

GLOSSARY

- abiotic factor** Nonliving component in the environment.
- abscisic acid** A plant hormone that promotes dormancy and is associated with water balance by causing stomatal closure.
- absorption spectrum** Graph of absorbance values for different wavelengths of light.
- absorptive heterotrophs** Organisms such as fungi, whose mode of nutrition is to secrete digestive enzymes into a substrate and then absorb the products of digestion.
- accessory fruit** Type of fruit in which most or part of the fruit is derived from tissue other than the ovary of a flower.
- achene** Simple, dry, indehiscent fruit with seed attached to pericarp at only a single point.
- actinomorphic** Regular or radially symmetric.
- active transport** Movement of materials across a cell membrane and against a concentration gradient that requires the expenditure of cellular energy.
- adaptation** Trait that enhances the survival of an organism in its environment.
- addictive drug** Substance that induces an addiction by causing physiological dependence, psychological dependence, and/or tolerance.
- adenine** One of the purine bases found in nucleotides and nucleic acids.
- adhesion** Attraction between unlike molecules. The polar nature of water molecules causes them to adhere (stick to) to a surface.
- ADP (adenosine diphosphate)** A nucleotide diphosphate that is often phosphorylated to form ATP.
- adventitious** Refers to an organ that forms in an unusual place; example: roots from leaves.
- aeciospore** Binucleate spore produced in an aecium.
- aecium (pl., aecia)** Cup-shaped structure in rust fungi composed of binucleate hyphae; aeciospores are formed here.
- aflatoxin** A complex of four mycotoxins produced by *Aspergillus flavus*; often found in peanut products.
- agar** Gelatinous product extracted from the walls of some red algae; used in growth media for microorganisms and in tissue culture.
- agarose** Gelatinous product derived from agar that is a common gel base in biotechnology.
- aggregate fruit** A fruit derived from a single flower with several separate ovaries; example: blackberry.
- aleurone** Protein-rich, outermost layer of endosperm in a cereal grain.
- alginic acid** Gelatinous material extracted from the walls of certain brown algae; used in a variety of commercial and industrial products.
- alkaloid** Nitrogenous substance, alkaline in solution, that produces physiological and/or psychological effects on the nervous system of animals.
- allele** Alternate expression of a gene.
- allelopathy** The release of chemicals by certain plants that inhibit the growth of competing plants.
- allergen** Foreign substance that induces an allergic response.
- alternate arrangement** One leaf borne per node.
- alternative medicine** A wide range of therapies outside the mainstream of traditional Western medicine; includes such treatments as aromatherapy, acupuncture, biofeedback, chiropractic manipulation, herbal medicine, hypnosis, and massage therapy.
- amatoxin** A deadly protoplasmic toxin produced by several genera of fungi, including *Amanita*, *Conocybe*, *Galerina*, and *Lepiota*.
- amino acid** Nitrogen-containing building block of proteins.
- amylopectin** Component of starch consisting of highly branched chains of repeating glucose units; insoluble in water.
- amyloplast** Starch-storing plastid.
- amylose** Component of starch consisting of unbranched chains of repeating glucose units; soluble in water.
- anabolic** Chemical reactions that synthesize and require energy.
- analgesic** Pain-relieving remedy.
- anaphase** Stage in mitosis in which sister chromatids separate and move to opposite poles of the cell.
- androecium (pl., androecia)** Collective term for all the stamens in a flower.
- angiosperm** A flowering plant whose seeds are contained within fruits.
- anisogamy** Sexual reproduction involving motile gametes of two different size classes.
- annual ring** Ring of xylem in woody stem composed of springwood and summerwood that corresponds in temperate regions to a chronological year.
- annulus** Remnant of the partial veil around the stipe of some mushrooms.
- anther** Pollen-producing part of a stamen.
- antheridium (pl., antheridia)** Male gametangium in which the male gametes, sperm, are produced.
- anthocyanin** Plant pigment usually of red, blue, or purple and commonly found in flowers and some fruits; one of the flavonoids.
- anthropogenic** Caused by human activity.
- antibiotic** Substance that inhibits the growth of microorganisms, such as bacteria or fungi.
- antibody** Immunological protein produced by B-lymphocytes in response to a specific antigen and capable of acting against said antigen.
- anticodon** The sequence of three nucleotides in a transfer RNA molecule that is complementary to a specific codon.
- antigen** Substance, usually a protein, that is foreign to the body and elicits an immunological reaction by antibodies.
- antipodal** One of several cells (usually three) of the embryo sac (female gametophyte) of angiosperms; located opposite the egg and synergids.
- apical meristem** Meristematic tissue located at the tips of roots and stems; responsible for primary growth of a plant.
- apoplast** Pathway of water entering a root that flows along intercellular spaces and cell walls.
- aquifer** Underground water reservoir.
- archaeobacteria** Primitive prokaryotes that are biochemically distinct from eubacteria and inhabit extreme environments.
- archegonium (pl., archegonia)** Female gametangium in which the female gamete or egg is produced and housed.
- aril** Thick, fleshy seed covering around some seeds.
- aromatherapy** A holistic approach to healing using essential oils extracted from plants.
- artificial selection** Selective breeding as practiced by humans on domesticated plants and animals.
- ascocarp** Fruiting body of an ascomycete.
- ascogonium (pl., ascogonia)** A female reproductive structure in some ascomycetes.
- ascospore** Sexual spore of an ascomycete fungus that is produced by meiosis, followed by mitosis.
- ascus** Saclike reproductive structure of ascomycetes in which meiosis, followed by mitosis, produces eight haploid cells called ascospores.
- asexual reproduction** Any type of reproduction not involving the union of gametes.
- atom** The smallest individual unit of an element that still retains the properties of that element.
- atomic mass** The total number of protons and neutrons in the atomic nucleus.
- atomic nucleus** Most of the mass of an atom: composed of protons and neutrons.
- atomic number** Number of protons in the atomic nucleus; there is a characteristic number for each type of element.
- atomic weight unit** The mass of one proton or neutron.
- ATP (adenosine triphosphate)** The energy compound of the cell.
- ATP synthase** A membrane-bound enzyme in mitochondria and chloroplasts that phosphorylates ADP to form ATP using energy from the passage of protons through the enzyme.
- autotroph** Self-feeder; an organism that can synthesize organic compounds from simple inorganic ones.
- auxins** A class of plant hormones that influences cell elongation and is involved in many stages of growth and development.
- awn** A slender bristle.
- axil** Upper angle between a leaf and stem.
- axillary bud** Bud found in the axil of a leaf, also called a lateral bud.



basidiocarp Fruiting body of a basidiomycete.

basidiospore Sexual spores of basidiomycetes.

basidium (pl., **basidia**) Club-shaped reproductive cell in basidiomycetes; undergoes meiosis to produce four haploid cells called basidiospores.

bast fiber Fibers located in phloem.

berry Simple, one- to many-seeded, fleshy fruit with thin exocarp; example: tomato.

beta-carotene Yellow to red pigment in plants; one of the most important of the carotenoids; converts to vitamin A in the body.

biennial Plant that completes its life cycle within two growing seasons; example: carrot.

binomial Two-word scientific name.

bio diesel A vegetable oil product used as a cleaner alternative to conventional petroleum-based diesel fuel; produces little soot or other pollutants.

biodiversity The sum variety of living organisms on Earth.

biological magnification Increase and concentration of toxins as they are passed along a food chain.

biomass Total dry weight of living organisms.

biome Large terrestrial communities recognized by characteristic vegetation.

bioremediation The use of microorganisms to reclaim contaminated soil and water.

biosphere The entire world of living organisms.

biotechnology The use of living organisms to provide products for humanity; using genetic engineering to create organisms with useful traits.

biotic factor Living component in the environment.

blade Flat, green part of a leaf; expanded or flattened portion of a brown alga.

B-lymphocytes Cells that manufacture antibodies involved in immunity.

body mass index (BMI) Body weight in kilograms per squared meter.

boreal forest Northern coniferous forest biome, also called the taiga, located south of the tundra and dominated by conifers.

bract A floral leaf.

bran The husk of a cereal grain; including the pericarp and seed coat of a cereal grain. The bran is removed in the processing of refined grains.

bud Embryonic shoot of a plant; may be composed of embryonic leaves or flowers or be mixed.

budding Type of asexual reproduction in which a small blip of the parental body develops into a new individual.

bulb Vertical, underground stem with food-storing leaves covered by papery leaves.

bundle sheath Sheath of parenchyma or sclerenchyma cells surrounding the vascular bundles in leaves.

callus Mass of undifferentiated cells in tissue culture.

calorie The amount of heat needed to raise the temperature of 1 g of water 1° Celsius; one thousand calories = 1 kilocalorie or 1 Calorie.

Calvin Cycle Biochemical pathway in photosynthesis in which carbon from atmospheric CO₂ is fixed and reduced into carbohydrate.

calyx Collective term for sepals of a flower.

canker localized area of dead tissue on a plant, usually on woody stems, branches, or twigs.

capsule Simple, dry, dehiscent fruit that opens along three or more seams or pores; example: cotton.

carbohydrate Organic compound containing carbon, hydrogen, and oxygen with the general formula of C_nH_{2n}O_n.

carcinogen A cancer-causing agent; may be chemical, microbial, radiation, or a gene mutation.

cardioactive glycoside Sugar-containing molecules with an active compound that affects the heartbeat.

carnivore Flesh-eating organism; animal that eats other animals.

carotenes Accessory photosynthetic plant pigments; protect chlorophyll from breakdown by light or oxygen.

carotenoids Class of plant pigments that includes carotenes and xanthophylls; most are yellow, orange, or red.

carpel The ovule-bearing part of a flower.

carrageenan Gelatinous material extracted from the walls of some red algae and used in a variety of commercial and industrial products.

carrying capacity Maximum number of a population that can be supported by the environment over a given period of time.

caryopsis Simple, dry, indehiscent fruit with a single seed that is fused to the ovary wall; also called a grain; example: wheat.

