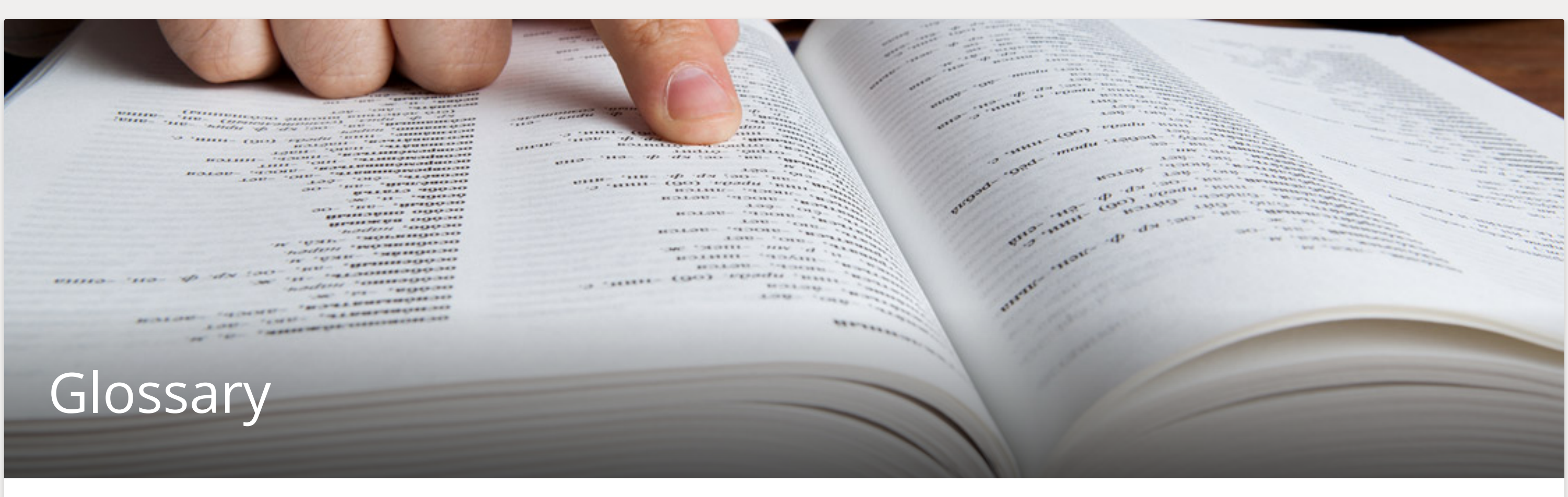

Glossary

amoeba: a type of unicellular organism belonging to the kingdom of protists; amoebas move by extending their cell membranes out to form little "feet"

analogy: a comparison that helps us understand an unfamiliar thing in terms of something familiar

archaea: microscopic organisms forming one of the six kingdoms of living things

arm: the part of a microscope that connects the base to the lenses

artery: a blood vessel that carries blood away from the heart

ATP (adenosine triphosphate): a chemical that forms "energy packets", produced by mitochondria out of sugars; the energy packets are used by other parts of cell to carry out their functions

bacterium (*plural:* bacteria): a type of unicellular organism forming one of the six kingdoms of living things; bacterial cells do not have nuclei to store their DNA

base: the lower part of a microscope, which stops it from tipping over and contains the light source

bioprinting: a technique that uses a 3D printer to organize living cells into tissues and organs

bone marrow: a type of spongy tissue found inside bones, where red blood cells are produced

carbon dioxide: a gas found in the atmosphere; used by plants in photosynthesis and produced by all living things, including humans

cell: the smallest living part of an organism; the basic building block of complex (multicellular) organisms, though some organisms consist of a single cell; most cells are microscopic, so are too small to be seen with the naked eye

cell culturing: a technique for growing cells or tissues in a controlled, artificial environment

cell cycle: the series of events in which a cell grows and divides, producing two new cells that begin the cycle again

cell division: the division of a cell into two new cells; this process allows organisms to grow, reproduce and repair themselves

cell membrane: a thin layer that surrounds a cell, forming a barrier with the world outside but allowing some substances to pass in and out

cell specialization: the presence of different cell types in a multicellular organism, each type having a special structure that allows it to carry out a particular job or function

cell theory: the basic scientific understanding of what cells are; it has three parts: 1. All living things are made up of one or more cells, 2. Cells are the basic units of organization in living things; 3. All cells come from other cells

cell wall: a strong, rigid structure that surrounds the cell membrane of a plant cell; it provides support and protection; animal cells do not have cell walls

chloroplast: a type of organelle that absorbs sunlight and stores the energy in sugar; it makes the sugar out of water and carbon dioxide in the process known as photosynthesis; it contains a green pigment so appears bright green under a microscope; it is found in some plant cells (in the leaves and stem) but not in others, and it is not found in animal cells

coarse focus knob: a large knob on a microscope that is used to bring the specimen roughly into focus

compound light microscope: a type of microscope in which light from the specimen passes through two lenses before it reaches the eye, producing greater magnification than a simple microscope (with only one lens)

cultured meat: meat that is grown artificially from a small number of cells that were taken from an animal; like ordinary meat, cultured meat is made up of animal cells (mostly muscle cells) but the animal does not need to be killed in order to produce it

cytosol: a watery jelly-like fluid that fills a cell, supporting the various organelles it contain

daughter cell: one of the new cells formed by cell division

diameter: a straight line passing from one side of an object or shape to the other side, passing through its centre

diaphragm: part of a microscope below the stage that allows the user to adjust the brightness of the image

digestive system: the organs in the body that work together to break down food and absorb the nutrients it contains; includes the mouth, stomach, liver, intestines and other organs

