GLOSSARY

abiotic environment—The nonliving physical and chemical environment that exerts an influence on living organisms; for example, soil, water, air.

acclimation—The process by which an individual organism is able to adjust physiologically to a change in immediate environmental conditions.

aerobic—Requiring molecular oxygen (O₂) for life or activity. Taking place in the presence of O₂.

algae—Primitive water-dwelling plants with a one-celled or simple multicellular structure. Algae lack roots, stems, or leaves but usually contain chlorophyll. They include kelps and other seaweeds, and phytoplankton such as the diatoms.

anaerobic—Living or active in the absence of oxygen.

basal cell carcinoma—A relatively common type of skin cancer that can result from exposure to sunlight. This cancer arises in the basal cell layer of the epidermis, where it spreads but rarely metastasizes to other organs.

biome—Major type of land community of organisms, usually identified in terms of characteristic vegetation; for example, tropical rain forest or desert.

biophysical environment—The nonliving physical and chemical environment that exerts an influence on living organisms; for example, soil, water, air.

biotic—Having to do with living organisms.

C₃ plants—Plants that make photosynthetic intermediate organic substances containing three carbon atoms. These plants cannot concentrate CO₂ near the enzymes of photosynthesis, and they tend to lose energy through a process called photorespiration. Examples: wheat, algae, most tree species.

C₄ plants—Plants that make photosynthetic intermediate organic substances containing four carbon atoms. These plants are able to concentrate CO₂ near the enzymes of photosynthesis, and they tend not to lose much energy through photorespiration. Examples: corn, grasses, tropical plants.

Calvin-Benson cycle—A series of enzyme-catalyzed reactions that occur within C₃ plants during photosynthesis. The reactions convert CO₂ into more complex, energy-storing molecules.

carbon cycle—The complex array of chemical and physical processes by which carbon flows through the biotic and abiotic environment.
**carcinoma**—A cancer of the surface tissues of an organ or organism. Carcinomas include basal and squamous cell tumors, among others, reflecting the type of cell from which the cancer originates.

**catalyst**—A substance that alters the rate of a chemical reaction, while itself remaining chemically unchanged by the reaction. A biological catalyst is called an enzyme.

**chlorophyll**—The organic green pigment molecule, occurring in plants, that captures light energy and channels it into the photosynthetic process.

**community**—All of the organisms living in a particular habitat.

**copepod**—A small marine or freshwater crustacean. Copepods are an important component of the zooplankton community in most parts of the world’s oceans and lakes. They are often referred to as the insects of the sea.

**CO₂ fertilization effect**—The increase in plant photosynthesis and/or growth that may occur in the presence of increased levels of CO₂ in the atmosphere.

**decomposition**—The decay of dead organic material. Decomposition is carried out by microorganisms and other decomposers that break down complex molecules and release the nutrients and the carbon (as carbon dioxide or methane).

**diel vertical migration**—The process carried out by many zooplankton and fish in oceans and lakes, whereby individuals migrate between subsurface layers and the surface. Animals are typically at depth during the day and migrate to the surface at night to feed. Such migration can be used to avoid UV exposure.

**digestion**—The chemical process whereby life forms break down food molecules into smaller, simpler molecules.

**DNA**—Deoxyribonucleic acid, the genetic material of almost all living organisms. DNA structure is a double helix of two phosphate-sugar strands cross linked by pairs of organic bases.

**ecosystem**—The unit of ecological organization that includes the entire community of organisms plus the physical environment in which it occurs.

**enzyme**—A specialized protein used by living organisms to affect the rates of various physiological processes.

**epidermis**—The outermost layer of the skin.

**excretion**—The process by which waste products or undigested food products are eliminated from living organisms.

**feedback**—The return of a portion of the output of any process or system to the input. The return may either add to the initial input (positive feedback) or subtract from the initial input (negative feedback).

**genotype**—The inherited constitution of an organism, which determines its characteristics and development.

**herbivore**—An animal that eats plants or parts of plants.

**homeothermic**—Regulating and maintaining a constant body temperature through internal mechanisms; warm-blooded.

**immune system**—That system of cells and molecules responsible for protection of the body of an organism from invasion by foreign substances, organisms, and cells.
**immunosuppression**—The inhibition or hindrance of the natural immune system of an organism.

**malignant melanoma**—An often-fatal form of skin cancer that is the result of transformations of the melanocytes in the skin. Four different types have been identified: superficial spreading melanoma, nodular melanoma, Hutchinson’s melanotic freckle, and unclassified melanoma.

