BIOLOGY GLOSSARY

A

Abiotic (factor) A term that describes a nonliving factor in an ecosystem

Absolute Dating Based on the amount of carbon-14 or other radioactive elements that remains in a fossil; gives the fossil an approximate age in years

Accessory Pigment Light-absorbing compounds found in photosynthetic organisms that work with chlorophyll *a*; these include chlorophyll *b*, *c*, and *d*, carotenoids, and phycobiliproteins, all of these absorb and transfer light energy to photosystem chlorophyll

Acid Solution with a pH lower than 7.

Acid Rain Rain or any other form of precipitation that is unusually acidic, meaning that it possesses elevated levels of hydrogen ions (low pH, caused by emissions of sulfur dioxide and nitrogen oxide, which react with the water molecules in the atmosphere to produce acids),harmful effects to plants, aquatic animals and infrastructure. Acid rain is

Activation Energy Energy needed to get a reaction started.

Active Transport The movement of particles from an area of low concentration to an area of high concentration that uses energy provided by ATP or a difference in electrical charges across a cell membrane.

Adaptation Inherited characteristic that increases an organism's chance of survival.

Adaptive Radiation Process in which organisms diversify rapidly into a multitude of new forms, particularly when a change in the environment makes new resources available, creates new challenges and opens environmental niches

Adenosine Triphosphate (ATP) A molecule that provides energy for cellular reactions and processes. ATP releases energy when one of its high-energy bonds is broken to release a phosphate group.

Adhesion The intermolecular attraction between unlike molecules. Capillary action results from the adhesive properties of water and the molecules that make up plant cells.

Aerobic Respiration Type of cellular respiration that requires oxygen.

Agriculture The artificial cultivation of food, fiber, and other goods by the systematic growing and harvesting of various organisms.

Air Pollution Particulates, biological molecules, or other harmful materials introduced into the Earth's atmosphere, possibly causing disease, death to humans, damage to other living organisms such as food crops, or the natural or built environment

Alcoholic Fermentation Type of anaerobic respiration that includes glycolysis followed by the conversion of pyruvic acid to ethyl alcohol and carbon dioxide and the formation of NAD^+

Algal Bloom Caused by nutrient pollution of nitrogen and phosphates that runoff into bodies of water (mostly freshwater and marine environments) causing rapid increase or accumulation in the population of algae (typically microscopic) in an aquatic system; some blooms may be recognized by discoloration of the water resulting from the high density of pigmented cells

Allele A variation of a gene's nucleotide sequence (an alternative form of a gene).

Allele Frequency The measure of the relative frequency of an allele at a genetic locus in a population; expressed as a proportion or percentage.

Allopatric Speciation Speciation that occurs when biological populations of the same species become isolated from each other to an extent that prevents or interferes with genetic interchange

Amino Acid Compound with an amino group ($-NH_2$) on one end and a carboxyl group (-COOH) on the other end.

Anabolic Pathway Set of metabolic pathways that construct molecules from smaller units

Anabolic Reaction Metabolic process that involves creating large molecules out of smaller molecules; in the process storing energy, an example is when your body makes fat out of extra nutrients you eat

Analogous Structure A physical structure, present in multiple species, that is similar in function but different in form and inheritance.

Anabolic Reaction Endothermic reaction in organisms

Anaerobic Respiration Type of cellular respiration that does not require oxygen.

Anaphase The third phase of mitosis, during which the chromosome pairs separate and move towards opposite poles

Anticodon Group of three bases on a tRNA molecule that are complementary to an mRNA codon.

Aphotic Zone Portion of a lake or ocean where there is little or no sunlight

Aquaporin Channel protein in the plasma membrane of a plant, animal, or microorganism cell that specifically facilitates osmosis, the diffusion of water across the membrane

Aquatic A term that describes an organism associated with a water environment.

Aquatic Biome Includes the habitats around the world that are dominated by water—from tropical reefs, to brackish mangroves, to Arctic lakes; largest of all the world's biomes—it occupies about 75 percent of the Earth's surface area

Artificial Selection Process by which humans breed animals and plants for particular traits

Asexual Reproduction Process by which by which a single parent reproduces by itself

Atom The smallest unit of an element that retains the chemical and physical properties of that element.

ATP (adenosine triphosphate) Stores chemical energy within cells for metabolism; end products of photophosphorylation, cellular respiration, and fermentation

ATP synthase Important enzyme that provides energy for the cell to use through the synthesis of adenosine triphosphate (ATP); formed from adenosine diphosphate (ADP) and inorganic phosphate (P_i)
Autosome Not a sex chromosome; appears in pairs in body cells
Autotroph (producer) Organism that can capture energy from sunlight or chemicals and use it to produce its own food from inorganic compounds; also called a producer

B

Base Solution with a pH higher than 7
Behavioral Isolation Form of reproductive isolation in which two populations have differences in courtship rituals or other types of behavior that prevent them from interbreeding
Beneficial Mutation Mutation in an organism's genome that produces a beneficial effect; specifically, it affects the organism in some way as to increase its chances of reproductive success
Binary Fission "Division in half", refers to a method of asexual reproduction that produces two genetically identical cells; most common form of reproduction in prokaryotes and occurs in some single-celled eukaryotes.
Biochemical Conversion The changing of organic matter into other chemical forms such as fuels
Biochemical Reaction Chemical reaction that occurs inside the cells of living things.
Biodiversity Biological diversity; the sum total of the variety of organisms in the biosphere.
Bioenergetics The study of energy flow (energy transformations) into and within living systems.
Bioflim Colony of prokaryotes that is stuck to a surface such as a rock or a host's tissue.
Biogeochemical Cycles The movement of abiotic factors between the living and nonliving components within ecosystems; also known as nutrient cycles (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).
Biological Interactions The effects organisms in a community have on one another
Biological Macromolecules A group of biomacromolecules that interact with biological systems and their environments.
Biology The scientific study of life.
Biomass Biological material derived from living, or recently living organisms
Biome A large area or geographical region with distinct plant and animal groups adapted to that environment.
Biosphere The zone of life on Earth; sum total of all ecosystems on Earth.

Biotechnology Any procedure or methodology that uses biological systems or living organisms to develop or modify either products or processes for specific use. This term is commonly associated with genetic engineering, which is one of many applications.
Biotic (factor) A term that describes a living or once-living organism in an ecosystem
Boiling Point The temperature at which the vapor pressure of the liquid equals the pressure surrounding the liquid and the liquid changes into a vapor
Budding Form of asexual reproduction in which a new organism genetically identical to the parent develops from an outgrowth or bud due to cell division at one particular site; new organism remains attached as it grows, separating from the parent organism only when it is mature
Buffer Weak acid of base that can react with strong acids or bases to help prevent sharp, sudden changes in pH

C

Calvin Cycle Second stage of photosynthesis in which carbon atoms from carbon dioxide are combined using the energy in ATP and NADPH, to make glucose
Cancer A group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body
Capillary Action Tendency of water to rise in a thin tube
Carbohydrate A macromolecule that contains atoms of carbon, hydrogen, and oxygen in a 1:2:1 ratio and serves as a major source of energy for living organisms (e.g., sugars, starches, and cellulose).
Carbon Cycle Interconnected pathways through which carbon is recycled through the biotic and abiotic components of the biosphere.
Carnivore Organism that obtains energy by eating animals.
Carrier (Transport) Proteins Proteins embedded in the plasma membrane involved in the movement of ions, small molecules, and macromolecules into and out of cells; also known as transport proteins.
Carrying Capacity (K) Largest number of individuals of a population that a given environment can support
Catabolic Pathway Set of metabolic pathways that break down molecules into smaller units and release energy
Catabolic Reaction Exothermic reaction in organisms
Catalyst A substance that enables a chemical reaction to proceed at a usually faster rate or under different conditions (e.g., lower temperature) than otherwise possible without being changed by the reaction.
Cell The basic unit of structure and function for all living organisms. Cells have three common components: genetic material, cytoplasm, and a cell membrane. Eukaryotic cells also contain specialized organelles.