Casparian strip Water-impermeable strip of suberin found in the transverse and radial walls of endodermal cells.

catabolic Chemical reactions that release energy by degrading complex compounds into simpler ones.

catalyst An agent that speeds up a chemical reaction but is not used up in the reaction.

catkin Inflorescence of unisexual flowers.

cell culture (tissue culture) The culture of single cells or tissues to form callus and then to develop whole plants asexually.

cell plate Double membrane across the equator of a dividing cell that develops from the phragmoplast; marks where the new cell walls will form.

Cell Theory A set of principles describing how cells are the fundamental units of life.

cellular respiration Cellular pathway for the production of ATP.

cellulose Complex carbohydrate that occurs in the cell walls of plants.

cell wall Rigid outer layer in the cells of plants, fungi, bacteria, and certain other organisms.

central vacuole A membrane-enclosed sac that takes up most of the volume of a mature plant cell.

centromere Constricted portion of chromosomes to which spindle fibers attach; region joining sister chromatids.

cereal Edible grains of cultivated grasses; examples: wheat, rice, corn.

chaff Bracts surrounding a cereal grain; removed during threshing.

chalazal Ovule end opposite the micropyle.

chaparral Biome characterized by dense thickets of evergreen shrubs with mild rainy winters and dry, hot summers.

chemiosmosis The coupling of ATP synthesis to electron transport by way of a proton gradient and ATP synthase.

chiasma (pl., **chiasmata**) The X-shaped configuration between the chromatids of homologous chromosomes that have exchanged genetic material during prophase I of meiosis.

chitin Complex polymer found in the cell walls of many fungi.

chlorophyll Green pigment found in the chloroplasts of plants, algae, and cyanobacteria that is essential to photosynthesis.

chloroplast Membrane-bound organelle in plants and algae that contains chlorophyll and in which photosynthesis takes place.

cholesterol Steroid that is an integral part of animal cell membranes and a precursor to other steroidal compounds in animals.

chromatids The identical duplicated halves of a single chromosome seen during cell division.

chromatin Dispersed form of genetic material, DNA and protein, in the nucleus of a nondividing cell.

chromoplast Membrane-bound organelle containing pigments other than chlorophyll; the pigments may be yellow, orange, or red.

chromosome Condensed form of DNA and proteins that appear in a dividing cell.

Citric Acid Cycle Another name for Krebs Cycle.

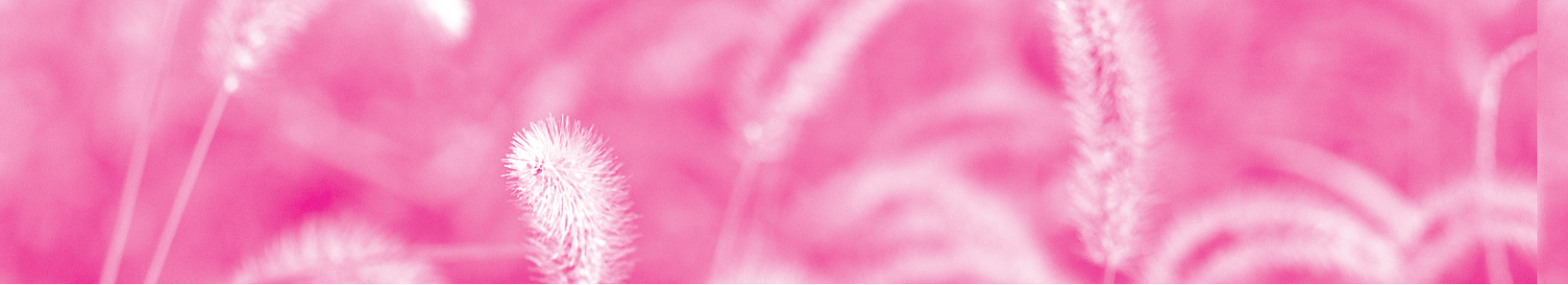
clade Monophyletic group of organisms, i.e., organisms that can trace descent from a common ancestor.

cladophyll Modified stem that resembles and functions as a leaf.

class Taxonomic rank consisting of related orders.

climax community Stable, self-sustaining community that is the culmination of ecological succession.

clone The production of a genetically identical individual through asexual reproduction.



codominance A condition in which both alleles of a heterozygous pair are expressed independently.

codon Genetic code composed of three nucleotide sequences.

coenzyme Organic molecule that is necessary for the proper functioning of an enzyme.

coevolution The interaction of species as selective forces upon each other, resulting in adaptations that enhance their interdependency.

cofactor Inorganic molecule or ion that is necessary for the proper functioning of an enzyme.

cohesion Tendency of like molecules to stick together, usually due to hydrogen bonds.

coleoptile Sheath surrounding the embryonic shoot of monocotyledons.

coleorrhiza Sheath surrounding the radicle (embryonic root) of monocotyledons.

collenchyma Ground tissue in plants with unevenly thickened primary cell walls; functions in support.

community All the populations in a given locale.

companion cell Phloem cell associated with a sieve tube member.

competitive exclusion Principle that no two species can occupy the same niche indefinitely.

complete flower A flower with all four floral whorls (sepals, petals, stamens, and carpels).

complete protein A protein that has all the essential amino acids and in the correct proportions.

compound A substance formed by two or more elements in a definite ratio.

compound leaf A leaf with a blade divided into separate leaflets.

compound pistil A pistil composed of more than one carpel.

conceptacles Spherical cavities where gametangia are produced and that have openings on the surface of the receptacle; found in certain genera of brown algae such as *Fucus*.

conidium (pl., **conidia**) Asexual reproductive spores of some ascomycetes and imperfect fungi.

consumer Organisms that cannot synthesize their food but must feed on other organisms.

coprolite Fossilized fecal material.

cork Suberized cells on the outer surface of woody stems and roots; produced by the cork cambium.

cork cambium Meristematic tissue that produces cork cells on its outer surface and phelloderm on its inner surface.

corm Underground, enlarged, food-storing stem covered by papery leaves.

corolla Collective term for the petals of a flower.

cortex Parenchymous tissue, the region between the epidermis and vascular tissue in a herbaceous root or stem.

cotyledon Seed leaf in the seed and seedling.

covalent bond Chemical bond formed when atoms share a pair of electrons.

crack Form of purified cocaine with widespread street use.

Crassulacean Acid Metabolism (CAM Pathway) A variation of the C_4 pathway that functions in a number of cacti and succulents; allows for the fixation of carbon dioxide during the night; then in the daytime the carbon dioxide is transferred to the Calvin Cycle.

crista (pl., **cristae**) Infoldings of the inner membrane of a mitochondrion.

crossing-over The exchange of genetic material between chromatids of homologous chromosomes during prophase I of meiosis.

cross-pollination Transfer of pollen from the stamen to the stigma of a flower of another plant.

culm Hollow, jointed stem of grasses.

cultivar Abbreviation for cultivated variety of plant.

cuticle Waterproof layer of cutin on leaves and nonwoody stems.

cutin Waxy material secreted by epidermal cells.

cyanogenic glycoside Glycoside that releases cyanide.

cytochromes Iron-containing enzymes that carry electrons in both photosynthesis and respiration.

cytokinesis The division of the cytoplasm to form daughter cells; usually accompanies mitosis and meiosis.

cytokinins A class of plant hormones that promote growth by stimulating cell division.

cytoplasm The entire contents of the cell exclusive of the nucleus.

cytosine A pyrimidine base in DNA and RNA.

cytoskeleton Cellular scaffolding of microtubules and microfilaments within the cytoplasm of the cell.

cytosol The more fluid portion of the cytoplasm.

dalton Atomic Weight Unit; the mass of one proton or one neutron.

dark reactions Biochemical reactions that make up the Calvin Cycle of photosynthesis.

deciduous Trees and shrubs that shed their leaves during the autumn.

deciduous forest Forest biome in which the dominant trees are deciduous.

decomposer Organism that obtains its nutrition by breaking down dead plants and animals or their waste products.

decongestant An agent that relieves nasal or respiratory congestion.

dehiscent fruit Fruit that splits open at maturity, facilitating seed dispersal.

deletion A mutation resulting from the loss of a small segment of DNA.

dendrochronology Study of the annual rings in trees to determine the timing of natural events in the past.

dendroclimatology Study of the annual rings of trees in order to interpret climatic changes in the past.

deoxyribonucleic acid (DNA) The genetic material of life.

deoxyribose Five-carbon sugar in DNA.

depressant Psychoactive drug that has a sedative effect on the central nervous system; actions include dulling mental awareness and inducing sleep.

dermal tissue Tissue that covers surfaces in plants.

desert Biome in which the annual precipitation is less than 25 cm (10 in).

detritus Wastes and remains of dead plants and animals.

diatomaceous earth Algal product composed of the fossilized remains of diatom frustules that are mined and used in a variety of products.

dicotyledon Member of a class of angiosperms in which the seedlings typically possess two cotyledons; commonly abbreviated to dicot.

differentially permeable membrane A membrane that allows the free passage of some materials but inhibits the passage of others.

diffusion The spontaneous movement of particles (ions, molecules, or atoms) from a region of higher concentration to one of lower concentration.

dihybrid cross A genetic cross between parents that differ for two traits.

dikaryon Mycelium of some fungi that have two separate haploid nuclei in each cell.

dioecious Refers to a plant species that has separate male and female plants; pollen-bearing and ovule-bearing flowers or cones are borne on different plants.

diploid Two complete sets of chromosomes in a cell; $2N$.

disaccharide Sugar consisting of two monosaccharides; example: sucrose is composed of glucose and fructose.

distillation Boiling of a liquid to evaporation and subsequent condensation of the vapors for the purposes of purification and concentration.

distilled spirit Alcoholic beverage with an alcoholic content from 80 to 100 proof; obtained by distillation of a beer or wine.

