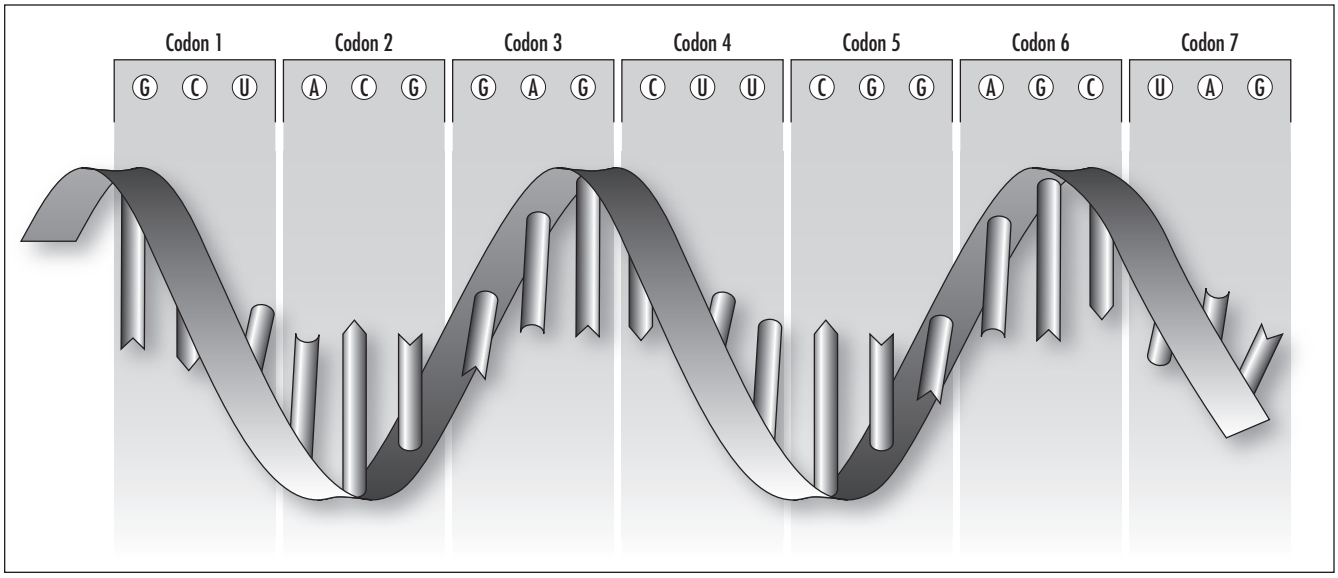


A codon consists of three bases in a DNA or RNA sequence that specify a single amino acid. ***(Courtesy of Darryl Leja, NHGRI, National Institutes of Health)***

of a specific amino acid into a protein, or (b) represents the starting or termination signal of protein synthesis.

See also MESSENGER RNA.

coefficient of kinship The kinship coefficient expresses the chance of finding common genes on the same locus. It also expresses the probability that alleles drawn randomly from each of two individuals are identical by descent. It is also the relationship between a pair of individuals.

coefficient of variation A measure of dispersion around the mean (average).

coelacanth A 400-million-year-old "living fossil," believed to have gone extinct 65 million years ago during the Cretaceous period and predating the dinosaurs by millions of years. The coelacanth was found alive in 1938 in South Africa. Today, *Latimeria chalumnae* and *Latimeria menadoensis* represent a once widespread family of sarcopterygian (fleshy-finned) coelacanth fishes. There are more than 120 species known from fossils.

coelom A fluid-filled body cavity lined with mesoderm where organs can develop.

coelomate Any organism whose body cavity is lined by mesoderm; animals possessing a coelom. These included the phylas: Entoprocta, Ectoprocta, Phoronida, Brachiopoda, Mollusca, Priapulida, Sipuncula, Echiura, Annelida, Tardigrada, Pentastoma, Onychophora, Arthropoda, Pogonophora, Echinodermata, Chaetognatha, Hemichordata, and Chordata.

See also ACOELOMATE.

coenocytic Having multiple nuclei embedded in cytoplasm without cross walls; the nuclei lie in a common matrix. Also denotes a mycelium where the hyphae lack septa, i.e., members of the Oomycota and Chytridiomycota.

coenzyme A low-molecular-weight, nonprotein organic compound (often a NUCLEOTIDE) participating in enzymatic reactions as a dissociable acceptor or donor of chemical groups or electrons.