Cell Cycle The series of events that take place in a cell leading to its division and duplication. The main phases of the cell cycle are interphase, nuclear division, and cytokinesis

Cell Division Process by which a parent cell divides into two or more daughter cells

Cell Theory Theory that all living things are made up of cells, all life functions occur within cells, and all cells come from pre-existing cells.

Cellular Respiration A complex set of chemical reactions involving an energy transformation where potential chemical energy in the bonds of "food" molecules is released and partially captured in the bonds of adenosine triphosphate (ATP) molecules.

Cell Wall Rigid layer that surrounds the plasma membrane of a plant cell and helps support and protect the cell.

Central Dogma of Biology Doctrine that genetic instructions in DNA are copied by RNA, which carries them to a ribosome where they are used to synthesize a protein (DNA → RNA →protein).

Central Vacuole Large saclike organelle in plant cells that stores substances such as water and helps keep plant tissues rigid.

Centrioles One of two tiny structures located in the cytoplasm of animal cells near the nuclear envelope.

Centromere Region of sister chromatids where they are joined together.

Channel protein Transmembrane protein found in the phospholipid bilayer membranes, they allow specific molecules/ ions (e.g. Na+) to pass through crossing the membrane.

Chargaff's Rules Observations by Erwin Chargaff that concentrations of the four nucleotide bases differ among species; and that, within a species, the concentrations of adenine and thymine are always about the same and the concentrations of cytosine and guanine are always about the same.

Chemical Bond Force that holds molecules together

Chemical Reaction Process that changes some chemical substances into others

Chemiosmosis Movement of ions across a selectively permeable membrane, down their electrochemical gradient, it relates to the generation of ATP by the movement of hydrogen ions across a membrane during cellular respiration or photosynthesis

Chemiosmotic gradient When a H+ ion enters the cell via a channel, it goes from an area of higher concentration to lower concentration thus driving the Electron Transport Chain, and the energy created is used to phosphorylate an ADP into an ATP

Chemoautotroph Producer that uses energy from chemical compounds to make food by chemosynthesis

Chemosynthesis Process by which some organisms use chemical energy to produce carbohydrates

Chlorophyll Green pigment in a chloroplast that absorbs sunlight in the light reactions of photosynthesis.

Chloroplast An organelle found in plant cells and the cells of other eukaryotic photosynthetic organisms where photosynthesis occurs.

Chromatid One of two identical "sister" parts of a duplicated chromosome.

Chromatin Granular material visible within the nucleus; consists of DNA tightly coiled around proteins.

Chromosomal Alteration (Mutation) A change in the structure of a chromosome (e.g., deletion, the loss of a segment of a chromosome and thus the loss of segment containing genes; duplication, when a segment of a chromosome is duplicated and thus displayed more than once on the chromosome; inversion**,** when a segment of a chromosome breaks off and reattaches in reverse order; and translocation, when a segment of one chromosome breaks off and attaches to a non-homologous chromosome).

Chromosomes A single piece of coiled DNA and associated proteins found in linear forms in the nucleus of eukaryotic cells and circular forms in the cytoplasm of prokaryotic cells; contains genes that encode traits. Each species has a characteristic number of chromosomes.

Clade Group of related organisms that includes an ancestor and all of its descendants.

Climate Average weather in an area over a long period of time.

Climax Community Final stable stage of ecological succession that may be reached in an undisturbed community.

Cloning A process in which a cell, cell product, or organism is copied from an original source (e.g., DNA cloning, the transfer of a DNA fragment from one organism to a self-replicating genetic element such as a bacterial plasmid; reproductive cloning, the transfer of genetic material from the nucleus of a donor adult cell to an egg cell that has had its nucleus removed for the purpose of creating an embryo that can produce an exact genetic copy of the donor organism; or therapeutic cloning, the process of taking undifferentiated embryonic cells [STEM cells] for use in medical research).

Co-dominance A pattern of inheritance in which the phenotypic effect of two alleles in a heterozygous genotype express each phenotype of each allele fully and equally; a phenotype which would not be expressed in any other genotypic combination

Codon Three-nucleotide sequence on messenger RNA that codes for a single amino acid.

Coevolution Process in which two interacting species evolve together, with each species influencing the other's evolution

Cohesion The intermolecular attraction between like molecules. Surface tension results from the cohesive properties of water.

Commensalism Symbiotic relationship in which one organism benefits and the other organism does not benefit or is not harmed.

Community (Ecological) Different populations of organisms interacting in a shared environment.

Comparative Anatomy Study of the similarities and differences in the structures of different species.

Comparative Embryology Study of the similarities and differences in the embryos of different species.

Competition When individuals or groups of organisms compete for similar resources such as territory, mates, water, and food in the same environment.

Competitive Exclusion Principle Principle of ecology stating that two different species cannot occupy the same niche in the same place for very long.

Complementary Base Pair Pair of nucleotide bases that bond together—either adenine and thymine (or uracil) or cytosine and guanine.

Compound Substance with a unique, fixed composition that consists of two or more elements

Compound Light Microscope Type of microscope which uses visible light and a system of lenses to magnify images of small samples

Concentration The measure of the amount or proportion of a given substance when combined with another substance.

Concentration Gradient The difference in the concentrations of the molecules in the two areas

Condensation Change of the physical state of matter from gas phase into liquid phase

Consumer (Heterotroph; Ecological) An organism that obtains energy by feeding on other organisms or their remains

Contractile Vacuole Vacuole that removes excess water from a cell.

Convergent Evolution Process by which unrelated organisms independently evolve similarities when adapting to similar environments

Coral Marine invertebrates in class *Anthozoa* of phylum *Cnidaria* typically living in compact colonies of many identical individual "polyps"; important reef builders that inhabit tropical oceans and secrete calcium carbonate to form a hard skeleton

Coral Reef Diverse underwater ecosystems held together by calcium carbonate structures secreted by corals

Cristae Fold in the inner membrane of a mitochondrion; providing a large amount of surface area for chemical reactions to occur on

Crossing-over An exchange of genetic material between homologous chromosomes during anaphase I of meiosis; contributes to the genetic variability in gametes and ultimately in offspring.

Cytokinesis The final phase of a cell cycle resulting in the division of the cytoplasm.

Cytolysis In animal cells only; when they swell and can burst.

Cytoplasm All of the material inside the plasma membrane of a cell (excluding organelles).

Cytoskeleton Structure of filaments and tubules in the cytoplasm that provides a cell with an internal framework.

