

34 bacteriochlorophyll

carbon atoms (C-7, C-8 and C-17, C-18) in two of the pyrrole rings.

See also ISOBACTERIOCHLORIN.

bacteriochlorophyll *See* CHLOROPHYLL.

bacterium (plural, bacteria) A single-celled prokaryotic microorganism in the bacteria domain.

See also BACTERIA.

balanced polymorphism The maintenance of two or more alleles in a population due to the selective advantage of the heterozygote. A heterozygote is a genotype consisting of two different alleles of a gene for a particular trait (Aa). Balanced polymorphism is a type of polymorphism where the frequencies of the coexisting forms do not change noticeably over many generations. Polymorphism is a genetic trait controlled by more than one allele, each of which has a frequency of 1 percent or greater in the population gene pool. Polymorphism can also be defined as two or more phenotypes maintained in the same breeding population.

See also POLYMORPHISM.

Banting, Frederick Grant (1891–1941) Canadian *Physician* Frederick Grant Banting was born on November 14, 1891, at Alliston, Ontario, Canada, to William Thompson Banting and Margaret Grant.

He went to secondary school at Alliston and then to the University of Toronto to study divinity before changing to the study of medicine. In 1916 he took his M.B. degree and joined the Canadian Army Medical Corps and served in France during World War I. In 1918 he was wounded at the battle of Cambrai, and the following year he was awarded the Military Cross for heroism under fire.

In 1922 he was awarded his M.D. degree and was appointed senior demonstrator in medicine at the University of Toronto. In 1923 he was elected to the Banting and Best Chair of Medical Research, which had been endowed by the legislature of the Province of Ontario.

Also in 1922, while working at the University of Toronto in the laboratory of the Scottish physiologist

John James Richard MACLEOD, and with the assistance of the Canadian physiologist Charles Best, Banting discovered insulin after extracting it from the pancreas. The following year he received the Nobel Prize in medicine along with Macleod. Angered that Macleod, rather than Best, had received the Nobel Prize, Banting divided his share of the award equally with Best. It was Canada's first Nobel Prize. He was knighted in 1934. The word *banting* was associated with dieting for many years.

In February 1941 he was killed in an air disaster in Newfoundland.

Bárány, Robert (1876–1936) Austrian *Physician* Robert Bárány was born on April 22, 1876, in Vienna, the eldest son of the manager of a farm estate. His mother, Maria Hock, was the daughter of a well-known Prague scientist. The young Bárány contracted tuberculosis, which resulted in permanent knee problems.

He completed medical studies at Vienna University in 1900, and in 1903, he accepted a post as demonstrator at the otological clinic.

Bárány developed a rotational method for testing the middle ear, known as the vestibular system, that commands physical balance by integrating an array of neurological, biological, visual, and cognitive processes to maintain balance. The middle ear's vestibular system is made up of three semicircular canals and an otolith. Inside the canals are fluid and hairlike cilia that register movement. As the head moves, so does the fluid, which in turn moves the cilia that send signals to the brain and nervous system. The function of the otolith, a series of calcium fibers that remain oriented to gravity, is similar. Both help the body to stay upright. Bárány's contributions in this area won him the Nobel Prize in physiology in 1914. To receive his award, he had to be released from a Russian prisoner of war camp in 1916 at the request of the prince of Sweden.

After the war he accepted the post of principal and professor of the Otological Institute in Uppsala, where he remained for the remainder of his life.

During the latter part of his life, Bárány studied the causes of muscular rheumatism. Although he suffered a stroke, this did not prevent him from writing on the subject. He died at Uppsala on April 8, 1936. An elite organization called the Bárány Society is named after him and is devoted to vestibular research.

barchan A crescent-shaped dune with wings, or horns, pointing downwind.

bark The outer layer or “skin” of stems and trunks that forms a protective layer. It is composed of all the tissues outside the vascular cambium in a plant growing in thickness. Bark consists of phloem, phelloderm, cork cambium, and cork.

Barr body One of the two X chromosomes in each somatic cell of a female is genetically inactivated. The Barr body is a dense object or mass of condensed sex chromatin lying along the inside of the nuclear envelope in female mammalian cells; it represents the inactivated X chromosome. X inactivation occurs around the 16th day of embryonic development. Mary Lyon, a British cytogeneticist, introduced the term *Barr body*.

basal body (kinetosome) A eukaryotic cell organelle within the cell body where a flagellum arises, which is

usually composed of nine longitudinally oriented, equally spaced sets of three microtubules. They usually occur in pairs and are structurally identical to a centriole.

