

# Glossary

## A

**Abdomen** The lower region of the body. In humans it contains the digestive organs, kidneys, etc.

**Accuracy** An accurate measurement is close to the true value.

**Acid** A substance that produces hydrogen ions when it dissolves in water.

**Acid rain** Rain that is acidic due to dissolved gases, such as sulphur dioxide, produced by the burning of fossil fuels.

**Activation energy** The minimum amount of energy needed for a given chemical reaction to take place.

**Active site** The site on an enzyme where the reactants bind.

**Active transport** The movement of substances against a concentration gradient and/or across a cell membrane, using energy.

**Adaptations** Special features which make an organism particularly well suited to the environment where it lives.

**Aerobic** Using oxygen.

**Aerobic respiration** The process by which food molecules are broken down using oxygen to release energy for the cells.

**Agar** The nutrient jelly on which many microorganisms are cultured.

**Alcohol** The commonly used name for drinks containing ethanol.

**Alcoholics** People who are addicted to alcohol.

**Alleles** A version of a particular gene.

**Alveoli** The tiny air sacs in the lungs which increase the surface area for gaseous exchange.

**Amino acids** The building blocks of protein.

**Anaerobic respiration** Cellular respiration in the absence of oxygen.

**Anomalous** A measurement that is well away from the pattern shown by other results.

**Anorexia nervosa** a mental disorder linked to an unrealistic body image and a need for control.

**Antibiotics** Drugs which destroy bacteria inside the body without damaging human cells.

**Antigens** The unique proteins on the surface of a cell. They are recognised by the immune system as 'self' or 'non-self'.

**Aqueous solution** A solution with water as the solvent.

**Arthritis** A painful and debilitating disease affecting the joints.

**Association** When two variables change together, but they are both linked by a third variable. E.g. lack of carbon dioxide in soil and poor growth of plants: both could be linked to too much water in the soil.

## B

**Bar charts** Used when the independent variable is categorical and the dependent variable is continuous.

**Bias** The influence placed on scientific evidence because of: wanting to prove your own ideas; supporting the person who is paying you; political influence; the status of the experimenter.

**Binge drinking** Short bouts of very heavy drinking.

**Biogas** Gas made by the action of microorganisms on the remains of living organisms.

**Biological detergents** Washing detergents that contain enzymes.

**Biodiesel** Diesel fuel made from plant materials.

**Biomass** The amount of biological material in an organism.

**Biomass fuel** Fuel from animal waste or cut-down plants.

**Bladder** The organ where urine is stored until it is released from the body.

**Blood** The liquid which is pumped around the body by the heart. It contains blood cells, dissolved food, oxygen, waste products, mineral ions, hormones and other substances needed in the body or needing to be removed from the body.

**Blood plasma** The clear yellow liquid part of the blood which carries dissolved substances and blood cells around the body.

**Blood vessels** The tubes which carry blood around the body, i.e. arteries, veins and capillaries.

## C

**Carbohydrases** Enzymes which speed up the breakdown of carbohydrates.

**Carbon cycle** The cycling of carbon through the living and non-living world.

**Carbon neutral** A process which uses as much carbon dioxide as it produces.

**Carcinogen** A chemical which is known to cause cancer.

**Carriers** People who have a single recessive allele for a genetic disease.

**Catalyst** A substance that speeds up the rate of another reaction but is not used up or changed itself.

**Categorical variable** These tell us the name of the variable, e.g. oak tree, beech tree, ash tree.

**Causal link** One change in a variable has caused a change in

another variable. You can only be reasonably certain of this when you have valid and reliable evidence. E.g. increasing light intensity causes an increase in the rate of photosynthesis.

**Cell membrane** The membrane around the contents of a cell which controls what moves in and out of the cell.

**Central nervous system (CNS)** The central nervous system made up of the brain and spinal cord where information is processed.

**Chance** When there is no scientific link between the two variables. E.g. increased sea temperatures and increased diabetes.

**Chlorophyll** The green pigment contained in the chloroplasts.

**Chloroplasts** The organelles in which photosynthesis takes place.

**Cholesterol** A substance made in the liver and carried around the body in the blood. High blood cholesterol levels seem to be linked to a high risk of heart disease.