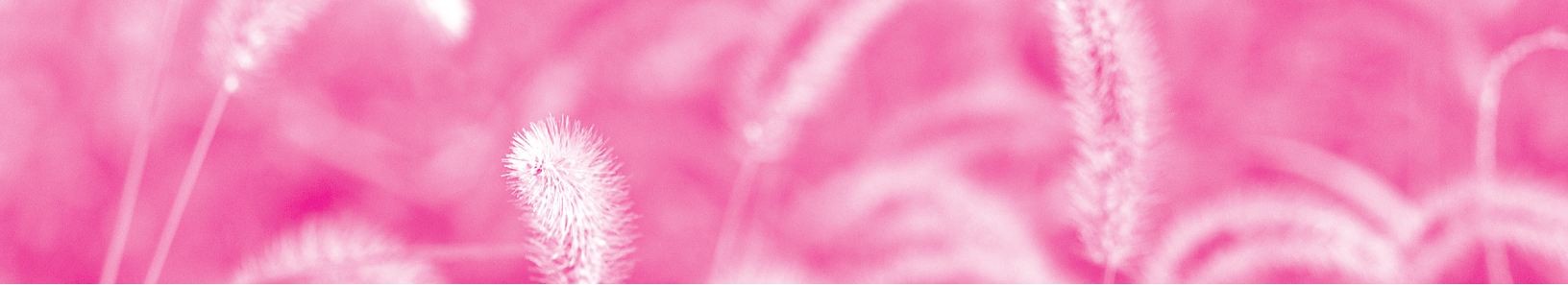
division Taxonomic rank that includes related classes; synonymous to phylum used in animal systematics.

domesticated plant A plant that has been genetically changed from the wild type by artificial selection.

dominant The allele of a gene that masks or suppresses the expression of an alternate allele.

double fertilization The fusion of egg and sperm resulting in a zygote, and the simultaneous fusion of sperm with two polar

- nuclei resulting in the formation of endosperm that characterizes all angiosperms.
- double helix** The form of the DNA molecule; refers to the complementary nucleotide strands of the DNA molecule twisted into a helix.
- drupe** Simple, fleshy fruit with the seed enclosed in a hard endocarp (pit); example: cherry.
- dry fruit** Fruit in which the cells of the pericarp are dry (dead) at maturity.
- drying oils** Plant oils that react with oxygen in the air to form a thin, waterproof, elastic film.
- ecological equivalent** Species that fulfill similar niches in different geographical regions.
- ecological pyramid of biomass** Total biomass of all organisms at each trophic level in a food chain; typically, biomass declines with successively higher trophic levels.
- ecological pyramid of energy** Total energy content of all organisms at each trophic level in a food chain; only 5% to 20% of energy is passed between trophic levels, so energy content declines at successively higher trophic levels.
- ecological pyramid of numbers** Number of organisms supported at each trophic level in a food chain; typically, fewer organisms are supported at successively higher trophic levels.
- ecological succession** Orderly process of natural change in a community composition over time, culminating in a self-perpetuating complex community; primary and secondary types are recognized.
- ecosystem** Community of living organisms interacting with the abiotic factors in the environment.
- ectomycorrhizae** A type of mycorrhizae in which the fungus forms a sheath or mantle around the root, penetrating between the cells of the root epidermis and cortex.
- egg** Nonmotile female gamete.
- egg apparatus** Egg cell and adjacent synergids in the embryo sac (female gametophyte) of angiosperms.
- electron** Negatively charged particle of an atom.
- Electron Transport System** The final stage of respiration; a series of enzymes and coenzymes on the inner membrane of mitochondria functioning in the transfer of electrons and the resulting synthesis of ATP.
- element** Building blocks of matter that cannot be broken down into a simpler substance; each element is composed of just one type of atom.
- embryo** Immature sporophyte that develops from a zygote.
- embryo sac** Female gametophyte of angiosperms; retained within the ovule.
- endergonic reaction** Chemical reaction that requires energy.
- endocarp** Innermost layer of the pericarp (fruit wall).
- endodermis** Innermost layer of the root cortex surrounding the stele; many of the endodermal cells have Casparian strips.
- endoplasmic reticulum (ER)** Membranous network of channels throughout the cytoplasm of a cell; some regions are studded with ribosomes (rough), and others are ribosome free (smooth).
- endosperm** Nutrient tissue that forms by the fusion of a sperm nucleus with two polar nuclei during double fertilization in angiosperms.
- endotrophic mycorrhizae** A type of mycorrhizae in which the fungus grows into the cells of the root cortex.
- energy** The ability to perform work.
- enzyme** Proteins that act as catalysts to chemical reactions.
- epicotyl** Portion of the shoot of an angiosperm embryo or seedling above the cotyledons.
- epidermis** Outermost tissue in all young and nonwoody plant organs.
- epigynous** Refers to a plant whose floral parts (sepals, petals, and stamens) appear to arise from the top of an ovary; the ovary is said to be inferior.
- epiphyte** Plant that grows on top of another plant for support and position.
- essential amino acid** Amino acid that cannot be synthesized by an organism but must be obtained ready-made in the diet for proper health.
- essential nutrient** Nutrient that cannot be synthesized by an organism but must be obtained ready-made in the diet for proper health.
- essential oil** Volatile component that contributes to the scent and flavoring of aromatic plants.
- ethylene** Gaseous plant hormone involved in fruit ripening and other aspects of plant growth and development.
- eubacteria** The majority of bacteria, including cyanobacteria, with distinctive biochemical features that distinguish them from archaeobacteria.
- eukaryotic** Refers to cells with a nucleus and distinct membrane-bound organelles.
- evolution** Inherited changes in populations shaped by natural selection over time.
- exergonic reaction** Chemical reactions that release energy.
- exine** The outer layer of the pollen wall.
- exocarp** Outermost layer in the pericarp (fruit wall).
- exon** An expressed segment of a gene; exons are separated from each other by introns.
- F₁ generation** First filial generation; offspring from a genetic cross.
- F₂ generation** Second filial generation of a genetic cross.
- FAD (flavin adenine dinucleotide)** An electron receptor in cellular respiration.
- family** Taxonomic rank consisting of a group of related genera.
- fat** Triglyceride that is solid at room temperature; usually of animal origin.
- fat-soluble vitamin** Vitamins that can be stored in fatty tissues of the body; vitamins A, D, E, and K.
- fatty acid** Long chains of carbon and hydrogen; component of phospholipids and triglycerides.
- fermentation** Anaerobic cellular respiration; organic compounds are broken down to release energy without the use of oxygen as an electron acceptor.
- Fertile Crescent** Area between the Tigris and Euphrates Rivers in the Near East; some of the earliest documented sites of agriculture.
- fiber** Long and narrow sclerenchymous cell; functions in support; an important dietary component that provides bulk; component of fabrics, ropes, and paper.
- fibrous roots** Root system with several main roots; common to many monocots.
- filament** Part of the stamen in a flower that supports the anther.
- flagellum (pl., flagella)** Whiplike cellular structure of motility; eukaryotic flagella are composed of microtubules.
- flavonoids** Class of plant pigments, some of which appear colorless to the human eye because their colors are activated by ultraviolet wavelengths; includes the anthocyanins, flavones, and flavonols.
- fleshy fruit** Fruit in which the cells of the pericarp are alive at maturity.
- floret** One of the small flowers that make up the inflorescences in the composite and grass families.
- fluid mosaic model** Model of cell membrane structure composed of a lipid bilayer with scattered proteins; often described as a sea of lipids with protein icebergs.
- follicle** Single, dry, dehiscent fruit that splits along one seam; example: milkweed.
- food chain** Progression of organisms that feed on or decompose the preceding one.
- food web** Interrelationships between several food chains in an ecosystem.
- forage crops** Crops that are grown as food for domesticated herbivores.
- forager** Member of a hunter-gatherer group.
- frame-shift mutation** A mutation caused by the insertion or deletion of nucleotides (fewer than three or a number not a multiple of three) resulting in the improper grouping into codons.
- free-threshing grain** Grain that separates easily from enclosing bracts.



fructose Six-carbon monosaccharide; often referred to as fruit sugar.

fruit A ripened ovary of an angiosperm flower.

fruiting body Reproductive structures in fungi.

frustule The glasslike diatom wall, which is often intricately marked with pits, grooves, and ridges, giving these microscopic forms the appearance of cut crystal.

fungicidal A compound that is able to kill a fungus and stop an infection.

fungistatic A compound that slows or stops the growth of a fungus.

G₁ Part of interphase known as Gap 1; time of active metabolism in the cell cycle.