Not to be confused with basal body temperature (BBT), which is the lowest body temperature of the day, usually the temperature upon awakening in the morning. BBT is usually charted daily and is used to determine fertility or to achieve pregnancy.

basal metabolic rate (BMR) BMR is the number of calories your body burns at rest to maintain normal body functions and changes with age, weight, height, gender, diet, and exercise.

base A substance that reduces the hydrogen ion concentration in a solution. A base has less free hydrogen ions (H^+) than hydroxyl ions (OH^-) and has a pH of more than 7 on a scale of 0–14. A base is created when positively charged ions (base cations) such as magnesium, sodium, potassium, and calcium increase the pH



An example of a deflation zone (low ground behind fore dunes) and an example of barchan dunes in Morro Bay, California. (Courtesy of Tim McCabe)

of water when released to solution. They have a slippery feel in water and a bitter taste. A base will turn red litmus paper blue (acids turn blue litmus red). The three types of bases are: Arrhenius, any chemical that increases the number of free hydroxide ions (OH⁻) when added to a water-based solution; Bronsted or Bronsted-Lowry, any chemical that acts as a proton acceptor in a chemical reaction; and Lewis, any chemical that donates two electrons to form a covalent bond during a chemical reaction. Bases are also known as alkali or alkaline substances, and when added to acids they form salts. Some common examples of bases are soap, ammonia, and lye.

See also ACID; BRØNSTED BASE; HARD BASE; LEWIS BASE.

basement membrane The thin extracellular layer composed of fibrous elements, proteins, and space-filling molecules that attaches the epithelium tissue (which forms the superficial layer of skin and some organs and the inner lining of blood vessels, ducts, body cavities, and the interior of the respiratory, digestive, urinary, and reproductive systems) to the underlying connective tissue. It is made up of a superficial basal lamina produced by the overlying epithelial tissue, and an underlying reticular lamina, which is the deeper of two layers and produced by the underlying connective tissue. It is the layer of tissue that cells “sit” or rest on.

base pairing The specific association between two complementary strands of nucleic acids that results from the formation of hydrogen bonds between the base components (adenine [A], guanine [G], thymine [T], cytosine [C], uracil [U] of the NUCLEOTIDES of each strand (the lines indicate the number of hydrogen bonds):

A=T and G

C in DNA, A=U and G

C (and in some cases GU) in RNA

Single-stranded nucleic acid molecules can adopt a partially double-stranded structure through intrastrand base pairing.

See also NUCLEOSIDES.

base-pair substitution There are two main types of mutations within a gene: base-pair substitutions and base-pair insertions or deletions. A base-pair substitution is a point mutation; it is the replacement of one nucleotide and its partner from the complementary deoxyribonucleic acid (DNA) strand with another pair of nucleotides. Bases are one of five compounds—adenine, guanine, cytosine, thymine, and uracil—that form the genetic code in DNA and ribonucleic acid (RNA).

basicity constant *See* ACIDITY CONSTANT.

basidiomycetes A group of fungi whose sexual spores (basidiospores) are borne in a basidium, a club-shaped reproductive cell. Includes the orders Agaricales (mushrooms) and Aphyllophorales.

See also FUNGI.

basidium (plural, basidia) A specialized club-shaped sexual reproductive cell found in the fertile area of the hymenium, the fertile sexual spore-bearing tissues of all basidiomycetes, and that produces sexual spores on the gills of mushrooms. Shaped like a baseball bat, it possesses four slightly inwardly curved horns or spikes called sterigma on which the basidiospores are attached.

Batesian mimicry A type of mimicry described by H. W. Bates in 1861 that describes the condition where a harmless species, the mimic, looks like a different species that is poisonous or otherwise harmful to predators, the model, and in this way gains security and protection by counterfeiting its appearance. Since many predators have become sick from eating a poisonous animal, they will avoid any similar looking animals in the future. Examples of Batesian mimicry include the Viceroy mimicking the Monarch butterfly and the clearwing moth that resembles a bee by having yellow and black coloring.

See also MIMICRY.

bathyal zone The deepest part of the ocean where light does not penetrate.

See also PELAGIC ZONE.