See also ENZYME.

coevolution The evolution of two species where the evolutionary changes in one of the species influences the evolution of the other. A classic example is the long, narrow bill of the hummingbird. It has coevolved with tubular flowers, and the adaptation of its bill allows it to feed on plants with long, tubular flowers. These flowers in turn have adapted (coevolved) for fertilization by the hummingbirds when they take their nectar.

See also EVOLUTION.

cofactor An organic molecule or ion (usually a metal ion) that is required by an ENZYME for its activity. It may be attached either loosely (COENZYME) or tightly (PROSTHETIC GROUP).

cohesion The force of attraction between molecules of the same substance that allows them to bind.

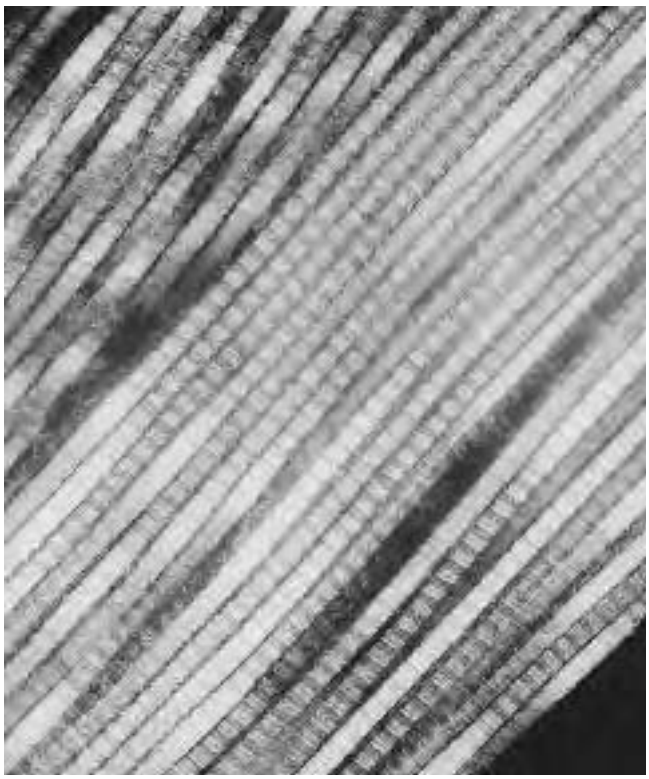
coitus An alternative term for intercourse.

Coleoptera The taxonomic order that comprises the insect group of beetles, one of the most adaptable and numerous insect groups. Beetles go through complete metamorphosis, have their hind wings covered by their fore wings, and are found in a variety of habitats.

A blister beetle (chemically protected) located in the Kelso Dunes, California, that feeds on flowers and pollinates them in the process. ***(Courtesy of Tim McCabe)***

collagen The most abundant fibrous protein in the human body (about 30 percent) and in the animal kingdom; shapes the structure of tendons, bones, and connective tissues. There are several types (I, II, III, IV) that are found in bone, skin, tendons, cartilage, embryonic tissues, and basement membranes.

collecting duct The area in the kidneys where urine is collected. Distal tubules of several nephrons join to form the collecting duct, which consists of the arcuate renal tubule, straight collecting tubule, and the papillary duct. Also known as the tubulus renalis colligens, or renal collecting tubule.



Colored transmission electron micrograph (TEM) of a section through healthy collagen fibers from human skin. Collagen is the major structural protein in the body, forming a large part of bones, tendons, and tissues. Magnification unknown. ***(Courtesy © Science Photo Library/Photo Researchers, Inc.)***

Collembola An arthropod order resembling small insects that are wingless and can jump remarkable distances.

collenchyma cell One of the three major plant cell types (dermal, ground, and vascular). Collenchyma cells are part of the ground tissue (ground tissues include parenchyma, collenchyma, and sclerenchyma cells) and are elongated and thick, with uneven cell walls and arranged in strands to provide support in areas of the plant that are growing.

colloidal bismuth subcitrate (**CBS**) *See* DE-NOL.

colony-stimulating factor (**CSF**) The category includes granulocyte-colony stimulating factor (G-CSF), macrophage-colony stimulating factor (M-CSF), and granulocyte-macrophage-colony stimulating factor (GM-CSF). These are all cytokine proteins that stimulate growth and reproduction of certain kinds of blood cells in the bone marrow. Also referred to as growth factors. The production of white blood cells is controlled by colony-stimulating factors. Cancer chemotherapy and inherited disorders are among the causes of low white-cell counts, which lower resistance to infection. Thus, CSFs are being investigated not only as a way to counteract low white-cell counts but also as a way to produce specific types of white blood cells. In addition, there is hope that CSFs can stimulate the body to produce additional bone marrow as well as cause some cancer cells to stop dividing.

combinatorial library A set of compounds prepared by combinatorial synthesis.

combinatorial synthesis A process to prepare large sets of organic compounds by combining sets of building blocks.

