunctivitis Eye disease caused by an adenovirus. *Known also as Shipyard Eye.*

Epidemic Relapsing Fever Louseborne cases of relapsing fever caused by several species of *Borrelia.*

Epidemic Typhus Louseborne rickettsial disease caused by *Rickettsia prowazekii*, seen most frequently in conditions of overcrowding and poor sanitation. *Known also as Classic, European, or Louseborne Typhus.*

Epidemiologic Study A study conducted in order to learn more about the spread of a disease in a population.

Epidemiologist A scientist who studies epidemiology.

Epidemiology The study of factors and mechanisms involved in the spread of disease within a population.

Epidermis The thin outer layer of the skin.

Epiglottitis An infection of the epiglottis.

Episomes Plasmids that can undergo integration into the bacterial chromosome.

Epitope The specific portion of an antigen particle that is recognized by a given antibody or T-cell receptor. *Known also as Antigenic Determinant.*

Epstein-Barr Virus (EBV) Virus that causes infectious mononucleosis and Burkitt's lymphoma.

Ergot Toxin produced by *Claviceps, purpurea*, a parasite fungus of rye and wheat that causes ergot poisoning when ingested by humans.

Ergot Poisoning Disease caused by ingestion of ergot, the toxin produced by *Claviceps purpurea*, a fungus of rye and wheat.

Erysipelas Infection caused by hemolytic streptococci that spreads through lymphatics, resulting in septicemia and other diseases.

Erythrocyte A red blood cell.

Erythromycin An antibacterial agent that has a bacteriostatic effect on protein synthesis.

Eschar The thick crust or scab that forms over a severe burn.

Essential Amino Acids Amino acids that must be obtained in the diet because they cannot be synthesized in the body (at least not in adequate amounts).

Essential Fatty Acids Fatty acids that must be obtained in the diet because they cannot be synthesized in the body in adequate amounts. Examples are linoleic acid and linolenic acid.

Ethanbutol An antibacterial agent effective against certain strains of mycobacteria.

Etiology The assignment or study of causes and origins of a disease.

Eubacteria True bacteria.

Englenoid An alga or plantlike protest, usually with a single flagella and a pigmented eyespot (stigma).

Eukarya One of the three Domains of living things; all members are eukaryotic.

Eukaryotes Organisms whose cells are compartmentalized by internal cellular membranes to produce a nucleus and organelles. Compare ► Prokaryotes.

Eukaryote An organism composed of eukaryotic cells.

Eukaryotic Cell A cell that has a distinct cell nucleus and other membrane-bound structures.

Eutophication The nutrient enrichment of water from detergents, fertilizes, and animal manures, which cause overgrowth of algae and subsequent depletion of oxygen.

Exanthema A skin rash.

Exergonic (1) In a nonisolated system, a process that is accompanied by a negative change in free energy (negative ΔG) and therefore is thermodynamically favored. Compare ► Endergonic. (2) Releasing energy from a chemical reaction.

Exocrine Cell A cell that secretes a substance that is excreted through a duct either into the alimentary tract or to the outside of the organism. Exocrine cells are grouped together in exocrine glands.

Exocytosis Process by which vesicles inside a eukaryotic cell fuse with the plasma membrane and release their contents from the eukaryotic cell.

Exoenzyme An enzyme that is synthesized in a cell but crosses the cell membrane to act in the periplasmic space or the cell's immediate environment. *Known also as Extracellular Enzyme.*

Exogenous Infection An infection caused by microorganisms that enter the body from the environment.

Exogenous Pyrogen Exotoxins and endotoxins from infectious agents that cause fever by stimulating the release of an endogenous pyrogen.

Exon A region in the coding sequence of a gene that is translated into protein (as opposed to introns, which are not). The name comes from the fact that exons are the only parts of an RNA transcript that are seen outside the nucleus. Compare ► Intron.

Exonuclease An enzyme that removes segments of DNA.

Exosporium A lipid-protein membrane formed outside the coat of some endospores by the mother cell.

Exotoxin A soluble toxin secreted by microbes into their surroundings, including host tissues.

Experimental Study An epidemiological study designed to test a hypothesis about an outbreak of disease, often about the value of a particular treatment.

Experimental Variable The factor that is purposely changed in an experiment.

Exponential Rate The rate of growth in a bacterial culture characterized by doubling of the population in a fixed interval of time. *Known also as Logarithmic Rate.*

Exportins A class of proteins involved in transporting materials out of nuclei. See ► Importins.

Extinction Coefficient (ε_λ) A coefficient that indicates the ability of a particular substance in solution to absorb light of wavelength λ. The molar extinction coefficient, ε_M, is the absorbance that would be displayed by a 1-M solution in a 1-cm light path.

Extracellular Enzyme See ► Exoenzyme.

Extrachromosomal Resistance Drug resistance of a microorganism due to the presence of resistance (R) plasmids.

Extreme Thermoacidophile Organism requiring very hot and acidic environment, usually belonging to Domain Archaea.

Fab Fragment The portion of an antibody that contains an antigen binding site.

Faciliated Diffusion Diffusion (down a concentration gradient) across a membrane (from an area of higher concentration to lower concentration) with the assistance of a carrier molecule, but not requiring ATP.

Facilitated Transport The movement of a substance across a biological membrane in response to a concentration or electrochemical gradient where the movement is facilitated by membrane pores or by specific transport proteins. Compare ► Active Transport, ► Passive Transport. *Known also as Facilitated Diffusion.*

Facultative Able to tolerate the presence or absence of a particular environmental condition.

Facultative Anaerobe A bacterium that carries on aerobic metabolism when oxygen is present but shifts to anerobic metabolism when oxygen is absent.

Facultative Parasite A parasite that can live either on a host or freely.

Facultative Psychrophile An organism that grows best at temperatures below 20°C but can also grow at temperatures above 20°C.

Facultative Thermophile An organism that can grow both above and below 37°C.

FAD Flavin adenine dinucleotide, a coenzyme that carries hydrogen atoms and electrons.

Fastidious Referring to microorganisms that have special nutritional needs that are difficult to meet in the laboratory.

Fat A complex organic molecule formed from glycerol and one or more fatty acids.

Fatty Acid A long chain of carbon atoms and their associated hydrogens with a carboxyl group at one end.

Fc Fragment The tail region of an antibody that may contain sites for macrophage and complement binding.

Feces Solid waste produced in the large intestine and stored in the rectum until eliminated from the body.

Feedback Inhibition Regulation of a metabolic pathway by the concentration of one of its intermediates or, typically, its end product, which inhibits an enzyme in the pathway. *Known also as End-Product Inhibition.*

Feline Panleukopenia Virus (FPV) A parvovirus that causes severe disease in cats.

Female Reproductive System The host system consisting of the ovaries, uterine tubes, uterus, vagina, and external genitalia.

Fermentation Anaerobic metabolism of the pyruvic acid produced in glycolysis.

Fermentations Processes in which cellular energy is generated from the breakdown of nutrient molecules where there is no net change in the oxidation state of the products as compared with that of the reactants; fermentation can occur in the absence of oxygen.

Fever A body temperature that is abnormally high.

Fibroblast A new connective tissue cell that replaces fibrin as a blood clot dissolves, forming grandulation tissue.

Fibrous Proteins Proteins of elongated shape, often used as structural materials in cells and tissues. Compare ► Globular Proteins.

Fifth Disease A normal disease in children caused by the *Erythrovirus* called B19, characterized by a bright red rash on the cheeks and a low-grade fever. *Known also as Erythema Infectiosum.*

Filariasis Disease of the blood and lymph caused by any of several different roundworms carried by mosquitoes.

Filovirus A filamentous virus that displays unusual variability in shape. Two filoviruses, the Ebola virus and the Marburg virus, have been associated with human disease.

Filter Paper Disk Method Method of evaluating the antimicrobial properties of a chemical agent using filter paper disks placed on an inoculated agar plate.

Filtration (1) A method of estimating the size of bacterial populations in which a known volume of air or water is drawn through a filter with pores too small to allow passage of bacteria. (2) A method of sterilization that uses a membrane filter to separate bacteria from growth media. (3) The filtering of water through beds of sand to remove most of the remaining microorganisms after flocculation in water treatment plants.

Fimbria See ▶ Attachment Pilus.

Fine Adjustment Focusing mechanism of a microscope that very slowly changes the distance between the objective lens and the specimen.

First Law of Thermodynamics The law that states that energy cannot be created or destroyed and that it is therefore possible to account for any change in the internal energy of a system ΔE by an exchange of heat (q) and/or work (w) with the surroundings $\Delta E = Q - w$.

First-Order Reaction A reaction whose rate depends on the first power of the concentration of the reactant. Compare ▶ Second-Order Reaction.

Fischer Projection A convention for representing stereoisomers in a plane. The tetrahedron of bonds on a carbon is represented as a plane cross, where the bonds to the right and left are assumed to be pointing toward the viewer and the bonds to the top and bottom are assumed to be pointing away from the viewer. Fischer projections of monosaccharides are oriented with the carbonyl group at the top; the chiral carbon farthest from the carbonyl group (which is the one that determines whether the sugar is the D or the L form) is then drawn with its hydroxyl to the right for the D form and to the left for the L form.

Five-Kingdom System System of classifying organisms into one of five kingdoms: Monera (Prokaryotae), Protista, Fungi, Plantae, and Animalia.

Flagellar Staining A technique for observing flagella by coating the surfaces of flagella with a dye or a metal such as silver.

Flagellum (plural: *flagella*) A long, thin, helical appendage of certain cells that provides a means of locomotion.

Flash Pasteurization See High-Temperature Short-Time Pasteurization.

Flat Sour Spoilage Spoilage due to the growth of spores that does not cause cans to bulge with gas.

Flatworm A primitive, unsegmented, hermaphroditic often parasitic worm. *Known also as Platyhelminthes.*

Flavin Adenine Dinucleotide (FAD), Flavin Mononucleotide (FMN) Coenzymes derived from vitamin B_2 (riboflavin) that function as electron acceptors in enzymes that catalyze electron transfer reactions.

Flavivirus A small, enveloped, (+) sense RNA virus that causes a variety of encephalitides, including yellow fever.

Flavorprotein An electron carrier in oxidative phosphorylation.

Flocculation The addition of alum to cause precipitation of suspended colloids, such as clay, in the water purification process.

Flourescence-Activated Cell Sorter (FACS) A machine that collects quantities of a particular cell type under sterile conditions for study.

Fluctuation Test A test to determine that resistance to chemical substances occurs spontaneously rather than being induced.

Fluid-Mosaic Model A model describing cellular membrane structure, according to which the proteins are embedded in a phosopholipid bilayer and are free to move in the plane of the membrane. This model is basically correct.

Fluke A flatworm with a complex life cycle; can be an internal or external parasite.

Fluorescence (1) Emission of light of one color when irradiated with another, shorter wavelength of light. (2) The phenomenon by which a substance that absorbs light at a given wavelength reradiates a portion of the energy as light of a longer wavelength.

Flourescence Activated Cell Sorter (FACS) Device that separates cells within a population based on whether or not they fluoresce.

Flourescence Miscroscopy Use of ultraviolet light in a microscope to excite molecules so that they release light of different colors.

Fluorescent Antibody Staining Procedure in fluorescence microscopy that uses a fluorochrome attached to antibodies to detect the presence of an antigen.

Fluoride Chemical that helps in reducing tooth decay by poisoning bacterial enzymes and hardening the surface enamel of teeth.

Flux With reference to a chemical pathway, the rate (in moles per unit time) at which reactant "flows through" the pathway to emerge as product. The term can be used for the rate at which particles undergo any process in which they either flow or can be thought of metaphorically as flowing.

Focal Infection An infection confined to a specific area from which pathogens can spread to other areas.

Folliculitis Local infection produced when hair follicles are invaded by pathogenic bacteria. *Known also as Pimple or Pustule.*

Fomite A nonliving substance capable of transmitting disease, such as clothing, dishes, or paper money.

Food Poisoning A gastrointestinal disease caused by ingestion of foods contaminated with preformed toxins or other toxic substances. *Known also as Enterotoxicosis.*

Footprinting With respect to molecular genetics, a technique used to identify the DNA segment in contact with a given DNA-binding protein. The DNA-protein complex is subjected to digestion with a nonspecific nuclease, which cleaves at the residues that are not protected by the protein.

Formed Elements Cells and cell fragments comprising about 40 percent of the blood.

F Pilus A bridge formed from an F1 cell to an F2 cell for conjugation.

F Plasmid Fertility plasmid containing genes direction synthesis of proteins that form an F pilus (sex pilus, or conjugation pilus).

F^- Cell A cell lacking the F plasmid; called recipient or female cell.

F^+ Cell A cell having an F plasmid, called donor or male cell.

F′ Plasmid An F plasmid that has been imprecisely separated from the bacterial chromosome so that it carries a fragment of the bacterial chromosome.

Frameshift Mutation A mutation that changes the reading for a gene by adding or deleting one or two nucleotides, thereby reducing the remainder of the message 3′ to the mutation to gibberish.

Frameshift Suppressor A mutant tRNA that contains either two or four bases in the Anticodon loop and can suppress the effects of a particular frameshift mutation in a gene.

Free Energy (*G*) thermodynamic quantity (function of state) that takes into account both enthalpy and entropy: $G = H - TS$, where H is enthalpy, S is entropy, and T is absolute temperature. The *change in free energy* (ΔG) for a process, such as a chemical reaction, takes into account the changes in enthalpy and entropy and indicates whether the process will be thermodynamically favored at a given temperature. *Known also as Gibbs Free Energy.*

Freeze-Etching Technique in which water is evaporated under vacuum from the freeze-fractured surface of a specimen before the observation with electron microscopy.

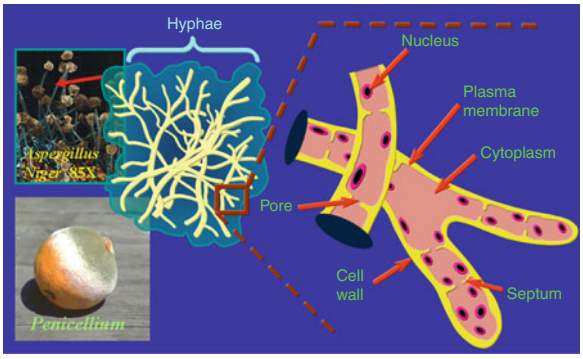
Freeze-Fracturing Technique in which a cell is first frozen and then broken with a knife so that the fracture reveals structures inside the cell when observed by electron microscopy.

Frictional Coefficient A coefficient that determines the frictional force on a particular particle (such as a molecule) in a particular medium at a given velocity. In the context of electrophoresis or centrifugation, it determines how fast a chemical species will move in a particular medium in response to a given electrical field or centrifugal force.

Fulminating See ► Acme.

Functional Group Part o a molecule that generally participates in chemical reactions as a unit and gives the molecule some of its chemical properties.

Fungi (singular: *fungus*) The kingdom of nonphotosynthetic, eukaryotic organisms that absorb nutrients from their environment.



Fungi cellular structure
Black, J.G., Microbiology, 5th Ed., John Wiley & Sons, New Work

Fungi Imperfecti Group of fungi termed "imperfect" because no sexual stage has been observed in their life cycles. *Known also as Deuteromycota.*

Furuncle A large, deep pus-filled infection. *Known also as a Boil.*

Fusion Proteins Genetically engineered proteins that are made by splicing together coding sequences from two or more genes. The resulting protein thus combines portions from two different parent proteins.

F_0F_1 Complex The enzyme complex in the inner mitochondrial membrane that uses energy from the transmembrane proton gradient to catalyze ATP synthesis. The F_0 portion of the complex spans the membrane, and the F_1 portion, which performs the ATP synthase activity, projects into the mitochondrial matrix.

Gamete A male or female reproductive cell.

Gametocyte A male or female sex cell.

Gamma Globulin See ► Immune Serum Globulin.

Ganglion An aggregation of neuron cell bodies.

Gas Gangrene A deep would infection, destructive of tissue, often caused by a combination of two or more species of *Clostridium*.

Gated Channel A membrane ion channel that can open or close in response to signals from outside or within the cell.

Gel Electrophoresis A type of electrophoresis in which the supporting medium is a thin slab of gel held between glass plates. The technique is widely used for separating proteins and nucleic acids. See also ► Electrophoresis and ► Isoelectric Focusing.

Gene A linear sequence of DNA nucleotides that form a functional unit within a chromosome or plasmid.

Gene Amplification A technique of genetic engineering in which plasmids or bacteriophages carrying a specific gene are induced to reproduce at a rapid rate within host cells.

Generalized Anaphylaxis See ► Anaphylactic Shock.

Generalized Transduction Type of transduction in which a fragment of DNA from the degraded chromosome of an infected bacteria cell is accidentally incorporated into a new phage particle during viral replication and thereby transferred to another bacterial cell.

Generation Time Time required for a population of organisms to double in number.

Genetic Code The code by which the nucleotide sequence of a DNA or RNA molecule specifies the amino acid sequence of a polypeptide. It consists of three-nucleotide codons that either specify a particular amino acid or tell the ribosome to stop translating and release the polypeptide. With a few minor exceptions, all living things use the same code.

Genetic Engineering The use of various techniques to purposefully manipulate genetic material to alter the characteristics of an organism in a desired way.

Genetic Fusion A technique of genetic engineering that allows transposition of genes from one location on a chromosome to another location; the coupling of genes from two different operons.

Genetic Homology The similarity of DNA base sequences among organisms.

Genetic Immunity Inborn or innate immunity.

Genetic Recombination Any process that results in the transfer of genetic material from one DNA molecule to another. In eukaryotes, it can refer specifically to the exchange of matching segments between homologous chromosomes by the process of crossing over.

Genetics The science of heredity, including the structure and regulation of genes and how these genes are passed between generations.

Gene Transfer Movement of genetic information between organisms by transformation, transduction, or conjugation.

Genital Herpes See ► Herpes Simplex Virus Type 2.

Genital Wart An often malignant wart associated with sexual transmitted viral disease having a very high association rate with cervical cancer. *Known also ad Condyloma.*

Genome The total genetic information contained in a cell, an organism, or virus.

Genotype The genetic information contained in the DNA of an organism. Compare ► phenotype.

Genus A taxon consisting of one or more species, the first name of an organism in the binomial system of nomenclature; for example, *Escherichia in Escherichia coli.*

German Measles See ► Rubella.

Germination The start of the process of development of a spore or an endospore.

Germ Theory of Disease Theory that microorganisms (germs) can invade other organisms and cause disease.

Giardiasis A gastrointestinal disorder caused by the flagellated protozoan *Giardia intestinalis.*

Gibberellins A family of diterpene plant growth hormones.

Gibbs Free Energy See ► Free Energy.

Gingivitis The mildest form of periodontal disease, characterized by inflammation of the gums.

Gingivostomatitis Inflammation of and damage to the glomeruli of the kidneys. *Known also as Bright's Disease.*

Globular Proteins Proteins whose three-dimensional folded shape is relatively compact. compare ► Fibrous Proteins.

Glomerulus A coiled cluster of capillaries in the nephron.

Glucocorticoids The steroid hormones cortisol and corticosterone, which are secreted by the adrenal cortex. In addition to other functions, they promote gluconeogenesis in response to low blood sugar levels.

Glucogenic In fuel metabolism, refers to substances (such as some amino acids) that can be used as substrates for glucose synthesis.

Gluconeogenesis The processes by which glucose is synthesized from noncarbohydrate precursors such as

glycerol, lactate, some amino acids, and (in plants) acetyl-CoA.

Glucose Transporter A membrane protein that is responsible for transporting glucose across a cell membrane. Different tissues may have glucose transporters with different properties.

Glycan Another name for polysaccharide.

Glycocalyx Term used to refer to all substances containing polysaccharides found external to the cell wall.

Clycolipids Lipids that have saccharides attached to their head groups.

Glycolysis The initial pathway in the catabolism of carbohydrates, by which a molecule of glucose is broken down to two molecules of pyruvate, with a net production of ATP molecules and the reduction of two NAD^+ molecules to NADH. Under aerobic conditions, these NADH molecules are reoxidized by the electron transport chain; under anaerobic conditions, a different electron acceptor is used. An anaerobic metabolic pathway used to break down glucose into pyruvic acid while producing some ATP.

Glycoprotein A long, spikelike molecule made of carbohydrate and protein that projects beyond the surface of a cell or viral envelope; some viral glycoproteins attach the virus to receptor sites on host cells, while other said fusion of viral and cellular membranes.

Glycosaminoglycans Polysaccharides composed of repeating disaccharide units in which one sugar is either *N*-acetylgalactosamine or *N*-acetylglucosamine. Typically the disaccharide unit carries a carboxyl group and often one or more sulfates, so that most glycosaminoglycans have a high density of negative charges. Glycosaminoglycans are often combined with protein to form proteoglycans and are an important component of the Extracellular matrix of vertebrates. *Known also as Mucopolysaccharides.*

Glycosidic Bond A covalent bond between two monosaccharides.