B cell or lymphocyte A type of white blood cell, or lymphocyte, that makes up 25 percent or more of the white blood cells in the body. The other class of lymphocyte is T cells. B cells develop in the bone marrow and spleen, and during infections they are transformed into plasma cells that produce large quantities of antibody (immunoglobulin) directed at specific pathogens. A cancer of the B lymphocytes is called a B-cell lymphoma.

behavioral ecology A subdiscipline that seeks to understand the functions, or fitness consequences, of behavior in which animals interact with their environment.

Békésy, Georg von (1899–1972) Hungarian *Physicist* Georg von Békésy was born in Budapest, Hungary, on June 3, 1899, to Alexander von Békésy, a diplomat, and his wife Paula. He received his early edu-



The Monarch butterfly is a chemically protected species that is mimicked by the Viceroy. This is known as Batesian mimicry. (Courtesy of Tim McCabe)

cation in Munich, Constantinople, Budapest, and in a private school in Zurich. He received a Ph.D. in physics in 1923 from the University of Budapest for a method he developed for determining molecular weight. He began working for the Hungarian Telephone and Post Office Laboratory in Budapest until 1946. During the years 1939–46 he was also professor of experimental physics at the University of Budapest.

While his research was concerned mainly with problems of long-distance telephone transmission, he conducted the study of the ear as a main component of the transmission system. He designed a telephone earphone and developed techniques for rapid, nondestructive dissection of the cochlea.

In 1946 he moved to Sweden as a guest of the Karolinska Institute and did research at the Technical Institute in Stockholm. Here he developed a new type of audiometer. The following year he moved to the United States to work at Harvard University in the Psycho-Acoustic Laboratory and developed a mechanical model of the inner ear. He received the Nobel Prize in 1961 for his discoveries concerning the physical mechanisms of stimulation within the cochlea. He moved on to the University of Hawaii in 1966, where a special laboratory was built for him.

He received numerous honors during his lifetime. He died on June 13, 1972, in Honolulu.

benthic zone A lower region of a freshwater or marine body. It is below the pelagic zone and above the abyssal zone, which is the benthic zone below 9,000 m. Organisms that live on or in the sediment in these environments are called benthos.

See also OCEANIC ZONE.

beringia All of the unglaciated area that encompassed northwestern North America and northeastern Asia, including the Bering Strait, during the last ice age.

berry A pulpy and stoneless fruit containing one or more seeds, e.g., strawberry.

beta sheet Preferentially called a beta pleated sheet; a regular structure in an extended polypeptide chain,

stabilized in the form of a sheet by hydrogen bonds between CO and NH groups of adjacent (parallel or antiparallel) chains.

beta strand Element of a BETA SHEET. One of the strands that is hydrogen bonded to a parallel or antiparallel strand to form a beta sheet.

beta turn A hairpin structure in a polypeptide chain reversing its direction by forming a hydrogen bond between the CO group of AMINO ACID RESIDUE n with the NH group of residue $(n+3)$.

See also HELIX.

biennial A plant that requires two years or at least more than one season to complete its life cycle. In the first year, plants form vegetative growth, and in the second year they flower. (Latin *biennialis*, from *biennis*; *bis*, twice, and *annus*, year)

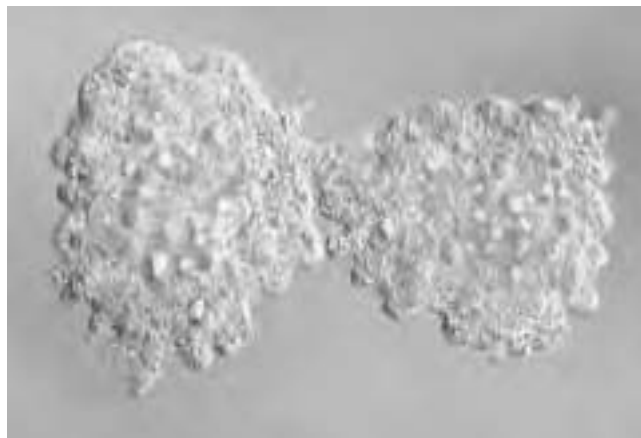
bifunctional ligand A LIGAND that is capable of simultaneous use of two of its donor atoms to bind to one or more CENTRAL ATOMS.

See also AMBIDENTATE.

bilateral symmetry Characterizing a body form having two similar sides—one side of an object is the mirror image of its other half—with definite upper and lower surfaces and anterior and posterior ends. Also called symmetry across an axis.