CoMFA *See* COMPARATIVE MOLECULAR FIELD ANALYSIS.

commensalism One of the forms of symbiosis. In this case, one organism benefits and the other is not affected.

community All of the organisms, plant and animal, that inhabit a specific geographic area.

companion cell A type of plant cell that is connected to a sieve-tube member, making up the phloem tissue. It retains the nucleus and dense cytoplasm to service adjacent sieve tube members, and it helps pump sugars into the phloem.

comparative molecular field analysis (**CoMFA**) A three-dimensional quantitative structure-activity relationship (3D-QSAR) method that uses statistical correlation techniques for analysis of the quantitative relationship between (a) the biological activity of a set of compounds with a specified alignment and (b) their three-dimensional electronic and steric properties. Other properties such as hydrophobicity and hydrogen bonding can also be incorporated into the analysis.

See also THREE-DIMENSIONAL QUANTITATIVE STRUCTURE-ACTIVITY RELATIONSHIP.

competitive exclusion principle (**Gause's law**) The condition where one species is driven out of a community by extinction due to interspecific competition; one species will dominate the use of resources and have a reproductive advantage, forcing the other to disappear.

competitive inhibitor A substance that resembles the substrate for an enzyme, both in shape and size, and competes with the substrate for the substrate binding site on the enzyme, thereby reducing the rate of reaction by reducing the number of enzyme molecules that successfully bind.

complementary DNA (**cDNA**) A laboratory-produced DNA section that is created by extracting a single-stranded RNA from an organism as a template

and transcribing it back into a double-stranded DNA using the enzyme reverse transcriptase. However, the cDNA does not include introns, those portions of the DNA that were spliced out while still in the cell. Used for research purposes and can be cloned into plasmids for storage.

complement fixation The consumption of complement, a complex of nine blood serum proteins that interact sequentially with specific antibodies (and concentrates in inflamed regions), by an antibody-antigen reaction containing complement-fixing antibodies. Used as a test to detect antibodies that react against a particular antigen such as a virus.

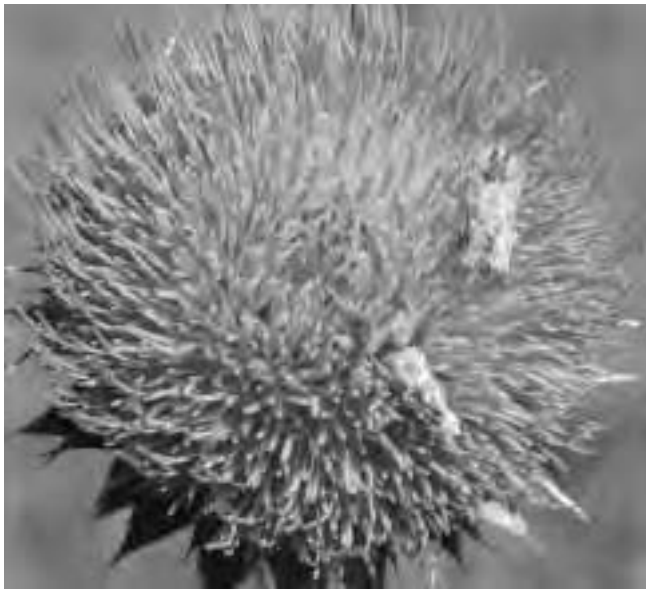
complement system A set of 30 glycoproteins in the blood serum in the form of components, factors, or other regulators that work at the surface of cells as receptors. Inactive until activated by immune responses, the system acts to dissolve and remove immune complexes and kill foreign cells.

complete digestive tract (alimentary canal) A tube that has an opening and end (mouth and anus) that is used in digestion. The complete digestive tract is one where food is ingested at one end of the tract, the mouth, and wastes from digestion are passed out of the tract at the other end, the anus. An incomplete digestive tract has just one opening used both to take in food and to eliminate wastes.

complete flower Any flower that has all four major parts: SEPALS, PETALS, STAMENS, and CARPELS.