Glyoxysome A specialized type of Peroxisome found in plant cells. It performs some of the reactions of photorespiration, and it also breaks down fatty acids to acetyl-CoA by β-oxidation and converts the acetyl-CoA to succinate via the glyoxylate cycle, thus enabling plants to convert fatty acids to carbohydrates.

Golgi Apparatus An organelle in eukaryotic cells that receives, modifies, and transports substances coming from the endoplasmic reticulum.

Golgi Complex A stack of flattened membranous vesicles in the cytoplasm. It serves as a routing center for proteins destined for secretion or for lysosomes or the cell membrane; it performs similar functions for membrane lipids, and it also modifies and finishes the oligosaccharide moieties of glycoproteins.

Gonorrhea A sexually transmitted disease caused by *Neisseria Gonorrhoeae.*

G Proteins A family of membrane-associated proteins that transduce signals received by various cell-surface receptors. They are called G proteins because binding of GTP and GDP is essential to their action.

Graft Tissue Tissue that is transplanted from one site to another.

Graft-Versus-Host (GVH) Disease Disease in which host antigens elicit an immunological response from graft cells that destroys host tissue.

Gram Molecular Weight See ► Mole.

Gram Stain A differential stain that uses crystal violet, iodine, alcohol, and safranin to differentiate bacteria. Gram-positive bacteria stain dark purple; Gram-negative ones stain pink/red.

Granulation Tissue Fragile, reddish, grainy tissue made up of capillaries and fibroblasts that appears with the healing of an injury.

Granule An inclusion that is not bounded by a membrane and contains compacted substances that do not dissolve in the cytoplasm.

Granulocyte A leukocyte (basophil, mast cell, Eosinophil, neutrophil) with granular cytoplasm and irregularly shaped, lobed nuclei.

Granuloma In a chronic inflammation, a collection of epithelial cells, macrophages, lymphocytes, and collagen fibers.

Granuloma Inguinale A sexually transmitted disease caused by *Calymmatobacterium Granulomatis. Known also as Donovanosis.*

Granulomatous Hypersensitivity Cell-mediated hypersensitivity reaction that occurs when macrophages have engulfed pathogens but have failed to kill them.

Granulomatous Inflammation A special kind of chronic inflammation characterized by the presence of granulomas.

Granzyme A Cytotoxin produced by cytotoxic T cells that help kill infected host cells.

Griseofulvin An antifungal agent that interferes with fungal growth.

Ground Itch Bacterial infection of sites of penetration by hookworms.

Group Translocation An active transport process in bacteria that chemically modifies substance so it cannot diffuse out of the cell.

Growth Curve The different growth periods of a bacterial or phage population.

Growth Factors Peptide mediators that influence the growth and/or differentiation of cells; they differ from growth hormones in being produced by many tissues and in acting locally.

Gumma A granulomatous inflammation, symptomatic of syphilis, that destroys tissue.

Gut-Associated Lymphatic Tissue (GALT) Collective name for the tissues of lymphoid nodules, especially those in the digestive, respiratory, and urogenital tracts; main site of antibody production.

Half-Life For a chemical reaction, the time at which half the substrate has been consumed and turned into product. The term can also refer to the analogous point in other processes, such as the radioactive decay of an isotope. *Known also as Half-Time.*

Halobacteria One of the groups of the Archaeobacteria that live in very concentrated salt environments.

Halophile A salt-loving organism that requires moderate to large concentrations of salt.

Hanging Drop A special type of wet mount often used with dark-field illumination to study motility of organisms.

Hansen's Disease The preferred name for leprosy, caused by *Mycobacterium leprae*, it exhibits various clinical forms ranging from tuberculoid to lepromatous.

Hantavirus Pulmonary Syndrome (HPS) The "Sin Nombre" hantavirus responsible for severe respiratory illness.

Haploid (1) A eukaryotic cell that contains a single, unpaired set of chromosomes. (2) A molecule that is too small to stimulate an immune response by itself but can do so when coupled to a larger, immunogenic carrier molecule (usually a protein).

Hapten A small molecule that can act as an antigenic determinant when combined with a larger molecule.

Haworth Projection A conventional planar representation of a cyclized monosaccharide molecule. The hydroxyls that are represented to the right of the chain in a Fischer projection are shown below the plane in a Haworth projection.

Heat Fixation Technique in which air-dried smears are passed through an open flame so that organisms are killed, adhere better to the side, and take up dye more easily.

Heat-Shock Proteins A group of Chaperonins that accumulate in a cell after it has been subjected to a sudden temperature jump or other stress. They are thought to help deal with the accumulation of improperly folded or assembled proteins in stressed cells.

Heavy Chain (H chain) Larger of the two identical pairs of chains comprising immunoglobulin molecules. Helicases Enzymes that catalyze the unwinding of duplex nucleic acids.

Helix-Loop-Helix Motif A binding motif that is found in calmodulin and some other calcium-binding proteins as well as in some DNA-binding proteins, It consists of two α helix segments connected by a loop.

Helix-Turn-Helix Motif A DNA-binding motif that is responsible for sequence-specific DNA binding in many transcription factors. It consist of two α helix segments connected by a β turn; one of the helices occupies the DNA major groove and makes specific base contacts.

Helminth A worm, with bilateral symmetry; includes the roundworms and flatworms.

Helper T Cell (T_H) (1) Lymphocytes that stimulate other immune cells, such as B cells and macrophages. (2) T lymphocytes whose role is to recognize antigens and help other defensive cells to mount an immune response. They help activate antigen-stimulated B cells (resulting in production of specific antibodies) and/or antigen-stimulated cytotoxic T cells (resulting in attack on antigenic cells), and they also produce immune mediators that stimulate nonspecific defense responses.

Hemagglutination Agglutination (clumping) of red blood cells, used in blood typing.

Hemagglutination Inhibition Test Serologic test used to diagnose measles, influenza, and other viral diseases, based on the ability of antibodies to viruses to prevent viral hemagglutination.

Heme A molecule consisting of a porphyrin ring (either protoporphyrin IX or a derivative) with a central complexed iron; it serves as a prosthetic group in proteins such as myoglobin, hemoglobin, and cytochromes.

Hemimethylated With respect to DNA, refers to the condition in which one strand of the duplex is methylated and the other is not. Newly replicated DNA is hemimethylated; normally a methylase enzyme then methylates appropriate bases in the new strand.

Hemoglobin The oxygen-binding compound found in erythocytes.

Hemolysin An enzyme that lyses red blood cells.

Hemolysis The lysis of red blood cells.

Hemolytic Disease of the Newborn Disease in which a baby is born with enlarged liver and spleen caused by efforts of these organs to destroy red blood cells damaged by maternal antibodies; mother is Rh-negative and baby is Rh-positive. *Known also as Erythroblastosis Fetalis.*

Hemorrhagic Uremic Syndrome (HUS) Infection with 0157-H7 strain of *Escherichia coli* causing kidney damage and bleeding in the urinary tract.

Hepadnavirus A small, enveloped DNA virus with circular DNA, one such virus causes hepatitis B.

Hepatitis An inflammation of the liver, usually caused by viruses but sometimes by an amoeba or various toxic chemicals.

Hepatitis A (formerly called infectious hepatitis) Common form of viral hepatitis caused by a single-stranded RNS virus transmitted by the fecal-oral route.

Hepatitis B (formerly called serum hepatitis) Type of hepatitis caused by a double-stranded DNA virus usually transmitted in blood or semen.

Hepatitis C (formerly called non-A, non-B hepatitis) Type of hepatitis distinguished by a high level of the liver enzyme alanine transferase, usually mild or inapparent infection but can be severe in compromised individuals.

Hepatitis D Severe type of hepatitis caused by presence of both hepatitis D and hepatitis B viruses, hepatitis D virus is an incomplete virus and cannot replicate without presence of hepatitis B virus as a helper. *Known also as Delta Hapatitis.*

Hepatitis E Type of hepatitis transmitted through fecally contaminated water supplies.

Hepatovirus One of three major groups of picornaviruses that can infect nerves and is responsible for causing hepatitis A.

Herd Immunity The proportion of individuals in a population who are immune to a particular disease. *Known also as Group Immunity.*

Heredity Having both male and female reproductive systems in one organism.

Herpes Gladiatorium Herpesvirus infection that occurs in skin injuries of wrestlers, transmitted by contact or on mats.

Herpes Labialis Fever blisters (cold sores) on lips.

Herpes Meningoencephalitis A serious disease caused by herpesvirus that can cause permanent neurological damage or death and that sometimes follows a generalized herpes infection or ascends from the trigeminal ganglion.

Herpes Pneumonia A rare form of herpes infection seen in burn patients, AIDS patients, and alcoholics.

Herpes Simplex Virus Type 1 (HSV-1) A virus that most frequently causes fever blisters (cold sores) and other lesions of the oral cavity, and less often causes genital lesions.

Herpes Simplex Virus Type 2 (HSV-2) A virus that typically causes genital herpes, but which can also cause oral lesions. *Known also as Herpes Hominis Virus.*

Herpesvirus A relatively large, enveloped DNA virus that can remain latent in host cells for long periods of time.

Heterogencity The ability of the immune system to produce many different kinds of antibodies, each specific for a different antigenic determinant.

Heterotroph An organism that uses compounds to produce biomolecules.

Heterotrophs Organisms that cannot synthesize their organic compounds entirely from inorganic precursors but most consume at least some organic compounds made by other organisms. In particular, these organisms cannot use CO_2 as a carbon source. compare ► Autotrophs.

Heterotrophy "Other-feeding" the use of carbon atoms from organic compounds for the synthesis of biomolecules.

Heterozygous In a diploid organism, the possession of two different alleles for a given gene (as opposed to two copies of the same allele). Compare ► Homozygous.

Hib Vaccine Vaccine against *Haemophilus influenzae b.*

High-Density Lipoprotein (HDL) A type of lipoprotein particle that functions mainly to scavenge excess cholesterol from tissue cells and transport it to the liver, where it can be excreted in the form of bile acids.

High-Energy Bond A chemical bond that releases energy when hydrolyzed; the energy can be used to transfer the hydrolyzed product to another compound.

High Frequency of Recombination (Hfr) Strain A strain of F^+ bacteria in which the F plasmid is incorporated into the bacterial chromosome.

High-Temperature Short-Time (HTST) Pasteurization Process in which milk is heated to 71.6°C for at least 15 seconds. *Known also as Flash Pasteurization.*

Hill Coefficient (n_H) A coefficient that indicates the degree of cooperativity of a cooperative transition; it is the maximum slope of a Hill plot of the transition.

Histamine Amine release by basophils and tissues in allergic reactions.

Histocompatibility Antigen An antigen found in the membranes of all human cells that is unique in all individuals except identical twins.

Histone A protein that contributes directly to the structure of eukaryotic chromosomes.

Histones The proteins that participate in forming the nucleosomal structure of chromatin. Four of the five kinds of histones make up the core particle of the nucleosome; the fifty is associated with the linker DNA between nucleosomes. All histones are small, very basic proteins.

Histoplasmosis Fungal respiratory disease endemic to the central and eastern United States, caused by the soil fungus *Histoplasma capsulatium. Known also as Darling's Disease.*

Holding Method See ► Low-Temperature Long-Time Pasteurization.

Holliday Junction An intermediate during homologous recombination; a four-armed structure in which each of

the participating DNA duplexes has exchanged one strand with the other duplex.

Holoenzyme A functional enzyme consisting of an apoenzyme and a coenzyme or cofactor.

Homeo Box A common sequence element of about 180 base pairs that is found in homeotic genes. It codes for a sequence-specific DNA-binding element of the helix-loop-helix class. See also ► Homeotic Genes.

Homeotic Genes Genes that contain homeo box elements and typically are involved in controlling the pattern of organismal development. Homeotic mutations, which scramble portions of this pattern, affect homeotic genes. The nuclear DNA-binding proteins encoded by these genes presumably serve as transcriptional regulators for the coordinated expression of groups of genes. See also ► Homeo Box.

Homolactic Acid Fermentation A pathway in which pyruvic acid is directly converted to lactic acid using electrons from reduced NAS (NADH).

Homologous Recombination Genetic recombination that requires extensive sequence homology between the recombining DNA molecules. Meiotic recombination by crossing over in eukaryotes is an example.

Homopolymer (biological) A polymer that is made of only one kind of monomer. Starch, made only of glucosyl units, is an example. Polymers that include more than one kind of monomer, like polypeptides and nucleic acids, are called heteropolymers.

Homozygous In a diploid organism, the possession of two identical alleles for a given gene. Compare ► Heterozygous.

Hookworm A disease caused by two species of small roundworms, *Ancylostoma duodenale* and *Necator americanus*, whose larvae burrow through skin and feet, enter the blood vessels, and penetrate lung and intestinal tissue.

Horizontal Transmission Direct contact transmission of disease in which pathogens are usually passed by handshaking, kissing, contact with sores, or sexual contact.

Hormone A substance that is synthesized and secreted by specialized cells and carried via the circulation to target cells, where it elicits specific changes in the metabolic behavior of the cell by interacting with a hormone-specific receptor.

Hormone-Responsive Element A DNA site that binds an intracellular hormone-receptor complex; binding of the complex to a hormone-responsive element affects the transcription of specific genes.

Host Any organism that harbors another organism.

Host-Induced Restriction and Modification A genetic system found in bacteria whereby a genetic element (often a plasmid) encodes both an enzyme for the methylation of DNA at a specific base sequence and an Endonuclease that cleaves unmethylated DNA at that sequence. The system thus *restricts* the DNA that can survive in the cell to DNA that is *modified* by methylation at the correct sequences.

Host Range The different types of organisms that a microbe can infect.

Host Specificity The range of different ghosts in which a parasite can mature.

Human Immunodeficiency Virus (HIV) One of the retroviruses that is responsible for AIDS.

Human Leukocyte Antigen (HLA) A lymphocyte antigen used in laboratory tests to determine compatibility of donor and recipient tissues for transplants.

Human Papillomavirus (HPV) Virus that attacks skin and mucous membranes, causing papillomas or warts.

Humoral Immune Response A response to foreign antigens carried out by antibodies circulating in the blood.

Humoral Immunity The immune response most effective in defending the body against bacteria, bacterial toxins, and viruses that have not entered cells.

Humus The nonliving organic components of soil.

Hyaluronidase A bacterially produced enzyme that digests hyaluronic acid, which helps hold the cells of certain tissues together, thereby making tissues more accessible to microbes. *Known also as Spreading Factor.*

Hybridoma A hybrid cell resulting from the fusion of a cancer cell with another cell, usually an antibody-producing white blood cell.

Hybridomas Cultured cell lines that are made by fusing antibody-producing B lymphocytes with cells derived from a mouse myeloma (a type of lymphocyte cancer). Like B cells, they produce specific antibodies, and like myeloma cells, they can proliferate indefinitely in culture.

Hydatid Cyst An enlarged cyst containing many tapeworm heads.

Hydrogen Bond An attractive interaction between the hydrogen atom of a donor group, such as —OH or ==NH, and a pair of nonbonding electrons on an acceptor group, such as O==C. The donor group atom that carries the hydrogen must be fairly electronegative for the attraction to be significant.

Hydrologic Cycle See ► Water Cycle.

Hydrolysis A chemical reaction that produces simpler products from more complex organic molecules.

Hydrophilic Refers to the ability of an atom or a molecule to engage in attractive interactions with water molecules. Substances that are ionic or can engage in

hydrogen bonding are hydrophilic. Hydrophilic substances are either soluble in water or, at least, wettable. Compare ► Hydrophobic.

Hydrophobic The molecular property of being unable to engage in attractive interactions with water molecules. Hydrophobic substances are nonionic and nonpolar; they are nonwettable and do not readily dissolve in water. Compare ► Hydrophilic.

Hydrophobic Effect With respect to globular proteins, the stabilization of tertiary structure that results from the packing of hydrophobic side chains in the interior of the protein.

Hydrostatic Pressure Pressure exerted by standing water.

Hyperimmune Serum A preparation of immune serum globulins having high titers of specific kinds of antibodies. *Known also as Convalescent Serum.*

Hyperparasitism The phenomenon of a parasite itself having parasites.

Hypersensitivity Disorder in which the immune system reacts inappropriately, usually by responding to an antigen it normally ignores. *Known also as an Allergy.*

Hypertonic Solution A solution containing a concentration of dissolved material greater than that within a cell.

Hypha (plural *hyphae*) A long, threadlike structure of cells in fungi or actinomycetes.

Hypochromism With respect to DNA, a reduction in the absorbance of ultraviolet light of wavelength of about 260 nm that accompanies the transition from random-coil denatured strands to a double-strand helix. It can be used to track the process of Denaturation or renaturation.

Hypothesis A tentative explanation for an observed condition or event.

Hypotonic Solution A solution containing a concentration of dissolved material lower than that within a cell.

IgA Class of antibody found in the blood and secretions.

IgD Class of antibody found on the surface of B cells and rarely secreted.

IgE Class of antibody that binds to receptors on basophils in the blood or mast cells in the tissues, responsible for allergic or immediate (type I) hypersensitivity reactions.

IgG The main class of antibodies found in the blood; produced in largest quantities during secondary response.

IgM The first class of antibody secreted into the blood during the early stages of a primary immune response (a rosette of five immunoglobulin molecules) or found on the surface of B cells (a single immunoglobulin molecule).

Illness Phase In an infectious disease, the period during which the individual experiences the typical signs and symptoms of the disease.

Imidazole An antifungal agent that disrupts fungal plasma membranes.

Immediate (Type I) Hypersensitivity Response to a foreign substance (allergen) resulting from prior exposure to the allergen. *Known also as Anaphylactic Hypersensitivity.*

Immersion Oil Substance used to avoid refraction at a glass-air interface when examining objects through a microscope.

Immune Complex An antigen-antibody complex that is normally eliminated by phagocytic cells.

Immune Complex Disorder A disorder caused by antigen-antibody complexes that precipitate in the blood and injure tissues; elicited by antigens in vaccines, on microorganisms, or on a person's own cells. *Known also as Immune Complex (Type III) Hypersensitivity.*

Immune Cytolysis Process in which the membrane attack complex of complement produces lesions on cell membranes through which the contents of the bacterial cells leak out.

Immune Serum Globulin A pooled sample of antibody-containing fractions of serum from many individuals. *Known also as Gamma Globulin.*

Immune System Body system that provides the host organism with specific immunity to infectious agents.

Immunity The ability of an organism to defend itself against infectious agents.

Immunocompromised Referring to an individual whose immune defenses are weakened due to fighting another infectious disease, or because of an immunodeficiency disease or an immunosuppressive agent.

Immunodeficiency Inborn or acquired defects in lymphocytes (B or T cells).

Immunodeficiency Disease A disease of impaired immunity caused by lack of lymphocytes, defective lymphocytes, or destructive lymphocytes.

Immunodiffusion Test serologic test similar to the precipitin test but carried out in agar gel medium.

Immunoelectrophoresis Serologic test in which antigens are first separated by gel electrophoresis and then allowed to react with antibody placed in a trough in the gel.

Immunofluorescence Referring to the use of antibodies to which a fluorescent substance is bound and used to detect antigens, other antibodies, or complement within tissue.

Immunogen See ► Antigen.

Immunogenic Something that is a potent stimulator of antibody production and defense cell activity.

Immunoglobulin (Ig) The class of protective proteins produced by the immune system in response to a particular epitope. *Known also as an Antibody.* See ► Antibodies.

Immunological Disorder Disorder that results from an inappropriate or inadequate immune system.

Immunological Memory The ability of the immune system to recognize substances it has previously encountered.

Immunology The study of specific immunity and how the immune system responds to specific infectious agents.

Immunosuppression Minimizing of immune reactions using radiation or cytotoxic drugs.

Impetigo A highly contagious pyoderma caused by staphylococci, streptococci, or both.

Importins A class of proteins involved in importing molecules into the nucleus. See ► Exportins.

Inapparent Infection An infection that fails to produce symptoms, either because too few organisms are present or because host defenses effectively combat the pathogens. *Known also as Subclinical Infection.*

Inborn Errors of Metabolism Human mutations that result in specific derangements of intermediary metabolism. Usually the problem is an enzyme that is inactive, overactive, too scarce, or too abundant; symptoms may result from the insufficient production of a necessary metabolite and/or from the accumulation of another metabolite to toxic levels.

Incidence Rate The number of new cases of a particular disease per 100,000 population seen in a specific period of time.

Inclusion A granule or vesicle found in the cytoplasm of a bacterial cell.

Inclusion Blennorrhea A mild chlamydial infection of the eyes in infants.

Inclusion Body (1) An aggregation of reticulate bodies within chlamydias. (2) A form of Cytopathic effect consisting of viral components, masses of viruses, or remnants of viruses.

Inclusion Conjunctivitis A chlamydial infection that can result from self-inoculation with *Chlamydia trachomatis.*

Incubation Period In the stages of infectious disease, the time between infection and the appearance of signs and symptoms.

Index Case The first case of a disease to be identified.

Index of Refraction A measure of the amount that light rays bend when passing from one medium to another.

Indicator organism An organism such as *Escherichia coli* whose presence indicates the contamination of water by fecal matter.