DNA (deoxyribonucleic acid): the chemical that makes up the genetic material in most organisms

egg cell: a type of specialized cell produced by females that allows sexual reproduction

electron: a type of particle that is even smaller than an atom

electron microscope: a type of microscope that uses beams of electrons instead of light; electron microscopes are much more powerful than traditional light microscopes – for example, giving us detailed images of the inner structure of cells

ethical: relating to whether an action is right or wrong

exoskeleton: a hard outer shell that protects and supports some animals, such as spiders and insects

eyepiece: another name for the ocular lens of a microscope

fat cell: a type of specialized cell that contains droplets of fat; they store energy from food for future use by the body

fertilization: the process in which an egg cell joins with a sperm cell to form a new organism by sexual reproduction

field of view: the area that can be seen through a microscope, usually circular

fine focus knob: a small knob on a microscope that is used to bring the specimen into sharp focus

focus: relating to an image that is clear and detailed

function: a job that something is especially good at doing because of its structure

fungus (*plural:* fungi): one of the six kingdoms of living things, including mushrooms, moulds and yeasts

genetic material: the material within a cell that determines how it functions; in plant and animal cells it is made up of DNA molecules that are contained within the nucleus

genetic modification: a technique for changing a living thing's DNA to influence how it looks or behaves

greenhouse gas: a gas that traps heat in the atmosphere and causes global warming

guard cell: a type of specialized cell found on the undersides of plant leaves; their function is to open and close microscopic pores that allow the plant to exchange gases with the atmosphere

haem: an iron-rich chemical found in blood that gives meat a certain colour and flavour; it also occurs widely in plants and other organisms

haemoglobin: a red pigment found in red blood cells that attaches to oxygen, allowing the cells to carry oxygen around the body

Hooke, Robert (1635–1703): an English scientist who first used the word "cell" to name the basic units of living things, after observing cork under a microscope

intestinal lining cell: a type of specialized cell found in the lining of the intestines; it has tiny finger-like structures (microvilli) that help it absorb water from half-digested food

inverse relationship: a relationship where an increase in one thing causes a decrease in the other thing; for example, as the magnification of a microscope increases, the field of view decreases

Jansen, Zacharias (1580–1638): a Dutch scientist who claimed to have invented the first compound light microscope and the first telescope

kingdom: the highest level of classification for living things; the six kingdoms are animals, plants, bacteria, archaea, fungi and protists

Leeuwenhoek, Anton (1632–1723): a Dutch scientist who first observed living unicellular organisms under the microscope

lens: a curved piece of glass or plastic that bends light; used in microscopes and telescopes to make things appear bigger

level of organization: one of the collections of parts that a complex (multicellular) organism can be analyzed into; the four main levels (from smallest to largest) are cells, tissues, organs and organ systems

low to high rule: the rule that you should always begin with the lowest power objective lens when viewing a specimen and then change to the next higher power lens

magnification: the ability of a microscope, telescope or magnifying glass to increase the size of an image; for example, a magnification of 10x means the object appears ten times larger than it really is; also known as *power*

micrometre (μm): a unit of length, one millionth of a metre; 1,000,000 micrometres (μm) are equal to 1 metre (m)

microscope: an instrument that uses lenses to allow us to view extremely small objects such as cells

microscopic: too small to see without the help of a microscope

microvillus (*plural:* microvilli): a tiny finger-like projection on an intestinal lining cell that increases its surface area, allowing the cell to absorb more water for use by the body

mitochondrion (*plural:* mitochondria): a type of organelle that breaks down sugars to supply the cell with energy for essential life processes; it is often described as a "power plant"

mitosis: a type of cell division that allows organisms to grow and repair damage

model: a representation of something that is made out of physical objects or programmed in a computer; it is often much larger or smaller than the thing it represents

multicellular organism: an organism that is made up of more than one cell; animals, plants and fungi are multicellular

nanometre (nm): a unit of length, one billionth of a metre; 1,000,000,000 nanometres (nm) are equal to 1 metre (m)

nerve cell: a type of specialized cell found in the brain, spinal cord and nerves that sends messages from one part of the body to another

nervous system: the body system that allows an animal to sense and respond to its environment and control body functions, made up of the brain, spinal cord, nerves and sense organs