G₂ Part of interphase after the synthesis of DNA and before the start of nuclear division and known as Gap 2.

gametangium (pl., **gametangia**) Structure in which gametes are produced.

gamete Sex cell.

gametophyte Haploid generation of plants that produce gametes.

gene Unit of hereditary information on chromosomes.

generalized niche Niche in which species have broad requirements and tolerate a range of conditions.

generative cell Cell in male gametophyte (pollen grain) that divides, producing two sperm.

genetically engineered microorganisms (GEMs) Bacteria that have been genetically engineered by the insertion or deletion of DNA segments.

genetic code The set of nucleotide triplets (codons) that code for amino acids used in protein synthesis.

genetic engineering The transfer of specific genes between organisms using techniques of molecular biology.

genetic erosion Irreversible loss of genetic diversity due to extinction of traditional varieties and wild ancestors of crop plants.

genetically modified plant (GM plant) Plant produced through genetic engineering and containing genes from another organism.

genotype Genetic makeup of an organism.

genus (pl., **genera**) Taxonomic rank consisting of a group of related species.

germ Embryo of a cereal grain.

germplasm Entire genetic makeup of an organism.

gibberellins A class of plant hormones involved in many stages of growth and development, especially stem elongation and seed germination.

glucose Six-carbon monosaccharide; one of the most abundant simple sugars; the building block of both cellulose and starch and important to several metabolic pathways.

glumes Pair of bracts at the base of a spikelet in a grass flower.

gluten Protein complex in endosperm of wheat and some other cereals that is essential in making a leavened bread.

glycemic index A scale to indicate how a food affects blood glucose levels. A high GI rating indicates that the food is quickly broken down into glucose that rapidly enters the bloodstream.

glycemic load Glycemic index multiplied by the number of grams of carbohydrate present in a food.

glycogen Polysaccharide of glucose; principal carbohydrate stored in animal and fungal cells.

glycolysis Pathway in cellular respiration in which glucose is split into pyruvate.

glycoprotein A protein with attached sugars.

glycoside Physiologically active compound in plants that always contains a sugar group, although the active part of the molecule may differ.

glyoxysome A type of microbody involved in the enzymatic conversion of stored fats to sugars in some seeds.

Golgi body (apparatus) Organelle of membranous, hollow sacs arranged in a stack; functions in modification, storage, and packaging of secretion materials; may be called dictyosome in plants.

grafting The union of a part of one plant, the scion, to the root or stock of another plant.

grain Single, dry indehiscent fruit of a single seed that is fused to the ovary wall.

granum (pl., **grana**) Stacked thylakoid membrane within a chloroplast.

grassland Biome in which the annual moderate precipitation is enough to support the growth of grasses but insufficient to support a forest.

greenhouse effect The warming of the Earth due to the atmospheric accumulation of carbon dioxide and other gases, which trap heat and radiate it back to the Earth's surface.

Green Revolution Introduction of scientifically developed food crops that can produce high yields under conditions of high inputs of water, fertilizers, and pesticides.

ground tissue Includes primary tissues of parenchyma, sclerenchyma, and collenchyma that make up much of the bulk of the primary plant body; function in support, photosynthesis, and storage; also known as fundamental tissue.

guanine Purine base present in both DNA and RNA.

guard cell One of a pair of specialized cells in the epidermis that regulates the opening and closing of a stoma.

gymnosperm Plants that bear naked or exposed seeds.

gynoecium (pl., **gynoecia**) Collective term for the carpels in a flower.

habitat Place or type of place where an organism lives.

hallucinogen Psychoactive drug capable of altering moods and perceptions of time and space.

haploid One set of chromosomes in a cell; *1N*.

hardwood Angiospermous trees or the wood from angiosperms.

HDL (high-density lipoprotein) Transport molecule that removes excess cholesterol from the body's tissues to the liver for degradation and elimination.

head Horizontal inflorescence of sessile flowers.

heartwood Core in woody stems, usually darker than surrounding tissue, and no longer functioning in water conduction.

hemicellulose Polysaccharide in plant cell walls that cross-links cellulose fibrils.

herb Nonwoody plant; aromatic plants whose leaves are used in seasoning.

herbaceous Refers to nonwoody plants.

herbal A text that describes plants that are useful medicinally and in other ways.

herbarium A permanent collection of dried and pressed plants that provides information on the location and identification of the local flora.

herbivore An animal that eats plants.

hesperidium Simple, fleshy fruit with leathery exocarp; example: any citrus fruit.

heterocysts Large, thick-walled, colorless cells where nitrogen fixation occurs in cyanobacteria.

heteromorphic Refers to an organism that has alternations of haploid and diploid generations that are morphologically different.

heterotroph Other feeder; organism that is incapable of synthesizing its own food and must obtain its nutrition from other organisms.

heterozygous Having two different alleles for a given trait.

hilum Scar on a seed indicating where it was attached to the ovary.

holdfast Attachment organ or cell at the base of certain algae.

homologous chromosomes Chromosome pairs of the same size and shape that carry genes for the same traits.

homozygous Having two identical alleles for a given trait.

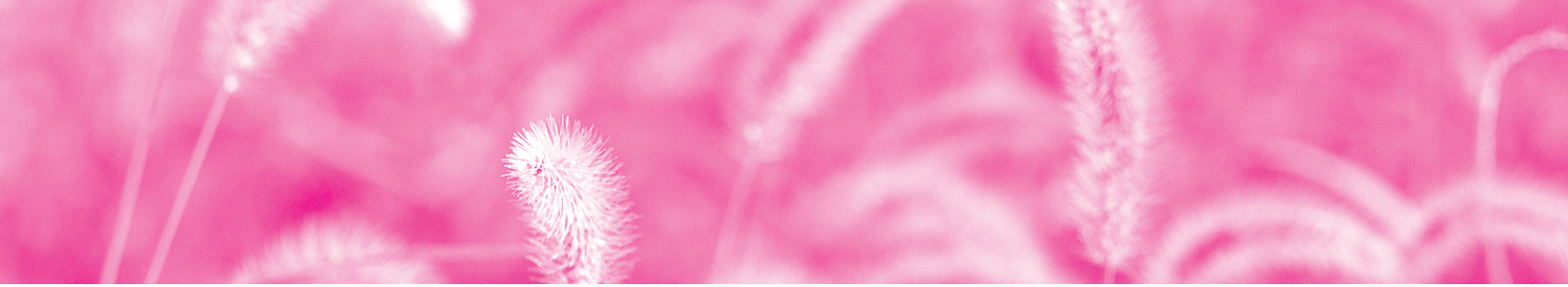
hormones Chemical messengers that are effective at very low concentrations.

hunter-gatherers Human social group that secures food sources from wild resources such as hunting animal prey or collecting edible plants from the wild.

hybrid Offspring of a cross between two species or between alternate homozygous conditions.

hydrocolloids Complex polysaccharides such as agar, carrageenan, and alginic acid found in algal cell walls and used as emulsifiers, stabilizers, and gelling agents.