Indigenous Organism An organism native to a given environment. *Known also as a Native Organism.*

Indirect Contact Transmission Transmission of disease through fomites.

Indirect Fecal-Oral Transmission Transmission of disease in which pathogens from feces of one organism infect another organism.

Induced Dipole A molecule has an induced dipole if an external electric field induces an asymmetric distribution of charge within it.

Induced Fit Model A model for how enzymes interact with substrates to achieve catalysis. According to this model, the empty active site of the enzyme only roughly fits the substrate(s), and the entry of substrate causes the enzyme to change its shape so as to both tighten the fit and causes the substrate to adopt an intermediate state that resembles the transition state of the uncatalyzed reaction. This is currently the dominant model for enzymatic catalysis.

Induced Mutation A mutation produced by agents called mutagen that increase the mutation rate.

Inducer A substance that binds to and inactivates a repressor protein.

Inducible Enzyme An enzyme coded for by a gene that is sometimes active and sometimes inactive.

Induction (1) The stimulation of a temperature phase (prophage) to excise itself from the host chromosome and initiate a lytic cycle of replication. (2) In cellular metabolism, the synthesis of a particular protein in response to a signal; for example, the synthesis of an enzyme in response to the appearance of its substrate.

Induration A raised, hard, red region on the skin resulting from tuberculin hypersensitivity.

Industrial Microbiology Branch of microbiology concerned with the use of microorganisms to assist in the manufacture of useful products or disposal of waste products.

Infant Botulism Form of botulism in infants associated with ingestion of honey. *Known also as "Floppy Baby" Syndrome.*

Infection The multiplication of a parasite organism, usually microscopic, within or upon the host's body.

Infectious Disease Disease caused by infectious agents (bacteria viruses, fungi, protozoa, and helminths).

Infectious Hepatitis See ► Hepatitis A.

Infectious Mononucleosis An acute disease that affects many systems, caused by the Epstein-Barr virus.

Infestation The presence of heminths (worms) or anthropods in or on a living host.

Inflammation The body's defensive response to tissue damage caused by microbial infection.

Influenza Viral respiratory infection caused by orthomyxoviruses that appears as epidemics.

Initiating Segment That part of the F plasmid that is transferred to the recipient cell in conjugation with an Hfr bacterium.

Innate Immunity Immunity to infection that exists in an organism because of genetically determined characteristics.

Insect An anthropod with three body regions, three pairs of legs, and highly specialized mouthparts.

Insertion The addition of one or more bases to DNA, usually producing a frameshift mutation.

In Situ Hybridization A technique for finding the chromosomal location of a particular DNA sequence by probing the chromosomes with a radiolabeled sequence that will hybridize with the sequence in question. The location of the probe is then visualized with radioautography.

Intercalation With respect to DNA, refers to the fitting (intercalation) of a small molecule between adjacent bases in a DNA helix.

Interferon (1) A small protein often released from virus-infected cells that binds to adjacent uninfected cells, causing them to produce antiviral proteins that interfere with viral replication. (2) All of the reactions in an organism that are concerned with storing and generating metabolic energy and with the biosynthesis of low-molecular-weight compounds and energy-storage compounds. It does not include nucleic acid and protein synthesis.

Interleukin A cytokine produced by leukocytes.

Intermediate Host An organism that harbors a sexually immature stage of a parasite.

Internal Energy (*E*) The energy contained in a system. For the purposes of biochemistry, the term encompasses all the types of energy that might be changed by chemical or nonnuclear physical processes, including the kinetic energy of motion and vibration of atoms and molecules and the energy stored in bonds and noncovalent interactions.

Intoxication The ingestion of a microbial toxin that leads to a disease.

Intron (1) Region of a gene (or mRNA) in eukaryotic cells that does not code for a protein. *Known also as the Intervening Region.* (2) A region in the coding sequence of a gene that is not translated into protein. Introns are common in eukaryotic genes but are rarely found in prokaryotes. They are excised from the RNA transcript before translation. Compare ► Exon.

Invasiveness The ability of a microorganism to take up residence in a host.

Invasive Stage Disease spreads into body from site of energy causing symptoms to appear.

Ion An electrically charged atom produced when an atom gains or loses one or more electrons.

Ion-Exchange Resins Polycationic or polyanionic polymers that are used in ion-exchange column chromatography to separate substances on the basis of electrical charge.

Ionic Bond A chemical bond between atoms resulting from attraction of ions with opposite charges.

Ionic Strength (I) A quantity that reflects the total concentration of ions in a solution and the stoichiometric charge (charge per atom or molecule) of each ion. It is defined as $I = {}^1/_2 \sum M_i Z_i^2$ where M_i and Z_i are respectively the molarity and stoichiometeric charge of ion *i*. It is used, for example, in calculating the effective radius of a counterion atmosphere.

Ion Pore A pore in a cellular membrane through which ions can diffuse. It is formed by a transmembrane protein and can discriminate among ions to some degree on the basis of size and charge. Many ions pores are gated, meaning that they can open and close in response to signals.

Iris Diaphragm Adjustable device in a microscope that controls the amount of light passing through the specimen.

Ischemia Reduced blood flow to tissues with oxygen and nutrient deficiency and waste accululation.

Isoelectric Focusing A version of gel electrophoresis that allows ampholytes to be separated almost purely on the basis of their isoelectric points. The ampholytes are added to a gel that contains a pH gradient and are subjected to an electric field, Each Ampholyte migrates until it reaches the pH that represents its isoelectric point, at which point it ceases to have a net electric charge and therefore comes to a halt and accumulates. See also ► Gel Electrophoresis, Isoelectric Point.

Isoelectric Point (pI) The pH at which the net charge on an ampholyte is, on average, zero.

Isoenzymes Different but related forms of an enzyme that catalyze the same reaction. Often differ in only a few amino acid substitutions. *Known also as Isozymes.*

Isograft A graft of tissue between genetically identical individuals.

Isolation Situation in which a patient with a communicable disease is prevented from contact with the general population.

Isomer An alternative form of a molecule having the same molecular formula but different structure.

Isomorphorous Replacement The replacement of one atom in a macromolecule with a heavy metal atom in such a way that the structure of the macromolecule does not change. It is used in the determination of molecular structure by x-ray crystal diffraction.

Isoniazid An Antimetabolite that is bacteriostatic against the tuberculosis-causing mycobacterium.

Isotonic Fluid containing the same concentration of dissolved materials as is in a cell; causes no change in cell volume.

Isotope An atom of a particular element that contains a different number of neutrons.

Isozymes See ▶ Isoenzymes.

Joule (J) A unit for energy or work, defined as the work done by a force of 1 newton when its point of application moves 1 meter in the direction of the force. It is the unit of energy used in the Système Internationale (SI).

Kala Azar Visceral leishmaniasis caused by *Leishmania donovani*.

Kaposi's Sarcoma A malignancy often found in AIDS patients in which blood vessels grow into tangled masses that are filled with blood and easily ruptured.

Karyogamy Process by which nuclei fuse to produce a diploid cell.

Keratin A waterproofing protein found in epidermal cells.

α-Keratins A class of keratins that are the major proteins of hair. They consist of long α-helical polypeptides, which are wound around each other to form triplet helices.

Keratitis An inflammation of the cornea.

Keratoconjunctivitis Condition in which vesicles appear in the cornea and eyelids.

Ketone Bodies The substances acetoacetate, β-hydroxybutyrate, and acetone, which are produced from excess acetyl-CoA in the liver when the rate of fatty acid β-oxidation in liver mitochondria exceeds the rate at which acetyl-CoA is used for energy generation or fatty acid synthesis.

Ketose A monosaccharide in which the carbonyl group occurs within the chain and hence represents a ketone group. Compare ▶ Aldose.

Kidney One of a pair of organs responsible for the formation of urine.

Kirby-Bauer Method See ▶ Disk Diffusion Method.

Koch's Postulates Four postulated formulated by Robert Koch in the 19th century, used to prove that a particular organism causes a particular disease.

Koplik's Spots Red spots with central bluish specks that appear on the upper lip mucosa in early stages of measles.

Krebs Cycle A sequence of enzyme-catalyzed chemical reactions that metabolizes 2-carbon units called acetyl groups to CO_2 and H_2O. *Known also as Tricarboxylic Acid Cycle and the Citric Acid Cycle.*

Kupffer Cells Phagocytic cells that remove foreign matter from the blood as it passes through sinusoids.

Kura Transmissible spongiform encephalopathy disease of the human brain, caused by prions, associated with cannibalism and tissue/organ transplants.

Lacrimal Gland Tear-producing gland of the eye.

Lactobacilli Type of regular, nonsporing, Gram-positive rod found in many foods; used in production of cheeses, yogurt, sourdough, and other fermented foods.

Lagging Strand During DNA replication, the strand that is synthesized in the opposite direction to the direction of movement of the replication fork; it is synthesized as a series of fragments that are subsequently joined. Compare ▶ Leading Strand.

Lag Phase First of four major phases of the bacterial growth curve, in which organisms grow in size but do not increase in number.

Large Intestine The lower area of the intestine that absorbs water and converts undigested food into feces.

Laryngeal Papilloma Benign growth caused by herpesviruses that can be dangerous is such papillomas block the airway, infants are often infected during birth by mothers having genital warts.

Laryngitis An infection of the larynx, often with loss of voice.

Larynx The voicebox.

Lassa Fever Hemorrhagic fever, caused by arenaviruses, that begins with pharyngeal lesions and proceeds to severe liver damage.

Latency The ability of a virus to remain the host cells for long periods of time while retaining the ability to replicate.

Latent Disease A disease characterized by periods of inactivity either before symptoms appear or between attacks.

Latent Period Period of a bacteriophage growth curve that spans the time from penetration through biosynthesis.

Latent Viral Infection An infection typical of herpesviruses in which an infection in childhood that is brought under control later in life is reactivated.

Lateral Gene Transfer Genes pass from one organism to another within the same generation.

Leader Sequence For an mRNA, the nontranslated sequence at the 5′ end of the molecule that precedes the initiation codon. For a protein, a short N-terminal hydrophobic sequence that causes the protein to be translocated into or through a cellular membrane. *Known also as Signal Sequence.*

Leading Strand During DNA replication, the strand that is synthesized in the same direction as the direction of movement of the replication fork; it is synthesized continuously rather than in fragments. Compare ► Lagging Strand.

Leavening Agent An agent, such as yeast, that produces gas to make dough rise.

Legionellas The causative bacterial agent in Legionnaires' disease, *Legionella pneumophila.*

Leishmaniasis A parasitic systemic disease caused by three species of protozoa of the genus *Leishmania* and transmitted by sandflies.

Leproma An enlarged, disfiguring skin lesion that occurs in the lepromatous form of Hansen's disease.

Lepromatous Referring to the nodular form of Hansen's disease (leprosy) in which a granulomatous response causes enlarged, disfiguring skin lesions called leptromas.

Lepromin Skin Test Test used to detect Hansen's disease (leprosy), similar to the tuberculin test.

Leprosy See ► Hansen's Disease.

Leptospirosis A zoonosis caused by the spirochete *Leptospira interrogans*, which enters the body through mucous membranes or skin abrasions.

Leukocidin An exotoxin produced by many bacteria, including the streptococci and staphylococci, that kills phagocytes.

Leukocyte A white blood cell.

Leukocyte-Endogenous Mediator A substance that helps raise the body temperature while decreasing iron absorption (increasing iron storage).

Leukocytosis An increase in the number of white blood cells (leukocytes) circulating in the blood.

Leukostatin An exotoxin that interferes with the ability of leukocytes to engulf microorganisms that release the toxin.

Leukotriene A reaction mediator released from mast cells after Degranulation that causes prolonged airway construction, dilation, and increased permeability of capillaries, increased thick mucous secretion, and stimulation of nerve endings that cause pain and itching.

Leukotrienes A family of molecules that are synthesized from arachidonic acid by the lipoxygenase pathway and function as local hormones, primarily to promote inflammatory and allergic reactions (such as the bronchial construction of asthma).

L Forms Irregularly shaped naturally occurring bacteria with defective cell walls.

Library With respect to molecular genetics, a large collection of random cloned DNA fragments from a given organism, sometimes representing the entire nuclear genome.

Ligand In general, a small molecule that binds specifically to a larger one – for example, a hormone that binds to a receptor, the term can also be used to mean a chemical species that forms a coordination complex with a central atom, which is usually a metal atom.

Ligase An enzyme that joins together DNA segments.

Light Chain (L chain) Smaller of the two identical pairs of chains constituting immunoglobulin molecules.

Light Microscopy The use of any type of microscope that uses visible light to make specimens observable.

Light Reaction The part of photosynthesis in which light energy is used to excite electrons from chlorophyll, which are then used to generate ATP and NADPH.

Light Reactions The photosynthetic subprocesses that depend *directly* on light energy; specifically, the synthesis of ATP by Photophosphorylation and the reduction of $NADP^+$ to NADPH via the oxidation of water. Compare ► Dark Reactions.

Light Repair Repair of DNA dimers by a light-activated enzyme. *Known also as Photoreactivation.*

Lineweaver-Burk Plot A plot that allows one to derive the rate constant k_{cat} and the Michaelis constant K_M for an enzyme-catalyzed reaction. It is constructed by measuring the initial reaction rate V at various substrate concentration [S] and plotting the values on a graph of $1/V$ versus $1/[S]$.

Linkage Map A map showing the arrangement of genes on a chromosome; it is constructed by measuring the frequency of recombination between pairs of genes.

Linking Number (*L*) The total number of times the two strands of a closed, circular DNA helix cross each other by means of either twist or writhe; this equals the number of times the two strands are interlinked. It reflects both the winding of the native DNA helix and the presence of any supercoiling. See also ► Twist and ► Writhe.

Lipid One of a group of complex, water-insoluble compounds.

Lipid A Toxic substance found in the cell wall of a Gram-negative bacteria.

Lipid Bilayer A membrane structure that can be formed by amphipathic molecules in an aqueous environment; it consists of two back-to-back layers of molecules, in each of which the polar head groups face the water and

the nonpolar tails face the center of the membrane. The fabric of cellular membranes is a lipid bilayer.

Lipids A chemically diverse group of biological compounds that are classified together on the basis of their generally apolar structure and resulting poor solubility in water.

Lipopolysaccharide Part of the outer layer of the cell wall in Gram-negative bacteria. *Known also as an Endoxtoxin.*

Lipoproteins Any lipid-protein conjugate. Specifically refers to lipid-protein associations that transport lipids in the circulation, Each consists of a core of hydrophobic lipids surrounded by a skin of amphipathic lipids with embedded apolipoproteins. Different kinds of lipoproteins play different roles in lipid transport.

Listeriosis A type of meningitis caused by *Listeria monocytogenes* that is especially threatening to those with impaired immune systems.

Loaiasis Tropical eye disease caused by the filarial worm *Loa loa.*

Lobar Pneumonia Type of pneumonia that affects one or more of the five major lobes of the lungs.

Local Infection An infection confirmed to a specific area of the body.

Localized Anaphylaxis An immediate (Type I) hypersensitivity restricted to only some tissue/organs resulting in e.g., reddening of the skin, watery eyes, hives, etc.

Locus The location of a gene on a chromosome.

Logarithmic Rate See ▶ Exponential Rate.

Log Phase Second of four major phases of the bacterial growth curve, in which cells divide at an exponential or logarithmic rate.

Long Terminal Repeats (LTRs) A pair of direct repeats several hundred base pairs long that are found at either end of a retroviral genome. They are involved in integration into the host genome and in viral gene expression.

Lophotrichous Having two or more flagella at one or both ends of a bacterial cell.

Low-Angle Neutron Scattering A set of techniques that can be used to find the size of a particle in solution or to find the size or spacing of internal regions that can be distinguished by different neutron scattering power, such as the protein and nucleic acid components of a nucleoprotein particle or labeled proteins within a multisubunit complex.

Low-Density Lipoprotein (LDL) A type of lipoprotein particle that functions mainly to distribute cholesterol from the liver to other tissues. Its protein component consists of a single molecule of apoprotein B-100.

Lower Respiratory Tract Thin-walled bronchioles and alveoli where gas exchange occurs.

Low-Temperature Long-Time (LTLT) Pasteurization Procedure in which milk is heated to 62.0°C for at least 30 minutes. *Known also as Holding Method.*

Luminescence Process in which absorbed light rays are reemitted at longer wavelengths.

Lyme Disease Disease caused by *Borrelia burgdorferi*, carried by the deer tick.

Lymph The excess fluid and plasma proteins lost through capillary walls that is found in the lymphatic capillaries.

Lymphangitis Symptom of septicemia in which red streaks due to inflamed lymphatics appear beneath the skin.

Lymphatic System Body system, closely associated with the cardiovascular system, that transports lymph in lymphatic vessels through body tissues and organs, performs important functions in host defenses and specific immunity.

Lymphatic Vessel Vessel that returns lymph to the blood circulatory system.

Lymph Node An encapsulated globular structure located along the routes of the lymphatic vessels that helps clear the lymph of microorganisms.

Lymphocyte A leukocyte (white blood cell) found in large numbers in lymphoid tissues that contribute to specific immunity.

Lymphogranuloma Venereum A sexually transmitted disease, caused by *Chlamydia trachomatis*, that attacks the lymphatic system.

Lymphoid Nodule A small, unencapsulated aggregation of lymphatic tissue that develops in many tissues, especially the digestive, respiratory, and unogenital tracts, collectively called gut-associated lymphatic tissue (GALT); they are the body's main sites of antibody production.

Lymphoid Stem Cell A cell in the bone marrow from which lymphocytes develop.

Lyophokine A cytokine secreted by T cells when they encounter an antigen.

Lymphilization The drying of a material from the frozen state, freeze-drying.

Lysis The destruction of a cell by the rupture of a cell or plasma membrane, resulting in the loss of cytoplasm.

Lysogen The combination of a bacterium and a temperate phage.

Lysogenic Pertaining to a bacterial cell in the state of lysogeny.

Lysogenic Conversion The ability of a prophage to prevent additional infections of the same cell by the same type of phage; also the conversion of a non-toxin–producing bacterium into a toxin-producing one by a temperate phage.

Lysogeny The ability of temperature bacteriophages to persist in a bacterium by the integration of the viral DNA into the host chromosome and without the replication of new viruses or cell lysis.

Lysosome A small membrane-bound organelle in animal cells that contains digestive enzymes.

Lytic Cycle The sequence of events in which a bacteriophage infects a bacterial cell, replicates, and eventually causes lysis of the cell.

Lytic Phage See ► Virulent Phage.

Macrolide 2w?>A large-ring compound, such as erythromycin, that is antibacterial by affecting protein synthesis.

Macrophage Ravenously phagocytic leukocytes found in tissues.

Mad Cow Disease Transmissible spongiform encephalopathy disease of the brain of cattle, caused by prions.

Madura Foot Tropical disease caused by a variety of soil organisms (fungi and actinomycetes) that often enter the skin through bare feet. *Known also as Maduromycosis.*

Maduromycosis See ► Madura Foot.

Major Histocompatibility Complex (MHC) A group of cell surface proteins that are essential to immune recognition reactions.

Malaria A severe parasitic disease caused by several species of the protozoan *Plasmodium* and transmitted by mosquitoes.

Male Reproductive System The host system consisting of the testes, ducts, specific glands, and the penis.

Malignant Relating to a tumor that is cancerous.

Malta Fever See ► Brucellosis.

Malted Referring to cereal grains that are partially germinated to increase the concentration of starch-digesting enzymes.

Mammary Gland A modified sweat gland that produces milk and ducts that carry milk to the nipple.

Mash Malted grain that is crushed and mixed with hot water.

Mass Spectrometry A method for determining the molecular mass from the velocity of motion of ions in a vacuum.

Mast Cell A leukocyte that releases histamine during an allergic response.

Mastigophoran A flagellate protozoan such as *Giardia.*

Mastoid Area Portion of the temporal bone prominent behind the ear opening.

Matrix Fluid-filled inner portion of a mitochondrion.

Maturation The process by which complete virions are assembled from newly synthesized components in the replication process.

Measles A febrile disease with rash caused by the rubeola virus, which invades lymphatic tissue and blood. *Known also as Rubeola.*

Measles Encephalitis A serious complication of measles that leaves many survivors with permanent brain damage.

Mebendazole An antihelminthic agent that blocks glucose uptake by parasitic roundworms.

Mechanical Stage Attachment to a microscope stage that holds the slide and allows precise control in moving the slide.

Mechanical Vector A vector in which the parasite does not complete any part of its life cycle during transit.

Mechanism-Based Inhibitor An enzyme inhibitor whose action depends on the enzyme's catalytic mechanism. Typically it is a substrate analog that irreversibly modifies the enzyme at a particular step in the catalytic cycle.

Medium A mixture of nutritional substances on or in which microorganisms grow.

Megakaryocyte Large cell normally present in bone marrow that gives rise to platelets.

Meiosis Division process in eukaryotic cells that reduces the chromosome number in half.

Membrane Attack Complex A set of proteins in the complement system that lyses invading bacteria by producing lesions in their cell membranes.

Membrane Electrical Potential With respect to biological membranes, a voltage difference that exists across a membrane owing to differences in the concentrations of ions on either side of the membrane.

