

# GLOSSARY

**µm** micron,  $10^{-6}$  of a metre

**abiotic factor** physical and chemical environmental factors

**abomasum** the true digestive part of the ruminant's stomach

**absorbance spectrum** the degree to which water absorbs different wavelengths of light

**absorption** the taking up of digested molecules into the cells of the body

**abundance** the extent to which members of a species are present in a given area

**acoustic signal** a signal transmitted by sound

**actin** protein, joined together in long filaments and making up a cell's cytoskeleton

**active site** the place on the surface of an enzyme molecule where substrate molecules attach

**active transport** a process in which energy is used to move particles through a membrane against a concentration gradient

**adaptation** structural, physiological (biochemical), behavioural and reproductive characteristics enable organisms to obtain their requirements and increase the chance of survival of the individual or the species

**adaptive value** behaviour that increase the chances of survival of the individual or the group

**adhesion proteins** membrane proteins that help link cells together

**adhesion** the forces of attraction between water molecules and the molecules on the sides of the vessel through which the water is travelling

**adventitious** relates to roots that grow from stems

**aestivation** dormancy in some animals during periods of drought

**alternation of generations** the occurrence within an organism's life cycle of a sexual phase and an asexual phase

**alveoli** cluster of tiny air sacs located at the end of the bronchioles

**amino acids** nitrogen-containing compounds that are the building blocks of all proteins

**ammonia** a nitrogenous waste product produced by marine fish

**amplexus** when a male frog or toad grasps the female during fertilisation

**amylase** enzyme that works to break down carbohydrates

**anaerobic** without oxygen

**angiosperms** flowering plants that reproduce through sexual means

**annuals** plants the life cycle of which lasts for a year

**anther** the organ that produces the male gametes (pollen) in a flower

**anthropocentric** 'human-centred'; describes a person who assigns human behaviour to other organisms

**antidiuretic hormone** hormone that affects how much water is reabsorbed into the collecting tubules in the kidneys

**antigens** markers on the cell surface made up of recognition proteins combined with carbohydrate molecules

**anus** the exit point of waste products and end point of gastrointestinal tract

**aorta** the largest artery leading out of the left ventricle to the rest of the body

**aortic valve** the valve located in the aorta as it leads away from the heart

**apoptosis** programmed cell death

**arid** dry conditions (not necessarily hot – Antarctica is arid)

**arteries** blood vessels with muscular and elastic walls that take blood away from the heart

**arterioles** the finest arteries that connect to the capillaries

**asexual** a process where new cells or organisms are produced without the fusion of gametes

**association** a relationship or interaction between species

**astronomical** describes events occurring outside Earth

**ATP (adenosine triphosphate)** the main energy-carrier molecule in cells, produced during cellular respiration

**atria** top chambers of the heart on both the right and left side of the heart; the entry point for veins into the heart

**atrioventricular valves** valves located between the atrium and the ventricle of the heart

**autonomic system** part of the peripheral nervous system that deals with involuntary control

**autotrophs** living things that are able to produce their own food through photosynthesis or chemosynthesis

**bicarbonate ions** the form in which carbon dioxide is transported from the tissues to the lungs in the blood

**bile duct** a tube leading from the gall bladder to the duodenum

**binary fission** division of a prokaryotic cell where one cell splits into two

**biochromes** microscopic pigments found in animal cells

**biodegradable** able to be broken down into simple inorganic material by the action of decomposers

**biodiversity** the variety of different living things: the different plants, animals and microorganisms, their genes and the ecosystems of which they are a part

**biogeochemical cycle** a specific term that describes the cycling of matter through the living component of an ecosystem, soils and rocks, water and the atmosphere (bio-geo-chemical)

**bioinformatics** developments in computer technology that use techniques from applied mathematics and statistics to solve biological problems; enables collection and analysis of large volumes of data

**biological clock** an internal mechanism by which many plants and animals are able to keep a sense of time

**biological control** management of populations of species by other organisms

**biological magnification (bioaccumulation)** the accumulation of non-biodegradable matter in the tissues of one organism, passed along from the previous one in the food chain

**biomass** the total amount of matter (mass) of living material in an ecosystem at a particular time

**biomes** areas of the Earth linked by a common feature

**bioprospecting** the search for plant and animal species from which medicinal drugs and other commercial compounds can be obtained

**bioremediation** the process of cleaning up and restoring contaminated areas using biological agents that stimulate natural biological processes

**biosecurity** protecting an environment from unwanted biological matter or organisms

**biosphere** 'layer' of the Earth including waters, lower atmosphere and soil, which supports life

**biota** life forms

**biotic factor** a factor related to the effect a living organism has on another living organism (e.g. predator, competitor, parasite)

**bisexual** containing both male and female reproductive organs

**Bowman's capsule** the capsule in which the glomerulus is located

**bronchi** the two branches from the trachea that lead to each lung

**bronchioles** the divisions in the bronchi as they lead into each lung

**budding** the development of a new organism from an outgrowth of the parent organism

**bulk transport** the transport of large quantities of materials into or out of the cytoplasm all at the one time

**buoyancy** the upward force that allows bodies to float or be suspended

**by-catch** undersized fish caught and discarded

**cancer** a mass of cells that divide uncontrollably

**canopy** the upper stratum of foliage

**capillaries** blood vessels that connect the arteries and veins and are narrow enough to allow single blood cells through at one time

**carbohydrate** a type of organic molecule important as a structural component and energy form

**cardiovascular system** the system in the vertebrate body consisting of the heart and blood vessels

**carnivores** a general term used to describe organisms that feed on other animals

**carnivorous** flesh-eating

**carpel** the female part of a flower

**carrier proteins** membrane proteins that pick up particles on one side of a membrane, change shape and release them on the other side

**carrying capacity** the maximum number of individuals of a given species that a site can support, without causing deterioration of the site

**cell division** splitting of cells to form new cells

**cell specialisation** when cells take on special features to enable them to carry out a specific task

**cell** the basic structural and functional unit that has the potential to survive and reproduce on its own

**cell theory** the theory that all living things are composed of one or more cells that come from pre-existing cells

**cellular respiration** a series of chemical reactions using glucose and oxygen and producing carbon dioxide and water; the energy released is used to build ATP molecules.