**Chromosomes** Thread-like structures carrying the genetic information found in the nucleus of a cell.

**Cirrhosis of the liver** A disease which is often the result of heavy drinking over a long period of time.

**Clones** Offspring produced by asexual reproduction which are identical to their parent organism.

**Combustion** The process of burning.

**Compost heap** A site where garden rubbish and kitchen waste are decomposed by microorganisms.

**Concentration gradient** The gradient between an area where a substance is at a high concentration and an area where it is at a low concentration.

**Conclusion** A conclusion considers the results and states how those results match the hypothesis. The

conclusion must not go beyond the data available.

**Constrict** To narrow.

**Continuous variable** A continuous variable can be any numerical value, e.g. your own weight.

**Control groups** Often used when there are a large number of control variables that cannot be kept constant. E.g. when testing a drug on thousands of different people, half will be given the drug and half will be given a similar treatment that does not contain the drug (placebo).

**Control variable** These are the variables that might affect your result and therefore must be kept the same for a valid investigation. E.g. concentration of the enzyme in an investigation of the effect of temperature.

**Controlled** An experiment is controlled when all variables that might affect your result (apart from the independent variable) have been kept constant.

**Culture** Growing microorganisms in the laboratory.

**Cuticle** The waxy covering of a leaf (or an insect) which reduces water loss from the surface.

**Cystic fibrosis** A genetic disease that affects the lungs, digestive and reproductive systems. It is inherited through a recessive allele.

**Cytoplasm** The water-based gel in which the organelles of all living cells are suspended.

## D

**Data** Measurements or observations of a variable. Plural of datum.

**Daughter cells** The cells produced by cell division.

**Decompose** To split up or break down organisms or waste material.

**Decomposers** Microorganisms that break down waste products and dead bodies.

**Denatured** Enzymes that are denatured have their protein

structure broken down and can no longer catalyse a reaction.

**Dependent variable** The variable that you are measuring as a result of changing the independent variable, e.g. the volume of CO<sub>2</sub> produced.

**Detritus feeders** See **decomposers**.

**Diabetes** A condition in which it becomes difficult or impossible for your body to control the levels of sugar in your blood.

**Dialysis** The process of cleansing the blood through a dialysis machine when the kidneys have failed.

**Dialysis machine** The machine used to remove urea and excess mineral ions from the blood when the kidneys fail.

**Diaphragm** The sheet of muscle which divides the thorax from the abdomen.

**Differentiated** Specialised for a particular function.

**Diffusion** The net movement of particles of a gas or a solute from an area of high concentration to an area of low concentration (along a concentration gradient).

**Dilate** To widen.

**Directly proportional** A graph will show this if the line of best fit is a straight line through the origin.

**Discrete variable** These are numerical, but can only be whole numbers, e.g. numbers of layers of insulation.

**Distillation** A process which separates the components of a mixture on the basis of their different boiling points.

**DNA** Deoxyribose nucleic acid, the material of inheritance.

**Dominant** The characteristic that will show up in the offspring even if only one of the alleles is inherited.

**Donor** The person who gives material from their body to another person who needs healthy tissues or organs, e.g. blood, kidneys. Donors may be alive or dead.

**Double circulation** The separate circulation of the blood from the heart to the lungs and then back to the heart and on to the body.

## E

**E number** A number given to a food additive in order to identify it.

**Economic** How science affects the cost of goods and services. E.g. developing a new drug might increase the cost of treatment.

**Ecosystem** All the animals and plants living in an area, along with things which affect them such as the soil and the weather: also the interaction between many different types of living organisms and the non-living features of their home.

**Effector organs** Muscles and glands which respond to impulses from the nervous system.

**Electron microscope** An instrument used to magnify specimens using a beam of electrons.

**Emulsifier** A substance which stops the two liquids in an emulsion separating.

**Emulsify** To physically break down large droplets into smaller droplets.

**Emulsion** A mixture of tiny droplets of one liquid in another liquid.

**Environmental** How science affects our natural surroundings. E.g. killing badgers to stop disease in cows.

**Enzyme** Protein molecules which act as biological catalysts. They change the rate of chemical reactions without being affected themselves at the end of the reaction.