Cytoplasmic streaming A circular flow of cytoplasm, involving myosin and actin filaments, that speeds the distribution of materials within cells
Cytosol Liquid found inside cells excludes organelles

D

Daughter Cell Either of the two cells formed when a cell undergoes cell division by mitosis
Dead Zone Area in the ocean or other body of water where low oxygen levels from excessive growth of algae have killed all aquatic organisms
Deciduous Plant Type of plant that seasonally loses its leaves to reduce water loss during the cold or dry season each year and grows new leaves later in the year.
Decomposer An organism that obtains nutrients by consuming dead and decaying organic matter which allows nutrients to be accessible to other organisms.
Deletion The loss of a segment of a chromosome and thus the loss of segment containing genes
Demographic Transition Transition from high birth and death rates to low birth and death rates as a country develops from a pre-industrial to an industrialized economic system
Density Dependent Depends on population size
Density Independent Affects all populations in similar ways, regardless of population size.
Deoxyribonucleic Acid (DNA) A biological macromolecule that encodes the genetic information for living organisms and is capable of self-replication and the synthesis of ribonucleic acid (RNA).
Dependent Variable Variable in a scientific experiment that is affected by another variable, called the independent variable.
Detritivore Decomposer that consumes detritus.
Detritus Substance composed of dead leaves, other plant remains, and animal feces that collects on the soil or at the bottom of a body of water
Development Progressive changes in size, shape, and function during the life of an organism by which its genetic potentials (genotype) are translated into functioning mature systems (phenotype)
Differentiation Process by which unspecialized cells become specialized into one of many different types of cells, such as neurons or epithelial cells.
Diffusion The movement of particles from an area of high concentration to an area of low concentration; a natural result of kinetic molecular energy.
Diploid Term used to refer to a cell that contains both sets of homologous chromosomes.
Directional Selection Form of natural selection in which the entire curve moves; occurs when individuals at one end of a distribution curve have higher fitness than individuals in the middle or at the other end of the curve

Dispersal Refers to both the movement of individuals (animals, plants, fungi, bacteria, etc.) from their birth site to their breeding site, as well as the movement from one breeding site to another; also used to describe the movement of seeds and spores
Disruptive selection Form of natural selection in which a single curve splits into two; occurs when individuals at the upper and lower ends of a distribution curve have higher fitness than individuals near the middle
Divergent Evolution Accumulation of differences between groups which can lead to the formation of new species
DNA (deoxyribonucleic acid) Molecule that encodes the genetic instructions used in the development and functioning of all known living organisms and many viruses
DNA Fingerprinting Analysis of sections of DNA that have little or no known function, but vary widely from one individual to another, in order to identify individuals.
DNA Replication The process in which DNA makes a duplicate copy of itself.
Dominant Allele Allele that masks the presence of another allele for the same gene when they occur together in a heterozygote.
Dominant Inheritance A pattern of inheritance in which the phenotypic effect of one allele is completely expressed within a homozygous and heterozygous genotype
Double Helix Structure formed by double-stranded molecules of nucleic acids such as DNA
Duplication When a segment of a chromosome is duplicated and thus displayed more than once on the chromosome

E

Ecological pyramid Diagram that shows the relative amounts of energy or matter within each trophic level in a food chain or food web.
Ecological Succession Changes through time in the numbers and types of species that make up the community of an ecosystem.
Ecology The study of the relationships between organisms and their interactions with the environment.
Ecosystem A system composed of organisms and nonliving components of an environment
Editing Occurs during DNA replication when exons and introns are separated, with the introns being spliced out and remaining in the nucleus
Electrochemical Gradient A gradient of electrochemical potential, usually for an ion that can move across a membrane
Electron Transport Chain (ETC) Series of electron-transport molecules that pass high-energy electrons from molecule to molecule and capture their energy
Elongation Stepwise addition of amino acids to the growing protein chain
Embryology The branch of zoology studying the early development of living things
Emigration Movement of individuals out of a population.

Endemic Species A species that is found in its originating location and is generally restricted to that geographic area

Endergonic Reactions Nonspontaneous reaction; a chemical reaction in which the standard change in free energy is positive, and energy is absorbed

Endocytosis A process in which a cell engulfs extracellular material through an inward folding of its plasma membrane.

Endomembrane System The collection of membranes inside and surrounding a eukaryotic cell, related either through direct physical contact or by the transfer of membranous vesicles; includes the plasma membrane, the nuclear envelope, the smooth and rough endoplasmic reticulum, the Golgi apparatus, lysosomes, vesicles, and vacuoles.

Endoplasmic Reticulum (ER) An organelle, containing folded membranes and sacs, responsible for the production, processing, and transportation of materials for use inside and outside a eukaryotic cell.

Endosymbiosis A theorized process in which early eukaryotic cells were formed from simpler prokaryotes.

Endosymbiotic Theory Theory that eukaryotic organelles such as mitochondria evolved from ancient, free-living prokaryotes that invaded primitive eukaryotic cells.

Endothermic Reaction Chemical reaction that absorbs energy.

Energy Ability to do work

Energy Coupling Transfer of energy from catabolism to anabolism, or transfer of energy from exergonic process to endergonic process

Energy Pyramid A model that illustrates the biomass productivity at multiple trophic levels in a given ecosystem.

Energy Transformation A process in which energy changes from one form to another form while some of the energy is lost to the environment

Enthalpy Defined thermodynamic potential, designated by the letter "H" that consists of the internal energy of the system plus the product of pressure and volume of the system

Entropy A measure of the number of specific ways in which a thermodynamic system may be arranged, commonly understood as a measure of disorder **Environment** The total surroundings of an organism or a group of organisms. **Enzyme** A protein that increases the rate of a chemical reaction without being changed by the reaction; an organic catalyst

Estuary A partly enclosed coastal body of brackish water with one or more rivers or streams flowing into it, and with a free connection to the open sea

Eukaryote A type of organism composed of one or more cells containing a membrane-bound nucleus, specialized organelles in the cytoplasm, and a mitotic nuclear division cycle.

Eukaryotic Cell Cell that contains a nucleus and other organelles

Evaporation Type of vaporization of a liquid that occurs from the surface of a liquid into a gaseous phase that is not saturated with the evaporating substance

Evidence Available body of facts or information indicating whether a belief or proposition is true or valid

Evolution A process in which new species develop from preexisting species (biological evolution or macroevolution); a change in the allele frequencies of a population of organisms from generation to generation (genetic evolution or microevolution)

Exergonic Reactions chemical reaction where the change in the free energy is negative, indicating a spontaneous reaction; energy is released

Exocytosis A process in which a cell releases substances to the extracellular environment by fusing a vesicular membrane with the plasma membrane, separating the membrane at the point of fusion and allowing the substance to be released

Exon Any nucleotide sequence encoded by a gene that remains present within the final mature RNA product of that gene after introns have been removed

Exothermic Reaction Chemical reaction that releases energy

Exotic Species Species that is introduced (usually by human actions) into a new habitat where it may lack local predators and out-compete native species

Experiment Scientific procedure undertaken to make a discovery, test a hypothesis, or demonstrate a known fact

Exponential Growth Pattern of population growth in which a population starts out growing slowly but grows faster and faster as population size increases.

Extinction A term that typically describes a species that no longer has any known living individuals.