**cellulase** an enzyme that facilitates the breakdown of cellulose

**cellulose** a complex carbohydrate molecule found in cell walls

**centrioles** structures in animal cells that produce and organise microtubules

**cervix** the opening of the uterus at the top of the vagina

**channel proteins** proteins that form passageways in membranes through which small ions can diffuse rapidly

**chemical control** using a chemical agent to manage the numbers of a population

**chemical digestion** where enzymes break down complex substances into simpler forms

**chemical signal** a signal transmitted by the release of specific chemicals such as pheromones

**chemosynthesis** the synthesis of organic substances using energy from chemical reactions

**chemotropism** growth response to the presence of particular chemicals

**chlorophyll** a green pigment found in chloroplasts; it is able to absorb light energy, making it available for photosynthesis

**chloroplast** a type of plastid containing the green pigment chlorophyll; its main function is photosynthesis and storage of carbohydrates

**cholesterol** a type of lipid found in cell membranes

**chromoplast** a type of plastid containing coloured pigments other than green

**chromosomes** structures made of a DNA molecule with associated proteins

**chyme** digested soupy substance, which is the form food takes after 6 hours in the stomach

**cilia** short, hair-like projections on the outside of cells, involved with movement

**circadian** describes a daily or 24-hour rhythm

**circumpolar currents** ocean currents circling the Earth's poles

**climax community** the end-point in a community succession where the community has become relatively stable; examples are old growth forests and rain forests

**cloaca** the end opening of the bird digestive tube

**clones** organisms genetically identical to their parents

**closed circulatory system** circulating fluid and the oxygen and nutrients it contains are confined to vessels throughout the body

**closed ecosystems** ecosystems in which there is little or no immigration and emigration

**closed system** a system in which there is no exchange of organisms or matter between it and another system

**clumped or grouped distribution** where several organisms are grouped together and the groups are distributed throughout the area

**coevolution** the process by which species evolve and adapt together

**coevolve** the evolving and adapting together of species

**coexistence** living together

**cohesion** attraction between individual water molecules

**cohesive** describes behaviour that causes resistance to rupturing when placed under tension

**coleoptiles** sheath-like covering of young growing tips of grasses

**collagen** fibrous protein; the most abundant protein in vertebrates

**colon** the first section of the large intestine, where water and minerals and vitamins are absorbed into the body

**colony** a group of alike cells working together as one organism

**commensalism** a relationship in which only one benefits

**community** the sum of all the living organisms living in a habitat at a particular time

**companion cells** plant cells associated with controlling neighbouring sieve cells

**competition** an interaction of organisms which have the same requirements and are rivals for those resources

**concentration gradient** a measure of the difference in concentration between two regions; see also **diffusion gradient**

**conduction** the transfer of heat energy from a relatively hot object to a relatively cool object by contact

**conjugation** the exchange of genetic material between two *Paramecium* by lining up next to each other

**connective** tissue providing support and holds parts of the body together

**consumer** any organism that cannot manufacture its own food, but depends on others for its food

**continental drift** the name given by Alfred Wegener to his 1915 theory, in which continents not only floated on top of deeper layers, but were able to slowly move ('drift') the way ice-floes do in the arctic ocean

**contractile vacuole** an organelle in some cells that contracts to discharge excess water to the environment

**convection** the transfer of heat by means of the rising of currents of warm air or water

**convection current** a circular current in a fluid like air, water or molten rock. The process occurs when the fluid is unevenly heated so that part of the fluid rises, cools, and then sinks, producing the circular movement

**counteradaptations** adaptations of a species that have offset or opposed the adaptations of competitors

**countercurrent** a current that flows in the opposite direction to another current

**courtship** the behavioural process whereby sexually mature individuals of a species select a mate

**cranium** bony skull

**creatinine** a waste product from muscle metabolism

**crenation** a condition of cells where they shrink in size and become scallop-shaped

**crepuscular** describes animals predominantly active at the twilight time at the beginning and end of the day

**crop** an organ designed to store undigested food in the bird digestive tract

**cross-pollination** when pollen from a flower attaches to the stigma of a different flower

**crust** the exterior part of the Earth

**culling** reducing the size of a population by killing some members of the population

**cuticle** waxy layer produced by epidermal cells of plants

**cycle** a representation of the way matter moves between the non-living and the living components of an ecosystem

**cytokinesis** division of the cytoplasm during cell division

**cytoplasm** all the fluid, dissolved substances and organelles between the plasma membrane and nucleus

**cytoplasmic streaming** movement of cytoplasm within a cell

**cytoskeleton** the system of microtubules and microfilaments within a cell that supports and gives shape to it, helps movement and reproduction

**cytosol** part of the cytoplasm containing highly organised fluid material with dissolved substances

**daughter cells** the cells produced when a cell divides

**day-neutral** describes plants that flower irrespective of the length of daylight

**deamination** the process where the nitrogen-containing amine group is separated from the rest of the amino acid

**decomposer** an organism such as a bacteria and fungus, which break downs complex organic matter into simpler matter

**deflected succession** where a community is prevented from reaching a stable successional end-point because of some form of interference

**denatured** describes a protein, the structure of which has been altered so that it no longer functions in the way it was meant to

**density** the number of individuals of a population, or biomass, in a given area or volume

**density-dependent** factors that depend on the density of the population for their effect

**density-independent** factors that do not depend on the density of the populations for their effect; all individuals are affected regardless of age or stage

**dentition** arrangement, type and number of teeth in vertebrates

**dermal tissue** the outermost cell layers of a plant

**detoxification** the breakdown of chemicals not normally found in the body by the liver

**detritivore** an organism that feeds on small pieces of dead plant or animal matter

**detritus** organic wastes, including faeces and dead tissues

**diapause** temporary suspension of bodily development and growth in response to adverse conditions; common in the development of embryos of kangaroos