Membrane Filter Method Method of testing for coliform bacteria in water in which bacteria are filtered through a membrane and then incubated on the membrane surface in growth a medium.

Memory Cell Long-lived B or T lymphocyte that can carry out an anamestic or secondary response.

Meninges Three layers of membrane that protect the brain and spinal cord.

Merozoite A malaria trophozoite found in infected red blood or liver cells.

Mesophile An organism that grows best at temperatures between 25 and 45°C, including most bacteria.

Mesophilic Spoilage Spoilage due to improper canning procedures or because the seal has been broken.

Messenger RNA (mRNA) (1) A type of RNA that carries the information from DNA to dictate the arrangement of amino acids in a protein. (2) RNA molecules that act as templates for the synthesis of polypeptides by ribosomes.

Metabolic Pathway A chain of chemical reactions in which the product of one reaction serves as the substrate for the next.

Metabolism The totality of the chemical reactions that occur in an organism. compare ▶ Anabolism and ▶ Catabolism.

Metacercaria The postcercarial encysted stage in the development of a fluke, prior to transfer to the final host.

Metachromasia Property of exhibiting a variety of colors when stained with a simple stain.

Metachromatic Granule A polyphosphate granule that exhibits metachromasia. *Known also as Volutin.*

Metastability For a system, the condition of being in a state that does not represent thermodynamic equilibrium but is nearly stable at the time scale of interest because progress toward equilibrium is slow.

Metastasize Relating to the spread of malignant tumors to other body tissues.

Methanogens One of the groups of the archaeobacteria that produce methane gas.

Metronidazole An antiprotozoan agent effective against *Trichomonas* infections.

Micelles Tiny droplets that form when an amphipathic substance that has a polar head group and a nonpolar tail region (such as a fatty acid) is added to an aqueous medium and shaken. Each droplet consists of a spherical cluster of amphipathic molecules arranged with their polar head groups facing out toward the water and their nonpolar tails facing in toward the center.

Michaelis-Menten Equation An equation that gives the rate of an enzyme-catalyzed reaction in terms of the concentrations of substrate and enzyme as well as two constants that are specific for a particular combination of enzyme and substrate: a rate constant, k_{cat}, for the catalytic production of product when the enzyme is saturated, and the Michaelis constant, K_M.

Microaerophile A bacterium that grows best in the presence of a small amount of free oxygen.

Microbe See ▶ Microorganism.

Microbial Antagonism The ability of normal microbiota to compete with pathogenic organisms and in some instances to effectively combat their growth.

Microbial Antagonism The ability of normal microbiota to compete with pathogenic organisms and in some instances to effectively combat their growth.

Microbial Growth Increase in the number of cells, due to cell division.

Microbiology The study of microorganisms.

Micrococci Aerobes or facultative anerobes that form irregular clusters by dividing in two or more planes.

Microenvironment A habitat in which the oxygen, nutrients, and light are stable, including the environment immediately surrounding the microbe.

Microfilament A protein fiber that makes up part of the cytoskeleton in eukaryotic cells.

Microfilaria An immature microscopic roundworm larva.

Micrometer (μm) Unit of measure equal to 0.000001 m or 10^{-6} m; formerly called a micron (μ).

Microorganism Organism studied with a microscope; includes the viruses. *Known also as a Microbe.*

Microscopy The technology for making very small things visible to the unaided eye.

Microtubule A protein tubule that forms the structure of cilia, flagella, and part of the cytoskeleton in eukaryotic cells.

Microtubule-Associated Proteins (MAPs) A class of proteins associated with microtubules that assist in dynamic processes.

Microtubules Fiberlike cytoplasmic structures that consist of units of the protein tubulin arranged helically to form a hollow tube. They are involved in various kinds of cellular motility, including the beating of cilia and flagella and the movement of organelles from one part of the cell to another.

Microvillus (plural: *Microvilli*) A minute projection from the surface of an animal cell.

Miliary Tuberculosis Type of tuberculosis that invades all tissues producing tiny lesions.

Minimum Bactericidal Concentration (MBC) The lowest concentration of an antimicrobial agent that kills microorganisms, as indicated by absence of growth following subculturing in the dilution method.

Minimum Inhibitory Concentration (MIC) The lowest concentration of an antimicrobial agent that prevents growth in the dilution method of determining antibiotic sensitivity.

Minus Strand In viral genomes, a nucleic acid strand that is complementary to the RNA strand that serves as mRNA. Compare ▶ Plus Strand.

Miracidium Ciliated, free-swimming first-stage fluke larva that emerges from an egg.

Mismatch Repair A system for the correction of mismatched nucleotides or single-base insertions or deletions produced during DNA replication; it scans the nearly replicated DNA, and when it finds an error,

it removes and replaces a stretch of the strand containing the error.

Missense Mutation A mutation that alters a DNA codon so as to cause one amino acid in a protein to be replaced by a different one.

Mitochondria The organelles whose chief task it is to supply the cell with ATP via oxidative phosphorylation. They contain the enzymes for pyruvate oxidation, the citric acid cycle, the β-oxidation of fatty acids, and oxidative phosphorylation, as well as the electron transport chain.

Mitochondrion An organelle in eukaryotic cells that carries out oxidative reactions that capture energy.

Mitosis Process by which the cell nucleus in a eukaryotic cell divides to form identical daughter nuclei.

Mixed-Functional Oxidase An oxygenase enzyme that analyzes a reaction in which two different substrates are oxidized, one by the addition of an oxygen atom from O_2 and the other by supplying two hydrogen atoms to reduce the remaining oxygen atom to H_2O.

Mixed Infection An infection caused by several species of organisms present at the same time.

Mixture Two or more substances combined in any proportion and not chemically bound.

MMR Vaccine Measles, mumps, and rubella vaccine.

Mole The weight of a substance in grams equal to the sum of the atomic weights of the atoms in a molecule of the substance. *Known also as Gram Molecular Weight.*

Molecular Mimicry Imitation of the behavior of a normal molecule by an antimetabolite.

Molecule Two or more atoms chemically bonded together.

Molluscum Contagiosum A viral infection characterized by flesh-colored, painless lesions.

Molten Globule A hypothetical intermediate state in the folding of a globular protein, in which the overall tertiary framework has been established but internal side chains (especially hydrophobic ones) are still free to move about.

Monera The kingdom of prokaryotic organisms that are unicellular and lack a true cell nucleus. *Known also as Prokaryotae.*

Moniliasis See ► Candidiasis.

Monoclonal Antibody A single, pure antibody produced in the laboratory by a clone of cultured hybridoma cells.

Monocular Refers to a light microscope having one eyepiece (ocular).

Monocyte A ravenously phagocytic leukocyte, called a macrophage after it migrates into tissues.

Monolayer A suspension of cells that attach to plastic or glass surfaces as a sheet one cell layer thick.

Monosaccharide A simple carbohydrate, consisting of a carbon chain or ring with several alcohol groups and either an aldehyde or ketone group.

Monotrichous A bacterial cell with a single flagellum.

Morbidity Rate The number of persons contracting a specific disease in relation to the total population (cases per 100,000).

Mordant A chemical that helps a stain adhere to the cell or cell structure.

Mortality Rate The number of deaths from a specific disease in relation to the total population.

Most Probable Number (MPN) A statistical method of measuring bacterial growth, used when samples contain too few organisms to give reliable measures by the plate-count method.

Mother Cell A cell that has approximately doubled in size and is about to divide into two daughter cells. *Known also as a Parent Cell.*

Mucin A glycoprotein in mucus that coats bacteria and prevents their attaching to surfaces.

Mucociliary Escalator Mechanism involving ciliated cells that allows materials in the bronchi, trapped in mucus, to be lifted to the pharynx and spit or swallowed.

Mucopolysaccharides See ► Glycosaminoglycans.

Mucous Membrane A covering over those tissues and organs of the body cavity that are exposed to the exterior. *Known also as Mucosa.*

Mucus A thick but watery secretion of glycoproteins and electrolytes secreted by the mucous membranes.

Multicatalytic Proteinase Complex (MPC) A massive complex of proteolytic enzymes that is found in the cytosol of many eukaryotic cells and seems to function in the programmed destruction of cellular proteins.

Multiple-Tube Fermentation Method Three-step method of testing for coliform bacteria in drinking water.

Mumps Disease caused by a paramyxovirus that is transmitted by saliva and invades cells of the oropharynx.

Murine Typhus See ► Endemic Typhus.

Muscarinic Acetylcholine Receptors A class of receptors for the neurotransmitter acetylcholine that are characterized by an ability to bind the toadstool toxin muscarine. Synapses that have these receptors may be either excitatory or inhibitory. Compare ► Nicotinic Acetylcholine Receptors.

Mutagen An agent that increases the rate of mutations.

Mutation Any inheritable change in the nucleotide sequence of genomic DNA (or genomic RNA, in the case of an RNA virus).

Mutualism A form of symbiosis in which two organisms of different species live in a relationship that benefits both of them.

Myasthenia Gravis Autoimmune disease specific to skeletal muscle, especially muscles of the limbs and those involved in eye movements, speech, and swallowing.

Mycelium (plural: *mycelia*). In fungi, a mass of long, threadlike structures (hyphae) that branch and intertwine.

Mycobacteria Slender, acid-fast rods, often filamentous, include organisms that cause tuberculosis, leprosy, and chronic infections.

Mycology The study of fungi.

Mycoplasmas Very small bacteria with cell membranes, RNA and DNA, but no cell walls.

Mycosis (plural: *Mycoses*) A disease caused by a fungus.

Myiasis An infestation caused by maggots (fly larvae).

Mycarditis An inflammation of the heart muscle.

Nacardioforms Gram-positive, nonmotile, pheomorphic, aerobic bacteria, often filamentous and acid-fast, include some skin and respiratory pathogens.

NAD Nicotinamide dinucleotide, a coenzyme that carries hydrogen atoms and electrons.

Naked Virus A virus that lacks an envelope.

Nanometer (► nm) Unit of measure equal to 0.000000001 m or 10^{-9}; formerly called a millimicron (nμ).

Narrow Spectrum The range of activity of an antimicrobial agent that attacks only a few kinds of microorganisms.

Nasal Cavity Part of the upper respiratory tract where air is warmed and particles are removed by hairs as they pass through.

Nasal Sinus A hollow cavity within the skull that is lined with mucous membrane.

Naturally Acquired Active Immunity When an individual is exposed to an infectious agent, often having the disease, and their own immune system responds in a protective way.

Naturally Acquired Immunity Defense against a specific disease is acquired sometime after birth, without the intervention or use of man-made products such as vaccines or gamma globulin.

Naturally Acquired Passive Immunity When antibodies made by another individual are given to a host, e.g., in mother's milk, without intervention by man.

Natural Killer (NK) Cell A lymphocyte that can destroy virus-infected cells, malignant tumor cells, and cells of transplanted tissues.

Negative (−) Sense RNA An RNA strand made up of bases complementary to those of a positive (+) sense RNA.

Negative Staining Technique of staining the background around a specimen, leaving the specimen clear and unstained.

Nematode See ► Roundworm.

Neonatal Herpes Infection in infants usually with HSV-2, most often acquired during passage through a birth canal contaminated with the virus.

Neoplasm A localized tumor.

Neoplastic Transformation The uncontrollable division of host cells caused by infection with a DNA tumor virus.

Nephron A functional unit of the kidney in which fluid from the blood is filtered.

Nernst Equation An equation that relates the electrical potential across a membrane to the concentrations of ions on either side of the membrane.

Nerve A bundle of neuron fibers that relays sensory and motor signals throughout the body.

Nervous System The body system, comprising the brain, spinal cord, and nerves, that coordinates the body's activities in relation to the environment.

Neurohormones Substances that are released from neurons and modulate the behavior of target cells, which are often other neurons. Unlike neurotransmitters, they do not act strictly across a synapse. Most neurohormones are peptides.

Neuron A conducting nerve cell.

Neurotoxin A toxin that acts by disrupting nerve cell function. Fast-acting neurotoxins often act by blocking the action of an ion gate necessary for the development of an action potential.

Neurosyphilis Neurological damage, including thickening of the meninges, ataxia, paralysis, and insanity, that results from syphilis.

Neurotoxin A toxin that acts on nervous system tissues.

Neurotransmitter A low-molecular-weight substance that is released from an axon terminal in response to the arrival of an action potential and then diffuses across the synapse to influence the post-synaptic cell, which may be either another neuron or a muscle or gland cell.

Neutral Referring to a solution with a pH of 7.

Neutralization Inactivation of microbes or their toxins through the formation of antigen-antibody complexes.

Neutralization Reaction An immunological test used to detect bacterial toxins and antibodies to viruses.

Neutron An uncharged subatomic particle in the nucleus of an atom.

Neutrophil A phagocytic leukocyte. *Known also as Polymorphonuclear leukocyte, PMNL.*

Neutrophile An organism that grows best in an environment with a pH of 5.4 to 8.5.

Nicotinic Acetylcholine Receptors A class of receptors for the neurotransmitter acetylcholine that are characterized by their ability t bind nicotine. Synapses with this king of receptor are excitatory. Compare ► Muscarinic Acetylcholine Receptors.

Nick Translation A process in which nucleotides in one strand of a nucleic acid duplex are replaced one by one with nucleotides complementary to the other strand. The process starts at a nick in the strand and causes the location of the nick to migrate (hence the origin of the term).

Niclosamide An antihelminthic agent that interferes with carbohydrate metabolism.

Nitrification The process by which ammonia or ammonium ions are oxidized to nitrites or nitrates.

Nitrofuran An antibacterial drug that damages cellular respiratory systems.

Nitrogenase Enzyme in nitrogen-fixing bacteroids that catalyzes the reaction of nitrogen gas and hydrogen gas to form ammonia.

Nitrogen Cycle Process by which nitrogen moves from the atmospheric through various organisms and back into the atmosphere.

Nitrogen Fixation The reduction of atmospheric nitrogen gas to ammonia.

Nocardiosis Respiratory disease characterized by tissue lesions and abscesses, caused by the filamentous bacterium *Nocardia asteroids*.

Nocturia Nightime urination, often a result of urinary tract infections.

Nomarski Microscopy Differential interference contrast microscopy; utilizes differences in refractive index to visualize structures producing a nearly three-dimensional image.

Noncommunicable Infectious Disease Disease caused by infectious agents but not spread from one host to another.

Noncompetitive Inhibitor A molecule that attaches to an enzyme at an allosteric site (a site other than the active site), distorting the shape of the active site so that the enzyme can no longer function.

Noncovalent Interactions All the kinds of interactions between atoms and molecules that do not involve the actual sharing of electrons in a covalent bond; they include electrostatic interactions, permanent and induced dipole interactions, and hydrogen bonding.

Noncyclic Photophosphorylation In photosynthesis, Photophosphorylation (light-dependent ATP synthesis) that is linked to a one-way flow of electrons from water through photosystems II and I and finally to NADPH; it is thus coupled to the oxidation of H_2O and the reduction of $NADP^+$. Compare ► Cyclic Photophosphorylation.

Noncyclic Photoreduction The photosynthetic pathway in which excited electrons from chlorophyll are used to generate ATP and reduce NADP with the splitting of water molecules.

Nongonococcal Urethritis (NGU) A gonorrhealike sexually transmitted disease most often caused by *Chlamydia trachomatis* and mycoplasmas.

Nonindigenous Organism An organism temporarily found in a given environment.

Noninfection Disease Disease caused by any factor other than infectious agents.

Nonself Antigens recognized as foreign by an organism.

Nonsense Codon A set of three bases in a gene (or mRNA) that does not code for an amino acid. *Known also as Terminator Codon.*

Nonsense Mutation A mutation that creates an abnormal stop codon and thus causes translation to terminate prematurely; the resulting truncated protein is usually nonfunctional.

Nonspecific Defenses Those host defenses against pathogens that operate regardless of the invading agent.

Nonspecific Immunity Product by general defenses, such as skin, lysozyme and complement, that protect against many different kinds of organisms rather than a specific one or two.

Nonsynchronous Growth Natural pattern of growth during the log phase in which every cell in a culture divides at some point during the generation time, but not simultaneously.

Normal Microflora Microorganisms that live on or in the body but do not usually cause disease. *Known also as Normal Flora.*

Northern Blotting A technique for detecting the presence of a specific RNA sequence in a cell and determining its size. The total RNA of the cell is extracted, resolved by gel electrophoresis, and blotted onto a filter. There it is incubated under annealing conditions with a radiolabeled probe for the sequence in question, and heteroduplexes of the probe with RNA are detected by radioautography.

Nosocomial Infection An inflection acquired in a hospital or other medical facility.

Notifiable Disease A disease that a physician is required to report to public health officials.

N-Terminus The end of a polypeptide chain that carries an unreacted amino group. A ribosome synthesizes

a polypeptide in the direction from the N-terminus to the C-terminus. *Known also as Amino Terminus.* See also ► C-Terminus.

Nuclear Envelope The double membrane surrounding the cell nucleus in a eukaryotic cell. It is pierced by nuclear pores that allow even quite large molecules, such as mRNAs and nuclear proteins, to enter or leave the nucleus.

Nuclear Magnetic Resonance (NMR) Spectroscopy A type of spectroscopy that depends on the fact that isotope nuclei having the property of spin will resonate with specific frequencies of microwave radiation when placed in a magnetic field of given strength. The resonance energy is sensitive to the local molecular environment, so NMR spectroscopy can be used to explore molecular structure. Also, different living tissues have characteristic overall NMR spectra, which are sensitive to changes in the tissue environment. NMR can thus be used in the study of tissue metabolism and the diagnosis of disease.

Nuclear Matrix A protein web that is left in the nucleus when histones and other weakly bound proteins are removed and most of the DNA is digested away. It is presumed to act as an organizing scaffold for the chromatin.

Nuclear Pore An opening in the nuclear envelope that allows for the transport of materials between nucleus and cytoplasm.

Nuclear Region Central location of DNA, RNA, and some proteins in bacteria; not a true nucleus. *Known also as Nucleoid.*

Nuclease An enzyme that cleaves nucleic acids.

Nucleic Acids Long polymers of nucleotides that encode genetic information and direct protein synthesis.

Nucleocapsid The nucleic acid and capsid of a virus.

Nucleoid The large, circular DNA molecule of a prokaryotic cell, along with its associated proteins; also sometimes called the bacterial chromosome. It is supercoiled and forms a dense mass within the cell, and the term Nucleoid is often used for the cell region occupied by this mass. See ► Nuclear Region.

Nucleolus (plural: *Nucleoli*) Area in the nucleus of a eukaryotic cell that contains RNA and serves as the site for the assembly of ribosomes.

Nucleoplasm The semifluid portion of the cell nucleus in eukaryotic cells that is surrounded by the nuclear envelope.

Nucleoside A molecule that, upon complete hydrolysis, yields 1 mole per mole of a purine or pyrimidine base and a sugar.

Nucleotide An organic compound consisting of a nitrogenous base, a five-carbon sugar, and one or more phosphate groups.

Nucleosome The first-order structural unit for the packing of DNA in chromatin, consisting of 146 bp of DNA wrapped 1.75 times around a core octamer of histone proteins. Successive nucleosomes are connected by stretches of "linker" DNA.

Nucleotide A molecule that, upon complete hydrolysis, yields at least 1 mole per mole of a Purine or pyrimidine base, a sugar, and inorganic phosphate.

Nucleus The membrane-bound structure in a eukaryotic cell that contains the chromosomal genetic material and associated components. It is also the place where RNA molecules are processed and ribosomes are assembled.

Null Cells Undifferentiated cells that cannot be identified as either B cells or T cells; include the natural killer (NK) cells.

Numerical Aperature The widest cone of light that can enter a lens.

Numerical Taxonomy Comparison of organisms based on quantitative assessment of a large number of characteristics.

Nutritional Complexity The number of nutrients an organism must obtain to grow.

Nutritional Factor One factor that influences both the kind of organisms found in an environment and their growth.

Objective Lens Lens in a microscope closest to the specimen that creates an enlarged image of the object viewed.

Obligate Requiring a particular environmental condition.

Obligate Aerobe A bacterium that must have free oxygen to grow.

Obligate Anaerobe A bacterium that is killed by free oxygen.

Obligate Intracellular Parasite An organism or virus that can live or multiply only inside a living host cell.

Obligate Parasite A parasite that must spend some or all of its life cycle in or on a host.

Obligate Psychrophile An organism that cannot grow at temperatures about 20°C.

Obligate Thermophile An organism that can grow only at temperatures above 37°C.

Ocular Lens Lens in the microscope that further magnifies the image creased by the objective lens.

Ocular Micrometer A glass disk with an inscribed scale that is placed inside the eyepiece of a microscope; used to measure the actual size of an object being viewed.

Okazaki Fragment One of the short, discontinuous DNA segments formed on the lagging strand during DNA replication.

Okazaki Fragments The discontinuous stretches in which the lagging strand is initially synthesized during DNA replication; these fragments are later joined to form a continuous strand.