Extracellular Located outside a cell

F

Facilitated Diffusion A process in which substances are transported across a plasma membrane with the concentration gradient with the aid of carrier (transport) proteins; does not require the use of energy

Fact Something that has really occurred or is actually the case; usually tests for a statement of fact's verifiability, scientific facts are verified by repeatable experiments

Fermentation Type of anaerobic respiration that includes glycolysis followed by the conversion of pyruvic acid to one or more other compounds and the formation of NAD^+

Fertilization Fusion of gametes to initiate the development of a new individual organism

Field Studies Collection of data that occurs outside of an experimental or lab setting; usually collection of data done in *natural settings or environments* and can be done in a variety of ways for various disciplines

Fitness Ability of an organism to survive and reproduce in its environment
Flaccid Limp; lacking in stiffness or firmness, as in a plant cell.
Food Organic molecules such as glucose that organisms use for chemical energy.
Food Chain A simplified path illustrating the passing of potential chemical energy (food) from one organism to another organism.
Food Web A complex arrangement of interrelated food chains illustrating the flow of energy between interdependent organisms.
Forensics The science of tests and techniques used during the investigation of crimes.
Fossil Record Information about past life, including the structure of organisms, what they ate, what ate them, in what environment they lived, and the order in which they lived.
Fossils The preserved remains or traces of organisms that once lived on Earth
Fossil Record Database of fossils that have been dated and categorized to show changes in life through almost any sequence of assemblages of fossil species in sedimentary rock layers; one of the most common evidences given for evolution
Founder Effect A decrease in genetic variation caused by the formation of a new population by a small number of individuals from a larger population
Fragmentation A form of asexual reproduction in multicellular or colonial organisms in which an organism is split into fragments; each of these fragments develop into mature, fully grown individuals that are clones of the original organism
Frame-shift Mutation The addition (insertion mutation) or removal (deletion mutation) of one or more nucleotides that is not indivisible by three, therefore resulting in a completely different amino acid sequence than would be normal. The earlier in the sequence nucleotides are added or removed, the more altered the protein will be
Free Energy Energy that is transferred from one form to another in order to do work or to make energy available for other processes
Freezing Point The temperature at which a liquid changes state to a solid
Freshwater Biome Includes inland bodies of water called ponds, lakes, wetlands, rivers, and streams and all the organisms that live within them
Fungi (singular, Fungus) Kingdom in the domain Eukarya that includes molds, mushrooms, and yeasts

G

Galapagos Islands An archipelago of volcanic islands distributed on either side of the Equator in the Pacific Ocean, 926 km west of continental Ecuador; site where Darwin developed many of his ideas about evolution
Gamete A specialized cell (egg or sperm) used in sexual reproduction containing half the normal number of chromosomes of a somatic cell.
Gametogenesis Development of haploid cells into gametes such as sperm and egg.

Gated Channel Transmembrane protein channel that opens or closes in response to a particular stimulus.

Gene A sequence of nucleotides composing a segment of DNA that provides a blueprint for a specific hereditary trait.

Gene Cloning Process of isolating and making copies of a gene.

Gene Expression The process in which a nucleotide sequence of a gene is used to make a functional product such as protein or RNA.

Gene Flow Change in allele frequencies that occurs when individuals move into or out of a population.

Gene Pool All the genes of all the members of a population.

Gene Recombination A natural process in which a nucleic acid molecule (usually DNA but can be RNA) is broken and then joined to a different molecule; a result of crossing-over.

Gene Splicing A type of gene recombination in which the DNA is intentionally broken and recombined using laboratory techniques.

Gene Theory Theory that the characteristics of living things are controlled by genes that are passed from parents to offspring.

Gene Therapy The intentional insertion, alteration, or deletion of genes within an individual's cells and tissues for the purpose of treating a disease.

Genetic Code Universal code of three-base codons that encodes the genetic instructions for the amino acid sequence of proteins.

Genetic Disorder Disease caused by a mutation in one or a few genes.

Genetic Drift A change in the allele frequency of a population as a result of chance events rather than natural selection.

Genetic Engineering A technology that includes the process of manipulating or altering the genetic material of a cell resulting in desirable functions or outcomes that would not occur naturally.

Genetically Modified Organism An organism whose genetic material has been altered through some genetic engineering technology or technique

Genetic Disorder An illness caused by one or more abnormalities in the genome, especially a condition that is present from birth (congenital)

Genetic Drift Change in the frequency of a gene variant (allele) in a population due to random sampling —along with natural selection, mutation, and migration—is one of the basic mechanisms of evolution

Genetic Engineering Direct manipulation of organism's genome using biotechnology; new DNA may be inserted in the host genome by first isolating and copying the genetic material of interest using molecular cloning methods to generate a DNA sequence, or by synthesizing the DNA, and then inserting this construct into the host organism

Genetics The scientific study of inheritance.

Genetic Trait Characteristic that is encoded in DNA.

Genotype The genetic composition of an organism with reference to a single trait, a set of traits, or the entire complement of traits of an organism.

Geographic Isolation Form of reproductive isolation in which two populations are separated physically by geographic barriers such as rivers, mountains, or stretches of water

Geological Time Scale System of chronological measurement of time measured through the study of stratification layers of rock; used by geologists, paleontologists, and other earth scientists to describe the timing and relationships between events that have occurred throughout Earth's history

Germline Mutation Any detectable and heritable variation in the lineage of germ cells that are transmitted to offspring, while, on the other hand, those in somatic cells are not

Gibbs Free Energy Thermodynamic potential that measures the "usefulness" or process-initiating work obtainable from a thermodynamic system at a constant temperature and pressure

Global Warming Recent rise in Earth's average surface temperature generally attributed to an increased greenhouse effect

Glucoregulation Sum of the biochemical and physiological processes involved in the breakdown and synthesis of simple sugars, oligosaccharides,and polysaccharides an d in the transport of sugar across cell membranes

Glucose Simple carbohydrate with the chemical formula $C_6H_{12}O_6$ that is the nearly universal food for life

Glycogen Multi-branched polysaccharide of glucose that serves as a form of energy storage in animals and fungi

Glycolysis First stage of cellular respiration in which glucose is split, in the absence of oxygen, to form two molecules of pyruvate (pyruvic acid) and two (net) molecules of ATP.

Golgi Apparatus An organelle found in eukaryotic cells responsible for the final stages of processing proteins for release by the cell.

Gradualism A proposed explanation in evolutionary biology stating that new species arise from the result of slight modifications (mutations and resulting phenotypic changes) over many generations.

Grana (Granum, singular) Within the chloroplast, consists of sac-like membranes, known as thylakoid membranes.

Greenhouse Effect Natural feature of Earth's atmosphere that occurs when gases in the atmosphere radiate the sun's heat back down to Earth's surface, making Earth's temperature far warmer than it otherwise would be.

Groundwater Water that exists in the ground either in the soil or in rock layers below the surface

Growing Season Term used for the period of time in a given year when the climate is prime for both indigenous and cultivated plants experience the most growth

Growth Process of increasing in physical size

H

Habitat An area that provides an organism with its basic needs for survival.
Habitat Loss Destruction or disruption of Earth's natural habitats, most often due to human actions such as agriculture, forestry, mining, and urbanization.
Haploid Term used to refer to a cell that contains only a single set of chromosomes and therefore only a single set of genes.
Hardy-Weinberg Theorem Founding principle of population genetics that proves allele and genotype frequencies do not change in a population that meets the conditions of no mutation, no migration, large population size, random mating, and no natural selection
Headwaters Furthest place in a river or stream from its estuary or confluence with another river, as measured along the course of the river
Herbivore Organism that obtains energy by eating only plants.
Heterotroph (Consumer) Organism that obtains energy from the food it consumes; also called a consumer.
Heterozygote Organism that inherits two different alleles for a given gene.
Heterozygous Term used to refer to an organism that has two different alleles for the same trait
Hierarchy of Life The arrangement of complex biological structures and systems that define life using a reductionist approach
Histones Family of basic proteins that associate with DNA in the nucleus and help condense it into chromatin
Homeostasis The regulatory process in which an organism regulates its internal environment.
Homeostatic Mechanism A regulatory mechanism that contributes to maintaining a state of equilibrium (e.g., thermoregulation, water regulation, and oxygen regulation).
Homologous Chromosomes Term used to refer to chromosomes that each have a corresponding chromosome from the opposite-sex parent.
Homologous Structure A physical characteristic in different organisms that is similar because it was inherited from a common ancestor.
Homozygote Organism that inherits two alleles of the same type for a given gene.
Homozygous Term used to refer to an organism that has two identical alleles for a particular trait.
Human Genome All of the DNA of the human species.
Human Genome Project International science project that sequenced all 3 billion base pairs of the human genome
Humidity Amount of water vapor in the air
Hybrid Offspring of crosses between parents with different traits
Hydrogen Bond Type of chemical bond that forms between molecules: found between water molecules

Hydrothermal Vent Fissure in a planet's surface from which geothermally heated water issues; commonly found near volcanically active places, areas where tectonic plates are moving apart, ocean basins, and hotspots

Hypertonic Describes a solution whose solute concentration is higher than the solute concentration inside a cell.