**diaphragm** sheet of muscle that separates the thorax from the abdomen in vertebrates

**dicotyledon** where the vascular bundles of plants are arranged in a ring towards the outside of the stem or trunk of the plant

**differentially permeable** describes a membrane that allows some substances to pass through, but not others

**differentiation** the process that gives rise to all specialised cell types

**diffusion** movement of particles from a region where they are at a relatively high concentration to a region where they are at a lower concentration

**diffusion gradient** the difference in concentration between two regions

**digestion** the breakdown of complex organic molecules into smaller components by mechanical and chemical means

**digestive system** the gastrointestinal tract, along with its associated glands, and the place where digestion takes place

**disaccharide** molecule formed when two monosaccharides join together chemically

**dissociate** when the oxygen molecules separate from the haemoglobin

**distribution** where a population of a species is spread within an ecosystem

**diurnal** describes animals active in the daylight

**DNA (deoxyribonucleic acid)** main molecule found within the nucleus; it codes for protein production

**dominance hierarchy** a set of levels in a society where some members are subordinate to others

**dominant** describes the strongest individual within a group

**dominant species** the most common or most obvious species in a particular community

**dormant** describes a seed that has stopped growing in unfavourable environmental conditions

**ductless gland** a gland that secrete its product directly into the bloodstream

**duodenum** the first part of the small intestine

**ecology** the study of the relationships between organisms and their environment

**ecosystem** a self-sustaining unit made up of living things (a community) interacting with and within a particular habitat

**ecosystem services** the services that natural systems provide in support of our requirements for life, without which our lives would be impossible or very costly to sustain; our air, soils, fresh water and climate are all maintained by natural processes

**ectoparasite** a parasite that lives on the surface of its host

**ectotherm** an animal that depends on a source of external heat

**effector** something that carries out a response to a stimulus; usually muscles or glands

**egestion** the removal of waste materials from the body

**eggs** female gametes or sex cells

**El Niño** sudden change in ocean temperature off the coast of Peru

**electromagnetic spectrum** consists of electromagnetic waves ranging from a long wavelength such as radio waves to a short wavelength such as X-rays and gamma rays; visible light is a small part of this spectrum

**electron microscope** a microscope that uses electrons instead of light to produce a magnified image of a specimen

**element** a pure substance the atoms of which are of one kind

**emergent** rising above, as in emergent plants rising above water

**endemic** describes species that are found in a particular area or country but nowhere else

**endocytosis** cellular uptake of substances from the environment via vesicle formation

**endometrium** the lining of the uterus

**endoparasite** a parasite that lives within the tissues of its host

**endoplasmic reticulum** interconnecting system of thin membrane sheets dividing the cytoplasm into compartments and channels

**endotherm** animals that retain heat generated by metabolic activity

**endothermic** ability of an animal to raise its core temperature above that of its surroundings

**energy flow** the passage of energy through an ecosystem along food chains and webs

**environment** the sum total of all the factors that affect or influence a living thing

**environmental gradients** gradual changes in environmental conditions across an area

**environmental resistance** environmental factors that affect population; density-dependent and density-independent

**enzymes** organic catalysts that speed up chemical reactions

**enzyme–substrate complex** a substance formed when an enzyme and a substrate molecule join

**ephemerals** short-lived; having a short life cycle

**epicormic buds** buds that lie under the bark of some plants

**epidermis** outer most part of the dermal layer of plants

**epididymis** where sperm is stored in the male mammal

**epiglottis** a small flap of tissue that closes off the trachea when food is entering the oesophagus

**epiphytes** aerial plants that live on other plants for support

**epithelial** covering that protects organs and covers the surface of the body

**equilibrium population** the population at set point

**equilibrium** the point at which particles are distributed evenly throughout a system; they move at equal rates in all directions

**erythrocytes** red blood cells

**ethologist** a person who studies animal behaviour

**ethology** study of animal behaviour

**eukaryotic** a complex type of cell with a membrane-bound nucleus and other membrane-bound organelles

**eutrophication** the enrichment of water by nutrients in run-off

**evaporation** the process in which liquid water changes to water vapour by heating

**exocytosis** cellular release of substances to the environment via vesicle formation

**exotic** not indigenous, non-native

**exponential** extremely rapid increase

**external environment** environment surrounding a cell

**external fertilisation** the fusion of gametes outside the body of an organism

**extracellular enzymes** enzymes that influence reactions outside the cell they are produced in

**extracellular fluid** fluid surrounding and bathing a cell

**exude** give out

**facilitated diffusion** when proteins in a cell membrane help particles diffuse through

**facultative** describes an association that may be obligatory for one species, but not another

**faeces** waste material stored in rectum

**Fallopian tubes** the duct along which a female gamete will travel in mammals

**fatty acids** a type of organic acid that combines with glycerol to form fat

**feedback mechanism** a mechanism in which the output or response affects the input or stimulus

**fertilisation** the fusion of gametes to produce a zygote

**fibrous roots** many smaller roots of the same size that grow out from the bottom of the plant stem

**filament** the stalk or support structure for the anther

**filaments** the leaf-like projections of which each gill is composed

**filtration** the process that occurs in the glomerulus when all but proteins and blood cells are forced out of the bloodstream into the Bowman's capsule

**fire regime** the season, intensity and frequency of fire in a given area over a period of time

**first-order consumers** organisms that feed on producers

**flaccid** describes the condition of plant cells that have lost water; the cytoplasm pulls away from the cell wall

**flagellum** a long, thread-like projection on the outside of a cell; it enables a cell to move through fluid

**foetus** the name of the mammalian embryo after approximately eight weeks

**follicle stimulating hormone (FSH)** hormone that stimulates egg cells to mature in mammals

**follicle** the structure that contains the released ovum or female gamete in mammals

**food chain** illustrates how energy is passed from one organism to another in an ecosystem

**food web** interconnecting food chains in an ecosystem

**fragmentation** a process in which new individuals are generated from fragments

**frass** faeces and detritus of insects and their larvae

**fundamental niche** the ideal niche that an organism would occupy if there were no limiting factors

**gall bladder** a storage area for bile

**gamete** a specialised haploid cell that fuses with a haploid cell from the opposite gender to produce a diploid zygote