Onchocerciasis Ana eye disease caused by the filarial larvae of the nematode *Onchocerca volvulus*, transmitted by blackflies, common in Africa and Central America. *Known also as River Blindness.*

Oncogene A gene that, in a mutated version, can help transform a normal cell to a cancer cell. Many oncogene codes for mutant proteins that are involved in the reception and transduction of growth factor signals. A cancer-causing gene.

Oncoprotein The protein product of an Oncogene.

ONPG and MUG Test Water purity test that relies on the ability of coliform bacteria to secrete enzymes that convert a substrate into a product that can be detected by a color change.

Oomycota See ► Water Mold.

Open-Promoter Complex A complex between RNA polymerase Holoenzyme and a promoter that has undergone initial unwinding (has "opened") preparatory to the start of transcription. It is preceded by a much less stable *closed-promoter complex*, in which the promoter has not unwound, that may either fall apart or proceed to an open-promoter complex.

Open Reading Frame A sequence within a messenger RNA that is bounded by start and stop codons and can be continuously translated. It represents the coding sequence for a polypeptide.

Operator A DNA site where a repressor protein binds to block the initiation of transcription from an adjacent promoter.

Operon (1) A sequence of a closely associated genes that includes both structural genes and regulatory sites that control transcription. (2) A set of contiguous prokaryotic structural genes that are transcribed as a unit, along with the adjacent regulatory elements that control their expressions.

Opthalmia Neonatorium Pyrogenic infection of the eyes caused by *Neisseria Gonorrhoeae. Known also as Conjunctivitis of the Newborn.*

Opportunist A species of resident or transient microbiota that does not ordinarily cause disease but can do so under certain conditions.

Opsonin An antibody that promotes phagocytosis when bound to the surface of a microorganism.

Opsonization The process by which microorganisms are rendered more attractive to phagocytes by being coated with antibodies (opsonins) and C3b complement protein. *Known also as Immune Adherence.*

Optical Isomers See ► Enantiomers.

Optical Microscope See ► Compound Light Microscope.

Optimum pH The pH at which microorganisms grow best.

Orbivirus Type of virus that causes Colorado tick fever.

Orchitis Inflammation of the testes; a symptom of mumps in postpubertal males.

Organelle An internal membrane-enclosed structure found in eukaryotic cells.

Organelles Membrane-bound compartments in the cytoplasm of eukaryotic cells. Each kind of organelle carries out a specific set of functions. Examples are mitochondria, chloroplasts, and nuclei.

Organic Chemistry The study of compounds that contain carbon.

Ornithosis Disease with pneumonialike symptoms, caused by *Chlamydia psittaci* and acquired from birds (previously called psittacosis and parrot fever).

Oroyo Fever One form of bartonellosis; an acute fatal fever with severe anemia. *Known also as Carrion's Disease.*

Orthomyxovirus A medium-sized, enveloped RNA virus that varies in shape from spherical to filamentous and has an affinity for mucus.

Osmosis A special type of diffusion in which water molecules move from an area of higher concentration to one of lower concentration across a selectively permeable membrane.

Osmotic Pressure The pressure required to prevent the net flow of water molecules by osmosis.

Otitis Externa Infection of the external ear canal.

Otitis Media Infection of the middle ear.

Outer Membrane A bilayer membrane, forming part of the cell wall of Gram-negative bacteria.

Ovarian Follicle An aggregation of cells in the ovary containing an ovum.

Ovary In the female, one of a pair of glands that produce ovarian follicles, which contain an ovum and hormone-secreting cells.

Oxidase An enzyme that catalyzes the oxidation of a substrate with oxygen as the electron acceptor.

Oxidation The loss of electrons and hydrogen atoms.

Oxidative Phosphorylation (1) Process in which the energy of electrons is captured in high-energy bonds as phosphate groups combine with ADP to form ATP. (2) The phosphorylation of ADP to ATP that occurs in conjunction with the transit of electrons down the electron transport chain in the inner mitochondrial membrane.

Oxygenase An enzyme that catalyzes the incorporation of oxygen into a substrate.

Palindrome With respect to DNA, a segment in which the sequence is the same on one strand read right to left as on the other strand read left to right; thus, a back-to-back pair of inverted repeats.

Pandemic An epidemic that has become worldwide.

Papilloma See ▶ Wart.

Papovavirus A small, naked DNA virus that causes both benign and malignant warts in humans, some types cause cervical cancer.

Parainfluenza Viral disease characterized by nasal inflammation, pharyngitis, Bronchitis, and sometimes pneumonia, mainly in children.

Parainfluenza Virus Virus that initially attacks the mucous membranes of the nose and throat.

Paramyxovirus A medium-sized, enveloped RNA virus that has an affinity for mucus.

Parasite An organism that lives in or on, and at the expense of, another organism, the host.

Parasitism A symbiotic relationship in which one organism, the parasite, benefits from the relationship, whereas the other organism, the host, is harmed by it.

Parasitology The study of parasites.

Parfocal For a microscope, remaining in approximate focus when minor focus adjustments are made.

Paroxysmal Stage State of whooping cough in which mucus and masses of bacterial fill the airway, causing violet coughing.

Partial Molar Free Energy See ▶ Chemical Potential.

Partition Coefficient (*K*) A coefficient that indicates how a particular substance will distribute itself between two media if allowed to diffuse to equilibrium between them; it is equal to the ratio of the solubilities of the substance in the two media.

Parvovirus A small, naked DNA virus.

Passive Immunity Immunity created when ready-made antibodies are introduced into, rather than created by, an organism.

Passive Immunization The process of inducing immunity by introducing ready-made antibodies into a host.

Passive Transport With respect to membrane transport, the movement of a substance across a biological membrane by molecular diffusion through the lipid bilayer. Compare ▶ Active Transport, ▶ Facilitated Transport. *Known also as Passive Diffusion.*

Pasteur Effect The inhibition of glycolysis by oxygen; discovered by Pasteur when he found that aerobic yeast cultures metabolize glucose relatively slowly.

Pasteurella-Haemophilus Group Very small Gram-negative bacilli and coccobacilli that lack flagella and are nutritionally fastidious.

Pasteurization Mild heating to destroy pathogens and other organisms that cause spoilage.

Pathogen An organism capable of causing disease in its host.

Pathogenicity The capacity to produce disease.

Pediculosis Lice infestation, resulting in reddened areas at bites, dermatitis, and itch.

Pellicle (1) A thin layer of bacteria adhering to the air-water interface of a broth culture by their attachment pili. (2) A strengthened plasma membrane of a protozoan cell. (3) Film over the surface of a tooth at the beginning of plaque formation.

Pelvic Inflammatory Disease (PID) An infection of the pelvic cavity in females, caused by any of several organisms including *Neisseria Gonorrhoeae* and *Chlamydia.*

Penetration The entry of the virus (or its nucleic acid) into the host cell in the replication process.

Penicillin An antibacterial agent that inhibits cell wall synthesis.

Penis Part of the male reproductive system used to deliver semen to the female reproductive tract during sexual intercourse.

Peptide Bond A covalent bond joining the amino group of one amino acid and the carboxyl group of another amino acid. It consists of an amide bond between the α-carboxyl group of one amino acid and the α-amino group of the next.

Peptidoglycan A structural polymer in the bacterial cell wall that forms a supporting net. *Known also as Murein.*

Peptidyltransferase During ribosomal polypeptide synthesis, the enzyme complex that transfers the polypeptide chain from the tRNA in the P site to the amino acid carried by the tRNA in the A site, thereby adding another amino acid to the chain, the complex is an integral part of the large ribosomal subunit.

Peptococci Anerobes that form pairs, tetrads, or irregular clusters, they lac both Catalase and the enzyme to ferment lactic acid.

Peptone A product of enzyme digestion of proteins that contains many small peptides; a common ingredient of a complex medium.

Perforin A Cytotoxin produced by cytotoxic T cells that bores holes in the plasma membrane of infection host cells.

Pericarditis An inflammation of the protective membrane around the heart.

Periodontal Disease A combination of gum inflammation, decay of cementum, and erosion of periodontal ligaments and bone that support teeth.

Periodontitis A chronic periodontal disease that affects the bone and tissue that supports the teeth and gums.

Peripheral Nervous System All nerves outside the central nervous system.

Periplasm Those substances (enzymes, transport proteins) located in the periplasmic space of Gram-negative bacteria or in the older cell wall of Gram-positive bacteria.

Periplasmic Enzyme An Exoenzyme produced by Gram-negative organisms, which acts in the periplasmic space.

Periplasmic Space The space between the cell membrane and the outer membrane in Gram-negative bacteria that is filled with periplasm.

Peritrichous Having flagella distributed all over the surface of a bacterial cell.

Permanent Dipole In chemistry, a molecule that has a permanent, asymmetric distribution of charge such that one end is negative and the other end positive, The water molecule is an example: The oxygen end has a partial negative charge, and the hydrogen end has a partial positive charge.

Permanent Parasite A parasite that remains in or on a host once it has invaded the host.

Permease An enzyme complex involved in active transport through the cell membrane.

Peroxisome (1) An organelle filled with enzymes that in animal cells oxidate amino acids and in plant cells oxidize fats. (2) A small, vesicular organelle that specializes in carrying out cellular reactions involving the transfer of hydrogen from a substrate to O_2. These reactions produce the by-product H_2O_2, which is split to H_2O and O_2 by the peroxisomal enzyme catalase.

Persistent Viral Infection The continued production of viruses within the host over many months or years.

Pertussis See ► Whooping Cough.

PEST Sequences A family of amino acid sequences that have been found on cellular proteins that undergo rapid turnover; they may target proteins for rapid proteolysis. They consist of a region about 12 to 60 residues long that is rich in praline, glutamate, serine, and threonine (P, E, E, and T in the one-letter abbreviation system).

Petechia (plural: *petechiae*) A pinpoint-size hemorrhage, most common in skin folds, that often occurs in rickettsial diseases.

pH A means of expressing the hydrogen-ion concentration, and thus the acidity, of a solution.

Phage See ► Bacteriophage.

Phage Typing Use of bacteriophages to determine similarities or differences among different bacteria.

Phagocyte A cell that ingests and digests foreign particles.

Phagocytosis Ingestion of solids into cells by means of the formation of vacuoles.

Phagolysosome A structure resulting from the fusion of lysosomes and a phagosome.

Phagosome A vacuole that forms around a microbe within the phagocyte that engulfed it.

Pharmaceutical Microbiology A special branch of industrial microbiology concerned with the manufacture of products used in treating or preventing disease.

Pharyngitis An infection of the pharynx, usually caused by a virus but sometimes bacterial in origin, a sore throat.

Pharnyx The throat, a common passage-way for the respiratory and digestive systems with tubes connecting to the middle ear.

Phase-Contrast Microscopy Use of microscope having a condenser that accentuates small differences in the refractive index of various structures within the cell.

Phenol Coefficient A numerical expression for the effectiveness of a disinfectant relative to that of phenol.

Phenotype The specific observable characteristics displayed by an organism. It results from the interaction of the organism's genetic makeup with the environment. Compare ► Genotype.

Pheromones Intercellular mediator compounds that are released from one organism and influence the metabolism or behavior of another organism, usually of the same species. Sex attractants, which elicit reproductive behavior in suitable recipients, are an example.

Phlebovirus Bunyavirus that is carried by the sandfly *Phlebotomus papatsii.*

Phorbol Esters A group of natural substances that resemble *sn*-1,2-diacyglycerol (DAG) in part of their structure and can act as tumor promoters. This effect suggests that the DAG second-messenger system may be involved in growth factor action.

Phosphodiester Link The linkage that connects the nucleotide monomers in a nucleic acid. It consists of a phosphate residue that links the sugar moieties of successive monomers by forming an ester bond with the 5′ carbon of one sugar and the 3′ carbon of the next.

Phospholipid A lipid composed of glycerol, two fatty acids, and a polar head group; found in all membranes.

Phosphorescence Continued emission of light by an object when light rays no longer strike it.

Phosphorus Cycle The cyclic movement of phosphorous between inorganic and organic forms.

Phosphorylation The addition of a phosphate group to a molecule, often from ATP, generally increasing the molecule's energy.

Phosphotransferase System A mechanism that uses energy from phosphorenolyruvate to move sugar molecules into cells by active transport.

Photoautotroph An autotroph that obtains energy from light.

Photoheterrotroph A heterotroph that obtains energy from light.

Photolysis Process in which light energy is used to split water molecules into protons, electrons, and oxygen molecule.

Photophosphorylation Phosphorylation of ADP to ATP that depends directly on energy from sunlight. The light energy is captured by a pigment such as chlorophyll and is passed in the form of excited electrons to an electron transport chain; the electron transport chain uses energy from the electrons to create a proton gradient across a membrane, which drives the synthesis of ATP.

Photoproducts The products that result when light energy causes a chemical reaction to occur in a substance. With respect to DNA, the term refers to the types of damaged DNA that can be caused by UV irradiation.

Photoreactivation A DNA repair process in which an enzyme uses light energy to break cyclobutane pyrimidine dimers created by UV irradiation and to restore the correct bonding. See ▶ Light Repair.

Photorespiration The cycle of reactions that occurs in place of the Calvin cycle when the photosynthetic enzyme rubisco adds O_2 rather than CO_2 to ribulose bisphosphate carboxylase. It takes place partly in chloroplasts, partly in peroxisomes, and partly in mitochondria; it expends ATP energy and loses a previously fixed CO_2 molecule in the process of regenerating the Calvin cycle intermediate 3-phosphoglycerate.

Photosynthesis The capture of energy from light and use of this energy to manufacture carbohydrates from carbon dioxide.

Photosystem A structural unit in a cellular membrane that captures light energy and converts a portion of it to chemical energy. The photosynthesis practiced by plants, algae and cyanobacteria involves two types of photosystem, both of which capture energy in the form of high-energy electrons and transduce it via an electron transport chain.

Phototaxis A non random movement of an organism toward or away from light.

Phylogenetic Pertaining to evolutionary relationships.

Physical Factor Factor in the environment, such as temperature, moisture, pressure, or radiation, that influences the kinds of organisms found and their growth.

Picornavirus A small, naked RNA virus; different genera are responsible for polio, the common cold, and hepatitis.

Pilus (plural: *pili*) A tiny hollow projection used to attach bacteria to surfaces (attachment pilus) or for conjugation (conjugation pilus).

Pimple See ▶ Folliculitis.

Pinna Flaplike external structure of the ear.

Pinworm A small roundworm, *Enterobius vermicularis*, that causes gastrointestinal disease.

Placebo An unmedicated, usually harmless substance given to a recipient as a substitute for or to test the efficacy of a medication or treatment.

Plantae The kingdom of organisms to which all plants belong.

Plaque (1) A clean area in a bacterial lawn culture where viruses have lysed cells. (2) A clear area that is formed by a local phage infection in a lawn of cultured bacteria in a Petri dish; for purposes of experimentation, it is the phage equivalent of a bacterial colony.

Plaque Assay A viral assay used to determine viral yield by culturing viruses on a bacterial lawn and counting plaques.

Plaque-Forming Unit A plaque counted on a bacterial lawn that gives only an approximate number of phages present, because a given plaque may have been due to more than one phage.

Plasma Liquid portion of the blood, excluding the formed elements.

Plasma Cell A large lymphocyte differentiated from a B cell that synthesizes and releases antibodies like those on the B cell surface.

Plasma Membrane A selectively permeable lipoprotein bilayer that forms the boundary between the cytoplasm of a eukaryotic cell and its environment. *Known also as Cell Membrane.*

Plasmid A small, circular, independent replicating piece of DNA in a cell that is not part of its chromosome and can be transferred to another cell. *Known also as Extrachromosomal DNA.*

Plasmids Small, extrachromosomal circular DNA molecules found in many bacteria, they replicate independently of the main chromosome and may occur in multiple copies per cell.

Plasmodial Slime Mold Funguslike protest consisting of a multinucleate amoeboid mass, or plasmodium, that moves about slowly and phagocytizes dead matter.

Plasmodium A multinucleate mass of cytoplasm that forms one of the stages in the life cycle of a plasmodial slime mold.

Plasmogamy Sexual reproduction in fungi in which haploid gametes unite and their cytoplasm mingles.

Plasmolysis Shrinking of a cell, with separation of the cell membrane from the cell wall, resulting from loss of water in a hypertonic solution.

Platelet A short-lived fragment of large cells called megakaryocytes, important component of the blood-clotting mechanism.

Pleomorphism Phenomenon in which bacteria vary widely in form, even within a single culture under optimal conditions.

Pleura Serious membrane covering the surfaces of the lungs and the cavities they occupy.

Pleurisy Inflammation of pleural membranes that causes painful breathing often accompanies lobar pneumonia.

Plus Strand In viral genomes, a nucleic acid strand that can serve as mRNA or (for DNA strand) that is homologous to one that can; as distinct from the complementary (minus) strand. Most viruses with single-strand genomes package only the plus or minus strand in virions; the other strand is made transiently during replication. Compare ► Minus Strand.

Pneumocystis Pneumonia A fungal respiratory disease caused by *Pneumocystis carinii*.

Pneumonia An inflammation of lung tissue caused by bacteria, viruses, or fungi.

Pneumonic Plague Usually fatal form of plague transmitted by aerosol droplets from a coughing patient.

Point Mutation Mutation in which one base is substituted for another at a specific location in a gene.

Polar Compound A molecule with an unequal distribution of charge due to an unequal sharing of electrons from between atoms.

Poliomyelitis Disease caused by any of several strains of polioviruses that attack motor neutrons of the spinal cord and brain.

Polyacrylamide Gel Electrophoresis (PAGE) A technique for separating proteins from a cell based in their molecular size.

Polyene An antifungal agent that increases membrane permeability.

Polymer (1) A large molecule that is made by linking together prefabricated molecular units (monomers) that are similar or identical to each other. The number of monomers in a polymer may range up to millions. (2) A long chain of repeating subunits.

Polymerase Chain Reaction (PCR) A technique that rapidly produces a billion or more identical copies of a DNA fragment without needing a cell.

Polymyxin An antibacterial agent that disrupts the cell membrane.

Polynucleotide A chain of many nucleotides.

Polypeptide A chain of many amino acids.

Polyribosome A long chain of ribosomes attached at different points along an mRNA molecule. *Known also as Polysome.*

Polysaccharide A carbohydrate formed when many monosaccharides are linked together by glycosidic bonds.

Polytene Chromosome An extra-thick chromosome that includes many parallel copies of the original DNA molecule; it is produced by repeated rounds of DNA replication without separation of the resulting copies. Polytene chromosomes are found in various cell types, notably *Drosophilia* salivary gland cells; they are useful in chromosome mapping because they are large and because the genes on the strands are arranged in strict register.

Pontiac Fever A mild variety of legionellosis.

Porin A protein in the outer membrane of Gram-negative bacteria that nonselectively transports polar molecules into the periplasmic space.

Portal of Entry A site at which microorganisms an gain access to body tissues.

Portal of Exit A site at which microorganisms can leave the body.

Positive Chemotaxis Movement of an organism toward a chemical.

Positive (+) Sense RNA An RNA strand that encodes information for making proteins needed by a virus.

Potable Water Water that is fit for human consumption.

Pour Plate A plate containing separate colonies and used to prepare a pure culture.

Pour Plate Method Method used to prepare pure cultures using serial dilutions, each of which is mixed with melted agar and poured into a sterile Petri plate.

Poxvirus DNA virus that is the largest and most complex of all viruses.

Precipitation Reaction Immunological test in which antibodies called precipitans react with antigens to form latticelike networks of molecules that precipitate from solution.

Precipitin Test Immunological test used to detect antibodies that is based on the precipitation reaction.

Prediction The expected outcome if a hypothesis is correct.

Preserved Culture A culture in which organisms are maintained in a dormant state.

Presumptive Test First stage of testing in multiple-tube fermentation in which gas production in lactose broth provides presumptive evidence that coliform bacteria are present.

Prevalence Rate The number of people infected with a particular disease at any one time.

Primaquine An antiprotozoan agent that interferes with a protein synthesis.

Primary Atypical Pneumonia A mild form of pneumonia with insidious onset. *Known also as Mycoplasma Pneumonia and Walking Pneumonia.*

Primary Cell Culture A culture that comes directly from an animal and is not subcultured.

Primary Immunodeficiency Disease A genetic or developmental defect in which T cells or B cells are lacking or nonfunctional.

Primary Infection An initial infection in a previously healthy person.

Primary Response Humoral immune response that occurs when an antigen is first recognized by host B cells.

Primary Structure For a nucleic acid or a protein, the sequence of the bases or amino acids in the polynucleotide or polypeptide. Compare ► Quaternary Structure, ► Secondary Structure, and ► Tertiary Structure.

Primary Treatment Physical treatment to remove solid wastes from sewage.

Primer A short piece of DNA or RNA that is base-paired with a DNA template strand and provide a free 3′—OH end from which a DNA polymerase can extend a DNA strand. Also refers to DNA oligomers used in the polymerase chain reaction.

Primosome An enzyme complex that is located in the replication fork during DNA replication; it synthesizes the RNA primers on the lagging strand and also participates in unwinding the parental DNA helix.

Prion An exceedingly small infectious particle consisting of protein without any nucleic acid.