- hydrogenation** Addition of one or more hydrogens to monounsaturated and polyunsaturated fatty acid chains.
- hydrogen bond** Weak chemical bond formed when the slightly positive hydrogen atom of a polar covalent bond is attracted to the slightly negative atom of a polar covalent bond of another molecule.
- hydroponics** Growing plants without soil in liquid nutrient solutions.
- hymenium** The layer of fertile cells that produces spores in a fungal fruiting body.
- hyperaccumulator** Any of certain plant species that concentrate specific minerals at extremely high levels.
- hypertonic** Solution with a greater solute concentration than that within a cell or reference solution.
- hypha** (pl., **hyphae**) Microscopic threads that make up the body of most fungi.
- hypocotyl** Region of stem in a plant embryo that is below the cotyledons.
- hypogynous** Floral whorls (sepals, petals, stamens) inserted below the ovary of a flower.
- hypotonic** Solution with a lesser solute concentration than that within a cell or reference solution.
- IgE** Immunoglobulin E; specific class of antibodies involved in allergic reactions; individuals who suffer from allergies have elevated levels of these antibodies.
- immunoglobulin** A category of protein known as an antibody.
- imperfect flower** Unisexual flower; either staminate or pistillate.
- imperfect stage** The asexual phase in a fungus life cycle characterized by the production of asexual spores.
- incomplete dominance** A type of inheritance in which the heterozygous phenotype is intermediate between the phenotypes of the dominant and recessive parents.
- incomplete flower** Flower lacking one or more floral whorls; typically either the sepals, petals, or both.
- incomplete protein** Protein that lacks the full complement of essential amino acids in the correct proportions.
- indehiscent fruit** Dry fruit that does not split open on maturity.
- inferior ovary** Ovary that lies below the attachment of the sepals, petals, and stamens; an epigynous flower.
- inflorescence** A cluster of flowers.
- insertion** A mutation resulting from the addition of a small segment of DNA.
- integral protein** A protein that spans or penetrates the lipid bilayer of cell membranes.
- integrated pest management** A multifaceted approach to plant disease control that is intended to reduce the need for pesticides; includes sanitation, crop rotation, biological controls, disease forecasting, and genetic resistance in addition to pesticides.
- integument** Outermost layers of an ovule that typically develop into the seed coat.
- internode** Region on a stem between nodes.
- interphase** Stage in the cell cycle when a cell is not dividing.
- intine** The inner layer of the pollen wall.
- intron** An intervening or noncoding segment of a gene; introns separate exons.
- involute** Whorl of bracts that subtend a flower or an inflorescence.
- ion** An atom or molecule that has lost or gained electrons and has either a positive or a negative charge.
- ionic bond** Chemical bond formed when ions of opposite charges attract.
- isogamy** Sexual reproduction involving motile gametes of two different physiological types but are identical in appearance.
- isomorphic** Alternation of haploid and diploid generations that are morphologically identical.
- isotonic** Solution in which the solute concentration is equal to that within the cell or reference solution.
- isotope** Alternate form of an element with a different number of neutrons but the same number of protons and electrons.
- karyogamy** In sexual reproduction, the fusion of genetically distinct nuclei.
- kinetic energy** Energy of motion.
- kinetochore** Specialized region on the centromere that connects a chromatid to the spindle.
- kingdom** Largest taxonomic category consisting of related phyla or divisions.
- Krebs Cycle** The second stage of cellular respiration that occurs in the mitochondria; completes the breakdown of glucose into carbon dioxide.
- land races** Traditional varieties of plant crops.
- lateral bud** Bud found in the axil of a leaf; also called an axillary bud.
- latex** Milky juice exuded from some plants.
- LDL (low-density lipoprotein)** Transports fats and cholesterol to the body cells, including the cells lining the bloodstream.
- leaflet** A subdivision of a leaf blade.
- legume** Simple, dry, dehiscent fruit that splits along two seams, a pod; member of the Fabaceae; a type of bean or pea.
- lemma** Bract in a grass flower.
- lenticel** Raised area in the bark of woody stems that permits the exchange of gases.
- leucoplast** Colorless plastid typically associated with starch formation and storage.
- lichen** Composite organism formed by the symbiotic association of a fungus and an alga.
- light harvesting antennae** A complex of several hundred chlorophyll and carotenoid molecules that form a part of each photosystem.
- Light Reactions** First steps in photosynthesis, in which chlorophyll traps solar energy, driving the formation of ATP and NADPH; water is also lysed, releasing oxygen.
- lignin** Complex organic compound that strengthens the secondary cell walls of plants.
- linkage** Tendency of genes located on the same chromosome to be inherited together.
- lipid** Organic compound that is insoluble in water; includes fats, oils, and steroids.
- litter** Partially decomposed plant material.
- locus** The location of a gene on a chromosome.
- lumen** Cavity bounded by secondary cell wall in dead plant cells.
- lymphocytes** A type of white blood cell; a component of the immune system produced by stem cells in the bone marrow.
- lysergic acid diethylamide (LSD)** A derivative of lysergic acid alkaloids, first isolated from ergot; strongly hallucinogenic.
- macromolecule** Complex organic molecule formed by joining smaller molecules; example: proteins are macromolecules formed by joining amino acids.
- macronutrient** Nutritional requirement needed in relatively large amounts.
- major mineral** Mineral requirement needed in relatively large amounts.
- mass number** Sum of the number of protons and neutrons in the nucleus of an atom; designated by a superscript to the upper left of the elemental symbol.
- matrix** Compartment of the mitochondrion enclosed by the inner membrane; site of the Krebs Cycle.
- measporangium** Sporangium that contains megaspores.
- megaspore** Spore that develops into the female gametophyte.
- megaspore mother cell** Diploid cell in measporangium that, upon undergoing meiosis, yields megaspores.
- meiosis** Two successive nuclear divisions during which the chromosome number is halved; in plants, meiosis results in the formation of spores.
- meristem** Area of actively dividing cells in plants.
- mesocarp** Middle layer in the pericarp (fruit wall).
- mesophyll** Photosynthetic middle layer in the blade of a leaf; typically composed of palisade and spongy parenchyma.
- messenger RNA (mRNA)** Type of RNA created from DNA template that travels to ribosomes and directs protein synthesis.
- metabolism** Sum total of the chemical reactions in an organism.



metaphase Stage of mitosis in which the chromosomes are aligned along the equator.

microbody Membrane-bound organelle that is the site of certain enzymatic conversions; example: peroxisomes and glyoxisomes.

microfilament Solid rod of protein and part of the cytoskeleton.

micronutrient Nutrient required in relatively small amounts; vitamins and minerals.

micropyle The opening in an ovule through which the pollen tube enters during fertilization.

microsporangium Sporangium that contains microspores.

microspore Spore that develops into the male gametophyte.

microspore mother cell Diploid cell in microsporangium that undergoes meiosis to produce microspores.

microtubule Hollow protein rod found in cilia, flagella, the spindle, and the cytoskeleton.

middle lamella Layer of adhesive material (primarily pectins) found between adjacent cell walls.

mineral Inorganic, essential micronutrient.

mitochondrion (pl., **mitochondria**) Membrane-bound organelle that is the site of cellular respiration.

mitosis Nuclear division, usually accompanied by cytokinesis, in which the chromosomes are duplicated and divided to form two identical daughter cells.

molecular farming Growing and harvesting genetically engineered crops that are producing pharmaceuticals.

molecule Two or more atoms held together by chemical bonds that retain the properties of the compound.

monocotyledon A class of angiosperms in which the seedlings typically possess one cotyledon; commonly abbreviated to monocot.

monoculture The cultivation of a single crop over a large region year after year.

monoecious Refers to a plant species whose separate male and female reproductive structures are borne on the same plant; pollen-bearing and ovule-bearing flowers or cones are borne on the same plant.

monohybrid cross Genetic cross between parents that differ by a single trait.

monomer Subunit of a polymer.

monosaccharide The simplest carbohydrate, a simple sugar.

monounsaturated fat Composed of fatty acid chains in which there is only a single C-C double bond; examples: canola oil and olive oil.

multiple alleles A condition in which more than two alleles exist for a given trait.

multiple fruit A fruit derived from the fusion of the ovaries of several flowers in an inflorescence; example: pineapple.

mutation An inheritable change in genes or chromosomes.

mycelium (pl., **mycelia**) A network of fungal hyphae.

mycobiont The fungal partner in a mutualistic relationship such as mycorrhizae or lichens.

mycoprotein A vegetarian food material produced from the mycelium of the fungus *Fusarium venenatum*.

mycorrhiza (pl., **mycorrhizae**) Symbiotic association between a fungus and a plant root.

mycotoxin A toxic compound formed by the hyphae of common molds growing under a variety of conditions, especially in contaminated foods.

NAD (nicotinamide adenine dinucleotide) A molecule capable of being reduced that acts as an electron intermediate during cellular respiration.

NADP (nicotinamide adenine dinucleotide phosphate) A molecule that acts as an electron intermediate during photosynthesis; is reduced during the Light Reactions and oxidized during the Calvin Cycle.

naked grain A grain that separates easily from the surrounding bracts.

narcotic Any psychoactive compound that is dangerously addictive; a compound that induces central nervous system depression resulting in numbness, lethargy, and/or sleep.

natural selection A guiding force of evolution in which organisms that are most fit, survive to reproduce.

nectar A sugary solution that attracts animals to plants.

nectar guide Color patterns present on petals that direct insects toward the nectar; often not visible to human eye.

nectary A gland that secretes nectar.

Neolithic The Stone Age period following the advent of agriculture.

net venation The netlike pattern of branching of veins on a leaf blade; also known as reticulate venation; characteristic of most dicot leaves.

neurotransmitter A chemical responsible for the transmission of impulses across a neural synapse.

neutron A particle in the nucleus of an atom with no charge and a mass of approximately one atomic weight unit.

niche The particular role played by an organism in an ecosystem.

nitrogen-fixation The process of reducing nitrogen gas to ammonia and nitrates, forms of nitrogen that can be utilized by plants.

node The region of a stem where leaves or branches arise.

non-drying oils Plant oils that remain liquid for prolonged periods upon exposure to the air.

nonseptate hypha Fungal hyphae that lack septa, or cross-walls.

nonshattering Refers to seeds and/or fruits that do not split off and scatter from the fruiting head; a trait associated with domesticated plants.

nucellus Tissue in the ovule within which the embryo sac develops; integuments surround the nucellus.

nuclear envelope A double membrane with pores surrounding the nucleus.

nuclear pores Small openings in the nuclear membrane.

nucleic acid A molecule consisting of joined nucleotides; the two types are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

nucleolus Spherical structure within the nucleus consisting of RNA and protein; assembly site for ribosomal subunits.

nucleotide A single unit of nucleic acid composed of a phosphate group, a five-carbon sugar (either ribose or deoxyribose), and a purine or pyrimidine base.

nucleus Membrane-bound organelle within eukaryotic cells; contains chromosomes and the nucleolus and is essential for the regulation of all cellular functions.

nut A one-seeded, dry, indehiscent fruit with a hard pericarp.

oil A triglyceride that is liquid at room temperature.

omnivore An organism that feeds on both plants and animals.

oogamy Sexual reproduction involving a nonmotile larger egg and a smaller swimming sperm.

oogonium A female gametangium that occurs in some groups of algae and fungi; gives rise to oospores.

opposite arrangement Two leaves borne per node and arranged across the stem from each other.

order Taxonomic rank consisting of a group of related families.

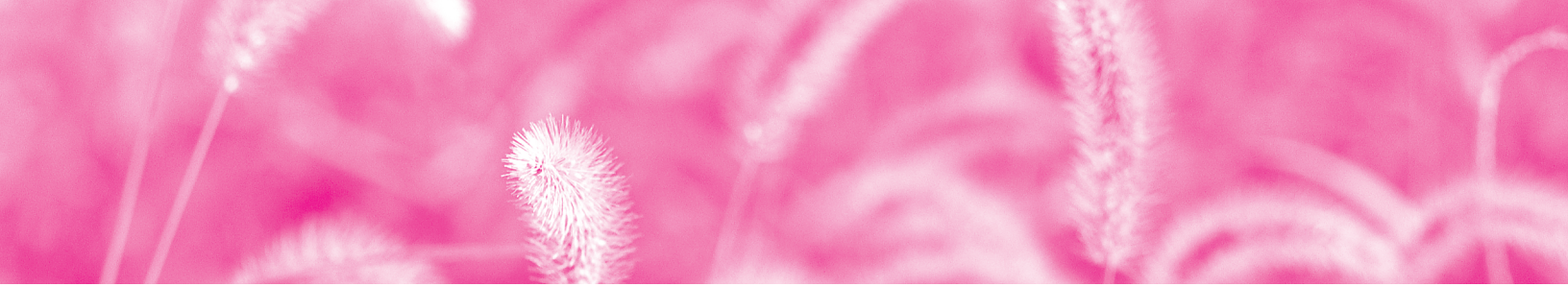
organelle A body within the cytoplasm of eukaryotic cells; several types of organelles occur, each with a specialized function, such as the chloroplast, which functions in photosynthesis.

osmosis Diffusion of water (or other solvents) through a differentially permeable membrane.