Hypothesis A proposed, scientifically testable explanation for an observed phenomenon.

Hypotonic Describes a solution whose solute concentration is lower than the solute concentration inside a cell

I

Immigration Movement of individuals into a population

Impermeable Not permitting passage of a substance or substances.

Incomplete Dominance A pattern of inheritance in which two alleles, inherited from the parents, are neither dominant nor recessive. The resulting offspring have a phenotype that is a blending of the parental traits.

Independent Assortment Independent segregation of genes during the formation of gametes.

Independent Variable Variable in a scientific experiment that is manipulated by the researcher to investigate its effect on another variable, called the dependent variable.

Inference Logical interpretation based on prior knowledge and experience.

Inheritance The process in which genetic material is passed from parents to their offspring.

Inheritance of Acquired Characteristics Mistaken idea of Jean Baptiste Lamarck that evolution occurs through the inheritance of traits that an organism develops in its own life time

Initiation First step in translation, in which the proper start position on the mRNA is identified

Innate Behavior Behavior closely controlled by genes that occurs naturally, without learning or practice, in all members of a species whenever they are exposed to a certain stimulus; also called instinctive behavior

Inorganic Molecules A molecule not consisting of carbon atoms

Integral Protein Transmembrane proteins, with hydrophobic regions that extend into and often completely span the hydrophobic interior of the plasma membrane The outer regions are hydrophilic and can easily make contact with aqueous solution on either side of the plasma membrane

Interdependent relationships in which members of the group are mutually dependent on the others

Intermembrane Space Region between the inner membrane and the outer membrane of a mitochondrion or a chloroplast

Interphase The longest-lasting phase of the cell cycle in which a cell performs the majority of its functions, such as preparing for nuclear division and cytokinesis.

Interspecific Competition Relationship between organisms of different species that strive for the same resources in the same place

Intertidal Zone Area that is above water at low tide and under water at high tide

Intracellular Located inside a cell.

Intraspecific Competition Relationship between organisms of the same species that strive for the same resources in the same place

Intron Any nucleotide sequence within a gene that is removed by RNA splicing while the final mature RNA product of a gene is being generated

Inversion When a segment of a chromosome breaks off and reattaches in reverse order.

Ion An atom that has gained or lost one or more electrons, thus acquiring a charge.

Ion Channel Transmembrane protein channel that allows a specific ion to flow across the membrane down its concentration gradient.

Isolating Mechanisms Features of behaviors, morphology, or genetics which serve to prevent mating or breeding between two different species (e.g., temporal isolation, in which individuals are active at different times of the day, seasons, or mating periods; ecological isolation, in which individuals only mate in their specific habitat; behavioral isolation, when there are no sexual cues between representatives of the species; mechanical isolation, when there is no sperm transfer during an attempted mating; and gametic incompatibility, when there is sperm transfer without fertilization occurring). If mating can take place, there are four factors that prevent hybrid viability: zygotic mortality (fertilization but no zygote), hybrid inviability (embryo is not viable), hybrid sterility (resulting adult is sterile), and hybrid breakdown (first generation is viable but future generations are not)

Isomers Molecules with the same molecular formula but different chemical structures

Isotonic Describes a solution whose solute concentration is equal to the solute concentration inside a cell

J

K

Keystone Species Species that plays an especially important role in its community so that major changes in its numbers affect the populations of many other species in the community

Kinetic Energy Energy of an object is the energy that it possesses due to its motion

Krebs Cycle Second stage of aerobic respiration in which two pyruvate (pyruvic acid) molecules from the first stage react to form ATP, NADH, and $FADH_2$

***K*-selected** Species in which population growth is controlled by density-dependent factors and population size is generally at or near carrying capacity

L

Lactic Acid Fermentation Type of anaerobic respiration that includes glycolysis followed by the conversion of pyruvic acid to lactic acid and the formation of NAD^+.

Last Universal Common Ancestor (LUCA) Hypothetical early cell (or group of cells) that gave rise to all subsequent life on Earth.

Law (Scientific) A law that generalizes a body of observations. At the time it is made, no exceptions have been found to a law. It explains things but does not describe them; serves as the basis of scientific principles.

Law of Independent Assortment Mendel's second law stating that factors controlling different characteristics are inherited independently of each other.

Law of Segregation Mendel's first law stating that the two factors controlling characteristics separate and go to different gametes

Life Cycle A series of changes in form that an organism undergoes, returning to the starting state

Light Reactions First stage of photosynthesis in which light energy from the sun is captured and changed into chemical energy that is stored in ATP and NADPH.

Limiting Factor Chemical or physical factor that limits the existence, growth, abundance, or distribution of an individual organism or a population.

Linkage Map Map that shows the positions of genes on a chromosome based on the frequency of crossing-over between the genes.

Linked Genes Genes that are located on the same chromosome.

Lipids A group of organic compounds composed mostly of carbon and hydrogen including a proportionately smaller amount of oxygen; are insoluble in water, serve as a source of stored energy, and are a component of cell membranes

Locus Specific location of a gene, DNA sequence, or position on a chromosome

Logistic Growth Pattern of population growth in which growth slows and population size levels off as the population approaches the carrying capacity

M

Macroevolution Evolutionary change that occurs over geologic time above the level of the species

Macromolecule A polymer with a high molecular mass. Within organisms there are four main groups: carbohydrates, lipids, proteins, and nucleic acids

Marine Biome *See Aquatic Biome*

Mass Extinction Extinction event in which many if not most species abruptly disappear from Earth

Matrix Found between the inner membrane and intermembrane of a mitochondrion; contains soluble enzymes that catalyze the oxidation of pyruvate and other small organic molecules

Matter Anything that takes up space and has mass.

Mechanism (Scientific) The combination of components and processes that serve a common function.

Meiosis A two-phase nuclear division that results in the eventual production of gametes with half the normal number of chromosomes.

Membrane Potential The difference in electric potential between the two sides of a cell membrane.

messenger RNA (mRNA) Type of RNA that copies genetic instructions from DNA in the nucleus and carries them to the cytoplasm.

Metabolism Set of chemical reactions through which an organism builds up or breaks down materials as it carries out its life processes.

Metamorphosis Process in which a larva undergoes a major transformation to change into the adult form, which occurs in amphibians, arthropods, and other invertebrates.

Metaphase Second phase of mitosis, during which the chromosomes line up across the center of the cell.

Microevolution Evolutionary change that occurs over a relatively short period of time within a population or species.

Migration (Genetics) The permanent movement of genes into or out of a population resulting in a change in allele frequencies.

Missense Mutation Point mutation in which there is a different amino acid.

Mitochondria (Mitochondrion, singular) A membrane-bound organelle found in most eukaryotic cells; site of cellular respiration.

Mitosis A nuclear division resulting in the production of two somatic cells having the same genetic complement as the original cell

Modeling A representation of part of the real world; scientific models represent the real world but are simpler than the real world and are useful for investigating complex systems to help scientists better understand how the real systems work

Molecular Clock Using DNA (or proteins) to measure how long it has been since related species diverged from a common ancestor.