In plants, the term applies to flowers that can be divided into two equal halves by only one line through the middle. Most leaves are bilaterally symmetrical.

bilateria Members of the branch of eumetazoans possessing bilateral symmetry. Many bilaterian animals exhibit cephalization, an evolutionary trend toward concentration of sensory structures, mouth, and nerve ganglia at the anterior end of the body. All bilaterally symmetrical animals are triploblastic, that is, having three germ layers: ectoderm, endoderm, and mesoderm.



***Amoeba proteus* showing cell division via binary fission. Amoebas are protozoans, the simplest form of animal life. (Courtesy of Hideki Horikami)**

binary fission A type of asexual reproduction in prokaryotes (cells or organisms lacking a membrane-bound, structurally discrete nucleus and other subcellular compartments) in which a cell divides or splits into two “daughter” cells, each containing a complete copy of the genetic material of the parent. Examples of organisms that reproduce this way are bacteria, paramecium, and *Schizosaccharomyces pombe* (an ascomycetous species of yeast). Also known as transverse fission.

binding constant *See* STABILITY CONSTANT.

binding site A specific region (or atom) in a molecular entity that is capable of entering into a stabilizing interaction with another molecular entity. An example of such an interaction is that of an ACTIVE SITE in an enzyme with its SUBSTRATE. Typical forms of interaction are by hydrogen bonding, COORDINATION, and ion-pair formation. Two binding sites in different molecular entities are said to be complementary if their interaction is stabilizing.

binomial (binomial name) Each organism is named using a Latin-based code consisting of a combination of two names, the first being a generic (genus) name and the second a specific trivial name, which, together,

constitute the scientific name of a species. *Lupinus perennis*, or wild blue lupine, is an example. Both names are italicized, and both names used together constitute the species name. This is an example of the binomial nomenclature, critical to the system of classification of plants and animals. Linnaeus, a Swedish naturalist, developed the system in the 18th century. The hierarchy lists the smallest group to largest group: species, genus, family, order, class, division, and kingdom. The first person to formally describe a species is often included, sometimes as an abbreviation, when the species is first mentioned in a research article (e.g., *Lupinus perennis* L., where L. = Linnaeus, who first produced this binomial name and provided an original description of this plant).

binuclear Less frequently used term for the IUPAC recommended term *dinuclear*.

See also NUCLEARITY.

bioassay A procedure for determining the concentration, purity, and/or biological activity of a substance (e.g., vitamin, hormone, plant growth factor, antibiotic, enzyme) by measuring its effect on an organism, tissue, cell, enzyme, or receptor preparation compared with a standard preparation.

bioavailability The availability of a food component or a XENOBIOTIC to an organ or organism.

biocatalyst A catalyst of biological origin, typically an ENZYME.

bioconjugate A molecular species produced by living systems of biological origin when it is composed of two parts of different origins, e.g., a conjugate of a xenobiotic with some groups, such as glutathione, sulfate, or glucuronic acid, to make it soluble in water or compartmentalized within the cell.

bioconversion The conversion of one substance to another by biological means. The fermentation of sug-

ars to alcohols, catalyzed by yeasts, is an example of bioconversion.

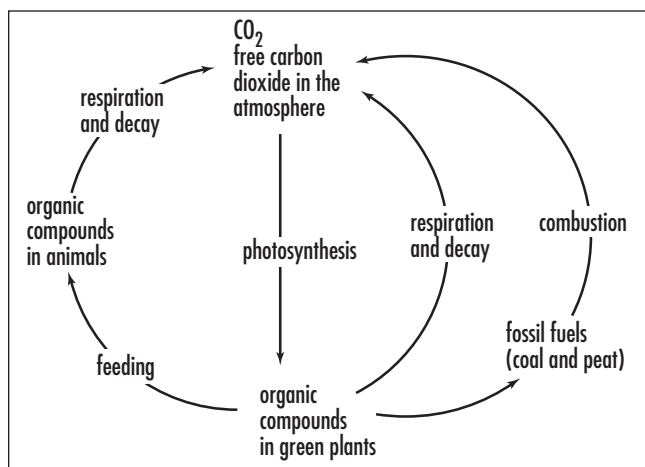
See also BIOTRANSFORMATION.