**gastric juice** juices secreted into the stomach from the walls of the organ, containing enzymes and hydrochloric acid

**gastrointestinal tract** the tube that runs through the body of vertebrates and that begins at the mouth and ends at the anus

**geosequestration** the process of locking away material, e.g. carbon dioxide gas, underground

**geotropism** the growth response to gravity; may be positive or negative

**gestation period** the period from conception till birth

**gills** respiratory or gas-exchange organs of aquatic animals

**gizzard** the muscular section of the bird stomach

**glomerular filtrate** fluid that has been filtered by the glomerulus of the kidneys

**glomerulus** the ball of capillaries in the nephron

**glycerol** a molecule that combines with three fatty acids to form fat

**glycogen** an important energy-storing polysaccharide in animals

**Golgi apparatus (Golgi body)** a collection of membranes that package and store substances in preparation for their release from the cell

**Gondwana** the southern super-continent that rifted apart to form present-day Antarctica, India, Africa, Australia, and South America

**grafting** when part of one plant is artificially attached to another

**greenhouse effect** warming of the Earth's lower atmosphere by the trapping of radiant heat given off by the Earth's surface by special gases known as greenhouse gases

**gross primary production (GPP)** the total organic matter in an ecosystem (or specified area) made in photosynthesis

**ground tissue** all the internal cells of a plant apart from the vascular tissue

**gullet** an area where food is temporarily stored or moves through from the mouth

**gymnosperm** a seed-producing plant with 'naked seeds', such as those produced by pine trees

**habit** the form or shape of a plant

**habitat** the place in which an organism lives

**habitat fragmentation** the breaking up of a habitat into small parts

**haemocyanin** a respiratory pigment found in arachnids and most crustaceans

**haemoglobin** the pigment in red blood cells that binds with oxygen and carries oxygen around the body

**haemolysis** the bursting of cells

**herbicides** chemicals that kill plants

**herbivores** first-order consumers that feed on plant organisms

**herbivorous** plant-eating

**heterotroph** an organism that cannot synthesise its own organic compounds from inorganic material; it depends on other organisms for its nutrients and energy requirements

**heterotroph** an organism that relies on other living things for its energy and nutrients

**hibernate** a period of dormancy over long periods of cold conditions

**holdfasts** structures that anchor many seaweeds to the substratum, such as the bottom layer or bedrock

**holistic** an overall view that takes into account more than just the parts together

**homeostasis** the maintenance of a relatively stable internal environment

**homeostatic control** a negative feedback process that, overall, maintains equilibrium

**homeothermic** relates to the ability to maintain a relatively constant body temperature

**humus** dark brown organic matter in soil, derived from decomposed plant and animal remains (detritus)

**hydrophilic** 'water-loving'; substances that easily dissolve in water

**hydrophobic** 'water-hating'; substances that strongly resist dissolving in water

**hydrotropism** the growth response to the presence of water

**hypertonic** describes a solution with a higher solute concentration compared with another solution

**hypotonic** describes a solution with a lower solute concentration compared with another solution

**ice ages** extended periods of time when glaciation occurred over large sections of the northern hemisphere and when the ice sheets expanded at both poles

**ileum** the final segment of the small intestine

**impermeable** unable to be passed through

**implantation** when the fertilised egg attaches to the wall of the thickened uterus

**impulses** electrical signals that pass along a nerve

**infanticide** the killing of young

**ingestion** the taking in of nutrients

**innate behaviour** instinctive behaviour the exhibition of which is not influenced by the experiences of the animal

**inorganic** all other compounds that are not organic

**inorganic compounds** compounds that do not contain carbon (unless in simple molecules such as carbon dioxide)

**interactions** interplay or association between organisms of the same or different species

**intercellular** occurring between cells

**internal environment** all material within the plasma membrane of a cell

**interspecific** describes interactions between members of different species

**interstitial fluid** lymph or fluid located around cells and tissues in the body

**intimate association** a relationship in which one organism lives inside another

**intracellular** occurring within a cell

**intracellular enzymes** enzymes that function within cells

**intraspecific** interactions between members of the same species

**introduced species** a species brought in from another place

**ions** atoms or molecules with an overall positive or negative charge

**isogamy** where all gametes produced are the same

**isotonic** describes a fluid with an equal concentration to another fluid; water can diffuse equally in both directions

**jejunum** the middle section of the small intestine

**keratin** tough, water-insoluble protein

**kidneys** the excretory organs of mammals

**La Niña** an event, opposite to El Niño, that produces good rains across northern Australia

**lacteals** the vessels that are located in the villi and carry the digested lipids to the lymphatic system

**land degradation** the decline in condition or quality of the land as a consequence of misuse or overuse, involving changes to soil, flora, fauna, water quality and quantity, visual quality and production levels

**large intestine** the final length of the gastrointestinal tract

**Laurasia** the northern super-continent formed after Pangaea broke up; it included what are now North America, Europe, Asia, Greenland and Iceland

**learnt behaviour** behaviour that changes, based on past experience and trial and error

**leucocytes** white blood cells

**leucoplast** a colourless plastid not containing pigments

**life cycle** the progression through which an individual passes from fertilisation till it is able to produce gametes

**light microscope** a microscope that uses light rays to enlarge an image of a specimen through glass lenses

**lignin** a complex carbohydrate found in thickened cell walls of xylem vessels

**lignotubers** large woody masses, or rootstocks, at the base of some trees

**limiting factor** a factor the effect of which restricts the distribution of a species

**lipase** enzyme produced by the pancreas to act on lipids

**lipid** a type of organic molecule that includes fats and oils; insoluble in water

**lipoprotein** substance of which a surfactant is composed

**lock-and-key mechanism** a model suggesting that the shape of a substrate molecules is an exact fit to the shape of an enzyme's active site

