

# Glossary

**abiotic factor** a nonliving aspect of an environment (Lesson 12)

**active transport** the process by which a cell uses energy to move materials against the concentration gradient (Lesson 3)

**adaptation** a heritable trait that increases an organism's chance of survival or reproduction (Lesson 17)

**alleles** the different forms of a gene for a specific trait (Lesson 8)

**amino acid** a carbon compound that contains at least one amino group ( $\text{NH}_2$ ) and one carboxyl group ( $\text{COOH}$ ) bonded to one or more other elements that form a side chain; a building block of proteins (Lessons 1, 5)

**analogous structures** body parts that have a similar function but do not have a similar structure (Lesson 20)

**antibiotic** a drug that is used to kill bacteria or slow their growth (Lesson 18)

**anticodon** a set of three nitrogenous bases on a tRNA molecule that are complementary to a codon on an mRNA molecule (Lesson 5)

**asexual reproduction** the production of genetically identical offspring by a single parent (Lesson 6)

**ATP** an organic molecule used for short-term energy storage and transport in a cell (Lesson 4)

**ATP-ADP cycle** the process in which ADP is constantly recombined with phosphates to form new molecules of ATP to support the work of the cell (Lesson 4)

**autotroph** an organism that makes its own food (Lessons 10, 13)

**binary fission** a process in which a cell divides into two parts, with each part receiving one copy of the organism's DNA (Lesson 6)

**biodiversity** a measure of the number of different kinds of organisms living in a specific area (Lessons 12, 15)

**biological evolution** a scientific framework that accounts for changes in the distribution of inherited traits in a population over time (Lesson 18)

**biomass** the amount of living matter in an ecosystem (Lesson 13)

**biome** a group of ecosystems that have similar climates and similar types of plant life (Lesson 12)

**biosphere** the thin region near Earth's surface that supports all life (Lesson 12)

**biotechnology** the use of organisms or biological systems to develop useful products or processes (Lesson 9)

**biotic factor** a living thing in an environment, or its remains or wastes (Lesson 12)

**Calvin cycle** the second series of reactions in photosynthesis, which take place in the stroma (Lesson 4)

**camouflage** a coloring or pattern that enables an organism to blend in with its surroundings (Lesson 17)

**carbohydrate** an organic macromolecule composed of carbon, hydrogen, and oxygen atoms, usually in a ratio of 1:2:1 (Lesson 1)

**carbon cycle** the continuous transfer of carbon between organisms and the nonliving parts of the environment (Lesson 14)

**carbon-oxygen cycle** the movements of carbon dioxide and oxygen through the environment (Lesson 14)

**carnivore** a consumer that eats only or mostly other consumers (Lesson 13)

**carrying capacity** the largest population that an ecosystem can support over a long period of time (Lesson 15)

**cell** the smallest unit that can carry out all the functions of life (Lesson 1)

**cell division** a process by which a cell divides to form two or more new cells (Lesson 6)

**cell membrane** a thin, flexible layer that surrounds a cell, supports and protects the cell, and gives it shape (Lesson 2)

**cell wall** a rigid structure that surrounds the cell membrane and gives the cell added protection and support; found in plants, prokaryotic cells, fungi, and some protists (Lesson 2)

**cellular respiration** a process in living things that breaks the chemical bonds of glucose to release energy (Lesson 4)

**chloroplast** an organelle that captures energy from the sun using a green pigment called chlorophyll and carries out photosynthesis (Lesson 2)

**chromosome** a threadlike structure found in the nucleus and made up of tightly coiled DNA (Lesson 5)

**clade** a group of organisms thought to have evolved from a common ancestor (Lesson 10)

**cladogram** a branching diagram that shows the relationships among organisms or groups of organisms; also called a phylogenetic tree (Lesson 11)

**cloning** the artificial production of a DNA fragment, cell, or organism that is genetically identical to the original DNA, cell, or organism (Lesson 9)