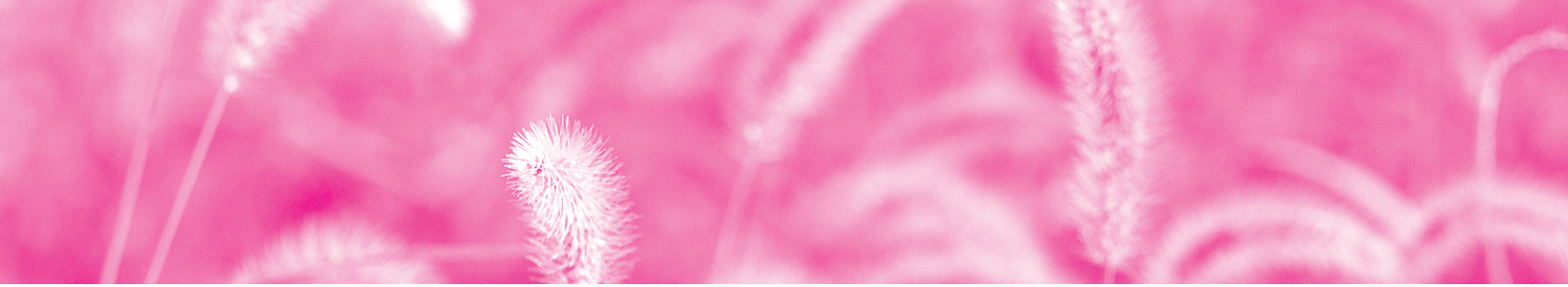
ovary Enlarged basal portion of a single carpel or several fused carpels; contains one to many ovules.

ovule Structure that will become a seed after fertilization; an integumented megasporangium that contains the embryo sac before fertilization.

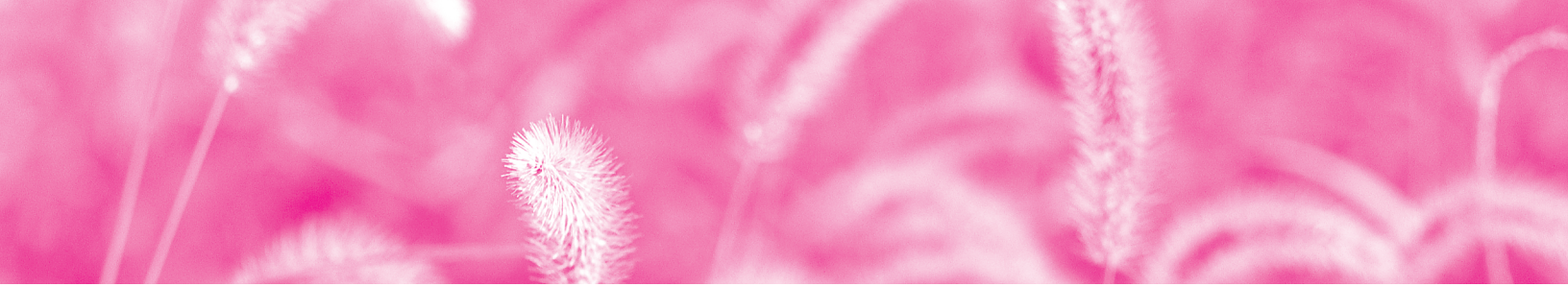
oxidization The loss of electrons or hydrogen from an atom or molecule.



- P₆₈₀** The reaction center for Photosystem II; a chlorophyll *a* molecule that is bound to a membrane protein and has a peak absorbance at 680 nm.
- P₇₀₀** The reaction center for Photosystem I; a chlorophyll *a* molecule that is bound to a membrane protein and has a peak absorbance at 700 nm.
- paddy** A flooded field used to cultivate lowland rice.
- palea** One of two bracts around the grass flower.
- Paleolithic** Old Stone Age; a cultural period during which early humans obtained food solely by foraging; ending in some areas approximately 10,000 years ago.
- palisade parenchyma** Parenchyma cells in the leaf mesophyll characterized by uniform rows of tightly packed cells with many chloroplasts beneath the upper epidermis.
- palmately compound leaf** Leaflets radiate from a common point.
- panicle** A branched inflorescence with the branches bearing loose flower clusters.
- parallel venation** Principal veins are parallel to one another; characteristic of monocot leaves.
- parasite** An organism that lives on or in the body of another living organism and derives nourishment from it.
- parenchyma** Ground tissue in plants with thin-walled cells varying in size and shape; the most abundant kind of cells in plants.
- parthenocarp** Development of fruits without fertilization resulting in seedless fruits.
- pathogen** A disease-causing organism such as some fungi and bacteria.
- pectin** A complex polysaccharide in the middle lamella and primary walls of plant cells.
- pedicel** An individual stalk of a flower that is part of an inflorescence.
- peduncle** The main stalk of an inflorescence or a single flower.
- penicillin** An antibiotic produced by various species in the genus *Penicillium*.
- pepo** A fleshy fruit with a tough outer rind that is composed of both receptacle tissue and exocarp such as cucumber, pumpkin, and melon.
- perennial** A plant that continues to live for an indefinite number of years.
- perfect flower** A flower having both stamens and carpels.
- perfect stage** The phase during the life cycle of a fungus when sexual fusion occurs, producing characteristic sexual spores.
- perianth** The petals and sepals together.
- pericarp** The fruit wall that develops from the ovary wall.
- pericycle** Root tissue sandwiched between the endodermis and the phloem; the outermost layer of the stele; meristematic region that gives rise to branch roots.
- periderm** Protective tissue that replaces the epidermis after secondary growth begins; includes the cork, the cork cambium, and sometimes other cells.
- perigenous** Refers to a flower in which the bases of the sepals, petals, and stamens form a cup around the ovary.
- peripheral protein** A protein on the surface of a biological membrane.
- perithecium** A flask-shaped ascocarp.
- permafrost** Soil that is permanently frozen.
- peroxisome** A microbody found in leaves and often associated with chloroplasts.
- petal** A floral organ that is leaflike and often brightly colored; a component of the corolla.
- petiole** The stalk of a leaf.
- phenolics** A large and diverse category of compounds, all of which contain one or more aromatic benzene rings (a ring of 6 carbon atoms with 6 hydrogen atoms attached) with one or more hydroxyl (OH) groups; they include flavonoids, tannins, and lignin.
- phenology** Timing of biological events (budburst, seed set, etc.) in the life cycle of an organism. Environmental cues such as day length or temperature often trigger the event.
- phenotype** The physical appearance of an organism.
- phloem** The vascular tissue that conducts organic materials synthesized by the plant.
- phospholipid** A type of lipid molecule occurring in a bilayer in biological membranes; a lipid with two fatty acids and a phosphate group attached to glycerol.
- phosphorylation** The addition of a phosphate group to a molecule.
- photon** A unit of light energy.
- photosynthesis** The process that results in the conversion of light energy into the chemical energy of carbohydrates.
- Photosystem I** A light-harvesting unit located on the thylakoid membrane of the chloroplast, with P₇₀₀ as the reaction center.
- Photosystem II** A light-harvesting unit located on the thylakoid membrane of the chloroplast, with P₆₈₀ as the reaction center.
- phragmoplast** A system of microtubules and vesicles that arises between two daughter nuclei at telophase and forms the cell plate.
- phycobilins** Accessory pigments present in the cyanobacteria and red algae and include phycocyanin and phycoerythrin.
- phylogeny** The evolutionary history and relationship of a species.
- physiological dependence** The condition in which there is a physical need for a drug to avoid withdrawal symptoms.
- phytochemical** Naturally occurring component in plants that appears to have beneficial effects upon human health.
- phytoremediation** Growing tolerant plants in polluted sites to decontaminate the soil or water.
- pinnately compound leaf** Leaflets attached on both sides of a common axis.
- pistillate flower** A flower having carpels but no stamens.
- pit** A pore in a secondary cell wall.
- pith** The central tissue of a dicot stem, consisting of parenchyma cells.
- plasmid** A small, circular DNA molecule found in bacterial cells.
- plasmodesma (pl., plasmodesmata)** A cytoplasmic strand that connects adjacent plant cells through pores in the cell wall.
- plasmodium** The vegetative stage of a slime mold.
- plasmogamy** The fusion of cytoplasm from two cells or gametes.
- plasmolysis** Shrinking of protoplasm in a cell due to loss of water in a hypertonic environment.
- plastid** A class of organelles that includes chloroplasts, leucoplasts, and chromoplasts.
- plywood** A building material consisting of two or more thin sheets of wood bonded together.
- pod** A dry dehiscent fruit that splits along two seams; a legume.
- point mutation** The smallest mutation caused by the change of a single nucleotide.
- polar nuclei** Two nuclei found in the embryo sac that unite with a sperm to form the primary endosperm nucleus.
- pollen** An immature male gametophyte of seed plants.
- pollen tube** A tube that develops from the pollen grain and carries the sperm to the ovule.
- pollination** The transfer of pollen from an anther to a stigma.
- polynomial** A scientific name composed of more than two words.
- polypeptide** A chain of amino acids connected by peptide bonds.
- polyploid** Having more than two complete sets of chromosomes.
- polysaccharide** A polymer such as starch or cellulose composed of thousands of monosaccharides.
- polyunsaturated fat** A fat having several to many double bonds between carbon atoms.
- pome** A simple fleshy fruit; the outer portion formed by floral parts that surrounded the ovary; examples: apple and pear.
- population** All the individuals of a species within a given area.
- potential energy** The energy stored in matter as a result of its location or chemical bonds.
- Pressure Flow Hypothesis** The theory that organic solutes move along a concentration gradient from source to sink through the phloem.
- primary consumer** An animal that feeds directly on producers.
- primary endosperm nucleus** The product of the fusion of a sperm and two polar nuclei in