**long-day** describes plants that require long periods of daylight before flowering

**loop of Henle** u-shaped, non-convoluted part of the tubule that connects the Bowman's capsule to the collecting duct

**lower critical temperature** the external temperature at which metabolic activity begins to rise, thereby increasing the output of heat

**lumen** any enclosed cavity

**lunar cycle** the cycle of the lunar phases as the Moon orbits around the Earth

**luteinizing hormone (LH)** a hormone that stimulates the release of the mature egg from the ovary in mammals

**lymph** fluid located between cells and around tissues in the body, a transparent fluid made of 95% water.

**lymph vessels** vessels that carry lymph around the body; they are often blind and drain into lymph nodes

**lysosomes** organelles within the cytoplasm, containing digestive enzymes

**macrophages** phagocytic white blood cells that ingest foreign particles and microorganisms

**Malpighian tubules** excretory organs of insects and spiders

**mantle** a layer of the Earth between the crust and the core

**marsupial** mammals that give birth to underdeveloped young who then spend time in a pouch till they are fully formed

**mass extinction** the disappearance of large numbers of species in a relatively short time

**mechanical digestion** where large pieces of food are broken down into smaller pieces of food

**megafauna** large animals

**megaspores** the halfway step in the production of the female gamete in a flowering plant

**meiosis** cell division that produces four daughter cells with half the amount of genetic material as the parent cell

**menstrual cycle** the 28-day cycle in the human female where the lining of the uterus is periodically thickened, then shed

**menstruation** the flow of blood and tissue through the vagina

**meristem** the areas of a plant where cells divide, such as the apex of roots and shoots, and the ring around the inside of stems and branches

**meristematic tissue** tissue that is actively dividing, such as that at the tips of roots and shoots, buds, and a ring of tissue in stems and roots that divides and increases girth

**merozoites** a phase in which gametes are produced (sexual phase)

**metamorphosis** the change in an organism from larval to adult stage

**microfilaments** solid contractile proteins, involved in movement and cell shape

**micrometre** a microscopic measurement equivalent to one millionth of a metre

**microspores** the halfway step in the production of pollen

**microtubules** hollow, cylindrical tubes in cells that act as scaffolding to determine cell shape and aid movement

**migration** the seasonal movement of whole communities or parts of communities

**minerals** inorganic compounds present in food and required for normal functioning

**mitochondria** organelles within the cytoplasm that are the site of aerobic respiration releasing energy for the cell

**mitosis** cell division by which two identical cells are produced

**monocotyledon** where the vascular bundles are scattered randomly throughout the stem

**monoestrous** describes a species in which the female comes into oestrus only once a year

**monosaccharide** single sugar molecule

**monotremes** mammals that reproduce via the production of soft-shelled eggs

**motile** the ability to move

**motor neurone** a nerve that transmits nerve impulses from the central nervous system to the effector

**multicellular** made up of many cells

**muscle** containing sheets or bundles of muscle cells that contract to produce movement

**mutualism** a relationship that exists between organisms of different species and that benefits both and harms neither

**myelin** a sheath of fatty material that wraps around some nerve cells, enabling them to transmit impulses more efficiently

**nanograms** 1 nanogram equals 1 thousand millionth of a gram

**nastic** relates to movement of a plant organ in response to a non-directional stimulus; can be slow or fast

**nephron** the functional unit of the kidney that filters the waste products from the bloodstream and maintains the balance of water and ions as required

**nervous** providing communication between all body structures

**net movement** the most movement in one direction

**net primary production (NPP)** the amount of organic matter actually available to herbivores; the GPP less the energy required by the producers themselves

**neurotransmitters** chemicals that transmit or carry a nerve impulse across the synapse

**nitrogen fixation** the process by which free nitrogen is 'fixed' or combined to form ammonium (NH<sub>4</sub>) or nitrate (NO<sub>3</sub>) ions before living things can make use of it for growth; all nitrogen-fixing organisms are prokaryotes (bacteria)

**nitrogen-fixing bacteria** bacteria found in the roots of certain plants that are able to capture and use atmospheric nitrogen

**nitrogenous** nitrogen-bearing compounds

**nm** nanometre,  $10^{-9}$  of a metre

**nocturnal** describes animals predominantly active at night

**non-biodegradable** unable to be broken down by the activity of decomposers

**non-renewable** describes a resource that is in effect finite because it is not replaced within normal human timescales; for example, Victoria's brown coal is non-renewable because it takes millions of years to form and accumulate

**nuclear membrane** the membrane surrounding the nucleus

**nucleolus** in a non-dividing nucleus, a site for assembling protein and RNA that will later form ribosomes

**nucleotides** organic compounds composed of a sugar, a phosphate group and a nitrogenous base

**nucleus** the organelle in a eukaryotic cell containing DNA; it functions to coordinate cellular activities

**nutiation** slight irregular movements

**nutrient cycle** a general term to describe the way nutrients are cycled between the living and non-living components of an ecosystem

**nymph** one stage in the life cycle of an animal between larval and adult stages

**obligatory association** members of two species that cannot survive without each other

**oedema** swelling of tissues caused by the capillary blood vessels passing out lymph into the surrounding tissues

**oesophagus** part of the alimentary canal located between the mouth and stomach

**oestrous** the time of ovulation, marked by heightened sexual excitement

**oestrous cycle** the sexual cycle of non-human mammals

**omasum** one of the four sections of the ruminant stomach

**omnivores** organisms that feed on a range of food, including plant and animal matter

**omnivorous** an organism that feeds on both plants and animals

**open circulatory system** where the circulating fluid is not confined to vessels but is able to bathe the tissues directly

**open ecosystems** ecosystems in which there is immigration and emigration

**open system** a system in which there is exchange of organisms or matter between it and another system

**opercular cavity** the cavity in which the gills are housed

**operculum** the covering over the gills found in bony fish

**optimum range** narrow range within the tolerance range an organism has for an abiotic factor, and at which the organism functions best

**organelles** small structures within a cell that perform a specific function

**organic catalysts** enzymes

**organic** derived from living organisms; complex carbon containing compounds

**organic compounds** complex compounds containing carbon and made by living things

**organs** structures of the body that perform one or more functions

**osmoconformer** an organism for which the internal concentration of solutions is generally the same as that of the external solutions