**codominance** an inheritance pattern in which both alleles are expressed in the same organism (Lesson 8)

**codon** a sequence of three nitrogenous bases that codes for a particular amino acid (Lesson 5)

**community** all the populations that inhabit and interact in the same area at the same time (Lesson 12)

**concentration gradient** a difference in concentration on opposite sides of a membrane (Lesson 3)

**conclusion** a summary and interpretation of the results of an investigation (Investigations 1, 2)

**condensation** the process of a gas (such as water vapor) changing to a liquid as it cools (Lesson 14)

**consumer** an organism that obtains its energy by eating other organisms (Lesson 13)

**crossing over** a process in which chromosome segments that code for the same sets of traits break off and are exchanged between homologous chromosomes (Lessons 6, 7)

**cytoplasm** a thick, jelly-like material that holds a cell's internal structures (Lesson 2)

**data** the information gathered during an investigation (Investigations 1, 2)

**decomposer** an organism that obtains energy from the wastes or remains of other organisms (Lesson 13)

**deletion mutation** a mutation in which a base pair is removed from a DNA sequence (Lesson 7)

- denitrification** the process in which bacteria in the soil and in certain marine environments convert nitrogen compounds into nitrogen gas, which returns to the atmosphere (Lesson 14)
- density-dependent limiting factor** a factor whose effect on population size increases as population density increases (Lesson 15)
- density-independent limiting factor** a factor whose effect on population size is not affected by population density (Lesson 15)
- dependent variable** a factor that may change in response to changes in the independent variable (Investigations 1, 2)
- descent with modification** the process by which the frequency of genes that are more useful in an environment increases in a population, while the frequency of genes that are less useful decreases (Lesson 18)
- diffusion** the movement of particles from an area of higher concentration to an area of lower concentration (Lesson 3)
- dihybrid cross** a cross used to study two traits at once (Lesson 8)
- diploid** having two copies of each chromosome (Lesson 6)
- divergence** the process of evolutionary separation (Lesson 11)
- DNA (deoxyribonucleic acid)** the nucleic acid that carries the cell's genetic information (Lesson 5)
- DNA fingerprinting** a technology that compares images of DNA fragments to determine relationships among individuals (Lesson 9)
- DNA replication** the process by which a DNA molecule is copied (Lesson 5)
- domain** the largest group in the modern biological classification system (Lesson 10)
- dominant** (describing an allele or trait) always expressed in an organism (Lesson 8)
- ecology** the science that studies the interactions among organisms and between organisms and their environments (Lesson 12)
- ecosystem** all the populations in an area and the nonliving parts of their environment (Lesson 12)
- electron transport chain** a series of proteins located on the inner membranes of the mitochondria that produce ATP from the molecules made in the Krebs cycle (Lesson 4)
- embryo** an early stage in the development of an organism (Lesson 20)
- embryology** the study of embryos (Lesson 20)
- endocytosis** a process in which a cell surrounds and takes in material from its environment (Lesson 3)
- endoplasmic reticulum (ER)** a network of membranes and sacs that surrounds the nuclear membrane and transports molecules from one part of the cell to another (Lesson 2)
- endosymbiosis** a scientific theory that explains how organelles of eukaryotic cells evolved from prokaryotes (Lesson 10)
- energy pyramid** a model that shows the available energy at each trophic level in an ecosystem (Lesson 13)
- enzyme** a functional protein that takes part in chemical reactions (Lesson 1)
- estivation** a reduction in an animal's rate of metabolism in response to extreme heat and lack of water (Lesson 17)
- eukaryote** an organism whose cells have a distinct, membrane-bound control center and other membrane-bound cell structures, called organelles (Lessons 2, 10)

**evaporation** the change of a liquid to a gas at the surface of the liquid (Lesson 14)

**exocytosis** a process in which a vacuole fuses with the cell membrane and the cell expels unwanted materials (Lesson 3)

**experiment** a carefully controlled test of a hypothesis (Investigations 1, 2)

**exponential growth** population growth that increases without limits, under ideal conditions (Lesson 15)

**facilitated transport** the movement of substances across a cell membrane with the aid of the proteins in the cell membrane; also called facilitated diffusion (Lesson 3)

**fitness** an organism's ability to survive and reproduce (Lesson 18)

**food chain** the path of food and energy from producer to consumer to decomposer (Lesson 13)

**food web** a network of food chains that are interconnected through multiple feeding relationships (Lesson 13)

**forensics** the use of science and technology to investigate crimes and answer legal questions (Lesson 9)

**fossil** the remains or trace of an organism that lived in a past age (Lesson 20)

**frame shift** a mutation, such as an insertion mutation or a deletion mutation, in which all the codons that follow the mutation are changed (Lesson 7)