Molecule The smallest particle of a substance that retains the chemical and physical properties of the substance and is composed of two or more atoms held together by chemical forces.

Monomer A molecule of any compound that can react with other molecules of the same or different compound to form a polymer. Each biological macromolecule has characteristic monomers.

Monosaccharide Simple sugar molecule.

Motility The ability to move.

Multicellular Made up of more than one cell.
Multiple Allele Trait More than two forms of a gene controlling the expression of a trait
Mutagen Environmental factors that causes mutations
Mutation A permanent transmissible change of genetic material (e.g., chromosomal mutations and gene mutations).
Mutualism Symbiotic relationship in which both organisms benefit.

N

Natural Resource Something supplied by nature that helps support life.
Natural Selection A process in nature in which organisms possessing certain inherited traits are better able to survive and reproduce compared to others of their species
Negative Feedback Loop A feedback in which the system responds in an opposite direction to the stimulus
Neutral Mutation Changes in DNA sequence that are neither beneficial nor detrimental to the ability of an organism to survive and reproduce
Neutralization Reaction When a strong acid and a strong base solution are mixed, a neutralization reaction occurs, and the products do not have characteristics of either acids or bases. Instead, a neutral salt and water are formed
Niche Role of a species in its ecosystem that includes all the ways the species interacts with the biotic and abiotic factors of the ecosystem.
Nitrogen Cycle Interconnected pathways through which nitrogen is recycled through the biotic and abiotic components of the biosphere.
Nitrogen Fixation Process of changing nitrogen gas to nitrates that is carried out by nitrogen-fixing bacteria in the soil or in the roots of legumes.
Nondisjunction The process in which sister chromatids fail to separate during and after mitosis or meiosis.
Nonnative Species A species normally living outside a distribution range that has been introduced through either deliberate or accidental human activity; also can be known as introduced, invasive, alien, nonindigenous, or exotic.
Nonrenewable Resource Natural resource that exists in a fixed amount and can be used up.
Nonsense Mutation Point mutation in which there is an insertion of a stop codon in the amino acid which stops protein synthesis.
Nucleic Acid A biological macromolecule (DNA or RNA) composed of the elements C, H, N, O, and P that carries genetic information

Nucleosomes Basic unit of DNA packaging in eukaryotes, consisting of a segment of DNA wound in sequence around eight histone protein cores
Nucleotide Monomer of nucleic acids made up of a 5-carbon sugar, a phosphate group and a nitrogenous base.
Nucleus (plural, Nuclei) A membrane-bound organelle in eukaryotic cells functioning to maintain the integrity of the genetic material and, through the expression of that material, controlling and regulating cellular activities

O

Observation Use of one or more of the senses – sight, hearing, touch, smell and sometimes taste – to gather information.
Omnivore Organism that obtains energy by eating both plants and animals.
Oogenesis Process of producing eggs in the ovary.
Operator Region of an operon where regulatory proteins bind.
Operon Region of prokaryotic DNA that consists of a promoter, an operator, and one or more genes that encode proteins needed for a specific function.
Organ An anatomical unit composed of tissues serving a common function.
Organelle A subunit within a cell that has a specialized function.
Organic Compound Compound found in living things that contains mainly carbon.
Organic Molecule A molecule containing carbon that is a part of or produced by living systems.
Organism A form of life; an animal, plant, fungus, protist or bacterium.
Organ System An anatomical system composed of a group of organs that work together to perform a specific function or task
Osmoregulation Active regulation of the osmotic pressure of an organism's fluids to maintain the homeostasis of the organism's water content; that is, it keeps the organism's fluids from becoming too diluted or too concentrated
Osmosis The movement of water or another solvent through permeable membranes from an area of higher water concentration (dilute) to an area of lower water concentration (concentrated).
Ozone Hole Hole in the ozone layer high in the atmosphere over Antarctica caused by air pollution destroying ozone.

P

Paleontologist A scientist who studies the life of past geological periods as known from fossil remains

Parapatric Speciation Relationship between organisms whose ranges do not significantly overlap but are immediately adjacent to each other; they only occur together in a narrow contact zone

Parasite Species that benefits in a parasitic relationship

Parasitism Symbiotic relationship in which one organism benefits and the other organism is harmed.

Passive Transport The transportation of materials across a plasma membrane without using energy.

Pathogen Disease-causing agent such as a bacterium, virus, fungus, or protozoan.

Pedigree Chart that shows the relationship within a family

Peripatric Speciation Subpopulation of a species enters a new niche that becomes geographically isolated

Peripheral Protein Protein loosely bound to the surface of a membrane or to part of an integral protein and not embedded in the lipid bilayer.

pH The measure of acidity or alkalinity (basicity) of an aqueous solution scaling from 1 (highly acidic) to 14 (highly alkaline) with a midpoint of 7 (neutral).

Phagocytosis Process by which a cell engulfs large particles or whole cells, either as a defense mechanism or as a means to obtain food

Pharmacogenomics Study of the role of genetics in drug response. It deals with the influence of genetic variation on drug response in patients by correlating gene expression or single-nucleotide polymorphisms with drug absorption, distribution, metabolism, and elimination, as well as drug receptor target effects

Phenotype The observable expression of a genotype.

Phospholipid Bilayer Double layer of phospholipid molecules that makes up a plasma membrane

Phosphorus Cycle Biogeochemical cycle that describes the movement of phosphorus through the lithosphere, hydrosphere, and biosphere; unlike other cycles phosphorus does not move through the atmosphere

Photic Zone Area in an aquatic biome that extends to a maximum depth of 200 meters

Photoautotroph Producer that uses energy from sunlight to make food by photosynthesis

Photolysis Chemical process by which molecules are broken down into smaller units through the absorption of light

Photosynthesis A process in which solar radiation is chemically captured by chlorophyll molecules and through a set of controlled chemical reactions resulting in the potential chemical energy in the bonds of carbohydrate molecules.

Photosystem Group of molecules, including chlorophyll, in the thylakoid membrane of a chloroplast that captures light energy.

Phylogenetic Tree Diagram that shows how species are related to each other through common ancestors.

Phylogeny Evolutionary history of a group of related organisms.

Phytoplankton Bacteria and algae that use sunlight to make food

Pigment Material that changes the color of reflected or transmitted light as the result of wavelength-selective absorption; pigmentation is used in organisms for many biological purposes including Camouflage, Mimicry, Aposematism (warning), Sexual selection and other forms of Signaling, Photosynthesis (in plants), as well as basic physical purposes such as protection from Sunburn.

Pinocytosis A method of active transport across the cell membrane in which the cell takes in extracellular fluids.

Pioneer Species Type of species that first colonizes a disturbed area.

Plasma Membrane A thin, phospholipid and protein molecule bilayer that encapsulates a cell and controls the movement of materials in and out of the cell through active or passive transport.

Plasmid Circular DNA molecule found in bacteria

Plasmodesma (plural, Plasmodesmata) An open channel in the cell wall of a plant through which strands of cytosol connect from an adjacent cell, allowing water, nutrients, and other substances to flow between cells.

Plasmolysis The contraction or shrinking of the cell membrane of a plant cell in a hypertonic solution in response to the loss of water by osmosis.

Plastids A group of membrane-bound organelles commonly found in photosynthetic organisms and mainly responsible for the synthesis and storage of food.

Point Mutation A single-base substitution causing the replacement of a single-base nucleotide with another nucleotide (e.g., silent mutation, in which there is no change in an amino acid; missense mutation, in which there is a different amino acid; and nonsense mutation, in which there is an insertion of a stop codon in the amino acid which stops protein synthesis).