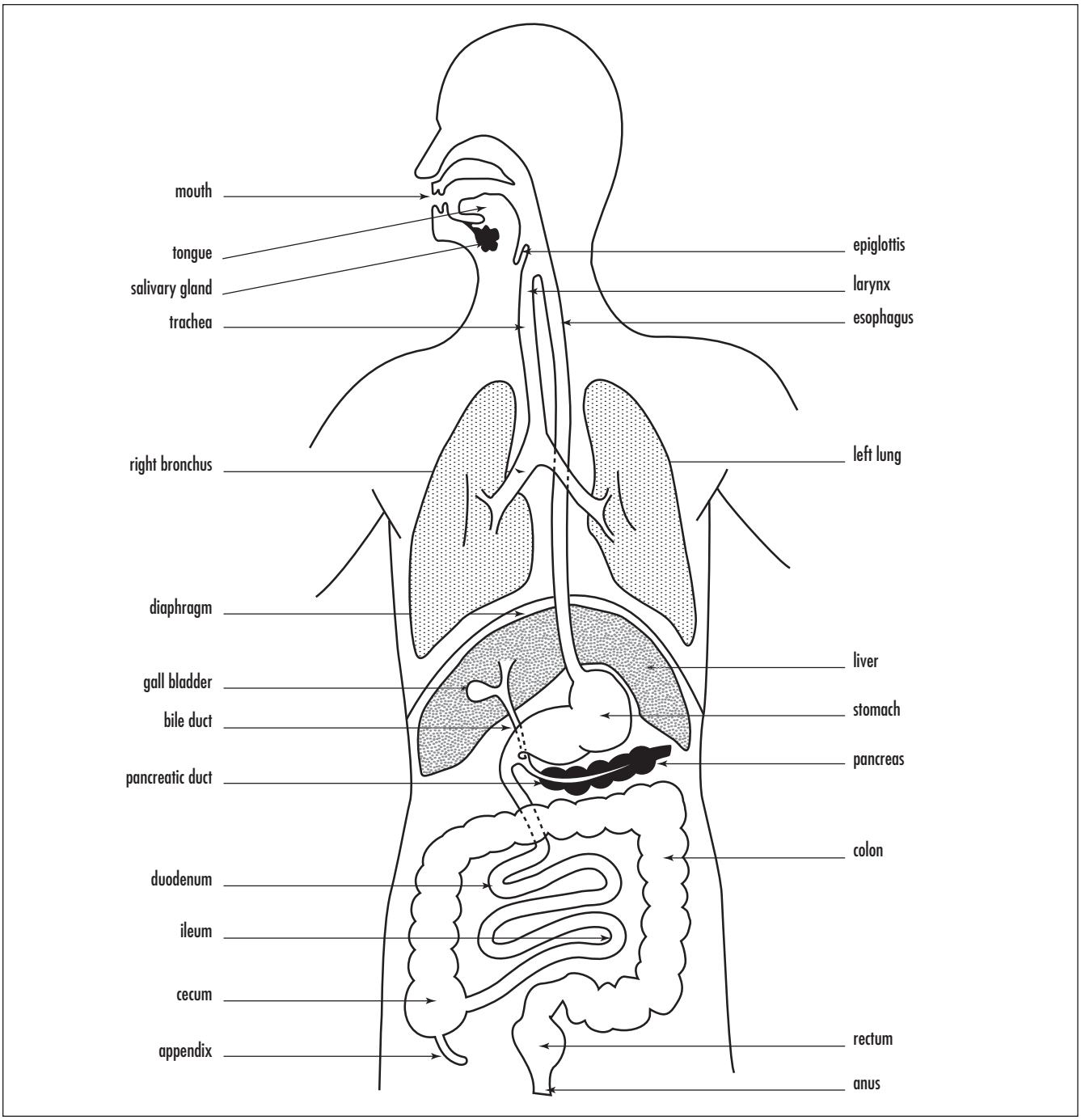
Compositae (Asteraceae) The composites (also known as the daisy or sunflower family), Compositae or Asteraceae, are one of the largest plant families, containing almost 20,000 species. Most of these species are herbs, but there are also some shrubs, trees, and vines. The family includes many edible salad plants (e.g., lettuce, endive, chicory, and artichoke); cultivated species such as the marigolds, daisies, sunflowers, and chrysanthemums; as well as many common weeds and wildflowers. It is primarily the latter, for example, ragweed and mugwort, that are involved in pollen-induced seasonal allergies.