Probe A single-stranded DNA fragment that has a sequence of bases that can be used to identify complementary DNA base sequences.

Processivity For a DNA or an RNA polymerase, the average number of nucleotides incorporated per event of binding between the polymerase and a 3′ primer terminus. It describes the tendency of a polymerase to remain bound to a template.

Prodromal Phase In an infectious disease, the short period during which nonspecific symptoms such as malaise and headache sometimes appear.

Prodrome A symptom indicating the onset of a disease.

Producer Organism that captures energy from the sun and synthesizes food. *Known also as Autotroph.*

Product The material resulting from an enzymatic reaction.

Productive Infection Viral infection in which viruses enter a cell and produce infectious progeny.

Proglottid One of the segments of a tapeworm, containing the reproductive organs.

Progressive Multifocal Leukoencephalopathy Disease caused by the JC polyomavirus with symptoms including mental deterioration, limb paralysis, and blindness.

Prokaryote Microorganism that lacks a cell nucleus and membrane-enclosed internal structures, all bacteria in the kingdom Monera (Prokaryotae) are prokaryotes.

Prokaryotes Primitive single-celled organism that are not compartmentalized by internal cellular membranes; the eubacteria and archaebacteria. Compare ► Eukaryotes.

Prokaryotic Cell A cell that lacks a cell nucleus; includes all bacteria.

Promoter A DNA sequence that can bind RNA polymerase, resulting in the initiation of transcription.

Propagated Epidemic An epidemic that arises from person-to-person contacts.

Prophage An inactive phage genome that is present in a bacterial cell and its progeny. It is integrated into the host chromosome.

Propionibacteria Pleomorphic, irregular, nonsporing, Gram-positive rods.

Prostaglandin A reaction mediator that acts as a cellular regulator, often intensifying pain.

Prostaglandins A family of compounds that are derived from certain long-chain unsaturated fatty acids (particularly arachidonic acid) by a cyclooxygenase pathway and that function as local hormones.

Prostate Gland The gland located at the beginning of the male urethra whose milky fluid discharge forms a component of semen.

Prostatitis Inflammation of the prostate gland.

Prosthetic Group A metal ion or small molecule (other than an amino acid) that forms part of a protein in the protein's native state and is essential to the protein's functioning; its attachment to the protein may be either covalent or noncovalent.

Proteases Enzymes that cleave peptide bonds in a polypeptide. Many show specificity for a particular amino acid sequence.

Proteasome A large, ATP-dependent protease complex that is found in the cytosol of cells and is involved in the selective degradation of short-lived cytoplasmic proteins.

Protein A polymer of amino acids joined by peptide bonds.

Protein Profile A technique for visualizing the proteins contained in a cell; obtained by the use of polyacrylamide gel electrophoresis.

Proteoglycans Glycoproteins in which carbohydrate is the dominant element. The carbohydrate is in the form of glycosamminoglycan polysaccharides, which are connected to extended core polypeptides to form huge, feathery molecules. Proteoglycans are important components of the intercellular matrix.

Protista The kingdom of organisms that are unicellular but contain internal organelles typical of the eukaryotes.

Protist A unicellular eukaryotic organism that is a member of the kingdom Protista.

Protofilaments The 13 linear columns of tubulin units that can be visualized in the structure of a microtubule; they result because each turn of the microtubule helix contains exactly 13 tubulin units. Each protofilament consists of alternating α and β tubulin subunits.

Proton A positively charged subatomic particle located in the nucleus of an atom.

Proton Motive Force (pmf) An electrochemical H^+ gradient that is set up across a cellular membrane by membrane-bound proton pumps, such as the ones in the inner mitochondrial membrane or thylakoid membrane. As the protons flow back down their gradient across the membrane, they can drive processes such as ATP synthesis.

Proton Pumping The active pumping of protons across a cellular membrane to form a proton gradient. For example, the electron transport chains of the inner mitochondrial and Thylakoid membranes incorporate proton pumps, which create the proton gradient that powers the ATP synthases of these membranes.

Proto-Oncogene A normal gene that can cause cancer in uncontrolled situations; often the normal gene comes under the control of a virus.

Protoplast A Gram-positive bacterium from which the cell wall has been removed.

Protoplast Fusion A technique of genetic engineering in which genetic material is combined by removing the cell walls of two different types of cells and allowing the resulting protoplasts to fuse.

Prototroph A normal, nonmutant organism. *Known also as Wild Type.*

Protozoa (singular: *protozoan*) Single-celled, microscopic, animallike protests in the kingdom Protista.

Provirus Viral DNA that is incorporated into a host-cell chromosome.

Pseudocoelom A primitive body cavity, typical of nematodes, that lacks the complete lining found in higher animals.

Pseudocyst An aggregate of trypanosome protozoa that forms in lymph nodes in Chagas' disease.

Pseudogenes Nontranscribed stretches of DNA that bear a strong sequence similarity to functioning genes and obviously arose from them during evolution. Many gene families contain pseudogene members.

Pseudomembrane A combination of bacilli, damaged epithelial cells, fibrin, and blood cells resulting from infection with diphtheria that can block the airway, causing suffocation.

Pseudomonads Aerobic motile rods with polar flagella.

Paeudoplasmodium A multicellular mass composed of individual cellular slime mold cells that have aggregated.

Pseudopodium A temporary footlike projection of cytoplasm associated with amoeboid movement.

Psittacosis See ► Ornithosis.

Psychrophile A cold-loving organism that grows best at temperatures of 15 to 20°C.

Puerperal Fever Disease caused by β-hemolytic streptococci, which are normal vaginal and respiratory microbiota that can be introduced during child delivery by medical personnel. *Known also as Childbed Fever or Puerperal Sepsis.*

Pulsed Field Gel Electrophoresis A type of gel electrophoresis in which the orientation of the electric field is charged periodically. This technique makes it possible to separate very large DNA molecules, up to the size of whole chromosomes.

Pure Culture A culture that contains only a single species of organism.

Purine The nucleic acid bases adenine and guanine.

Pus Fluid formed by the accumulation of dead phagocytes, the material they have ingested, and tissue debris.

Pustule See ► Folliculitis.

Pyelonephritis Inflammation of the kidneys.

Pyoderma A pus-producing skin infection caused by staphylococci, streptococci, and Corynebacteria, singly or in combination.

Pyrimidine Any of the nucleic acid bases thymine, cytosine, and uracil.

Pyrogen A substance that acts on the hypothalamus to set the body's "thermostat" to a higher-than-normal temperature.

Q Fever Pneumonialike disease caused by *Coxiella burnetii*, a rickettsia that survives long periods outside cells and can be transmitted aerially as well as by ticks.

Quantum Efficiency (*Q*) With respect to photosynthesis, the ratio of oxygen molecules released to photons absorbed.

Quarantine The separation of human or animals from the general population when they have a communicable disease or have been exposed to one.

Quaternary Ammonium Compound (quat) A cationic detergent that has four organic groups attached to a nitrogen atom.

Quaternary Structure (1) The three-dimensional structure of a protein molecule formed by the association of two or more polypeptide chains. (2) For a protein, the level of structure that results when separate, folded polypeptide chains (subunits) associate in a specific way to produce a complete protein. Compare ► Primary Structure, ► Secondary Structure, and ► Tertiary Structure.

Quinine An antiprotozoan agent used to treat malaria.

Quinolone A bactericidal agent that inhibits DNA replication.

Quinone A nonprotein, lipid-soluble electron carrier in oxidative phosphorylation. *Known also as Coenzyme Q.*

Rabies A viral disease that affects the brain and nervous system with symptoms including hydrophobia and aerophobia; transmitted by animal bites.

Rabies Virus An RNA-containing rhabdovirus that is transmitted through animal bites.

Rad A unit of radiation energy absorbed per gram of tissue.

Radial Immunodiffusion Serological test used to provide a quantitative measure of antigen or antibody concentration by measuring the diameter of the ring of precipitation around an antigen.

Radiation Light rays, such as X-rays and ultraviolet rays, that can act as mutagens.

Radioautography A technique in which an item containing radioactively labeled elements (for example, a tissue slice or a chromatography gel) is laid against a photographic film; the radioactivity exposes the film to form an image of the labeled elements. Also called autoradiography.

Radioimmunoassay (RIA) Technique that uses a radioactive anti-antibody to detect very small quantities of antigens or antibodies.

Radioisotope Isotope with unstable nuclei that tends to emit subatomic particles and radiation.

Ramachandran Plot A plot that constitutes a map of all possible backbone configurations for an amino acid in a polypeptide. The axes of the plot consist of the rotation angles of the two backbone bonds that are free to rotate (ϕ and ψ, respectively); each point ϕ,ψ on the plot thus represents a conceivable amino acid backbone configuration.

Random Coil Refers to a linear polymer that has no secondary or tertiary structure but instead is wholly flexible with a randomly varying geometry. This is the state of a denatured protein or nucleic acid.

Rat Bite Fever A disease caused by *Streptobacillus moniliformis* transmitted by bites from wild and laboratory rats.

Rate Constant With respect to chemical reactions, a constant that relates the reaction rate for a particular reaction to substrate concentrations.

Rate Equation An equation, such as the Michaelis-Menten equation that relates velocity of an enzyme-catalyzed reaction to measurable parameters.

Reactant Substance that takes part in a chemical (enzymatic) reaction.

Reaction Center In photosynthesis, a specific pair of chlorophyll molecules in a photosystem that collect light energy absorbed by other chlorophyll molecules and pass it to an electron acceptor, normally the first compound of an electron transport chain.

Reactive Oxygen Species (ROS) Oxygen species intermediate in oxidation level between O_2 and H_2O, which are more reactive than O_2; ROS include superoxide, peroxide, peroxynitrite, and hydroxyl radical.

Reagin Older name for immunoglobulin E (IgE); very important in allergies.

Receptor A protein that binds selectively to a specific molecule (such as an intercellular mediator or antigen) and initiates a biological response.

Recognition Helix In a helix-turn-helix DNA binding motif, the α-3 helix, which fits deep in the major groove and is responsible for the sequence specificity of binding.

Recombinant DNA DNA combined from two different species by restriction enzymes and ligases.

Recombinant DNA Molecule A DNA molecule that includes segments from two or more precursor DNA molecules.

Recombination (1) The combining of DNA from two different cells, resulting in a recombinant cell. (2) A process in an organism in which two parent DNA molecules give rise to daughter DNA that combines segments from both parent molecules. It may involve the integration of one DNA molecule into another, the substitution of a DNA segment for a homologous segment on another DNA molecule, or the exchange of homologous segments between two DNA molecules.

Redia The development stage of the fluke immediately following the sporocyst stage.

Reducing Equivalent An amount of a reducing compound that donates the equivalent of 1 mole of electrons in an oxidation-reduction reaction. The electrons may be expressed in the form of hydrogen atoms.

Reduction The gain of electrons and hydrogen atoms.

Reference Culture A preserved culture used to maintain an organism with its characteristics ad originally defined.

Reflection The bouncing of light off an object.

Refraction The bending of light as it passes from one medium to another medium of different density.

Regulator Gene Gene that controls the expression of structural genes of an operon through the synthesis of a repressor protein.

Regulatory Site The promotor and operator regions of an operon.

Regulon A group of unlinked (nonadjacent) genes that are all regulated by a common mechanism.

Relapsing Fever Disease caused by various species of *Borrelia,* most commonly by *B recurrentis*; transmitted by lice.

Release The exit from the host cell of new virions, which usually kills the host cell.

Release Factors Independent protein factors that are necessary participants in the release of a finished polypeptide chain from a ribosome.

Rennin An enzyme from calves' stomachs used in cheese manufacture.

Reovirus A medium-sized RNA virus that has a double-capsid with no envelope; causes upper respiratory and gastrointestinal infections in humans.

Replica Plating A technique used to transfer colonies from one medium to another.

Replication Process by which an organism or structure (especially a DNA molecule) duplicates itself.

Replication Cycle The series of steps of virus replication in a host cell.

Replication Fork A site at which the two strands of the DNA double helix separate during replication and new complementary DNA strands form.

Replicon A unit in the genome that consists of an origin of replication and all the DNA that is replicated from that origin.

Repressor In an operon it is the protein that binds to the operator, thereby preventing transcription of adjacent genes.

Repressor Protein Substance produced by host cells that keeps a virus in an inactive state and prevents the infections of the cell by another phage.

Reservoir Host An infected organism that makes parasites available for transmission to other hosts.

Reservoir of Infection Site where microorganisms can persist and maintain their ability to infect.

Resident Microflora Species of microorganisms that are always present on or in an organism.

Resistance The ability of a microorganism to remain unharmed by an antimicrobial agent.

Resistance (R) Gene A component of a resistance plasmid that confers resistance to a specific antibiotic or to a toxic metal.

Resistance (R) Plasmid A plasmid that carries genes that provide resistance to various antibiotics or toxic metals. *Known also as R Factor.*

Resistance Transfer Factor (RTF) A component of a resistance plasmid that implements transfer by conjugation of the plasmid.

Resolution The ability of an optical device to show two items as separate and discrete entities rather than a fuzzily overlapping image.

Resolving Power A numerical measure of the resolution of an optical instrument.

Respiration With respect to energy metabolism, the process in which cellular energy is generated through the oxidation of nutrient molecules with O_2 as the ultimate electron acceptor. This type of respiration is also called *cellular respiration* to distinguish it from respiration in the sense of breathing.

Respiratory Anaphylaxis Life-threatening allergy in which airways become constructed and filled with mucous secretions.

Respiratory Bronchiole Microscopic channel in the lower respiratory system that ends in a series of alveoli.

Respiratory Chain The electron transport chain that is employed during cellular respiration and has O_2 as the ultimate electron acceptor.

Respiratory Syncytial Virus (RSV) Cause of lower respiratory infections affecting children under 1 year old, causes cells in culture to fuse their plasma membranes and become multinucleate masses (syncytia).

Respiratory System Body system that moves oxygen from the atmosphere to the blood and removes carbon dioxide and other wastes from the blood.

Resting Potential The voltage difference that exists across the membrane of an excitable cell, such as a nerve cell, except in places when an action potential is in progress. It is a consequence of the ion gradients that are maintained across the membrane.

Restriction Endonuclease Enzymes that catalyze the double-strand cleavage of DNA at specific base sequences. Many restriction endonucleases with

different sequence specificities have been found in bacteria; they are used extensively in molecular genetics.

Restriction Enzyme Another term for RESTRICTION ENDONUCLEASE.

Restriction Fragment Length Polymophism (RFLP) (1) A short piece of DNA snipped out by restriction enzymes. (2) A type of genetic polymorphism that is readily detected by Southern blotting and can be used to screen for genetic diseases. It is based on the fact that alleles often have different restriction Endonuclease cleavage sites and therefore produce different arrays of fragments upon cleavage with appropriate endonucleases.

Reticulate Body An intracellular stage in the life cycle of chlamydias.

Retinoids Substances that are derived from retinoic acid (a form of vitamin A) and act as intercellular mediators; they are particularly important in regulating development.

Retrovirus An enveloped RNA virus that uses its own reverse transcriptase to transcribe its RNA into DNA in the cytoplasm of the host cell.

Retroviruses A family of RNA viruses that possess reverse transcriptase. After the virus infects a cell, this enzyme transcribes the RNA genome into a double-strand DNA version, which integrates into a host chromosome. Human immunodeficiency virus (HIV) is a retrovirus.

Reverse Transcriptase An enzyme found in retroviruses that synthesizes a double-strand DNA molecule from a single-strand RNA template. It is an important tool in molecular genetics.

Reverse Transcription An enzyme found in retroviruses that copies RNA into DNA.

R Factor See ▶ Resistance (R) Plasmid.

R Group An organic chemical group attached to the central carbon atom in an amino acid.

Rhabdovirus A rod-shaped, enveloped RNA virus that infects insects, fish, various other animals, and some plants.

Rh Antigen An antigen found on some red blood cells, discovered in the cells of Rhesus monkeys.

Rheumatic Fever A multisystem disorder following infection by β-hemolytic *Streptococcus pyogenes* that can cause heart damage.

Rheumatoid Arthritis Autoimmune disease that affects mainly the joints but can extend to other tissues.

Rheumatoid Factor IgM found in the blood of patients with rheumatoid arthritis, and their relatives.

Rhinovirus A virus that replicates in cells of the upper respiratory tract and causes the common cold.

Ribonucleic Acid (RNA) Nucleic acid that carries information from DNA to sites where proteins are manufactured in cells and that directs and participates in the assembly of proteins.

Ribosomal RNA (rRNA) A type of RNA that, together with specific proteins, makes up the ribosomes.

Ribosome Site for protein synthesis consisting of RNA and protein, located in the cytoplasm.

Ribosomes Large protein – RNA complexes that are responsible for synthesizing polypeptides under the direction of mRNA templates.

Rickettsialpox Mild rickettsial disease with symptoms resembling those of chickenpox; caused by *Rickettsia akari* and carried by mites found on house mice.

Rickettsias Small, nonmotile, Gram-negative organisms, obligate intercellular parasites of mammalian and anthropod cells.

Rifamycin An antibacterial agent that inhibits ribonucleic and (RNA) synthesis.

Rift Valley Fever Disease caused by bunyaviruses that occurs in epidemics.

Ringworm A highly contagious fungal skin disease that can cause ringlike lesions.

River Blindness See ▶ Onchocerciasis.

RNA Editing A type of RNA processing that has been found in the mitochondrial mRNAs of certain eukaryotes, in which the RNA sequence is altered by the insertion of uridine residues at specific sites.

RNA Polymerase An enzyme that binds to one strand of exposed DNA during transcription and catalyzes the synthesis of RNA from the DNA template.

RNA Primer During DNA replication, the short stretch of RNA nucleotides that is laid down at the beginning of each Okazaki fragment; it provides a 3′ –OH end from which DNA polymerase can extend the fragment, It is later replaced with DNA.

RNA Tumor Virus Any retrovirus that causes tumors and cancer.

Rocky Mountain Spotted Fever Disease caused by *Rickettsia rickettsia* and transmitted by ticks.

Rotavirus Virus transmitted by the fecal-oral route that replicates in the intestine, causing diarrhea and enteritis.

Roundworm A worm with a long, cylindrical, unsegmented body and a heavy cuticle. *Known also as a Nematode.*

Rubella Viral disease characterized by a skin rash; can cause severe congenital damage. *Known also as German Measles.*

Rubeola See ▶ Measles.

Rubisco (Ribulose Bisphosphate Carboxylase-Oxygenase) The enzyme that accomplishes carbon

fixation in photosynthesis by adding CO_2 to ribulose-1,5-bisphosphate. It can also add O_2 in place of CO_2, initiating photorespiration.

Rule of Octets Principle that an element is chemically stable if it contains eight electrons in its outer shell.

Sac Fungus A member of a diverse group of fungi that produces saclike asci during sexual reproduction. *Known also as Ascomycota.*

St. Anthony's Fire See ► Erysipelas.

St. Louis Encephalitis Type of viral encephalitis most often seen in humans in the central United States.

Salmonellosis A common enteritis characterized by abdominal pain, fever, and diarrhea with blood and mucus; caused by *Salmonella* species.

Sapremia A condition caused when saprophytes release metabolic products into the blood.

Saprophyte An organism that feeds on dead or decaying organic matter.

Sarcina A group of eight cocci in a cubicle packet.

Sarcodine An amoeboid protozoan.

Sarcoplasmic Reticulum A network of membranous tubules that surrounds each myofibril in a skeletal muscle cell. It is a specialized region of endoplasmic reticulum; its main function is to sequester and then release the Ca^{2+} that triggers myofibril contraction.

Sarcoptic Manage See ► Scabies.

Satellite DNA DNA consisting of multiple tandem repeats of very short, simple nucleotide sequences. It typically makes up 10% to 20% of the genome of higher eukaryotes; at least some of it may play a role in chromosome structure.

Saturated Fatty Acid A fatty acid containing only carbon-hydrogen single bonds.

Scabies Highly contagious skin disease caused by the itch mite *Sarcoptes scabiei. Known also as Sarcoptic Mange.*

Scalded Skin Syndrome Infection caused by staphylococci consisting of large, soft vesicles over the whole body.

Scanning Electron Microscope (SEM) A type of electron microscopy in which a beam of electrons is scanned across an object, and the pattern of reflected electrons is analyzed to crease an image of the object's surface. This type of microscope is used to study the surfaces of specimens. Compare ► Transmission Electron Microscopy.

Scanning Tunneling Microscope (STM) Also called scanning probe microscope; type of microscope in which electron tunnel into each other's clouds, can show individual molecules, live specimens, and work underwater.

Scarlet Fever (sometimes called scarlatina) Infection caused by *Streptococcus pyogenes* that produces an erythrogenic toxin.

Schaeffer-Fulton Spore Staining A differential stain used to make endospores easier to visualize.

Schick Test Test to determine immunity to diphtheria.

Schistosomiasis Disease of the blood and lymph caused by blood fluke of the genus *Schistosoma. Known also as Bilharzia.*

Schizogony Multiple fission, in which one cell gives rise to many cells.