Polarity Difference in electrical charge between different parts of the same molecule

Pollen Fine to coarse powder containing the micro-gametophytes of seed plants, which produce the male gametes

Pollination Process by which pollen is transferred from the anther to the stigma of the plant, thereby enabling fertilization and reproduction

Polyadentation Addition of a poly tail to a primary transcript RNA

Polygenic Trait (Characteristic) A trait in which the phenotype is controlled by two or more genes at different loci on different chromosomes.

Polymer Large compound formed from combinations of many monomers.

Polymerase Chain Reaction (PCR) Technique that allows molecular biologists to make many copies of a particular gene.

Polynucleotide Chain of nucleotides that alone or with another such chain makes up a nucleic acid.

Polypeptide Chain of amino acids that alone or with other such chains makes up a protein.

Polysaccharide Chain of monosaccharides that makes up a complex carbohydrate such as starch.

Population A group of individuals of the same species living in a specific geographical area and reproducing.

Population Density Average number of individuals in a population per unit of area or volume.
Population Distribution Describes how the individuals are distributed, or spread throughout their habitat.
Population Dynamics The study of short- and long-term changes in the number of individuals for a given population, as affected by birth, death, immigration, and emigration.
Population Genetics Science focusing on evolution within populations that is the area of overlap between evolutionary theory and Mendelian genetics.
Population Growth Rate (r) How fast a population changes in size over time.
Population Pyramid Bar graph that represents the age-structure of a population
Positive Feedback Loop Process in which the effects of a small disturbance on a system include an increase in the magnitude of the stimulus
Potential Energy Stored energy of position
Precipitation Water that falls from clouds in the atmosphere to Earth's in the form of rain, snow, sleet, hail, or freezing rain.
Predation Interaction in which one organism captures and heeds on another organism.
Predator Species that consumes another in a predator-prey relationship
Prediction (scientific) Statement that tells what will happen under certain conditions
Prey Species that is consumed by another in a predator-prey relationship.
Primary Succession Change in the numbers and types of species that live in a community that occurs in an area that has never before been colonized.
Principle (Scientific) A concept based on scientific laws and axioms (rules assumed to be present, true, and valid) where general agreement is present.
Probability Likelihood that a particular event will occur.
Producer (Autotroph; Ecological) An organism that uses a primary energy source to conduct photosynthesis or chemosynthesis
Product Substance that forms as the result of a chemical reaction.
Prokaryote A single-celled organism that lacks a membrane-bound nucleus and specialized organelles.
Prokaryotic Cell Cell without a nucleus that is found in single-celled organisms.
Promoter Region of a gene where a RNA polymerase binds to initiate transcription of the gene.
Prophase First and longest phase of mitosis, during which the chromosomes become visible and the centrioles separate and take up positions on the opposite sides of the nucleus.
Protein A macromolecule that contains the principal components of organisms: carbon, hydrogen, oxygen, and nitrogen; performs a variety of structural and regulatory functions for cells.
Protein Synthesis The process in which amino acids are arranged in a linear sequence through the processes of transcription of DNA and to RNA and the translation of RNA to a polypeptide chain.

Protist Kingdom in the domain Eukarya that includes all eukaryotes except plants, animals, and fungi.
Pumps (Ion or Molecular) Any of several molecular mechanisms in which ions or molecules are transported across a cellular membrane requiring the use of an energy source (e.g., glucose, sodium [Na+], calcium [Ca+], and potassium [K+]).
Punctuated Equilibrium A proposed explanation in evolutionary biology stating that species are generally stable over long periods of time. Occasionally there are rapid changes that affect some species which can quickly result in a new species.
Punnett Square Diagram showing the gene combinations that might result from a genetic cross.

Q

R

Random Fertilization Random combination of that produces genetic variation in the process of sexual reproduction
Reactant Starting material in a chemical reaction
Reading Frame A way of dividing the sequence of nucleotides in a nucleic acid (DNA or RNA) molecule into a set of consecutive, non-overlapping triplets; when these triplets equate to amino acids or stop signals during translation, they are called codons
Recessive Allele Allele that is masked by the presence of another allele for the same gene when they occur together in a heterozygote
Recessive Inheritance A pattern of inheritance in which the phenotypic effect of one allele is only expressed within a homozygous genotype. In a heterozygous condition with a dominant allele, it is not expressed in the phenotype.
Recombinant DNA DNA produced by combining DNA from different sources.
Regeneration Regrowing of tissues, organs, or limbs that have been lost or damaged.
Regulatory Element Region of DNA where a regulatory protein binds.
Regulatory Protein Protein that regulates gene expression.
Relative Dating Method of dating fossils by their location in rock layers; determines which fossils are older or younger but not their age in years.
Renewable Resource Natural resource that can be replenished by natural processes as quickly as humans use it
Reproduction Biological process by which new "offspring" individual organisms are produced from their "parents"
Reproductive Isolation Separation of species or populations so that they cannot interbreed and produce fertile offspring
Reservoir Part of a biogeochemical cycle that holds an element or water for a long period of time.

Respiration Exchange of gases between the body and the outside air.
Restriction Enzyme Enzyme that cuts DNA at a specific sequence of nucleotides.
Ribonucleic Acid (RNA) Single-stranded nucleic acid that contains the sugar ribose and that helps make proteins.
ribosomal RNA Type of RNA that helps form ribosomes and assemble proteins.
Ribosome A cellular structure composed of RNA and proteins that is the site of protein synthesis in eukaryotic and prokaryotic cells
RNA (Ribonucleic acid) Family of large biological molecules that perform multiple vital roles in the coding, decoding, regulation, and expression of genes
RNA Polymerase An enzyme that produces primary transcript RNA
RNA World Hypothesis Hypothesis that RNA was the first organic molecule to evolve and that early life was based on RNA, rather than DNA or protein.
***r*-selected** Species in which population growth is rapid but death rates are high so population size is generally below the carrying capacity
Runoff The flow of water that occurs when excess water from rain, melt-water, or other sources flows over the earth's surface

S

Sampling Study of a selection of a subset of individuals from within a statistical population to estimate characteristics of the whole population
Saprotroph Decomposer such as a fungus or protozoan that feeds on any remaining organic matter that is left after other decomposers do their work
Saturated Fatty Acid Molecule in lipids in which carbon atoms are bonded to as many hydrogen atoms as possible
Scanning Electron Microscope (SEM) Type of electron microscope that produces 3-D images of a sample by scanning it with a focused beam of electrons
Scavenger Decomposer that consumers the soft tissues of dead animals
Science A body of evidence-based knowledge gained through observation and experimentation related to the natural world and technology.
Scientific Investigation Plan for asking questions and testing possible answers.
Scientific Law Statement describing what always happens under certain conditions in nature.
Scientific Method The process of a scientific investigation
Scientific Principle Explain the 'why' and 'how' of various phenomena; problem or method that has to be proven by an exact point of science
Scientific Theory Broad explanation that is widely accepted as true because it is supported by a great deal of evidence
Secondary Succession Change in the numbers and types of species that live in a community that occurs in an area that was previously colonized but has been disturbed.

Selective Breeding The process of breeding organisms that results on offspring with desired genetic traits.

Selective Permeability (Semi-permeability) Property of biological membranes that allows only certain substances to pass through them.

Semiconservative DNA Replication The process in which the DNA molecule uncoils and separates into two strands. Each original strand becomes a template on which a new strand is constructed, resulting in two DNA molecules identical to the original DNA molecule

Semipermeability (Selectively Permeability)

Sessile Of or relating to an animal that is unable to move from place to place

Sex Chromosome X or Y chromosome (in humans).