**osmoregulation** the process whereby osmosis is involved in the regulation of water in the body

**osmoregulator** an organism that has specialised mechanisms for regulating its internal concentration of solutions, despite differences in the concentration of solutions in their external environment

**osmosis** the net movement of a solvent, usually water, across a differentially permeable membrane from a weak solution to a strong solution

**osmotic pressure** the pressure needed to prevent osmosis occurring; the higher the pressure, the more likely that water will diffuse in

**ovaries** where female gametes are produced and stored

**ovary** the container of female gametes

**ovulation** the release of the egg from the ovary in mammals

**ovule** the female gamete in a flower

**oxyhaemoglobin** the compound formed when oxygen combines with the haemoglobin in red blood cells

**palaeogeologist** a scientist who studies rocks and landforms that existed in the past

**palaeontologists** scientists who study palaeontology, the science of the forms of life that existed over the course of Earth history, e.g. the study of fossils

**palisade cells** elongated cells packed with chloroplasts

**pancreas** a gland located behind the stomach; produces juices and leads into the top of the small intestine

**pancreatic juice** juices produced by the pancreas, leading into the duodenum

**Pangaea** a super-continent consisting of all of Earth's land masses. It existed from the Permian through Jurassic periods before breaking up during the late Triassic.

**parasitism** a relationship between species in which one benefits and the other is harmed

**parenchyma** large, thin-walled cells that make up the cortex of the plant

**parenting behaviour** behaviour that supports the development and nurturing of young till they are able to fend for themselves

**passive transport** movement of materials without requiring energy

**perennial** describes plants that tend to continue to grow year after year

**peristalsis** unidirectional muscular contractions of the oesophagus

**permeable** able to be passed through

**petals** the modified leaves of a flower

**pH** a measure of how acidic or alkaline a solution is

**phagocytosis** a process when larger particles, mainly solids, enter a cell by being engulfed by its plasma membrane, forming vesicles, which move into the cytoplasm

**pheromones** chemical signals used to communicate with members of the same species

**phloem** plant vascular tissue that transports sugars and other solutes

**phospholipid bilayer** two layers that make up the plasma membrane of a cell; each layer is made of a row of phospholipid molecules, each made up of a hydrophilic head and hydrophobic tail

**photoperiod** the relative hours of light and darkness in a 24-hour period. Some plants respond to a change in day length (photoperiod) in order to grow or flower.

**photoperiodism** refers to the physiological reaction of organisms to the length of day or night

**photosynthesis** the chemical reaction using energy from the sun to convert carbon dioxide and water into glucose and oxygen

**photosynthetic efficiency** describes how well a producer converts light energy into the chemical energy of carbohydrates

**phototropism** the growth movement in response to light; may be positive or negative

**physiological stress** stress caused when an organism experiences conditions outside its tolerance range

**phytochrome** a pigment that plants use to detect light (a plant photoreceptor) in the red region of the spectrum

**phytohormones** plant growth substances

**phytoplankton** the collective term for the tiny photosynthetic organisms present in bodies of water

**pinocytosis** a process by which drops of fluid enter a cell by being engulfed by the plasma membrane, forming vesicles which move into the cytoplasm

**pioneer plants** a term used for plants capable of invading bare sites, such as a newly exposed soil surface

**placenta** the organ that develops between the endometrium and the membrane surrounding the baby; ensures the baby receives nutrition, and allows gas exchange and the excretion of wastes

**placental** describes mammals that develop completely into miniature forms of the adult and are nourished during gestation via a placenta

**plasma** a substance making up 55% of the blood fluid in which blood cells are suspended

**plasma membrane** the outermost barrier of a cell separating the cytoplasm from other cells and its environment

**plasmids** small, circular molecules of extra bacterial DNA

**plasmodesmata** junctions between plant cells which allow the passage of ions into specific structures in the plant

**plasmolysis** loss of water from a plant cell to the point where the cytoplasm pulls away from the cell wall

**plastids** organelles in plant cells containing coloured pigments

**plate tectonics** a theory that the bending (folding) and breaking (faulting) of the solid surface of the Earth results from the slow movement of large sections (plates) of that surface

**platelets** fragments of cells that aid in the clotting of blood

**plates** segments of the lithosphere

**pneumatophores** aerial roots that link with underground roots and enable gaseous exchange

**poikilothermic** describes an organism the body temperature of which changes with the temperature of its surroundings; there is no internal regulatory mechanism to control temperature

**pollen sacs** the containers of the pollen located in the anther

**pollen** the male gametes produced by flowers

**pollen tube** a tube produced in the stigma following the landing of a pollen grain on its sticky surface

**pollination** when the male pollen lands on the female organ in flowers

**pollinators** agents that transfer pollen from the male part of a plant to the female part; precedes fertilisation

**pollutants** the wastes, derived from human activities, which are added to the environment

**pollution** the process of adding to the environment wastes derived from human activities

**polyestrous** describes a species in which the female comes into oestrus many times a year

**polysaccharide** a chain of monosaccharide sugar molecules

**polyunsaturated** a type of fat containing double bonds between many carbon atoms

**population** the number of a particular species living in a particular place at a particular time

**primary succession** the colonisation of plants in a barren place

**producer** an autotrophic organism that can synthesise organic matter from inorganic matter, using the energy of the Sun (if it is photosynthetic) or that from chemical reactions (if it is chemosynthetic)

**products** substances at the end of a metabolic reaction

**progesterone** a hormone that acts to thicken the lining of the uterus

**prokaryotic** a simple type of cell that has no membrane-bound nucleus or other membrane-bound organelles

**proteins** large organic molecules, containing nitrogen, essential to the structure and function of living things

**pulmonary circulation** the circulation of blood through the lungs

**pulmonary valves** valves located in the pulmonary artery which leads to the lungs

**pyloric sphincter** the small muscular ring at the end of the stomach

**pyramid of biomass** a representation that shows the relationship between the total amount of (dry) organic matter at each trophic level in a given area of an ecosystem