biodiversity (biological diversity) The totality of genes, species, and ecosystems in a particular environment, region, or the entire world. Usually refers to the variety and variability of living organisms and the ecological relationships in which they occur. It can be the number of different species and their relative frequencies in a particular area, and it can be organized on several levels, from specific species complexes to entire ecosystems or even molecular-level heredity studies.

bioenergetics The study of the energy transfers in and between organisms and their environments and the regulation of those pathways. The term is also used for a form of psychotherapy that works through the body to engage the emotions and is based on the work of Wilhelm Reich and psychiatrist Alexander Lowen in the 1950s.

biofacies A characteristic set of fossil fauna. Facies is a geological term that means “aspect” and is used for defining subdivisions based on an aspect or characteristic of a rock formation, such as lithofacies, based on physical characteristics, or biofacies, based on the fossil content.

biogeochemical cycles Both energy and inorganic nutrients flow through ecosystems. However, energy is a one-way process that drives the movement of nutrients and is then lost, whereas nutrients are cycled back into the system between organisms and their environments by way of molecules, ions, or elements. These various nutrient circuits, which involve both biotic and abiotic components of ecosystems, are called biogeochemical cycles. Major biogeochemical cycles include the water cycle, carbon cycle, oxygen cycle, nitrogen cycle, phosphorus cycle, sulfur cycle, and calcium cycle. Biogeochemical cycles can take place on a cellular level (absorption of carbon dioxide by a cell) all the way to global levels (atmosphere and ocean interactions).



The carbon cycle, one of the main biogeochemical cycles that processes and transfers nutrients from organisms to their environment.

These cycles take place through the biosphere, lithosphere, hydrosphere, and atmosphere.

biogeographic boundary (zoogeographical region)

Six to nine regions that contain broadly similar fauna. Consists of Nearctic, Palearctic, Neotropical, Aethiopian, Oriental, and Australian, and some include Holarctic, Palaeotropical, and Oceania.

biogeography The study of the past and present distribution of life.

bioisostere (nonclassical isostere) A compound resulting from the exchange of an atom or of a group of atoms with another broadly similar atom or group of atoms. The objective of a bioisosteric replacement is to create a new compound with similar biological properties to the parent compound. The bioisosteric replacement can be physicochemically or topologically based.

See also ISOSTERE.

bioleaching Extraction of metals from ores or soil by biological processes, mostly by microorganisms.

biological clock The internal timekeeping that drives or coordinates a circadian rhythm.

biological control (integrated pest management)

Using living organisms to control other living organisms (pests), e.g., aphids eaten by lady beetles.

biological half-life The time at which the amount of a biomolecule in a living organism has been reduced by one half.

See also HALF-LIFE.

biological magnification (bioaccumulation)

The increase in the concentration of heavy metals (e.g., mercury) or organic contaminants (e.g., chlorinated hydrocarbons [CHCs]) in organisms as a result of their consumption within a food chain/web. An excellent example is the process by which contaminants such as polychlorinated biphenyls (PCBs) accumulate or magnify as they move up the food chain. For example, PCBs concentrate in tissue and internal organs, and as big fish eat little fish, they accumulate all the PCBs that have been eaten by everyone below them in the food chain.

biological species A population or group of populations whose members can interbreed or have the potential to interbreed.

See also SPECIES.

bioluminescence

The process of producing light by a chemical reaction by a living organism, e.g., glow-worms, fireflies, and jellyfish. Usually produced in organs called photopores or light organs, bioluminescence can be used for luring prey or as a courting behavior.

biomass The dry weight of organic matter in unit area or volume, usually expressed as mass or weight of a group of organisms in a particular habitat. The term also refers to organic matter that is available on a renewable basis such as forests, agricultural crops, wood and wood wastes, animals, and plants.

biome A large-scale recognizable grouping, a distinct ecosystem, that includes many communities of a similar nature that have adapted to a particular environment. Deserts, forests, grasslands, tundra, and the oceans are biomes. Biomes have changed naturally and moved many times during the history of life on Earth. In more recent times, change has been the result of human-induced activity.

biomembrane Organized sheetlike assemblies, consisting mainly of proteins and lipids (bilayers), that act as highly selective permeability barriers. Biomembranes contain specific molecular pumps and gates, receptors, and enzymes.

biomimetic Refers to a laboratory procedure designed to imitate a natural chemical process. Also refers to a

compound that mimics a biological material in its structure or function.