Sex-Linked Gene Gene located on a sex chromosome.

Sex-Linked Trait A trait, associated with a gene that is carried by either the male or female parent (e.g., color blindness and sickle-cell anemia).

Sexual Dimorphism Differences between the phenotypes of males and females of the same species.

Sexual Reproduction Process by which two cells from different parents unite to produce the first cell of a new organism.

Silent Mutation Point mutation in which there is no change in an amino acid

Sister Chromatids Refers to either of the two identical copies formed by the replication of a single chromosome, with both copies joined together by a common centromere

Sixth Mass Extinction Current mass extinction caused primarily by habitat loss due to human actions.

Sodium-Potassium Pump Type of active transport in which sodium ions are pumped out of the cell and potassium ions are pumped into the cell with the help of a carrier protein and energy from ATP.

Solubility Property of a solid, liquid, or gaseous chemical substance called solute to dissolve in a solid, liquid, or gaseous solvent to form a homogeneous solution of the solute in the solvent

Solute The dissolved substance in a solution

Solution Mixture that has the same composition throughout

Solvent Substance in which a solute is dissolved to form a solution

Somatic Mutation Mutation that occurs in cells of the body other than gametes**.**

Spawning Depositing large numbers of gametes in the same place and at the same time by fish or amphibians.

Specialization Evolution of different adaptations in competing species, which allows them to live in the same area without competing.

Speciation A process typically caused by the genetic isolation from a main population resulting in a new genetically distinct species.

Species The lowest taxonomic level of biological classification consisting of organisms capable of reproduction that results in fertile offspring.

Specific Heat The measure of the heat energy required to increase the temperature of a unit quantity of a substance by a certain temperature interval.

Spermatogenesis Process of producing sperm in the testes

Splicing The process by which introns are removed from the RNA to produce mature messenger RNA that contains only exons

Spindle Fanlike microtubule structure that helps separate the chromosomes during mitosis

Spontaneous Mutation Mutations arising from a variety of sources, including errors in DNA replication, spontaneous lesions, and transposable genetic elements

Stabilizing Selection Form of natural selection by which the center of the curve remains in its current position; occurs when individuals near the center of a distribution curve have higher fitness than individuals at either end

Statistical Analysis Component of data analytics; that describes the nature of the data to be analyzed, explores the relation of the data to the underlying population, creates a model to summarize understanding of how the data relates to the underlying population, proves (or disproves) the validity of the model, and employs predictive analytics to run scenarios that will help guide future actions; main goal of statistical analysis is to identify trends

Stimulus any kind of detectable signal that carries information

Stomata (singular, Stoma) Tiny pore in the epidermis of a plant leaf that controls transpiration and gas exchange with the air.

Stroma Space outside the thylakoid membranes of a chloroplast where the Calvin cycle of photosynthesis takes place.

Sublimation Process in which ice and snow change directly to water vapor.

Substrate Reactant of an enzyme-catalyzed reaction

Succession A series of predictable and orderly changes within an ecosystem over time

Surface Tension Contractive tendency of the surface of a liquid that allows it to resist an external force

Survivorship Curve Graph that represents the individuals still alive at each age in a population

Sustainable Use Use of resources in a way that meets the needs of the present and also preserves the resources for the use of future generations.

Symbiosis Relationship in which two species live closely together, in which one always benefits from the relationship.

Symbiotic Relationship A relationship between two organisms (i.e., mutualism, in which both organisms benefit; parasitism, in which one organism benefits and the other organism is harmed; and commensalism, in which one organism benefits and the other organism does not benefit or is not harmed).

Sympatric Speciation Evolution of a new species that occurs when without geographic separation first occurring between members of an original species

Synthetic Biology Field of biology involved in engineering new functions from living systems.

System A set of interacting or interdependent components, real or abstract, that form an integrated whole. An open system is able to interact with its environment. A closed system is isolated from its environment.

T

TATA box Regulatory element that is part of the promoter of most eukaryotic genes
Taxonomy Science of classifying organisms.
Telophase Fourth and final phase of mitosis, during which the chromosomes begin to disperse into a tangle of dense material.
Temperature A measure of the average kinetic energy (energy of motion) of particles in a sample of matter This physical property can determine the rate and extent to which chemical reactions can occur within living systems. It is commonly measured in degrees Celsius (°C) or Fahrenheit (°F).
Temporal Isolation Form of reproductive isolation in which individuals are active at different times of the day, seasons, or mating periods
Termination Final step in in translation, in which the protein sequence has been totally delivered
Terrestrial A term that describes an organism associated with a land environment.
Terrestrial Biome A biome of or pertaining to land, as in terrestrial ecosystem.
Tetrad Structure containing 4 chromatids that forms during meiosis.
Theory (Scientific) An explanation of observable phenomena based on available empirical data and guided by a system of logic that includes scientific laws; provides a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain the nature or behavior of a specific set of phenomena
Thermoregulation Ability of an organism to keep its body temperature within certain boundaries, even when the surrounding temperature is very different
Thylakoid Membrane Membrane in a chloroplast where the light reactions of photosynthesis occur
Tissue An anatomical unit composed of cells organized to perform a similar function.
Transcription The process in which a strand of messenger RNA (mRNA) is synthesized by using the genetic information found on a strand DNA as a template.
transfer RNA (tRNA) Type of RNA that brings amino acids to ribosomes where they are joined together to form proteins
Transformation One of several processes by which genetic material in the form of “naked” deoxyribonucleic acid (DNA) is transferred between microbial cells; its discovery and elucidation constitutes one of the significant cornerstones of molecular genetics
Transgenic Term used to refer to an organism that contains genes from other organisms.

Transgenic Crop Crop that has been genetically modified with new genes that code for traits useful to humans.
Translation The process in which the messenger RNA (mRNA) molecule on a ribosome is decoded to produce a sequence of amino acids for protein synthesis.
Translocation The process in which a segment of a chromosome breaks off and attaches to another chromosome
Transmission Electron Microscope (TEM) Microscopy technique in which a beam of electrons is transmitted through an ultra-thin specimen, interacting with the specimen as it passes through producing a one-dimensional image
Transpiration Loss of water from a plant through its leaves
Transport Protein Protein in a plasma membrane that helps other substances cross the membrane.
Trophic Level The position of an organism in relation to the flow of energy and inorganic nutrients through an ecosystem (e.g., producer, consumer, and decomposer)
Tumor Abnormal growth of body tissue; can be cancerous
Turgid Swollen or distended, as in plants cells

U

Unicellular Made up of a single cell.
Unsaturated Fatty Acid Molecule in lipids in which some carbon atoms are bonded to other groups of atoms rather than to hydrogen atoms

V

Vacuole Large saclike organelle that stores and transports materials inside a cell
Vesicle Small saclike organelle that stores and transports materials inside a cell.
Vesicle Transport Type of active transport in which substances are carried across the cell membrane by vesicles.
Vestigial Structure A physical characteristic in organisms that appears to have lost its original function as a species has changed over time.
Virus Tiny, nonliving particle that contains DNA but lacks other characteristics of living cells

W

Water Cycle Interconnected pathways through which water is recycled through the biotic and abiotic components of the biosphere

Wetland Land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem

X

X-Linked Gene Gene located on the X chromosome.
X-Linked Trait Trait controlled by a gene located on the X chromosome.

Y

Z

Zooplankton Tiny animals that feed on phytoplankton
Zygote Fertilized egg.