***Ragweed* (Ambrosia)**
Ragweed refers to the group of approximately 15 species of weed plants, belonging to the Compositae family. Most ragweed species are native to North America, although they are also found in Eastern Europe and the French Rhône Valley. The ragweeds are annuals characterized by their rough, hairy stems and mostly lobed or divided leaves. The ragweed flowers are greenish and inconspicuously concealed in small heads on the leaves. The ragweed species, whose copious pollen is the main cause of seasonal allergic rhinitis (hay fever) in eastern and middle North America, are the common ragweed (*A. artemisiifolia*) and the great, or giant, ragweed (*A. trifida*). The common ragweed grows to about 1 meter (3.5 feet); is common all across North America; and is also commonly referred to as Roman wormwood, hogweed, hogbrake or bitterweed. The giant ragweed, meanwhile, can reach anywhere up to 5 meters



An example of pollinators (moths) and a plant in the Compositae family (thistle flower) from Painted Rock, Colorado. *(Courtesy of Tim McCabe)*

(17 feet) in height and is native from Quebec to British Columbia in Canada and southward to Florida, Arkansas, and California in the United States. Due to the fact that ragweeds are annuals, they can be eradicated simply by mowing them before they release their pollen in late summer.



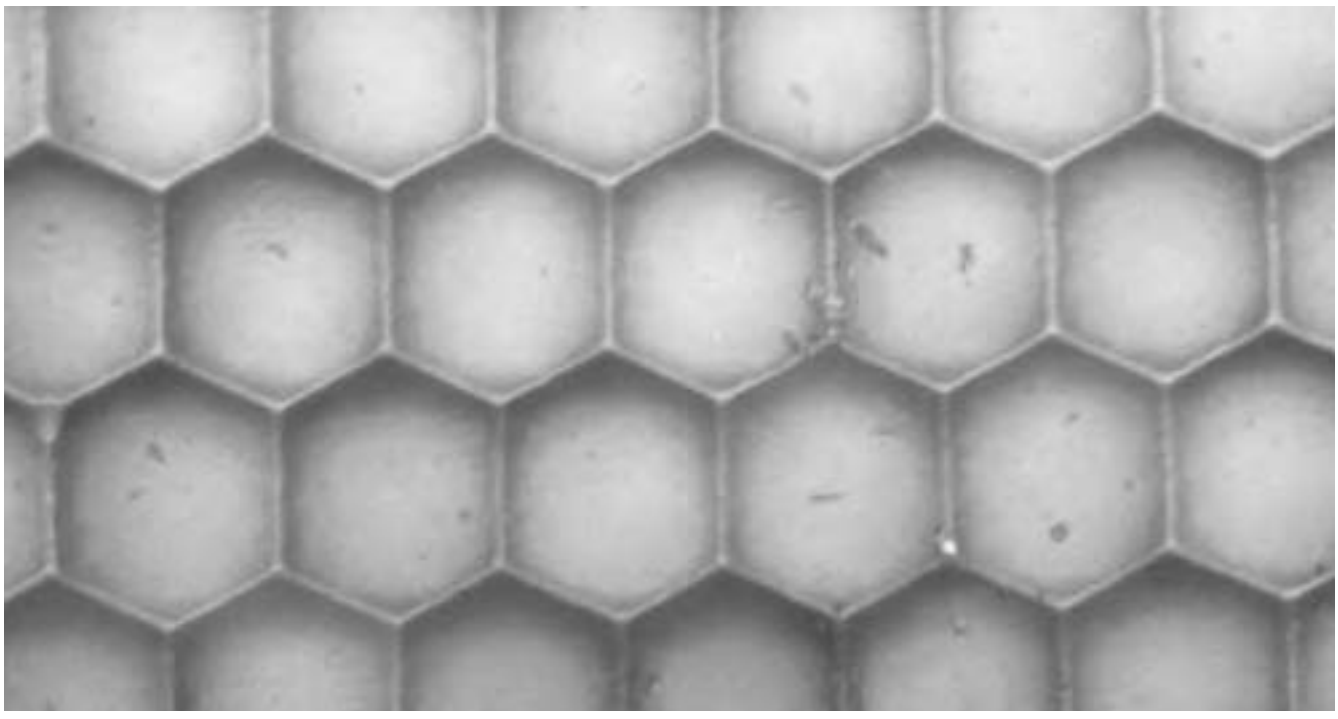
The complete digestive tract is one where food is ingested at one end of the tract, the mouth, and wastes from digestion are passed out of the tract at the other end, the anus.