Scolex Head end of a tapeworm, with suckers and sometimes hooks that attach to the intestinal wall.

Scrapie Transmissible spongiform encephalopathy disease of the brain of sheep, causing extreme itching so that the sheep repeatedly scrape themselves against posts, trees, etc.

Scrub Typhus A typhus caused by *Rickettsia tsutsugamushi*, transmitted by mites that feed on rats. *Known also as Tsutsugamushi.*

Sebaceous Gland Epidermal structure, associated with hair follicles, that secretes an oily substance called sebum.

Sebum Oily substance secreted by the sebaceous glands.

Secondary Immunodeficiency Disease Result of damage to T cells or B cells after they have developed normally.

Secondary Infection Infection that follows a primary infection, especially in patients weakened by the primary infection.

Secondary Response The folding or coiling of a polypeptide chain into a particular pattern, such as a helix or pleated sheet.

Secondary Structure (1) Local folding of the backbone of a linear polymer to form a regular, repeating structure. The B- and Z-forms of the DNA helix and the α-helix and β-sheet structures of polypeptides are examples. Compare ► Primary Structure, ► Quaternary Structure, and ► Tertiary Structure. (2) The folding or coiling of a polypeptide chain into a particular pattern such as a helix or pleated sheet.

Secondary Treatment Treatment of sewage by biological means to remove remaining solid wastes after primary treatment.

Second Law of Thermodynamics The law that states that the entropy in a closed system never decreases. An alternative statement is that processes that are thermodynamically favored at constant temperature and pressure involve a decrease in free energy.

Second Messenger An intercellular substance that relays an Extracellular signal (such as a hormonal signal) from the cell membrane to intracellular effector proteins.

Second-Order Reaction A reaction in which two reactant molecules must come together for the reaction to occur. The reaction is called second-order because the reaction rate depends on the square of reactant concentration (for two molecules of the same reactant) or on the product of two reactant concentrations (for two different reactants). Compare ► First-Order Reaction.

Secretory Piece A part of the IgA antibody that protects the immunoglobulin from degradation and helps in the secretion of the antibody.

Secretory Vesicle Small membrane-enclosed structure that stores substances coming from the Golgi apparatus.

Sedimentation Coefficient (*S*) A coefficient that determines the velocity at which a particular particle will sediment during centrifugation; it depends on the density of the medium, the specific density of the particle, and the size, shape, and mass of the particle.

Sedimentation Equilibrium A technique for using centrifugation to measure the mass of a large molecule such as a protein. A solution of the substance is centrifuged at low speed until the tendency of the substance to sediment is balanced by its tendency to diffuse to uniform concentration; the resulting concentration gradient is used to measure the molecular mass.

Selectively Permeable Able to prevent the passage of certain specific molecules and ions while allowing others through.

Selective Medium A medium that encourages growth of some organisms and suppresses growth of others.

Selective Toxicity The ability of an antimicrobial agent to harm microbes without causing significant damage to the host.

Self Molecules that are not recognized as antigenic or foreign by an organism.

Semen The male fluid discharge at the time of ejaculation, containing sperm and various glandular and other secretions.

Semiconservative Replication Replication in which a new DNA double helix is synthesized from one strand of parent DNA and one strand of new DNA.

Seminal Vesicle A saclike structure whose secretions form a component of semen.

Semisynthetic Drug An antimicrobial agent made partly by laboratory synthesis and partly by microorganisms.

Sense Codon A set of three DNA (or mRNA) bases that code for an amino acid.

Sense Strand For a gene, the DNA strand that is homologous to an RNA transcript of the gene – that is, it carries the same sequence as the transcript, except with T in place of U. It is thus complementary to the strand that served as a template for the RNA.

Sensitization Initial exposure to an antigen, which causes the host to mount an immune response against it.

Septicemia An infection caused by rapid multiplication of pathogens in the blood. *Known also as Blood Poisoning.*

Septicemic Plague Fatal form of plague that occurs when bubonic plague bacteria move from the lymphatics to the circulatory system.

Septic Shock A life-threatening septicemia with low blood pressure and blood-vessel collapse, caused by endotoxins.

Septic Tank An underground tank for receiving sewage, where solid material settle out as sludge, which must be pumped periodically.

Septum (plural: *septa*) A cross-wall separating two fungal cells.

Sequela (plural: *sequelae*) The aftereffect of a disease; after recovery from it.

Serial Dilution A method of measurement in which successive 1:10 dilutions are made from the original sample.

Seroconversion The identification of a specific antibody in serum as a result of an infection.

Serology The branch of immunology dealing with laboratory tests to detect antigens and antibodies.

Serovar Strain; a subspecies category.

Serum The liquid part of blood after cells and clotting factors have been removed.

Serum Hepatitis See ► Hepatitis B.

Serum Killing Power Test used to determine effectiveness of an antimicrobial agent in which a bacterial suspension is added to the serum of a patient whose is receiving an antibiotic; and incubated.

Serum Sickness Immune complex disorder that occurs when foreign antigens in seta cause immune complexes to be deposited in tissues.

Severe Combined Immunodeficiency (SCID) Primary immunodeficiency disease caused by failure of stem cells to develop properly, resulting in deficiency of both B and T cells.

Sewage Used water and the wastes it contains.

Sex Factors Plasmids that specify gene products that enable bacteria to engage in conjugation (bacterial mating).

Sexually Transmitted Disease (STD) An infectious disease spread by sexual activities.

Shadow Casting The coating of electron microscopy specimens with a heavy metal, such as gold or palladium, to create a three-dimensional effect.

Shigellosis Gastrointestinal disease caused by several strains of *Shigella* that invade intestinal lining cells. *Known also as Bacillary Dysentery.*

Shinbone Fever See ► Trench Fever.

Shingles Sporadic disease caused by reactivation of varicella-zoster herpesvirus that appears most frequently in older and Immunocompromised individuals.

Shrub of Life A diagram that represents our current understanding of the early evolution of life. There are many roots rather than a single ancestral line, and the branches criss-cross and merge again and again.

Sickle-Cell Disease A genetic disease resulting from a hemoglobin mutation. It produces fragile erythrocytes, leading to anemia.

Sign A disease characteristic that can be observed by examining the patient, such as swelling or redness.

Signal Recognition Particles (SRPs) Cytoplasmic particles that dock ribosomes on the surface of the endoplasmic reticulum (ER) if the nascent polypeptide is destined to be processed by the ER. The SRP recognizes and binds to a specific N-terminal signal sequence on the nascent polypeptide.

Simple Diffusion The net movement of particles from a region of higher to one of lower concentration; does not require energy from a cell.

Signal Sequence See ► Leader Sequence.

Simple Stain A single dye used to reveal basic cell shapes and arrangements.

Single-Cell Protein (SCP) Animal feed consisting of microorganisms.

Sinus A large passageway in tissues, lined with phagocytic cells.

Sinusitis An infection of the sinus cavities.

Sinusoid An enlarged capillary.

Site-Directed Mutagenesis A technique by which a specific mutation is introduced at a specific site in a cloned gene. The gene can then be introduced into an organism and expressed.

6–4 Photoproduct A type of DNA damage caused by UV irradiation in which a bond forms between carbon-6 of one pyrimidine base and carbon-4 of an adjacent pyrimidine base. This type of photoproduct appears to be the chief cause of UV-induced mutations.

Skin The largest single organ of the body that presents a physical barrier to infection by microorganisms.

Slime Layer A thin protective structure loosely bound to the cell wall that protects the cell against drying, helps trap nutrients, and sometimes binds cells together.

Slime Mold A funguslike protist.

Sludge Solid matter remaining from water treatment that contains aerobic organisms that digest organic matter.

Sludge Digester Large fermentation tank in which sludge is digested by anerobic bacteria into simple organic molecules, carbon dioxide, and methane gas.

Small Intestine The upper area of the intestine where digestion is completed.

Smallpox A formerly worldwide and serious viral disease that has now been eradicated.

Smear A thin layer of liquid specimen spread out on a microscopic slide.

Solute The substance dissolved in a solvent to form a solution.

Solution A mixture of two or more substances in which the molecules are evenly distributed and will not separate out on standing.

Solvent The medium in which substances are dissolved to form a solution.

Somatic Mutation A mutation that occurs in a cell of an organism other than a germ-like cell; it may affect the organism in which it occurs, but it cannot be passed on to progeny.

Sonication The disruption of cells by sound waves.

SOS Response A bacterial response to various potentially lethal stresses, including severe UV irradiation. It involves the coordinated expression of a set of proteins that carry out survival maneuvers, including an error-prone type of repair for thymine dimers in DNA.

Southern Blotting A technique for detecting the presence of a specific DNA sequence in a genome. The DNA is extracted, cleaved into fragments, separated by gel electrophoresis, denatured, and blotted onto a nitrocellulose filter. There it is incubated under annealing conditions with a radiolabeled probe for the sequence in question, and heteroduplexes of the probe with genomic DNA are detected by radioautography.

Specialized Transduction Type of transduction in which the bacterial DNA transduced is limited to one or a few genes lying adjacent to a prophage that are accidentally included when the prophage is excised from the bacterial chromosome.

Species A group of organisms wit many common characteristics; the narrowest taxon.

Species Immunity Innate or inborn genetic immunity.

Specific Defense A host defense that operates in response to a particular invading pathogen.

Specific Epithet The second name of an organism in the binomial system of nomenclature, following that of the genus – for example, *coli* in *Escherichia coli.*

Specific Immunity Defense against a particular microbe.

Specificity (1) The property of an enzyme that allows it to accept only certain substrates and catalyze only one particular reaction. (2) The property of a virus that restricts it to certain specific types of host cells. (3) The ability of the immune system to mount a unique immune response to each antigen it encounters.

Spectrophotometer An instrument that exposes a sample to light of defined wavelengths and measures the absorbance. Different types of spectrophotometers operate in different wavelength ranges, such as ultraviolet, visible, and infrared.

Spectrum of Activity Refers to the range of different microbes against which are antimicrobial agent is effective.

Spheroplast A Gram-negative bacterium that lacks the cell wall but had not lysed.

Spike A glycoprotein projection that extend to form the viral capsid or envelope and is used to attach to or fuse with host cells.

Spindle Apparatus A system of microtubules in the cytoplasm of a eukaryotic cell that guides the movement of chromosomes during mitosis and meiosis.

Spin Label A substance that has an unpaired electron detectable by electron spin resonance and that is used as a chemical label.

Spirillar Fever A form of rat bite fever, caused by *Spirillum minor*, first described as sodoku in Japan.

Spirillum (plural: *spirilla*) A flexible, wavy-shaped bacterium.

Spirochetes Corkscrew-shaped motile bacteria.

Spleen The largest lymphatic organ; acts as a blood filter.

Spliceosome A protein-RNA complex in the nucleus that is responsible for splicing introns out of RNA transcripts.

Spontaneous Generation The theory that living organisms can arise from nonliving things.

Spontaneous Mutation A mutation that occurs in the absence of any agent known to cause changes in DNA; usually caused by errors during DNA replication.

Sporadic Disease A disease that is limited to a small number of isolated case posing no great threat to a large population.

Spore A resistant reproductive structure formed by fungi and actinomycetes; different from a bacterial endospore.

Spore Coat A keratinlike protein material that is lad down around the cortex of an endospore by the mother cell.

Sporocyst Larval form of a fluke that develops in the body of its snail or mollusk host.

Sporotrichosis Fungal skin disease caused by *Sporothrix schenckii* that often enters the body from plants.

Sporozoite A malaria trophozoite present in the salivary glands of infected mosquitoes.

Sporulation The formation of spores such as endospores.

Spread Plate Method A technique used to prepare pure cultures by placing a diluted sample of cells on the surface of an agar plate and then spreading the sample evenly over the surface.

Stain A molecule that can bind to a structure and give it color. *Known also as a Dye.*

Standard Bacterial Growth Curve A graph plotting the number of bacteria versus time and showing the phases of bacterial growth.

Standard Reduction Potential (E_0) For a given pair consisting of an electron donor and its conjugate acceptor, the reduction potential under standard conditions (25°C; donor and acceptor both at 1 m concentration).

Standard State A reference state, with respect to which thermodynamic quantities (such as chemical potentials) are defined. For substances in solution, standard state indicates 1 m concentration at 1 atm pressure and 25°C.

Start Codon The first codon in a molecule of mRNA which begins the sequence of amino acids in protein synthesis; in bacteria it always codes for methionine.

Stationary Phase The third of four major phases of the bacterial growth curve in which new cells are produced at the same rate that old cells die, leaving the number of live cells constant.

Sterility The state in which there are no living organisms in or on a material.

Sterilization The killing or removal of all microorganisms in a material or on an object.

Steroid A lip having a four-ring structure, includes cholesterol, steroid hormones, and vitamin D.

Stock Culture A reserve culture used to store an isolated organism in pure condition for use in the laboratory.

Stop Codon (1) The last codon to be translated in a molecule of mRNA, causing the ribosome to release from the mRNA. (2) RNA codons that signal a ribosome to stop translating an mRNA and to release the polypeptide. In the normal genetic code, they are UAG, UGA, and UAA.

Strain A subgroup of a species with one or more characteristics that distinguish it from other subgroups of that species.

Streak Plate Method Method used to prepare pure cultures in which bacterial are lightly spread over the surface of agar plates, resulting in isolated colonies.

Streptococci Aerotolerant anerobes that form pairs, tetrads, or chains by dividing in one or two planes; most lack the enzyme catalase.

Streptokinase A bacterially produced enzyme that digests (dissolves) blood clots.

Streptolysin Toxin produced by streptococci that kills phagocytes.

Streptomycetes Gram-positive, filamentous, sporing, soil-dwelling bacteria, produces of many antibiotics.

Streptomycin An antibacterial agent that blocks protein synthesis.

Stringent Response A mechanism that inhibits the expression of all structural genes in bacteria under conditions of amino acid starvation. It involves inhibition of the synthesis of ribosomal and transfer RNAs.

Stroma The fluid-filled inner portion of a chloroplast.

Stromatolite Live or fossilized layered mats of photosynthetic prokaryotes associated with warm lagoons or hot springs.

Strongyloidiasis Parasitic disease caused by the roundworm *Stongyloides stercoralis* and a few closely related species.

Structural Gene A gene that carries information for the synthesis of a specific polypeptide.

Structural Protein A protein that contributes to the structure of cells, cell parts, and membranes.

Sty An infection at the base of an eyelash.

Subacute Disease A disease that is intermediate between an acute and a chronic disease.

Subacute Sclerosing Panencephalitis (SSPE) A complication of measles, nearly always fatal, that is due to the persistence of measles viruses in brain tissue.

Subclinical Infection See ► Inapparent Infection.

Subculturing The process by which cells from an existing culture are transferred to fresh medium in new containers.

Substrate (1) The substance on which an enzyme acts. (2) A surface or food source on which a cell can grow or a spore can germinate.

Substrate-Level Phosphorylation Synthesis of a nucleoside triphosphate (usually ATP) driven by the breakdown of a compound with higher phosphate transfer potential.

Suicide Inhibitor An enzyme inhibitor on which the enzyme can act catalytically but which irreversibly alters the active site of the enzyme in the process. (It is called a suicide inhibitor because the enzyme "commits suicide" by acting on it.)

Sulfate Reduction The reduction of sulfate ions to hydrogen sulfide.

Sulfonamide A synthetic, bacteriostatic agent that blocks the synthesis of folic acid. *Known also as Sulfa Drugs.*

Sulfur Cycle The cyclic movement of sulfur through an ecosystem.

Sulfur Oxidation The oxidation of various forms of sulfur to sulfate.

Sulfur Reduction The reduction of elemental sulfur to hydrogen sulfide.

Superantigens Powerful antigens, such as bacterial toxins, that activate large numbers of T cells, causing a large immune response that can cause diseases such as toxic shock.

Supercoiling For a DNA double helix, turns of the two strands around each other that either exceed or are fewer than the number of turns in the most stable helical conformation. Only a helix that is circular or else fixed at both ends can support supercoiling, See ► Twist.

Superhelix Density (σ) A measure of the superhelicity of a DNA molecule. It is equal to the change in linking number caused by the introduction of supercoiling divided by the linking number the DNA molecule would have in its relaxed state.

Superinfection A secondary infection from the removal of normal microbiota, allowing colonization by pathogenic, and often antibiotic-resistant, microbes.

Superoxide A highly reactive form of oxygen that kills obligate anaerobes.

Superoxide Dismutase An enzyme that converts superoxide to molecular oxygen and hydrogen peroxide.

Suppression With respect to mutations, a mutation that occurs at a different site from that of an existing mutation in a gene but restores the wild-type phenotype.

Suppressor T Cell (T_S) Possibly a type of cytotoxic or helper T cells that inhibits immune responses.

Surface Tension A phenomenon in which the surface of water behaves like a thin, invisible elastic membrane.

Surfactant A substance that reduces surface tension.

Susceptibility The vulnerability of an organism to harm by infectious agents.

Svedberg Unit (S) In ultracentrifugation, a unit used for the sedimentation coefficient; it is equal to 10^{-13} second.

Swarmer Cell Spherical, flagellated *Rhizobium* cell that invades the root hairs of leguminous plants, eventually to form nodules.

Sweat Gland Epidermal structure that empties a watery secretion through pores in the skin.

Swimmer's Itch Skin reaction to cercariae of some species of the helminth *Schistosoma*.

Symbiosis The living together of two different kinds of organisms.

Symport A membrane transport process that couples the transport of a substrate in one direction across a membrane to the transport of a different substrate in the same direction. Compare ► Antiport.

Symptom A disease characteristic that can be observed or felt only by the patient, such as pain or nausea.

Synchronous Growth Hypothetical pattern of growth during the log phase in which all the cells in a culture divide at the same time.

Syncytium (plural: *syncytia*) A multinucleate mass in a cell culture, for example, caused by the respiratory syncytial virus.

Syndrome A combination of signs and symptoms that occur together.

Synergism Referring to an inhibitory effect produced by two antibiotics working together that is greater than either can achieve alone.

Synthesis The step of viral replication during which new nucleic acids and viral proteins are made.

Synthetic Drug An antimicrobial agent synthesized chemically in the laboratory.

Synthetic Medium A growth medium prepared in the laboratory from materials of precise or reasonably well-defined composition.

Syphilis A sexually transmitted disease, caused by the spirochete *Treponema pallidum*, characterized by a chancre at the site of entry and often eventual neurological damage.

Systemic Blastomycosis Disease resulting from invasion by *Blastomyces dermatitides* of internal organs, especially the lungs.

Systemic Infection An infection that affects the entire body. *Known also as a Generalized Infection.*

Systemic Lupus Erythematosus A widely disseminated, systemic autoimmune disease resulting from production of antibodies against DNA and other body components.

Tapeworm Flatworm that lives in the adult stage as a parasite in the small intestine of animals.

Tartar Calcium deposition on dental plaque forming a very rough, hard crust.

Tautomers Structural isomers that differ in the location of their hydrogen and double bonds.

Taxon (plural: *taxa*) A category used in classification, such as species, genus, order, family.

Taxonomy The science of classification.

Tay-Sachs Disease A genetic disease caused by a deficiency of the lysosomal enzyme N-acetylhexosaminidase A, which is involved in sphingolipid degradation. The deficiency results in accumulation of the ganglioside sphingolipid GM_2, particularly in the brain.

T Cell See T Lymphocyte.

T-Dependent Antigen Antigen requiring helper T cell (T_H2) activity to activate B cells.

Teichoic Acid A polymer attached to peptidoglycan in Gram-positive cell walls.

Telomerase A DNA polymerase that adds a short repeating sequence to the 3′ strand at either end of a chromosomal DNA molecule, thus creating a single-strand overhand. This overhand gives room for priming the origin of a final Okazaki fragment during DNA replication so that the full length of the chromosome can be copied.

Telomeres Special DNA sequences at the ends of eukaryotic chromosomes.

Temperate Phage A bacteriophage that does not cause a virulent infection; rather, its DNA is incorporated into the host cell chromosome, as a prophage, and replicated with the chromosome.

Temperate Phages Bacterial phages that can establish a condition of lysogeny.

Template DNA used as a pattern for the synthesis of a new nucleotide polymer in replication or transcription.

Template Strand A DNA or an RNA strand that directs the synthesis of a complementary nucleic acid strand.

Temporary Parasite A parasite that feeds on and then leaves its host (such as a biting insect).

Teratogen An agent that induces defects during embryonic development.

Teratogenesis The induction of defects during embryonic development.

Terminator See Stop Codon.

Terminator Codon A codon that signals the end of the information for a particular protein. *Known also as Nonsense Codon or Stop Codon.*

Tertiary Structure (1) The folding of a protein molecule into globular shapes. (2) Large-scale folding structure in a linear polymer that is at a higher order than secondary structure. For proteins and RNA molecules, the tertiary structure is the specific three-dimensional shape into which the entire chain is folded. Compare ► Primary Structure, ► Quaternary Structure, and ► Secondary Structure.

Tertiary Treatment Chemical and physical treatment of sewage to produce an effluent of water pure enough to drink.

Test A shell made of calcium carbonate and common to some protists.