biomineralization The synthesis of inorganic crystalline or amorphous mineral-like materials by living organisms. Among the minerals synthesized biologically in various forms of life are fluorapatite ($\text{Ca}_5(\text{PO}_4)_3\text{F}$), hydroxyapatite, magnetite (Fe_3O_4), and calcium carbonate (CaCO_3).

biopolymers Macromolecules, including proteins, nucleic acids, and polysaccharides, formed by living organisms.

bioprecursor prodrug A PRODRUG that does not imply the linkage to a carrier group, but results from a



Cuatraciénagas dunes in Mexico showing an example of the biodiversity of plants found in the xeric conditions of gypsum sands and deserts. (Courtesy of Tim McCabe)

molecular modification of the active principle itself. This modification generates a new compound, able to be transformed metabolically or chemically, the resulting compound being the active principle.

biosensor A device that uses specific biochemical reactions mediated by isolated enzymes, immunosystems, tissues, organelles, or whole cells to detect chemical compounds, usually by electrical, thermal, or optical signals.

biosphere The entire portion of the Earth between the outer portion of the geosphere (the physical elements of the Earth's surface crust and interior) and the inner portion of the atmosphere that is inhabited by life; it is the sum of all the planet's communities and ecosystems.

biotechnology The industrial or commercial manipulation and use of living organisms or their components to improve human health and food production, either on the molecular level (genetics, gene splicing, or use of recombinant deoxyribonucleic acid [DNA]) or in more visible areas such as cattle breeding.

biotic Pertains to the living organisms in the environment, including entire populations and ecosystems.

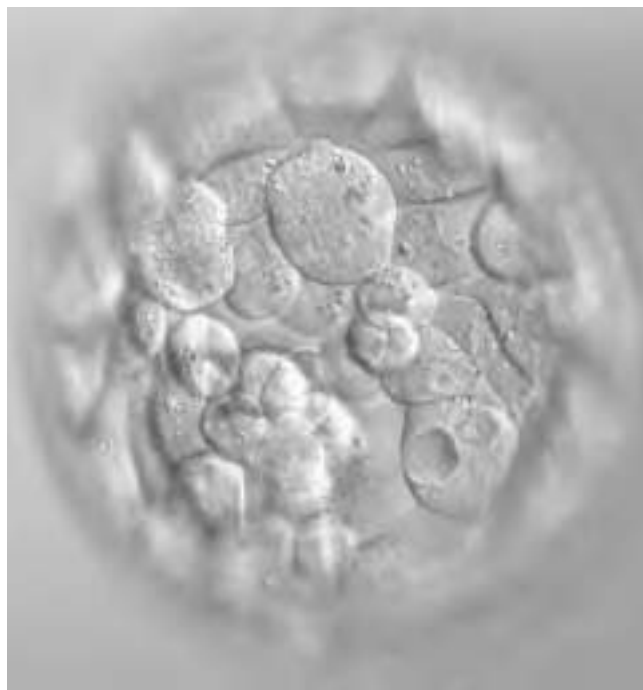
biotransformation A chemical transformation mediated by living organisms or ENZYME preparations. The chemical conversion of substances by living organisms or enzyme preparations.

See also BIOCONVERSION.

bivalve A mollusk having two valves or shells that are hinged together, e.g., mussels and clams.

blastocoel The fluid-filled cavity that forms in the center of the blastula embryo. The blastula is an early stage in the development of an ovum, consisting of a hollow sphere of cells enclosing the blastocoel.

See also BLASTULA.



Light micrograph of a human embryo at the blastocyst stage. This early blastocyst is about four days old, appearing as a hollow ball of cells. On around day six, the embryo will begin to implant into the wall of the uterus. Magnification unknown. (Courtesy © Pascal Goetgheluck/Photo Researchers, Inc.)

blastocyst An embryonic stage in mammals; a hollow ball of 30–150 cells produced one week after FERTILIZATION in humans. It is a sphere made up of an outer layer of cells called the trophoblast, a fluid-filled cavity called the BLASTOCOEL, and a cluster of cells on the interior called the INNER CELL MASS. It is the inner cell mass that becomes what is known as the FETUS.

See also EMBRYO.

blastopore The opening of the ARCHENTERON (primitive gut) in the gastrula that develops into the mouth in protostomes (metazoans such as the nematodes, flatworms, and mollusks that exhibit determinate, spiral cleavage and develop a mouth from the blastopore) and the anus in deuterostomes. (Animals such as the chordates and echinoderms in which the first opening in the embryo becomes the anus, while the mouth appears at the other end of the digestive system.)

blastula Early stage of animal development of an embryo, where a ball forms consisting of a single layer of cells that surrounds the fluid-filled cavity called the blastocoel. The term *blastula* is often used interchangeably with the term *blastocyst*.