**melanin**—A dark skin pigment, manufactured by melanocytes, that absorbs ultraviolet radiation and protects deeper skin layers from exposure.

**melanocytes**—Specialized cells in the human skin that manufacture melanin when exposed to UV light.

**nanometer**—A unit of length, equal to one-billionth of a meter \(10^{-9}\) meters).

**net primary production (NPP)**—Organic matter accumulation in plants, calculated as the difference between photosynthesis and respiration.

**non-melanoma skin cancer**—A cancer that affects the keratin-producing cells in the skin, including basal cell and squamous cell carcinomas. This kind of cancer has a higher cure rate than melanoma.

**organic substances**—Chain-like or ring-like carbon-containing compounds that also contain hydrogen and can contain oxygen, nitrogen, sulfur, and phosphorus.

**oxidant**—A reactive chemical compound that tends to lose electrons when it interacts with other molecules. In the atmosphere, important oxidants are ozone \(O_3\), hydrogen peroxide \(H_2O_2\), hydroperoxyl radical \(HO_2\), and hydroxyl radical \(OH\).

**PAR**—Photosynthetically active radiation. Visible light in the wavelengths from 400 to 700 nanometers (blue to red light), used in the process of plant photosynthesis.

**part per million (ppm)**—A unit that expresses the concentration of a chemical substance. A 1 ppm concentration of molecule X means that one molecule out of a million is molecule X. Related units are part per billion (ppb) and part per trillion (ppt).

**pH**—A numerical scale that indicates the acidity of a substance. Neutrality is indicated by pH 7; higher pH values are basic, and lower pH values are acidic.

**photochemical reaction**—Any chemical reaction that requires light (often ultraviolet light).

**photorespiration**—Plant respiration that occurs in the presence of light. Photorespiration wastes energy that could otherwise be used to make photosynthetic products. It is common in C3 plants in bright sunlight on hot days.

**photosynthesis**—The process by which light, carbon dioxide, and water are used by plants to make carbohydrate products, essentially converting light into chemical energy; also called primary production.

**phytoplankton**—Tiny photosynthetic plants that live in the water column of oceans and lakes. Phytoplankton form the base of the aquatic food chain.

**poikilothermic**—Unable to regulate body temperature by internal mechanisms; cold-blooded.

**population**—All members of a particular species in a given area at one time.
protein—Any of a group of organic molecules that occur in all living matter and are essential for the growth and repair of tissue. Proteins contain amino acids as their fundamental building blocks. All proteins contain carbon, hydrogen, nitrogen, and oxygen; nearly all contain sulfur. There are hundreds of different proteins, and they constitute at least half of the dry weight of living matter.

protist—Any of the unicellular organisms of the kingdom Protista, which includes protozoans, bacteria, some algae, and other forms not easily classified as plant or animal.

reactant—A starting material of a chemical reaction. The reactants are shown on the left side of the arrow in a chemical equation.

respiration—An oxygen-consuming metabolic process used by plants and animals to break down organic substances, yielding energy and releasing carbon dioxide.

species—A fundamental category in the classification of living organisms, ranking after a genus. Organisms of the same species share common characteristics and appearance, and they are capable of interbreeding.

squamous cell carcinoma—A relatively common skin cancer that can result from exposure to sunlight. It occurs in what is known as the Malpighian layer of the epidermis.

stomates—The tiny pores on the surfaces of plant leaves and stems, through which gases and water vapor are transferred between the atmosphere and the plant. The size of the opening varies depending on environmental conditions; it is crucial in controlling the amount of water lost from the interior of the plant.

transpiration—The evaporation of water from the interior of plants or animals. In plants, the size of the stomatal openings regulates this water loss. In the case of corn, about 100 pounds of water are transpired for every pound of dried plant material (leaves, stems, grain, roots, cobs).

ultraviolet radiation—Electromagnetic radiation of wavelengths between 100 and 400 nanometers. This range is somewhat arbitrarily divided into three segments, which increase in wavelength and decrease in energy: UV-C (100–280 nanometers), UV-B (280–320 nm), and UV-A (320–400 nm). Biological effects are greatest for UV-C and smallest for UV-A. UV radiation is higher in energy than visible light and is invisible to the human eye.

zooplankton—Animal life, often microscopic, that drifts in oceans or lakes.