Testis (plural: *testes*) One of a pair of male reproductive glands that produce testosterone and sperm.

Tetanus Disease caused by *Clostridium tetani* in which muscle stiffness progresses to eventual paralysis and death. *Known also as Lockjaw.*

Tetanus Neonatorum Type of tetanus acquired through the raw stump of the umbilical cord.

Tetracycline An antibacterial agent that inhibits protein synthesis.

Tetrad Cuboidal groups of four cocci.

Thallus The body of a fungus.

Theca A tightly affixed, secreted outer layer of dinoflagellates that often contains cellulose.

Therapeutic Dosage Level Level of drug dosage that successfully eliminates a pathogenic organism if maintained over a period of time.

Thermal Death Point The temperature that kills all the bacteria in a 24-hour-old broth culture at neutral pH in 10 minutes.

Thermal Death Time The time required to kill all the bacteria in a particular culture at a specified temperature.

Thermoacidophile A member of one of the groups of the archaeobacteria that live in extremely hot, acidic environments.

Thermophile A heat-loving organism that grows best at temperatures from 50 to 60°C.

Thermophilic Anaerobic Spoilage Spoilage due to endospore germination and growth in which gas and acid are produced, making cans bulge.

Thrush Milky patches of inflammation on oral mucous membranes; a symptom of Candidiasis, caused by *Candida albicans.*

Thylakoid An internal membrane of chloroplasts that contains chlorophyll.

Thymus Gland Multilobed lymphatic organ located beneath the sternum that posses lymphocytes into T cells.

Tick Paralysis A disease characterized by fever and paralysis due to anticoagulants and toxins secreted into a tick's bite via the ectoparasite's saliva.

Tincture An alcoholic solution.

T-Independent Antigen Antigen not requiring helper T cells (T_H2) activity to activate B cells.

Tinea Barbae Barber's itch; a type of ringworm that causes lesions in the beard.

Tinea Capitis Scalp ringworm, a form of ringworm in which hyphae grow in hair follicles, often leaving circular patterns of baldness.

Tinea Corporis Body ringworm, a form of ringworm that causes ringlike lesions with a central scaly area.

Tinea Cruris Groin ringworm, a form of ringworm that occurs in skin folds in the pubic region. *Known also as Jock Itch.*

Tinea Pedis See ► Athlete's Foot.

Tinea Unguium A form of ringworm that causes hardening and discoloration of fingernails and toenails.

Tissue Culture Culture made from a single tissue, assuring a reasonably homogenous set of cultures in which to test the effects of a virus or to culture an organism.

Titer The quantity of a substance needed to produce a given reaction.

T-Lymphocyte Thymus-derived cell of the immune system and agent of cellular immune responses. *Known also as T Cell.*

Togavirus A small, enveloped RNA virus that multiplies in many mammalian and anthropod cells.

Tolerance A state in which antigens no longer elicit an immune response.

Tonsilitis A bacterial infection of the tonsils.

Tonsil Lymphoid tissue that contributes immune defenses in the form of B cells and T cells.

Topoisomerases Enzymes that change the supercoiling of DNA helices by either allowing the superhelical torsion to relax (thus reducing the supercoiling) or adding more twists (thus increasing the supercoiling).

Topoisomers With respect to DNA, closed circular DNA molecules that are identical except in their sense or degree of supercoiling. DNA topoisomers can be interchanged only by cutting one or both strands using topoisomerases.

TORCH Series A group of blood tests used to identify teratogenic diseases in pregnant women and newborn infants.

Total Magnification Obtained by multiplying the magnifying power of the objective lens by the magnifying power of the ocular lens.

Toxemia The presence and spread of exotoxins in the blood.

Toxic Dosage Level Amount of a drug necessary to cause host damage.

Toxic Shock syndrome (TSS) Condition caused by infection with certain toxigenic strains of *Staphylococcus aureus*; often associated with the use of super absorbent but abrasive tampons.

Toxin Any substance that is poisonous to other organisms.

Toxoid An exotoxin inactivated by chemical treatment but which retains its antigenicity and therefore can be used to immunize against the toxin.

Toxoplasmosis Disease caused by the protozoan *Toxoplasma gondii* that can cause congenital defects in newborns.

Trace Element Minerals, such as copper, iron, zinc, and cobalt ions, that are required in minute amounts for growth.

Trachea The windpipe.

Trachoma Eye disease caused by *Chlamydia trachomatis* that can result in blindness.

Transamination In the cell, the enzymatic transfer of an amino group from an amino group a keto acid. The keto acid becomes an amino acid and vice versa.

Transcription The synthesis of an RNA molecule complementary to a DNA strand; the information encoded in the base sequence of the DNA is thus "transcribed" into the RNA version of the same code. Compare ► Translation.

Transcription Factors Proteins that influence the transcription of particular genes, usually by binding to specific promoter sites.

Transduction The transfer of genetic material from one bacterium to another by a bacteriophage.

Transfer RNA (tRNA) Type of RNA that transfers amino acids from the cytoplasm to the ribosomes for placement in a protein molecule.

Transformation A change in an organism's characteristics through the transfer of naked DNA.

Transfusion Reaction Reaction that occurs when matching antigens and antibodies are present in the blood at the same time.

Transgenic (1) State of permanently changing an organism's characteristics by integrating foreign DNA (genes) into the organism. (2) Refers to an organism whose genome contains one or more DNA sequences from a different species (transgenes). Genetic engineering can be used to create transgenic animals.

Transient Microflora Microorganisms that may be present in or on an organism under certain conditions and for certain lengths of time t sites where resident microbiota.

Transition State In any chemical reaction, the high-energy or unlikely state that must be achieved by the reacting molecule(s) for the reaction to occur.

Translation The synthesis of a polypeptide under the direction of an mRNA, so that the nucleotide sequence of the mRNA is "translated" into the amino acid sequence of the protein. Compare ► Transcription.

Transmissible Spongiform Encephalopathies Prion-caused diseases resulting in brain tissue developing multiple holds such that it resembles a sponge, includes Creutzfeldt-Jakob disease, mad cow disease, kuru, scrapie and others.

Transmission The passage of light through an object.

Transmission Electron Microscope (TEM) A type of electron microscopy in which a beam of electrons passes through the object to be viewed and creates an image on a photographic plate or screen. Very thin slices of specimens are used.

Transovarian Transmission Passing of pathogen from one generation of ticks to the next as eggs leave the ovaries.

Transplantation The moving of tissue from one site to another.

Transplant Rejection Destruction of grafted tissue or of a transplanted organ by the host immune system.

Transposable Element A mobile genetic sequence that can move from one plasmid to another plasmid or chromosome.

Transposable Genetic Elements Genetic elements that are able to move from place to place within a genome. A Transposon is one type of transposable element.

Transposal of Virulence A laboratory technique in which a pathogen is passed from its normal host sequentially through many individual members of a new host species, resulting in a lessening or even total loss of its virulence in the original host.

Transposase An enzyme that is involved in the insertion of a bacterial Transposon into a target site.

Transposition The process whereby certain genetic sequences in bacteria or eukaryotes can move from one location to another.

Transposon A mobile genetic sequence that contains the genes for transposition as well as one or more other genes not related to transposition.

Traumatic Herpes Type of herpes infection in which the virus enters traumatized skin in the area of a burn or other injury.

Traveler's Diarrhea Gastrointestinal disorder generally caused by pathogenic strains of *Escherichia coli*.

Trench Fever Rickettsial disease, caused by *Rochalimaea Quintana*, resembling epidemic typhus in that is transmitted by lice and is prevalent during wars and under unsanitary conditions. *Known also as Shinbone Fever.*

Treponemes Spirochetes belonging to the genus *Treponema.*

Triacylglycerol A molecule formed from three fatty acids bonded to glycerol.

Tricarboxylic Acid Cycle See ► Citric Acid Cycle and ► Krebs Cycle.

Trichinosis A disease caused by a small nematode, *Trichinella spiralis*, that enters the digestive tract

as encysted larvae in poorly cooked meat, usually pork.

Trichocyst Tentaclelike structure on ciliates for catching prey for attachment.

Trichomoniasis A parasitic urogenital disease, transmitted primarily by sexual intercourse, that causes intense itching and a copious white discharge, especially in females.

Trichuriasis Parasitic disease caused by the whipworm, *Trichuris trichiura*, that damages intestinal mucosa and causes chronic bleeding.

Trickling Filter System Procedure in which sewage is spread over a bed of rocks coated with aerobic organisms that decompose the organic matter in it.

Trophozoite Vegetative form of a protozoan such as *Plasmodium*.

Trypanosomiasis See ▶ African Sleeping Sickness.

Tube Agglutination Test Serologic test that measures antibody titers by comparing various dilutions of the patient's serum against known quantities of an antigen.

Tubercle A solidified lesion or chronic granuloma that forms in the lungs in patients with tuberculosis.

Tuberculin Hypersensitivity Cell-mediated hypersensitivity reaction that occurs in sensitized individuals when they are exposed to tuberculin.

Tuberculin Skin Test An immunological test for tuberculosis in which a purified protein derivative from the *Mycobacterium tuberculosis* is injected subcutaneously, resulting in an induration if there was previous exposure to the bacterium.

Tuberculoid Referring to the anesthetic form of Hansen's (disease leprosy) in which areas of skin lose pigment and sensation.

Tuberculosis Disease caused mainly by *Mycobacterium tuberculosis*.

Tularemia Zoonosis caused by *Francisella tularensis*, most often associated with cottontail rabbits.

Tumor An uncontrolled division of cells, often caused by viral infection.

Turbidity A cloudy appearance in a culture tube indicating the presence of organisms.

Turnover Number With respect to an enzyme-catalyzed reaction, the number of substrate molecules one enzyme molecule can process (turn over) per second when saturated with substrate. It is equivalent to the catalytic rate constant, k_{cat}.

Twist (*T*) With respect to a DNA double helix, the total number of times the two strands of the helix cross over each other, excluding writhing. It is a measure of how tightly the helix is wound. See also ▶ Linking Number and ▶ Writhe.

Tympanic Membrane Membrane separating the outer and middle ear. *Known also as the Eardrum.*

Type Strain Original reference strain of a bacterial species, descendants of a single isolation in pure culture.

Typhoidal Tularemia Septicemia that resembles typhoid fever, caused by bacteremia from tularemia lesions.

Typhoid Fever An epidemic enteric infection caused by *Salmonella typhi*, uncommon in areas with good sanitation.

Typhus Fever Rickettsial disease that occurs in a variety of forms including epidemic, endemic (murine), and scrub typhus.

Tyrocidin An antibacterial agent that disrupts cell membranes.

Ulceroglandular Referring to the form of tularemia caused by entry of *Francisella tularensis* through the skin and characterized by ulcers on the skin and enlarged regional lymph nodes.

Ultrafiltration The technique of filtering a solution under pressure through a Semipermeable membrane, which allows water and small solutes to pass through but retains macromolecules.

Ultra-High Temperature (UHT) Processing A method of sterilizing milk and dairy products by raising the temperature to 87.8°C for three seconds.

Uncoating Process in which protein coats of animal viruses that have entered ells are removed by proteolytic enzymes.

Undulant Fever See ▶ Brucellosis.

Universal Precautions A set of guidelines established by the CDC to reduce the risks of disease transmission in hospital and medical laboratory settings.

Unsaturated Fatty Acid A fatty acid that contains at least one double bond between adjacent carbon atoms.

Upper Respiratory Tract The nasal cavity, pharynx, larynx, trachea, bronchi, and larger bronchioles.

Ureaplasmas Bacteria with unusual cell walls, require sterols as a nutrient.

Ureter Tube that carries urine from the kidney to the urinary bladder.

Urethra Tube through which urine passes from the bladder to the outside during micturition (urination).

Urethritis Inflammation of the urethra.

Urethrocystitis Common term used to describe urinary tract infections involving the urethra and the bladder.

Urinalysis The laboratory analysis of urine specimens.

Urinary Bladder Storage area for urine.

Urinary System Body system that regulates the composition of body fluids and removes nitrogenous and other wastes from the body.

Urinary Tract Infection (UTI) A bacterial urogenital infection that causes Urethritis or cystitis.

Urine Water collected in the kidney tubules.

Urogenital System Body system that (1) regulates the composition of body fluids and removes certain wastes from the body and (2) enables the body to participate in sexual reproduction.

Use-Dilution Test A method of evaluating the antimicrobial properties of a chemical agent using standard preparations of certain test bacteria.

Uterine Tube A tube that conveys ova from the ovaries to the uterus. *Known also as Fallopian Tubes or Oviducts.*

Uterus The pear-shaped organ in which a fertilized ovum implants and develops.

Vaccine A substance that contains an antigen to which the immune system responds.

Vacuole A membrane-bound structure that stores materials such as food or gas in the cytoplasm or eukaryotic cells.

Vagina The female genital canal, extending from the cervix to the outside of the body.

Vaginitis Vaginal infection, often caused by opportunistic organisms that multiply when the normal vaginal Microflora are disturbed by antibiotics or other factors.

Van der Waals Radius (r) The effective radius of an atom or a molecule that defines how close other atoms or molecules can approach; it is thus the effective radius for closest molecular packing.

Variable Anything that can change in an experiment.

Varicella-Zoster Virus A herpesvirus that causes both chickenpox and shingles.

Vasodilation Dilation of the capillary and venule walls during an acute inflammation.

Vector (1) A self-replicating carrier of DNA; usually a plasmid, bacteriophage, or eukaryotic virus. (2) An organism that transmits a disease-causing organism from one host to another. (3) In genetic engineering, a DNA molecule that can be used to introduce a DNA sequence into a cell where it will be replicated and maintained. Usually a plasmid or a viral genome.

Vegetation A growth that forms on damaged heart valve surfaces in bacterial endocarditis, exposed collagen fibers elicit fibrin deposits, and transient bacteria attach to the fibrin.

Vegetative Cell A cell that is actively metabolizing nutrients.

Vehicle A nonliving carrier of an infectious agent from its reservoir to a susceptible host.

Venezuelan Equine Encephalitis Type of viral encephalitis seen in Florida, Texas, Mexico, and South America; infects horses more frequently than humans.

Verminous Intoxication An allergic reaction to toxins in the metabolic wastes of liver flukes.

Verruga Peruana One form of bartonellosis; a chronic nonfatal skin disease.

Vertical Gene Transfer Genes that pass from parents to offspring.

Vertical Transmission Direct contact transmission of disease in which pathogens are passed from parent to offspring in an egg or sperm, across the placenta, or while traversing the birth canal.

Very Low-Density Lipoprotein (VLDL) A type of lipoprotein particle that is manufactured in the liver and functions mainly to carry triacylglycerols from the liver to adipose and other tissues.

Vesicle A membrane-bound inclusion in cells.

Vibrio A comma-shaped bacterium.

Vibriosis An enteritis caused by *Vibrio parahaemolyticus*, acquired from eating contaminated fish and shellfish that have not been thoroughly cooked.

Virion A single virus particle.

Villus (plural: *villi*) A multicellular projection from the surface of a mucous membrane, functioning in absorption.

Viral Enteritis Gastrointestinal disease caused by rotaviruses, characterized by diarrhea.

Viral Hemagglutination Hemagglutination caused by binding of viruses, such as those that cause measles and influenza, to red blood cells.

Viral Meningitis Usually self-lining and nonfatal form of meningitis.

Viral Neutralization The binding of antibodies to viruses, which is used in an immunological test to determine if a patient's serum contains viruses.

Viral Pneumonia Disease caused by viruses such as respiratory syncytial virus.

Viral Specificity Refers to the specific types of cells within an organism that a virus can infect.

Viral Yield See Burst Size.

Viremia An infection in which viruses are transported in the blood but do not multiply in transit.

Viridans Group A group of streptococci that often infect the valves and lining of the heart and cause incomplete (alpha) hemolysis of red blood cells in laboratory cultures.

Virion A complete virus particle, including its envelope if it has one.

Viroid An infectious RNA particle, smaller than a virus and lacking a capsid, that causes various plant diseases.

Virulence The degree of intensity of the disease produced by a pathogen.

Virulence Factor A structural or physiological characteristic that helps a pathogen cause infection and disease.

Virulent Phage A bacteriophage that enters the lytic cycle when it infects a bacterial cell, causing eventual lysis and death of the host cell. *Known also as Lytic Phage.*

Virus A submicroscopic, parasitic, acellular microorganism composed of a nucleic acid (DNA or RNA) core inside a protein coat.

Viruses Infectious entities that contain the nucleic acid to code for their own structure but that lack the enzymatic machinery of a cell; they replicate by invading a cell and using its machinery to express the viral genome. Most viruses consist of little but nucleic acid enclosed in a protein coat; some viruses also have an outer lipid-bilayer envelope.

Visceral Larva Migrans The migration of larvae of *Toxocara* species in human tissues, where they cause damage and allergic reactions.

Vitamin A substance required for growth that the organism cannot make.

Volutin Polyphosphate granules. *Known also as Metachromatic Granule.*

Walking Pneumonia See ► Primary Atypical Pneumonia.

Wandering Macrophages Phagocytic cells that circulate in the blood or move into tissues when microbes and other foreign material are present.

Wart A growth on the skin and mucous membranes caused by infection with human papillonavirus. *Known also as Papilloma.*

Water Cycle Process by which water is recycled through precipitation, ingestion by organisms, respiration, and evaporation. *Known also as the Hydrologic Cycle.*

Water Mold A funguslike protist that produces flagellated asexual spores (zoospores) and large, motile gametes. *Known also as Oomycota.*

Wavelength The distance between successive crests or troughs of a light wave.

Western Blotting A technique for identifying proteins or protein fragments in a mixture that react with a particular antibody. The mixture is first resolved into bands by one-dimensional denaturing gel electrophoresis. The protein bands are then "blotted" onto a nitrocellulose sheet, the sheet is treated with the antibody and any bands that bind the antibody are identified. More accurately called immunoblotting.

Western Equine Encephalitis Type of viral encephalitis seen most often in the western United States; infects horses more frequently than humans.

West Nile Fever Emerging viral disease new to the U.S., transmitted by mosquitoes, causing seizures and encephalitis; lethal to crows.

Wet Mount Microscopy technique in which a drop of fluid containing the organisms (often living) is placed on a slide.

Wetting Agent A detergent solution often used with other chemical agents to penetrate fatty substances.

Whey The liquid portion (waste product) of milk resulting from bacterial enzyme addition.

Whipworm *Trichuris trichiura*, a worm that causes trichuriasis infestation of the intestine.

Whitlow A herpetic lesion on a finger that can result from exposure to oral, ocular and probably genital herpes.

Whooping Cough A highly contagious respiratory disease caused primarily by *Bordetella pertussis. Known also as Pertussis.*

Wild-Type Refers to the normal genotype found in free-living, natural members of a group of organisms.

Wort The liquid extract from mash.

Wound Botulism Rare form of botulism that occurs in deep wounds when tissue damage impairs circulation and creates anerobic conditions in which *Clostridium botulinum* can multiply.

Writhe (*W*) With respect to a supercoiled DNA helix, the number of times the helix as a whole crosses over itself – that is, the number of superhelical turns that are present. See also ► Linking Number and ► Twist.

Xenobiotic An organic compound that is not produced by the organism in which it is found.

Xenograph A graft between individuals of different species.

X-Ray Diffraction A technique that is used to determine the three-dimensional structure of molecules, including macromolecules. A crystal or fiber of the substance is illuminated with a beam of x-rays, and the repeating elements of the structure scatter the x-rays to form a diffraction pattern that gives information on the molecule's structure. See also ► Diffraction Pattern.

Yeast Artificial Chromosomes (YACs) Artificial chromosomes used for cloning and maintaining large fragments of genomic DNA for investigational purposes, A YAC is constructed by recombinant DNA techniques from a year Centromere, two telomeres (chromosome ends), selectable markers, and cloned DNA in the megabase range.

Yeast Extract Substance from yeast containing vitamins, coenzymes, and nucleosides; used to enrich media.

Yellow Fever Viral systemic disease found in tropical areas, carried by the mosquito *Aedes aegypti*.

Yersiniosis Severe enteritis caused by *Yersinia enterocolitica*.

Z-DNA A DNA duplex with a specific left-hand helical structure. In vitro, it tends to be the most stable form from DNA duplexes that have alternating purines and pyrimidines, especially under conditions of cytosine methylation or negative supercoiling.

Ziehl-Neelsen Acid-Fast Stain A differential stain for organisms that are not decolorized by acid in alcohol, such as the bacteria that cause Hansen's disease (leprosy) and tuberculosis.

Zone of Inhibition A clear area that appears on agar in the disk diffusion method, indicating where the agent has inhibited growth of the organism.

Zoonosis (plural: *zoomoses*) A disease that can be transmitted from animals to humans.

Zygomycosis Disease in which certain fungi of the genera *Mucor* and *Rhizopus* invade lungs, the central nervous system, and tissues of the eye orbit.

Zygomycota See ► Bread Mold.

Zygospore In bread molds, a thick-walled, resistant, spore-producing structure enclosing a zygote.

Zygote A cell formed by the union of gametes (egg and sperm).