Mugwort *(Artemisia vulgaris, A. campestris, A. dracunculus, A. rupestris, A. mutellina, A. absinthium, A. maritima, A. austriaca, A. pontica, A. laciniata, A. abrotanum, A. annua, A. tilessii)* A shrubby weed most commonly found on wasteland, mugwort can reach heights of up to 2 meters (7 feet) and is characterized by quite small, yellow to reddish brown flowers and a woody stem. The mugwort pollen season (in central Europe) is generally late July to September, with a peak around mid-August. Mugwort is known to cross-react with almost all members of the Compositae family, especially the ragweeds, as well as dandelions, sunflowers, chamomille, and all daisylike flowers. Mugwort also displays an important cross-reaction in the context of food allergies to celery.

compound The combination of two or more different elements, held together by chemical bonds. The elements in a given compound are always combined in the same proportion by mass (law of definite proportion).

compound eye A multifaceted eye found in most invertebrates. The eye is composed of many separate cylinder-shaped (hexagonal) units called ommatidia. Each ommatidium has its own surface area, lens (crystalline cone), light receptors (retinulae), and optic nerve fiber. The images from the collection of ommatidia are then processed.

comproportionation Describes a chemical reaction when a mixture of species in different oxidation states reacts to produce a product that is in a different but more stable intermediate oxidation state. A type of redox reaction. For example, when iodide ions and



Light micrograph of hexagonal facets, called ommatidia, that form the compound eye of a dragonfly. The compound eye is a characteristic of insects, although the size, shape, and number of facets vary among species. The dragonfly, with 30,000 facets, has the largest insect eye. Each ommatidia is a light-sensitive unit consisting of a lens immediately behind the cuticular surface and light-sensitive cells. Light stimulating these cells is converted into electrical signals that are passed to the brain. The insect sees a mosaic image made up from separate bits of information entering each ommatidia. Magnification: ×55 at 35-mm size, ×110 at 6 × 7-cm size. ***(Courtesy © John Walsh/Photo Researchers, Inc.)***

iodate ions react together, they form elemental iodine. The reverse of DISPROPORTIONATION.

computational chemistry A discipline using mathematical methods for the calculation of molecular properties or for the simulation of molecular behavior.

computer-assisted drug design (CADD) Involves all computer-assisted techniques used to discover, design, and optimize biologically active compounds with a putative use as DRUGS.

concanavalin A A protein from jack beans, containing calcium and manganese, that agglutinates red blood cells and stimulates T lymphocytes to undergo mitosis.

condensation reaction (dehydration reaction) A (usually stepwise) reaction in which two or more reactants (or remote reactive sites within the same molecular entity) yield a single main product with accompanying formation of water or of some other small molecule, e.g., ammonia, ethanol, acetic acid, hydrogen sulfide.

The mechanism of many condensation reactions has been shown to comprise consecutive addition and elimination reactions, as in the base-catalyzed formation of (*E*)-but-2-enal (crotonaldehyde) from acetaldehyde via 3-hydroxybutanal (aldol). The overall reaction in this example is known as the aldol condensation.

The term is sometimes also applied to cases where the formation of water or another simple molecule does not occur.

cone cell A photoreceptor cell of the eye that is found in the retina and densely populates the central portion, called the macula. It is responsible for seeing color and fine visual detail.

See also ROD CELL.

confidence limits A statistical parameter defining the lower and upper boundaries/values of a confidence interval. A range of values that is estimated from a sample group that is highly likely to include the true, although unknown, value.

configuration In the context of stereochemistry, the term is restricted to the arrangement of atoms of a molecular entity in space that distinguishes the entity as a STEREOISOMER, the isomerism of which is not due to CONFORMATION differences.

conformation A spatial three-dimensional arrangement of atoms in a molecule that can rotate without breaking any bonds.

congener A substance—literally *con-* (with) *generated*—synthesized by essentially the same synthetic chemical reactions and the same procedures. An ANALOG is a substance that is analogous in some respect to the prototype agent in chemical structure.

The term *congener,* while most often a synonym for *homologue,* has become somewhat more diffuse in meaning, so that the terms *congener* and *analog* are frequently used interchangeably in the literature.

conidium A nonmotile asexual spore borne at the tip of a special hyphal branch called a conidiophore. It is diverse in form: single or multicelled; simple or complex; round, elongated, or spiral shaped. It is found in ascomycetes and basidiomycetes only.