neuron: another name for a nerve cell

nucleus (*plural:* nuclei): a type of organelle within a cell that contains DNA, the genetic information that directs how the cell grows and functions; it is often called the "control centre" of the cell

nutrient: a substance that the body needs to be healthy, usually obtained from food

objective lens: a lens that sits directly above the stage of a microscope; there are usually three objective lenses with different power or magnification

ocular lens: the lens in a microscope that is closest to the eye; it usually has a magnification of 10x

organ: a part of the body that performs a particular role, such as the heart, liver or brain; they are made up of different types of tissue and work together to form organ systems

organelle: one of the structures within a cell that performs a particular job or function, such as the nucleus or mitochondria

organism: a living thing; something that is made up of one or more cells, and typically can grow, reproduce, take in nutrients, get rid of wastes and respond to its environment

organ system: a group of organs in the body that work together to perform particular functions; another name for body system

oxygen: a gas found in air that we need to breathe in to stay alive; cells in the whole body need oxygen to release the energy stored in sugars

paramecium (*plural:* paramecia): a type of unicellular organism that lives in water and belongs to the kingdom of protists

parent cell: the cell that divides to produce new daughter cells in cell division

pattern: the repetition of a shape, line or colour

photoreceptor: a type of specialized cell in the eye that detects light, allowing us to see

photosynthesis: the process used by plants to produce their own food; chloroplasts absorb sunlight and store the energy in sugar, made from water and carbon dioxide

pigment: a substance that absorbs light, giving it a certain colour

power: the ability of a microscope, telescope or magnifying glass to increase the size of an image; for example, a power of 10x means the object appears ten times larger than it really is; also known as *magnification*

prefix: part of a word that can be added to many different words, such as "micro-"

protist: a type of unicellular organism forming one of the six kingdoms of living things

red blood cell: a type of specialized cell that carries oxygen around the body in the blood

respiratory system: the body system that allows an animal to exchange gases with its environment; in humans, it is made up of the airways and lungs, and allows the body to absorb oxygen from the air and get rid of carbon dioxide

root hair cell: a type of specialized cell found on the surfaces of plant roots, with long projections ("hairs") that allow the cell to absorb water from the soil more quickly

Schleiden, Matthias (1804–1881): a German scientist who used microscopes to conclude that all plants are made of cells; he and Schwann came up with the first version of cell theory

Schwann, Theodor (1810–1882): a German scientist who used microscopes to conclude that all animals are made of cells; he and Schleiden came up with the first version of cell theory

scientific theory: an explanation that can be tested by observation or experiment; scientific theories are changed to fit the available evidence, or rejected if the evidence contradicts them

single-celled organism: a living thing that consists of a single cell; bacteria, archaea and protists are single-celled organisms; another name for *unicellular organism*

skeletal system: the body system, made up of bones and cartilage, that provides protection and support; the skeletal system works with the muscular system to allow body movement and maintain posture

slide: a rectangular piece of glass used to hold a specimen while it is viewed under a microscope

Socratic seminar: a type of round-table discussion of a topic designed to promote rich learning instead of fiery debate

specialized cell: a type of cell that has a particular structure to help it perform its job or function

specimen: an object viewed under a microscope

sperm cell: a type of specialized cell produced by males that allows sexual reproduction

spontaneous generation: an old scientific theory claiming that living things can form out of non-living matter (or even out of nothing); it was rejected because it didn't fit the evidence that cells always come from other cells – this is one of the parts of the modern cell theory

stage: the flat platform that supports a specimen while it is viewed under a microscope

stakeholder: a person or group who has an interest in the outcome of an issue

stem cell: a cell that has not yet specialized to perform a particular function

stereo light microscope: a type of microscope with two eyepieces that provides a 3D image of a specimen

surface area: the size of a surface, measured in units such as square metres (m^2) or square centimetres (cm^2)

tissue: a collection of similar cells that form part of an organism and work together to perform a certain function; for example, muscle or skin

total magnification: the overall magnification provided by two lenses in a compound light microscope; equal to the magnification of the objective lens multiplied by the magnification of the ocular lens

unicellular organism: a living thing that consists of a single cell; bacteria, archaea and protists are unicellular

vacuole: a type of organelle within a cell that stores water, nutrients and wastes; plant cells usually have a single large vacuole that expands when the plant has plenty of water; animal cells usually have many small vacuoles

vein: a blood vessel that returns blood to the heart

viable: able to work successfully

Virchow, Rudolf (1821–1902): a German scientist who helped to develop modern cell theory by rejecting the idea of spontaneous generation

virus: a very small microscopic object that can invade cells and use their organelles to produce copies of itself; viruses are usually classified as non-living because they are not cells

white blood cell: a type of specialized cell found in the blood that helps to protect the body from infection

xylem cell: a type of specialized cell found in the roots, stems and leaves of plants; their function is to transport water and minerals from the roots to the rest of the plant

yeast: a type of microscopic fungus made up of single cells; used to make bread and beer

I'm finished