- the embryo sac of angiosperms; double fertilization.
- primary growth** Growth in length due to the activities of the apical meristems of shoot and root.
- primary wall** The wall layer of a plant cell deposited during cell expansion, generally thin and elastic.
- producer** An organism that manufactures food through photosynthesis.
- prokaryotic cell** A type of cell lacking a nucleus and membrane-bound organelles; found in the Kingdoms Archaeobacteria and Eubacteria.
- prophase** The first stage of mitosis, characterized by the condensation of chromatin into chromosomes and the formation of the spindle.
- prosthetic group** Nonprotein groups that are attached to an enzyme or other protein and necessary for its function.
- protein** A macromolecule composed of one or more polypeptides, each composed of many amino acids.
- proton** A positively charged particle in the nucleus of an atom.
- protoplast** All of a plant cell excluding the wall.
- psychoactive drug** A drug that affects the central nervous system by influencing the release of neurotransmitters or mimicking their actions.
- psychological dependence** A condition marked by the strong desire to repeat the use of a drug to reexperience the feelings of well-being induced by the drug.
- purine** One type of nitrogen-containing base found in nucleotides; consisting of adenine and guanine.
- pyrimidine** One type of nitrogen-containing base found in nucleotides; consisting of cytosine, thymine, and uracil.
- raceme** A vertical inflorescence with stalked flowers.
- radicle** The embryonic root found in the seed.
- reaction center** A chlorophyll *a* molecule bound to a membrane protein.
- receptacle** The expanded tip of a pedicel or peduncle to which the floral organs are attached; also, swollen areas at the end of the blade that function as reproductive regions in certain members of the brown algae.
- recessive** Refers to an allele that is masked in the phenotype by a dominant allele.
- recombinant DNA** The introduction of genes from one organism into the DNA of a second organism.
- redox reaction** Oxidation-reduction reaction; a chemical reaction involving the transfer of electrons from one molecule to another.
- reduction** Gain of electrons or hydrogen from an atom or molecule.
- resin** An exudate released when a tree is wounded; common in conifers but also occurring in some angiosperms.
- reticulate venation** Netted venation; the arrangement of veins in a leaf that resembles a net; characteristic of dicot leaves.
- retting** The process that frees flax fibers by allowing microbial decomposition to break down the outer part of the stem.
- rhizome** A horizontal, underground stem.
- ribonucleic acid (RNA)** The nucleic acid formed from DNA and involved in protein synthesis; nucleotide of chain of phosphates, ribose sugars, and purine and pyrimidines.
- ribose** A pentose sugar present in RNA.
- ribosomal RNA (rRNA)** The type of RNA that is a component of ribosomes.
- ribosome** A particle composed of two subunits, each containing RNA and protein; functions in protein synthesis.
- root cap** A thimble-shaped group of cells found at the tip of roots; functions to protect the meristem.
- root hair** A root epidermal cell that functions in water absorption.
- root nodule** Gall-like structures on the roots of legumes that contain symbiotic nitrogen-fixing bacteria.
- rough ER** A portion of the endoplasmic reticulum containing ribosomes.
- runner** A horizontal stem that grows along the surface of the ground; also known as a stolon.
- samara** A simple, dry indehiscent fruit with the pericarp bearing winglike outgrowths; winged fruit of maple.
- saponin** A glycoside with a steroid molecule as the active component, such as diosgenin from yams.
- saprobe** An organism deriving its food from the dead body or nonliving products of another organism.
- sapwood** Region of secondary xylem that actively transports water; light-colored wood immediately inside the vascular cambium.
- saturated fat** A fat in which all the carbons in the fatty acids are connected by single bonds, thereby having the maximum number of hydrogen atoms.
- savanna** A tropical grassland biome with scattered trees.
- schizocarp** A dry indehiscent fruit that splits into two one-seeded halves at maturity.
- scion** A small twig or bud that is grafted to a stock.
- sclereid** A sclerenchyma cell with a thick, lignified secondary wall having many pits; variable in form but not usually elongated.
- sclerenchyma** Tissue composed of cells with thick secondary walls; functioning in support or protection.
- sclerophyllous** Vegetation characterized by thick leathery leaves with abundant sclerenchyma cells; vegetation of a chaparral.
- sclerotium (pl., sclerotia)** A fungal resting body resistant to unfavorable conditions; a firm, hardened mass of hyphae (or a hardened plasmodium of a slime mold) that will germinate on the return of favorable conditions.
- scutellum** The single cotyledon in grass seeds.
- secondary consumer** An animal that feeds on other consumers.
- secondary growth** The increase in girth of stems and roots; produced by the activities of the vascular cambium and cork cambium.
- secondary product** Any chemical compound synthesized by plants or fungi but not critical for the basic metabolic functions of that organism; often functioning to deter predators or attract pollinators; a secondary metabolite.
- secondary wall** The innermost layer of a cell wall formed after cell elongation has ceased; often characterized by the deposition of lignin.
- seed** A matured ovule containing an embryo and food supply and covered by a seed coat.
- seed bank** Storage facility for seeds of domesticated plants and wild relatives; facility for preserving genetic diversity.
- seed coat** The outer layer of a seed that is developed from the integuments of the ovule; the testa.
- seed plant** Common term for gymnosperms and angiosperms.
- self-pollination** Transfer of pollen from stamen to stigma within the same flower or plant.
- semidrying oils** Plant oils that dry slowly or at elevated temperatures, intermediate between drying and nondrying oils.
- sepal** A leaflike floral organ that protects the unopened flower bud.
- septate** Divided by cross-walls into cells.
- septum (pl., septa)** A dividing wall or partition; a cross-wall in a fungal hypha or algal filament.
- sexual reproduction** A type of reproduction that involves the fusion of gametes (usually egg and sperm) to form a zygote.
- shattering** A trait found in wild plants in which the fruiting head breaks apart to scatter the seeds over a wide area.
- short grass prairie** A grassland biome characterized by short grass and low rainfall; also known as the plains.
- sieve plate** The perforated wall area in a sieve tube member.
- sieve tube** A long tube specialized for the conduction of food materials (products of photosynthesis) and consisting of several to many sieve tube members.
- sieve tube member** A phloem cell characterized by a sieve plate and enucleate



condition; specialized for the conduction of products of photosynthesis.

simple fruit A fruit that develops from a single ovary.

simple leaf A leaf that is not divided into leaflets.

simple pistil A pistil that contains a single carpel.

smooth ER The portion of endoplasmic reticulum that lacks ribosomes.

softwood General term for the wood (secondary xylem) of conifers.

somaclonal variant A plant showing a mutation that developed asexually during the tissue culture of a single callus.

somatic mutation A mutation that occurs in cells of leaves, stems, or roots; a mutation occurring in any cells that are not involved in gamete formation.

sorus (pl., sori) A cluster of sporangia found on a fern leaf.

specialized niche Niche in which species have a narrow range of tolerance.

species A single kind of organism; often defined as a group of interbreeding populations reproductively isolated from any other such group.

sperm A male gamete.

spermogonium (pl., spermogonia) A structure that produces spermatia in the rust fungi.

spermatium (pl., spermatia) Minute, nonmotile male gametes that occur in the rust fungi.

spice A pungent, aromatic plant product derived from plants native to tropical regions and used to flavor foods.

spike An inflorescence in which the main axis is elongated and the flowers are sessile.

spikelet A small group of grass flowers; a unit of the inflorescence in grasses.

spindle The aggregation of microtubules that is involved in the movement and separation of chromosomes during mitosis and meiosis.

spongy parenchyma Part of the leaf mesophyll; cells are loosely arranged and contain chloroplasts.

sporangiospore A spore that develops within a sporangium.

sporangium (pl., sporangia) A structure in which spores are produced.

spore A reproductive unit (often unicellular) that is capable of developing into a new organism without fusion with another cell.

sporophyte A diploid plant that produces spores; the diploid phase of a life cycle that has an alternation of generations.

springwood The cells in the secondary xylem that are formed early in the season, usually with wide vessels (angiosperms) or wide tracheids (gymnosperms); also called early wood.

stamen The floral organ that produces pollen; consisting of an anther and filament.

staminate flower A flower having stamens but no carpels.

starch A polysaccharide composed of a thousand or more glucose molecules; the chief food-storage material of most plants.

statins Cholesterol-lowering drugs that were originally isolated from fungi and have been widely used since the 1990s.

stele The vascular cylinder; vascular tissue making up the central cylinder of roots.

steroid A type of lipid containing four fused rings of carbon atoms with various side chains.

stigma The receptive portion of the carpel to which the pollen adheres.

stimulant A psychoactive compound that excites and enhances mental alertness and physical activity; often reduces fatigue and suppresses hunger.

stipe A supporting stalk; such as those in mushrooms and brown algae.