conifer A seed-bearing evergreen tree or shrub, a gymnosperm, that reproduces by the use of cones. Conifers inhabit cool temperate regions and have leaves in the form of needles or scales. Examples include pines, fir, spruce, and hemlock. The gymnosperms are the plant order of nonflowering plants, which are characterized by the fact that their seeds are exposed to the air during all stages of development. The name *gymnosperm* means "naked seeds." Gymnosperms are woody plants and are pollinated by wind, hence their potential for inducing seasonal allergy. The seed-bearing structure is typically a cone. Gymnosperm members include the cycads (e.g., sago palm); ginkgoes; conifers (order Pinales) (e.g., monkey-puzzle, nutmeg);

An example of a bristlecone pine (gymnosperm) reflecting climax conditions and ancient life in the White Mountains of California. *(Courtesy of Tim McCabe)*

family Cupressaceae (e.g., cedar); family Taxaceae (e.g., yew); family Taxodiaceae (e.g., redwood); and family Pinaceae (e.g., pine).

See also DECIDUOUS.

conjugation The process of transferring genetic material between two organisms that are temporarily joined.

connective tissue (myofascial matrix; fascia) A very strong tissue that is the main support system for the body, an important component of muscles, tendons, ligaments, cartilage, and bones. It wraps around various systems as a tough fibrous sheath, giving shape and strength. Composed of cells and extracellular matrix.

consensus sequence A SEQUENCE of DNA, RNA, protein, or carbohydrate—derived from a number of similar molecules—that comprises the essential features for a particular function.

conservation biology A branch of biology concerned with the loss of world biodiversity.

conspecific Refers to animals (individuals or populations) of the same species.

continental drift Two hundred million years ago the Earth's continents were joined together to form one gigantic supercontinent called Pangaea. As the rock

The meeting of the North American tectonic plate and the European tectonic plate can be clearly seen near Pingvellir, Iceland, where ravines and cliffs mark the line of the Atlantic Fault. To the left of the picture is the eastern edge of the North American continental plate; to the right is the western edge of Europe. The Atlantic Fault cuts across Iceland from northeast (in the distance) to southwest. The two plates are slowly moving apart by the process of continental drift as the Atlantic Ocean widens. This process causes Iceland's intense seismic and volcanic activity. The last major earthquake occurred at Pingvellir in 1789, when part of the land sank by 50 centimeters in 10 days. *(Courtesy © Simon Fraser/Photo Researchers, Inc.)*

plates that the continents sit on moved, the supercontinent broke up and began to move apart. This process is known as continental drift.

See also GONDWANALAND; PANGAEA.

contraception The conscious and deliberate act of preventing pregnancy.

contrast agent Paramagnetic (or FERROMAGNETIC) metal complex or particle causing a decrease in the relaxation times (increase in relaxivity) of nuclei detected in an image, usually made of water.

See also IMAGING.

convection Fluid or air circulation driven by temperature gradients; the rising of warm air and the sinking of cool air. The transfer of heat by circulation or movement of heated liquid or gas.

convergent evolution When two unrelated species share similar traits arising from each species independently adapting to a similar environmental condition.

cooperativity The phenomenon that binding of an effector molecule to a biological system either enhances or diminishes the binding of a successive molecule, of the same or different kind, to the same system. The system may be an ENZYME or a protein that specifically binds another molecule such as oxygen or DNA. The effector molecule may be an enzyme SUBSTRATE or an ALLOSTERIC EFFECTOR. The enzyme or protein exists in different CONFORMATIONs, with different catalytic rates or binding affinities, and binding of the effector molecule changes the proportion of these conformations. Enhanced binding is named positive cooperativity; diminished binding is named negative cooperativity. A well-known example of positive cooperativity is in HEMOGLOBIN. In biocatalysis it was originally proposed that only multiSUBUNIT enzymes could respond in this way. However, single-subunit enzymes may give such a response (so-called mnemonic enzymes).

See also BIOCATALYST.

coordination A coordination entity is composed of a CENTRAL ATOM, usually that of a metal, to which is attached a surrounding array of other atoms or group of atoms, each of which is called a LIGAND. A coordination entity can be a neutral molecule, a cation, or an anion. The ligands can be viewed as neutral or ionic entities that are bonded to an appropriately charged central atom. It is standard practice to think of the ligand atoms that are directly attached to the central atom as defining a coordination polyhedron (tetrahedron, square plane, octahedron, etc.) about the central atom. The coordination number is defined as being equal to the number of sigma-bonds between ligands and the central atom. This definition is not necessarily appropriate in all areas of (coordination) chemistry. In a coordination formula, the central atom is listed first. The formally anionic ligands appear next, and they are listed in alphabetic order according to the first symbols of their formulas. The neutral ligands follow, also in alphabetic order, according to the same principle. The formula for the entire coordination entity, whether charged or not, is enclosed in square brackets. In a coordination name, the ligands are listed in alphabetic order, without regard to charge, before the name of the central atom. Numerical prefixes indicating the number of ligands are not considered in determining that order. All anionic coordination entities take the ending -ate, whereas no distinguishing termination is used for cationic or neutral coordination entities.

cordilleran A system of parallel mountain ranges forming the spine of continents (e.g., Andes in South America, Rocky Mountains in North America). Spanish for mountain range.