See also BLASTOCOEL; BLASTOCYST.

bleomycin (BLM) A glycopeptide molecule that can serve as a metal-chelating ligand. The Fe(III) complex of bleomycin is an antitumor agent, and its activity is associated with DNA cleavage.

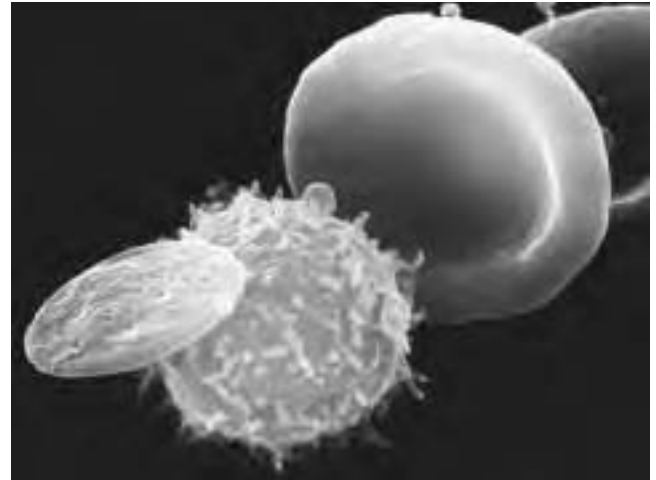
BLM *See* BLEOMYCIN.

blood Blood is an animal fluid that transports oxygen from the lungs to body tissues and returns carbon dioxide from body tissues to the lungs through a network of vessels such as veins, arteries, and capillaries. It transports nourishment from digestion, hormones from glands, carries disease-fighting substances to tissues, as well as wastes to the kidneys. Blood contains red and white blood cells and platelets that are responsible for a variety of functions, from transporting substances to fighting invasion from foreign substances. Some 55 percent of blood is a clear liquid called plasma. The average adult has about five liters of blood.

See also ARTERY; CAPILLARY; VEIN.

blood-brain barrier (BBB) The blood-brain barrier is a collection of cells that press together to block many substances from entering the brain while allowing others to pass. It is a specialized arrangement of brain capillaries that restricts the passage of most substances into the brain, thereby preventing dramatic fluctuations in the brain's environment. It maintains the chemical environment for neuron functions and protects the brain from the entry of foreign and harmful substances. It allows substances in the brain such as glucose, certain ions, and oxygen and others to enter, while unwanted ones are carried out by the endothelial cells. It is a defensive system to protect the central nervous system.

What is little understood is how the blood-brain barrier is regulated, or why certain diseases are able to manipulate and pass through the barrier.



Scanning electron micrograph (SEM) showing three types of cells found in human blood. At right is a red blood cell (erythrocyte), a biconcave disc that transports oxygen around the body. A white blood cell (center) is roughly spherical with microvilli projecting from its surface. Different types of white cells are active in the body's immune response to infection. The waferlike cell at left is a blood platelet, which functions to control clotting and thus prevents bleeding from damaged vessels. Each cubic millimeter of blood contains approximately 5 million red cells, 7,000 white cells, and 250,000 platelets. Magnification: $\times 3,850$ at 35-mm size, $\times 27,000$ at 8×10 -in. size. (Courtesy © NIBSC/Photo Researchers, Inc.)

There is evidence that multiple sclerosis attacks occur during breakdowns of the blood-brain barrier. A study in rats showed that flavinoids, such as those found in blueberries and grape seeds among others, can inhibit blood-brain barrier breakdown under conditions that normally lead to such breakdown.

Researchers at the University of Maryland School of Medicine in Baltimore have identified a receptor in the human brain that regulates the interface between the bloodstream and the blood-brain barrier and could lead to a new understanding of this nearly impenetrable barrier and to treatment of diseases that affect the brain. They found that two proteins, zonulin and zot, unlock the cell barrier in the intestine, attach themselves to receptors in the intestine to open the junctions between the cells, and allow substances to be absorbed. The new research indicates that zonulin and zot also react with similar receptors in the brain, suggesting that it may become feasible to develop a new generation of drugs able to cross the blood-brain barrier.