**pyramid of energy** a representation that shows the transfer of energy from one level to another through a community

**pyramid of numbers** a diagram that shows the number of individual organisms at each trophic level in a given area of an ecosystem

**quadrat** a frame of known dimensions used to estimate populations of species in a given area

**qualitative** descriptions that do not involve measurements

**quantitative** measurements that can be quantified – expressed in units

**radiant energy** the wave energy emitted by a body such as the Sun

**radiation** the transfer of heat from a hot object by infra-red waves

**random distribution** a distribution in which organisms are spaced irregularly

**range** the geographic extent or area that a species inhabits

**reabsorption** the process whereby essential ions and water is reabsorbed back into the blood stream

**realised niche** the actual niche an organism occupies subject to limiting factors

**receptor** a structure that detects (or receives) a stimulus or signal

**receptor proteins** membrane proteins that cause changes in cell activities after binding to signalling molecules

**recognition proteins** membrane proteins that distinguish the body's own cells and foreign invaders

**rectum** the final section of the large intestine, where waste may be stored prior to evacuation

**reflex arc** a neural pathway along which an impulse travels from the receptor, along a sensory neurone to the spinal cord, then along a motor neurone to the effector

**refuges** regions in which certain species or communities of organisms are able to persist during a period in which most of the original geographic range becomes uninhabitable because of climatic change

**remnant populations** small, isolated groups of a species surviving after the rest of the population has not survived



- reproduction** methods by which organisms give rise to similar cells or organisms
- resource partitioning** the exploitation of resources by different species of organisms living in the same habitat
- reticulum** the second section of the ruminant stomach
- ribosomes** small structures in cells that build amino acids into complex proteins
- RNA (ribonucleic acid)** a single-stranded nucleic acid that functions in transcribing and translating information from DNA into proteins
- root hairs** extremely fine extensions of epidermal cell
- root pressure** the force that pushes water up the stem from the roots
- root system** all parts of the plant found below ground, such as the roots and root hairs
- rough endoplasmic reticulum** endoplasmic reticulum with ribosomes attached
- rumen** the storage section of the ruminant stomach
- runner** the growth from an axillary bud that is able to produce roots and then develop into another individual plant
- salination** increased salt concentration
- saline** salty
- salinity** the total amount of dissolved material (mostly salt) in water or soil
- saliva** a transparent fluid released by the salivary glands
- salivary glands** glands that produce mucus, saliva and amylase; located at the base of the tongue
- sampling techniques** ways of estimating populations of species
- saprobionts (saprotrophs)** decomposers; organisms that feed on the tissues of dead organisms
- saturated** a type of fat containing only single bonds between carbon atoms
- scavengers** consumers that feed on dead and decaying flesh or remains
- scion** the piece of the plant that is artificially attached in grafting
- scrotum** the sac that contains the male testis
- secondary succession** the recolonisation of disturbed plant communities
- second-order consumers** consumers that feed on first-order consumers (also known as herbivores)
- secretion** the transfer of wastes from the filtering process to the collecting duct and then the bladder
- sedentary** a stationary lifestyle
- seed** a fertilised plant ovule
- seed disperser** an animal that forages and disperses seeds
- seed predators** animals, particularly insects, that consume or remove large quantities of seeds
- self-pollination** when pollen from a flower attaches to the stigma of the same flower
- semen** a mixture of sperm and seminal fluid
- seminal fluid** fluid secreted by the seminal vesicle and prostate gland
- semiferous tubules** the place where sperm is produced in male mammals
- sensory neurone** a nerve that transmits nerve impulses from the receptor towards the central nervous system
- septum** the wall in the heart that separates the left side from the right side, thus keeping oxygenated and deoxygenated blood apart
- sessile** permanently attached in one place rather than free-moving
- set point** the level of equilibrium a population reaches
- sexual** the formation of new individuals from the fusion of sex cells or gametes
- sexual dimorphism** an obvious difference, usually in size and colour, between the sexes of the one species
- shoot system** all parts of the plant found above ground, such as the stem, leaves and reproductive organs
- short-day** describes plants that flower after a long period of darkness (better described as long-night plants)
- shrub** a small, bushy plant
- sieve cells** long and tubular plant cells without a nucleus that join to form sieve tubes through which sugar and other solutes travel
- signal receivers** those individuals that respond to the signallers
- signallers** individuals whose actions or cues induce behavioural changes in other individuals of the same species
- sink** a reservoir of material or energy; often used in relation to atmospheric CO<sub>2</sub>
- small intestine** narrow tube that leads downwards from the stomach; approximately 7 metres in length
- smooth endoplasmic reticulum** endoplasmic reticulum that has no ribosomes attached
- social behaviour** the behaviour of animals living in groups
- solute** a substance that can be dissolved in another substance
- solvent** a substance in which other substances can be dissolved, the most common being water
- somatic system** the part of the peripheral nervous system associated with voluntary control
- source** a place of origin of material or energy; often used in relation to atmospheric CO<sub>2</sub>
- southern oscillation** the changing air pressure over the Pacific Ocean that is associated with the onset of either El Niño or La Niña
- species diversity** the range of different species within a community or ecosystem
- sperm** a male gamete or sex cell
- spindle fibres** microtubules, produced during cell division, that move chromosomes in precise directions
- spongy mesophyll** layer of cells in leaf that are irregularly shaped with few chloroplasts contained within and many air spaces around them
- spores** reproductive bodies able to withstand harsh environmental conditions
- sporozoites** a phase in which asexual spores are produced
- stamen** the male part of a flower
- starch** an important energy-storing polysaccharide in plants
- statolith** starch grains in cells near the root and shoot tips
- stem cells** unspecialised, immature cells capable of being transformed into different kinds of specialised, differentiated cells
- steroids** a group of lipids having a wide range of functions
- stigma** the female organ that projects from the ovule and is supported by the style
- style** the extension of the ovule in the flower
- stimulus** a condition or signal that causes a response
- stimulus–response** relates to a mechanism in which a stimulus or signal causes an effect
- stock** the plant to which the part of another plant is attached in grafting
- stoma** the pore or space of the stomata