Cori, Carl Ferdinand (1896–1984) Austrian *Biochemist* Carl Ferdinand Cori was born in Prague on December 5, 1896, to Carl I. Cori, director of the Marine Biological Station in Trieste. He studied at the gymnasium in Trieste and graduated in 1914, when he entered the German University of Prague to study medicine. During World War I, he served as a lieutenant in the sanitary corps of the Austrian army on the Italian front; he returned to the university to graduate as a doctor of medicine in 1920. He spent a year at

the University of Vienna and a year as assistant in pharmacology at the University of Graz until, in 1922, he accepted a position as biochemist at the State Institute for the Study of Malignant Diseases in Buffalo, New York. In 1931, he was appointed professor of pharmacology at the Washington University Medical School in St. Louis, where he later became professor of biochemistry.

He married Gerty Theresa CORI (née Radnitz) in 1920. They worked together in Buffalo. When he moved to St. Louis, she joined him as a research associate. Gerty Cori was made professor of biochemistry in 1947.

Jointly, they researched the biochemical pathway by which glycogen, the storage form of sugar in liver and muscle, is broken down into glucose. They also determined the molecular defects underlying a number of genetically determined glycogen-storage diseases. For these discoveries the Coris received the 1947 Nobel Prize in physiology or medicine.

They became naturalized Americans in 1928. He died on October 20, 1984, in Cambridge, Massachusetts. His wife died earlier, in 1957.

See also CORI, GERTY THERESA (NÉE RADNITZ).

Cori, Gerty Theresa (née Radnitz) (1896–1957) Austrian *Biochemist* Gerty Theresa Cori (née Radnitz) was born in Prague on August 15, 1896, and received her primary education at home before entering a lyceum for girls in 1906. She entered the medical school of the German University of Prague and received the doctorate in medicine in 1920. She then spent two years at the Carolinian Children's Hospital before emigrating to America with her husband, Carl, whom she married in 1920. They worked together in Buffalo, and when he moved to St. Louis, she joined him as a research associate. She was made professor of biochemistry in 1947.

Jointly, they researched the biochemical pathway by which glycogen, the storage form of sugar in liver and muscle, is broken down into glucose. They also determined the molecular defects underlying a number of genetically determined glycogen-storage diseases. For these discoveries the Coris received the 1947 Nobel Prize for physiology or medicine. She died on October 26, 1957.

See also CORI, CARL FERDINAND.

cork cambium A narrow cylindrical sheath of plant tissue (meristematic) that produces cork cells that replace the epidermis during secondary growth. The resulting cork is impregnated with suberin, a waterproof, waxy fatty acid derivative.

corphin The F-430 cofactor found in methyl-coenzyme M reductase, a nickel-containing ENZYME that catalyzes one step in the conversion of CO_2 to methane in methanogenic bacteria. The Ni ion in F-430 is coordinated by the tetrahydrocorphin LIGAND. This ligand combines the structural elements of both PORPHYRINs and CORRINs.

See also COORDINATION; METHANOGENS; OXIDOREDUCTASE.

corpus luteum A secreting tissue in the ovary, formed from a collapsed follicle, that produces increasing levels of estrogen as well as progesterone after ovulation. These hormones prepare the endometrium for the implantation of a fertilized egg. However, if pregnancy does not occur, the corpus luteum regresses and these hormone levels decline. This results in the breakdown of the endometrium and initiates menstrual bleeding. If pregnancy does occur, the corpus luteum begins to produce human chorionic gonadotropin (HCG).

corrin A ring-contracted PORPHYRIN derivative that is missing a carbon from one of the mesopositions (C-20). It constitutes the skeleton $C_{19}H_{22}N_4$ upon which various B12 vitamins, COFACTORs, and derivatives are based.

cortex Generic term for the outer layer of an organ. Also the region of parenchyma cells in the root between the stele and epidermis filled with ground tissue.

coterie The basic society of prairie dogs, or a small, close group.

cotransport A simultaneous transporting of two solutes across a membrane by a transporter going one way (symport) or in opposite directions (antiport).