**gamete** a sex cell produced through the process of meiosis (Lesson 6)

**gene** a small section of DNA that encodes information for assembling one or more proteins (Lesson 5)

**gene flow** the introduction of genes from one population into the gene pool of another population (Lesson 19)

**gene pool** the total genetic information of all members of a population (Lesson 18)

**gene therapy** the alteration, insertion, or deletion of a gene in an individual's cells in order to treat a disease (Lesson 9)

**generation** one step in the line of descent of an organism, from parent to offspring (Lesson 18)

**genetic drift** a change in the allele frequencies of a population as a result of chance events (Lesson 19)

**genetic engineering** the direct manipulation of a cell's genetic material to produce organisms with useful traits (Lesson 9)

**genetic equilibrium** a theoretical state in which the frequency of alleles in a population stays constant (Lesson 19)

**genetic variability** the range of genetic differences within a population or species (Lesson 19)

**genetic variation** the range of possibilities for a trait that can be passed to offspring (Lesson 7)

**genetically modified organism (GMO)** an organism whose genes have been altered through genetic engineering (Lesson 9)

**genetics** the branch of biology concerned with inheritance—the passing of characteristics, or traits, from parent to offspring (Lesson 5)

**genotype** all or part of an organism's genetic composition (Lesson 8)

**geotropism** a plant's growth in response to gravity (Lesson 17)

**glycolysis** the first stage of cellular respiration, which releases a small amount of energy from glucose (Lesson 4)

**Golgi body** a system of membranes that modify proteins and lipids according to where and how they will be used in a cell (Lesson 2)

**greenhouse effect** an effect of the atmosphere that keeps Earth at a temperature that is suitable for life (Lesson 16)

**greenhouse gas** a gas that produces the greenhouse effect, such as water vapor, methane, or carbon dioxide (Lesson 16)

**haploid** having half the number of chromosomes present in other cells of an organism (Lesson 6)

**Hardy-Weinberg principle** a scientific principle stating that genetic equilibrium will be reached in large populations when certain conditions are met, including no genetic drift, no heritable mutations, no natural selection, no nonrandom mating, and no movement of individuals into or out of the population (Lesson 19)

**herbivore** a consumer that eats only or mostly plants or plant products (Lesson 13)

**heterotroph** an organism that cannot make its own food and instead feeds on other organisms (Lessons 10, 13)

**heterozygous** having two different alleles for a trait (Lesson 8)

**hibernation** an inactive or dormant state of an organism during winter (Lesson 17)

**homeostasis** (in a cell or organism) the regulation of internal conditions despite changes in external conditions (Lesson 2)

**homeostasis** (in an ecosystem) the balancing of biotic and abiotic factors to maintain stability (Lesson 12)

**homologous structures** body parts of different organisms that have a similar structure but may have different functions (Lesson 20)

**homozygous** having two matching (dominant or recessive) alleles for a trait (Lesson 8)

**hypertonic** having a higher concentration of solutes than that inside a cell (Lesson 3)

**hypothesis** a proposed answer to a scientific question (Lesson 3; Investigations 1, 2)

**hypotonic** having a lower concentration of solutes than that inside a cell (Lesson 3)

**incomplete dominance** an inheritance pattern in which neither allele is dominant (Lesson 8)

**independent assortment** in meiosis, the way in which homologous pairs line up along the center of the cell in a random fashion during metaphase I (Lesson 6)

**independent variable** the factor an experimenter changes to test its effects (Investigations 1, 2)

**inherited trait** a characteristic that is passed down genetically from parent to offspring (Lesson 18)

**innate behavior** a behavior of an animal that is inherited rather than learned (Lesson 17)

**insertion mutation** a mutation in which a base pair is inserted in a DNA sequence (Lesson 7)

**instinct** a complicated pattern of innate behaviors, such as those involved in building a nest (Lesson 17)

**isotonic** having equal concentrations of solutes on both sides of a membrane (Lesson 3)

**keystone species** a species that plays a critical role in the community structure of the ecosystem it inhabits (Lesson 15)

**kingdom** the next level of biological classification under domain (Lesson 10)

**Krebs cycle** the second stage of cellular respiration, which converts pyruvic acid to carbon dioxide and also releases high-energy electrons (Lesson 4)