**stomach** a muscular part of the gut that holds food and releases protein-digesting enzymes and hydrochloric acid

**stomata** small pores that provide openings through the epidermis and cuticle layer of a plant

**stratification** vertical differences in abiotic conditions, giving rise to 'layers' or strata

**stroma** the jelly-like semifluid interior of a chloroplast

**substrates** substances that enter a reaction; also called reactants or precursors

**substratum** rock layer or bedrock under the organism

**succession** the progressive change of communities over time

**surface area to volume ratio** the mathematical ratio of the size of the surface area (in two dimensions) compared to the volume of an object (in three dimensions)

**surface tension** the force that creates the effect of a stretched membrane over liquid

**surfactant** substance such as a detergent, that when applied to any surface reduces the surface tension

**surplus killing** the killing of prey beyond requirements for survival

**survivorship** the probability of survival of species

**sustainably** meeting the resource needs of the present population without damaging the functionality of the area's ecosystem or its ability to meet the resource needs of future populations.

**sympiosis** a general term describing a close association between living things

**synapses** gaps between the nerve endings

**system** a combination of parts and processes that make a whole, consisting of inputs, processing and outputs

**system** several organs that are interrelated and together perform a specific function

**systemic circulation** the circulation of blood throughout the body

**tap roots** large, tapering main root of a plant that has slender, short, side branches

**taxis** the movement of a whole organism in response to a stimulus; may be positive or negative

**terrestrial** land-dwelling, as opposed to water-dwelling

**territory** the area where an animal's needs (food, shelter and a mate) are met

**thigmotropism** growth movement in response to contact

**thylakoid** interconnecting folded membranes within chloroplasts

**thyroxine** a hormone produced by the thyroid gland

**tissues** cells that work together to perform a similar function

**tolerance level** for every abiotic factor, the range within which an organism can survive and reproduce

**tongue** a strong muscle in the mouth that moves food around

**tonoplast** membrane around a vacuole

**top consumer** the last link in the food chain

**trachea** windpipe of vertebrates strengthened with rings of cartilage

**tracheids** a type of xylem tissue; they are made of long, dead, hollow cells with pointed ends and walls pitted with holes

**transect** a cross-section across an area

**translocation** the movement of glucose from where it is synthesised in a plant to other parts of the plant, via the phloem

**transpiration** evaporation of water from the leaves of a plant

**transpiration stream** continuous column of water that runs the length of the stem of a plant

**transport proteins** membrane proteins that form a channel allowing some substances to move through the membrane

**tree** a woody plant taller than a shrub; typically has one main trunk with side branches

**triglyceride** type of lipid composed of three fatty acid tails attached to a glycerol unit

**trophic efficiency** relates to the percentage of the energy at one trophic level that ends up in the next trophic level

**trophic level** a feeding level in the food chain of an ecosystem

**tropism** the growth movement in response to a unidirectional stimulus

**trypsin** enzyme produced by the pancreas; works on protein

**turgid** when so much water is taken into a plant cell that the cell wall stretches, causing the cell to be swollen and rigid

**turgor** rigid or firm state of plant cells caused by the outwards pressure of water within the cells

**umami** a 'savoury' taste sensation produced by particular glutamates

**uniform or continuous distribution** a distribution in which organisms are evenly spaced

**unsaturated** a type of fat containing double bonds between some carbon atoms

**upper critical temperature** the temperature at which the body's cooling mechanisms fail to keep the body temperature stable and the metabolic rate increases with rise in external temperature; can lead to hyperthermia

**urea** nitrogenous waste created as amino acids are broken down in mammals

**urethra** the duct in mammals that carries urine outside of the body; in males it also carries sperm

**uric acid** solid nitrogenous waste produced by some desert-dwelling animals

**uterus** the enlarged end of the Fallopian tubes where a fertilised egg will implant and develop in mammals

**vacuoles** membrane-bound fluid-filled spaces within a cell

**vagina** the passage leading from the uterus to the exterior in the female human

**valves** flaps of tissue that allow unidirectional flow of the blood

**vas deferens** the duct that carries the sperm from the epididymis to the urethra

**vascular** relates to having specialised conducting or transport tissues

**vascular bundles** the grouping of the phloem and xylem vessels through the stem of a plant

**vascular tissue** the transport tissues of a plant; there are two types of vascular tissue – xylem and phloem

**vector** an outside agent (such as wind or an insect) that transfers the pollen grains from one plant to another

**vegetative propagation** cloning of plants

**veins** blood vessels with thinner walls and valves that take blood to the heart

**ventricles** the bottom, larger, muscular chambers of the heart that pump the blood out of the heart to the lungs (right ventricle) or the rest of the body (left ventricle)

**vernalisation** flowering signalled after a period of cold

**vesicles** small, membrane-bound sacs in cytoplasm that transport, store or digest substances

**vessels** a type of xylem tissue; continuous tubes created by the joining of dead, hollow, cylindrical cells

**villi** projections from the wall of the small intestine that facilitate absorption of the products of digestion

**visual signal** a signal transmitted by the overt display of individuals

**vitamins** organic compounds needed by living things in small amounts for normal functioning

**Volvox** a species of multicellular organism comprised of a hollow sphere of cells embedded in a gelatinous wall

**water cycle** the continuous exchange of water between living things and their non-living surroundings

**water logging** what happens to plants when the watertable rises into the root zone; results in anaerobic conditions that may kill some plants; may also cause salinity levels in the soil to rise

**wind-pollinated** the carrying of pollen grains from one plant to another by the wind

**xeromorphic** used to describe plants or parts of plants that are adapted to survive in dry conditions

**xylem** plant vascular tissue that transports water and dissolved mineral ions from the roots to the shoots; also provides the plant with support

**zonation** horizontal differences in abiotic conditions that give rise to distinctive zones

**zooplankton** the collective term for the tiny heterotrophic organisms present in bodies of water

**zygote** the result of the fusion of two gametes of the opposite gender