stipule A small appendage found in pairs at the base of leaves.

stock The rooted part of a plant to which the scion is grafted.

stolon A horizontal stem that grows along the ground surface; may form adventitious roots and plantlets; also known as a runner.

stoma (pl., stomata) A minute opening, bordered by guard cells, in the epidermis of leaves and stems.

stroma The ground substance of the chloroplasts where the reactions of the Calvin Cycle occur.

stroma thylakoid A thylakoid that does not occur in a granum; connects separate grana.

style The tissue that connects the stigma to the ovary in the carpel.

suberin A fatty material found in the cell walls of cork cells and the Casparian strip of the endodermis.

substrate The substance acted on by an enzyme; the surface on which a plant or fungus grows or is attached.

sucrose A disaccharide made from a molecule of glucose linked to a molecule of fructose; table sugar.

sugar A monosaccharide; a carbohydrate with the general formula $C_nH_{2n}O_n$.

summerwood The cells in the secondary xylem that are formed late in the season, usually with few vessels (angiosperms) or narrow tracheids (gymnosperms); also called late wood.

superior ovary An ovary located above the sepals, petals, and stamens.

symbiosis A relationship in which two organisms live in intimate association with each other.

symplast The interconnected protoplasm of all cells in a plant.

synapsis The pairing of homologous chromosomes that occurs in Prophase I of meiosis.

synergid One of a pair of short-lived cells that lay close to the egg in the mature embryo sac.

taiga A biome in the Northern Hemisphere dominated by conifers; the northern coniferous or boreal forest.

tall grass prairie A grassland biome characterized by many tall grasses up to 5 meters (16 feet) tall.

tannin A secondary product found in many plants that has been widely utilized as stains, dyes, inks, or tanning agents for leather; believed to function in plants by discouraging herbivores.

taproot A relatively large primary root that gives rise to smaller, lateral roots.

taxon (pl., taxa) A general term for any taxonomic rank such as species, genus, or order.

teliospore A thick-walled spore found in the rust and smut fungi; karyogamy occurs within the teliospore and it gives rise to the basidium.

telophase The last stage of mitosis and meiosis during which the chromosomes become reorganized into daughter nuclei.

temperate rain forest A biome dominated by coniferous trees, high rainfall, and high humidity; moist coniferous forest.

tepal Members of the perianth that are not differentiated into sepals and petals.

terpene An unsaturated hydrocarbon formed from an isoprene building block; found in many plants in the form of essential oils.

testa Seed coat.

testcross A cross involving one parent that is homozygous recessive for a given trait.

tetrad A group of four, such as the four haploid spores that form after meiosis, or the four chromatids in a bundle after homologous chromosomes pair.

thallus Body of an alga, which can vary from a microscopic unicell to a large macroscopic multicellular organism.

thylakoid membrane A saclike photosynthetic membrane in chloroplasts; stacks of thylakoids form the grana.

thymine A pyrimidine base occurring in DNA but not in RNA.

Ti plasmid The tumor-inducing plasmid from the bacterium *Agrobacterium tumefaciens*; commonly used as a vector for recombinant DNA studies in plants.

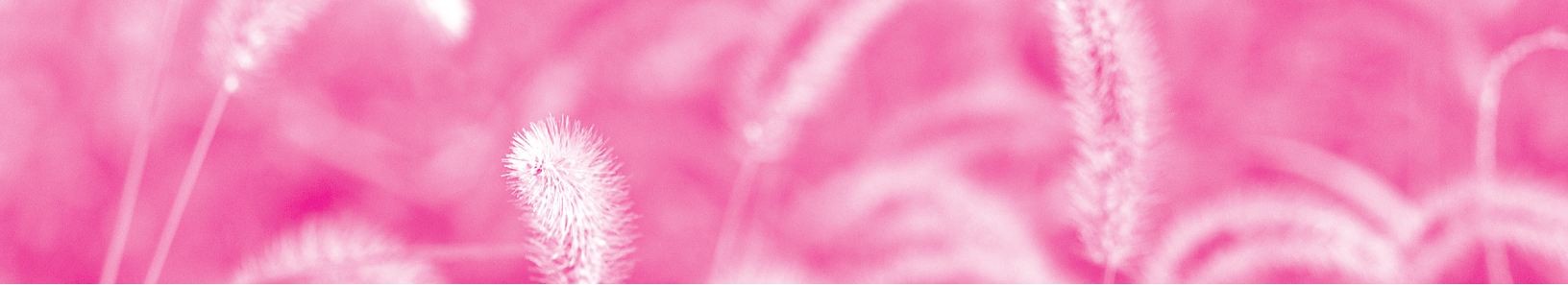
tisane Herbal tea.

tissue A group of cells that perform a specific function.

toxin A poisonous substance.

trace element An inorganic element required in small amounts for plant growth.

trace mineral Dietary minerals that are required in minute quantities.



tracheid An elongated, tapering xylem cell that is specialized for conducting water and support with lignified pitted walls.

trans fat Unsaturated fat subjected to hydrogenation, which changes the configuration of carbon-carbon double bonds from *cis* to *trans* and the fat from its natural liquid state to a solid form.

transcription The formation of RNA as a complementary copy of a portion of the DNA molecule.

transfer RNA (tRNA) A class of small RNA molecules that transfer amino acids to the correct position on the messenger RNA molecule at the ribosome for protein synthesis.

transgenic Refers to cells or organisms that contain genes that were inserted into them from other organisms through the techniques of genetic engineering.

translation The synthesis of a polypeptide from a specific sequence of codons on a messenger RNA molecule; occurs at the ribosomes.

transpiration The loss of water vapor from leaves; occurs mostly through the stomata.

Transpiration-Cohesion Theory The theory that explains water movement in the xylem; the driving forces are the pull of transpiration and the cohesion of water molecules.

trichome An epidermal appendage, such as a hair or a scale.

triglyceride A type of lipid formed from three fatty acids bonded to a molecule of glycerol; a fat or an oil.

triploid Refers to a cell or a nucleus that contains three sets of chromosomes; common in endosperm.

trophic level A step in the movement of energy through an ecosystem; a step in a food chain.

tropical rain forest An endangered tropical biome with high rainfall and an exceptional diversity of species.

tuber An enlarged, fleshy, underground stem tip, such as the potato.

tuberous roots Modified fibrous roots that have become fleshy and enlarged with food reserves.

tundra A treeless circumpolar biome with meadowlike vegetation above the Arctic Circle.

turgid Refers to a swollen, distended cell that is firm owing to water uptake.

umbel A flat-topped inflorescence in which the stalked flowers all radiate out from a common point.

universal veil A membrane that totally encloses some young mushrooms; after it breaks, its remnants appear as a volva at the base and scales on the cap.

unsaturated fat A fat containing one or more double bonds between carbon atoms.

uracil A pyrimidine found in RNA but not DNA.

uredium (pl., uredia) The structure that produces uredospores in rust fungi; sometimes called a uredinium.

uredospore A reddish, binucleate spore formed by rust fungi; often forms the repeating stage of the rust; also called a urediniospore.

vascular bundle A strand of tissue containing primary xylem and primary phloem, often surrounded by a bundle sheath.

vascular cambium Meristematic tissue that gives rise to secondary xylem and secondary phloem.

vascular cylinder The stele; vascular tissue making up the central cylinder of roots.

vascular plant A general name for any plant that has xylem and phloem.

vascular ray Sheet of parenchyma that extends radially through the wood, across the cambium and into the secondary phloem; rays are produced by the vascular cambium and function in lateral transport.

vascular tissue Tissue that is specialized for the long-distance transport of water or photosynthetic products; xylem and phloem.

vegan A pure vegetarian consuming no animal products at all.

vegetarian A person who does not consume animal flesh; some consume dairy products and eggs, but others are vegans.

vegetative cell The cell in the pollen grain that develops into the pollen tube.

vein A vascular bundle that forms part of the conducting and supporting tissue of a leaf.

vener A thin sheet of wood, often with attractive grain, used to cover less expensive wood.

vesicular-arbuscular (VA) mycorrhizae The most prevalent type of endotrophic mycorrhizae, in which hyphae grow between cells in the cortex and form branching

structures called arbuscles within the cells where nutrient exchange occurs.

vessel A tubelike column of vessel elements that are connected by open end walls and are specialized for the conduction of water and minerals.

vessel element One of the cells forming a vessel and characterized by a perforation plate.

vitamin A naturally occurring organic compound that is necessary, in small amounts, for the normal metabolism of plants and animals.

volva Remnant of the universal veil of certain mushrooms.

water-soluble vitamin A vitamin that is not readily stored in the body, with excess eliminated in the urine; includes B vitamins and vitamin C.

weed A plant not valued for its use or beauty and not intentionally planted; a category of hay fever plants that includes nongrass and nontree species.

whorled arrangement Three or more leaves per node.

winnowing The process that separates the grain from the fragments of chaff.

wood Secondary xylem.

wood pulp A watery suspension of pulverized wood used in the production of paper, cardboard, fiberboard, rayon, cellophane, and other products.

xanthophyll Any of several yellow carotenoid pigments found in chloroplasts.

xerophyte A plant adapted for growth in arid conditions.

xylem The vascular tissue specialized for the conduction of water and minerals; consists of tracheids and vessel elements, fibers, and parenchyma cells.

zoospore A motile spore.

zygomorphic flower A bilaterally symmetrical flower, capable of being divided into two symmetrical halves only by a single longitudinal plane passing through the axis.

zygosporangium (or zygospor) The thick-walled sexual spore formed by members of the zygomycetes.

zygote A diploid cell that is formed by the fusion of two gametes.