**law of dominance** a scientific law stating that the dominant allele will prevent the recessive allele from being expressed (Lesson 8)

**law of independent assortment** a scientific law stating that different pairs of genes separate independently of each other during meiosis (Lesson 8)

**law of segregation** a scientific law stating that gene pairs separate when gametes (sex cells) are formed by the process of meiosis, so each gamete contains only one allele from each pair (Lesson 8)

**light reactions** the first series of reactions in photosynthesis, which take place in the thylakoids (Lesson 4)

**limiting factor** any component of an ecosystem that can slow the growth of a population (Lesson 15)

**lipid** a large organic molecule that is composed of hydrogen, carbon, and oxygen and that makes up fats, oils, and waxes (Lesson 1)

**logistic growth** population growth that first increases and then stabilizes at the ecosystem's carrying capacity (Lesson 15)

**lysosome** a small, spherical organelle that uses enzymes to digest (break down) complex molecules (Lesson 2)

**macromolecule** a very large molecule that forms when smaller molecules are joined by chemical bonds (Lesson 1)

**meiosis** the process of two nuclear divisions that produces sex cells, or gametes (Lesson 6)

**messenger RNA (mRNA)** a strand of RNA that is complementary to a specific strand of DNA and carries information from the DNA to ribosomes in the cytoplasm (Lesson 5)

**migration** the instinctive seasonal movement of a species (Lesson 17)

**mimicry** an organism's resemblance to an object in its surroundings or to another organism (Lesson 17)

**mitochondria** (singular: mitochondrion) organelles that carry out cellular respiration (Lesson 2)

**mitosis** a process of nuclear division in which DNA is divided equally between two new nuclei (Lesson 6)

**monohybrid cross** a cross in which only one trait is studied (Lesson 8)

**monomer** a small molecule that forms the basic unit of macromolecules (Lesson 1)

**mutagen** an agent that causes a genetic mutation (Lesson 7)

**mutation** any change to an organism's genetic material (Lesson 7)

**natural resource** a product of the environment that is useful to humans (Lesson 16)

**natural selection** the process by which organisms with traits that are most favorable in their environment are most likely to survive and pass on their traits to offspring (Lesson 18)

**niche** the role a population plays within a community (Lesson 12)

**nitrogen cycle** the continuous movement of nitrogen among organisms and the environment (Lesson 14)

**nitrogen fixation** a process in which certain soil bacteria break down nitrogen gas from the atmosphere and convert it into nitrogen-containing compounds (Lesson 14)

**nondisjunction** the failure of chromosomes to separate correctly during the production of gametes (Lesson 7)

**nonnative species** a species that is introduced into an ecosystem by human activity (Lesson 16)

**nonrandom mating** the selection of mates based on differences in their phenotypes (Lesson 19)

**nonrenewable resource** a product of the environment that exists in limited amounts and cannot be replaced within a human lifetime (Lesson 16)

**nucleic acid** a large, complex molecule made up of smaller molecules containing carbon, hydrogen, oxygen, nitrogen, and phosphorus atoms; a macromolecule that stores and transmits genetic information (Lesson 1)

**nucleotide** one of the small units that join together to form a nucleic acid (Lesson 1)

**nucleus** the large, central structure of eukaryotic cells that directs and controls most cellular activities (Lesson 2)

**observation** information gathered through the senses, with or without the aid of a scientific tool (Investigations 1, 2)

**omnivore** a consumer that eats both plants and animals (Lesson 13)

**osmosis** the movement of water molecules across a membrane from a less concentrated solution into a more concentrated solution (Lesson 3)

**overproduction of offspring** the producing of more offspring than the resources of the environment can support (Lesson 18)

**passive transport** the movement of materials into or out of a cell without an expenditure of energy (Lesson 3)

**phenotype** one or more traits that an organism displays (Lesson 8)

**phosphorus cycle** the continuous movement of phosphorus through rocks, soil, water, and organisms (Lesson 14)

**phosphorylation** the process of combining ADP with free phosphates in a cell (Lesson 4)

**photosynthesis** a chemical process through which energy from sunlight is used to convert carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ) into a sugar called glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) and oxygen gas ( $\text{O}_2$ ) (Lesson 4)

**phototropism** a plant's growth in response to light (Lesson 17)

**phylogenetic tree** a branching diagram that shows the relationships among organisms or groups of organisms; also called a cladogram (Lesson 11)

**phylogeny** the evolutionary history of a species (Lesson 11)

**pollution** the release of harmful substances, or pollutants, into the environment (Lesson 16)

**polymer** a chain of repeating monomers (Lesson 1)

**population** all the organisms of a species that live in an area at the same time (Lessons 12, 15, 18)

**population density** the number of individuals per unit of area (Lesson 15)

**precipitation** water that falls from the atmosphere in the form of rain, hail, snow, or sleet (Lesson 14)

**primary consumer** a consumer that eats producers (Lesson 13)

**procedure** a step-by-step plan for an experiment (Investigations 1, 2)

**producer** an organism that captures energy from a primary source, usually the sun, and converts it to chemical energy (Lesson 13)

**prokaryote** a single-celled organism that lacks a membrane-bound nucleus and organelles (Lessons 2, 10)

**protein** a complex polymer composed mainly of carbon, hydrogen, oxygen, nitrogen, and sometimes sulfur (Lesson 1)

**radioisotope dating** a means of measuring the age of a material by comparing the amount of a radioactive form of an element contained in the material with the amount of its decay product (Lesson 20)

**recessive** (describing an allele or trait) expressed in an organism only when no dominant alleles are present (Lesson 8)

**recombinant DNA** the new DNA that results when DNA from one organism is inserted into the DNA of another organism (Lesson 9)

**reflex** an involuntary response to a stimulus (Lesson 17)

**relative dating** a means of identifying the age of a fossil or rock by comparing it to other fossils or rocks (Lesson 20)

**renewable resource** a product of the environment that can be replaced through natural processes within a human lifetime (Lesson 16)

**resistance** an organism's ability to withstand a harmful agent (Lesson 18)

**ribosomal RNA (rRNA)** a form of RNA that makes up part of the structure of a ribosome and works with proteins to carry out translation (Lesson 5)

**ribosome** a cellular structure that assembles a variety of proteins that are used throughout the cell (Lesson 2)

**RNA (ribonucleic acid)** the nucleotide that copies information from DNA and uses it to control protein production (Lesson 5)

**secondary consumer** a consumer that eats primary consumers (Lesson 13)

**selective breeding** the intentional mating of organisms to produce offspring with specific traits (Lesson 9)

**selectively permeable** allowing only some substances to pass through (Lesson 2)

**sexual reproduction** a form of reproduction in which cells from two parents join to form a new individual (Lesson 6)

**speciation** the formation of one or more new species from an existing species (Lesson 19)

**species** a group of organisms that share most characteristics and can interbreed to produce fertile offspring (Lessons 10, 18)

**substitution mutation** a mutation in which a base pair is changed in a DNA sequence (Lesson 7)

**survival of the fittest** the process by which only organisms that are best adapted to their environment survive and reproduce; natural selection (Lesson 18)

**taxonomy** the field of biology that deals with classifying organisms (Lesson 10)

**tertiary consumer** a consumer that eats secondary consumers (Lesson 13)



**theory of evolution** a scientific theory that explains how species develop from preexisting species (Lesson 11)

**thigmotropism** a plant's response to touch (Lesson 17)

**transcription** the process in which DNA serves as a template for making a complementary strand of RNA (Lesson 5)

**transfer RNA (tRNA)** a molecule that carries a single amino acid on one end and a specific sequence of exposed bases, or anticodon, on the other (Lesson 5)

**translation** the conversion of the information in mRNA into a sequence of amino acids that makes up a specified protein (Lesson 5)

**transpiration** the release of water vapor through the stomata, or openings, in a plant's leaves (Lesson 14)

**trophic level** a feeding level in an ecosystem (Lesson 13)

**tropism** a plant's growth in a certain direction in response to a stimulus (Lesson 17)

**vacuole** an organelle that stores water and other important materials, including salts, proteins, and carbohydrates (Lesson 2)

**variation** the range of possibilities for a trait in a population (Lesson 18)

**virus** an infectious, nonliving particle made up of a nucleic acid enclosed in a protein or lipid-protein shell (Lesson 10)

**water cycle** the continuous movement of water and its natural changes from one form to another (Lesson 14)