**Enzyme substrate complex** The combination of the enzyme and the substrate at the active site.

**Ethanol** A chemical found in alcoholic drinks and biofuels such as gasohol, chemical formula  $C_2H_5OH$ .

**Ethical** Whether it is 'right' or 'wrong' to do something. E.g.

experimentation on animals to develop new drugs.

**Evidence** Scientific evidence should be reliable and valid. It can take many forms. It could be an observation, a measurement or data that somebody else has obtained.

**Evolution** The process of slow change in living organisms over long periods of time as those best fitted to survive breed successfully.

**Extinction** The process by which animals become extinct – the permanent loss of all the members of a species from the face of the Earth.

## F

**Fair test** Only the independent variable is affecting your dependent variable, all other variables are kept the same.

**Fatty acids** Building blocks of lipids.

**Fermenters** The large vessels used in commercial fermentation processes.

**Food additive** A substance added to food to improve its flavour, texture or shelf-life.

**Fossil fuel** Coal, oil or gas or any other fuel formed long ago from the fossilised remains of dead plants or creatures.

**Fructose syrup** A sugar syrup.

## G

**Gametes** Sex cells.

**Gasohol** A mixture of petrol (gasoline) and ethanol.

**Genes** A short section of DNA carrying genetic information.

**Genetic engineering/genetic modification** A technique for changing the genetic information of a cell.

**Genetic diseases** Diseases which are inherited.

**Genetic disorders** See **genetic diseases**.

**Global warming** Warming of the

Earth due to greenhouse gases in the atmosphere trapping infra-red radiation from the surface.

**Glucagon** Hormone involved in the control of blood sugar levels.

**Glucose** A simple sugar.

**Glycerol** Building block of lipids.

**Glycogen** Carbohydrate store in animals, including the muscles, liver and brain of the human body.

**Greenhouse gases** Gases such as carbon dioxide in the atmosphere that absorb infra-red radiation from the Earth's surface.

## H

**Haemoglobin** The red pigment which carries oxygen around the body.

**Heart** The muscular organ which pumps blood around the body.

**High-density lipoproteins (HDLs)** Chemicals which carries cholesterol in the blood and lower the risk of heart disease.

**Homeostasis** The maintenance of constant internal body conditions.

**Hormones** Chemical messages secreted by special glands and carried around the body in the blood.

**Hydroponics** Growing plants in water enriched by mineral ions rather than soil.

**Hypothesis** Using theory to suggest explanations for observations, e.g. 'I think that the plants are smaller because they do not have enough water.'

## I

**Immune system** The body system which recognises and destroys foreign tissue such as invading pathogens.

**Immunisation** Giving a vaccine which allows immunity to develop without exposure to the disease itself.

**Immunosuppressant drugs** Drugs which suppress the immune system of the recipient of

a transplanted organ to prevent rejection.

**Independent variable** The variable that you have decided to change in an investigation, e.g. the temperature of the enzyme in an investigation to find out the effect of temperature on enzyme activity.

**Insoluble** Unable to dissolve in a given solvent.

**Insulin** Hormone involved in the control of blood sugar levels.

**Interval measurements** The values of your independent variable that you choose within the range e.g. 10 cm<sup>3</sup>; 20 cm<sup>3</sup>; 30 cm<sup>3</sup>; 40 cm<sup>3</sup>; 50 cm<sup>3</sup>.

**Isomerase** An enzyme which converts one form of a molecule into another.

## K

**Kidneys** Organs which filter the blood and remove urea, excess salts and water.

**Kidney transplant** Replacing failed kidneys with a healthy kidney from a donor.

## L

**Lactic acid** One product of anaerobic respiration. It builds up in muscles with exercise. Important in yoghurt and cheese making processes.

**Lactic fermentation** Fermentation using bacteria to break down the lactose in milk and produce lactic acid.

**Lactose** The main sugar found in milk.

**Light microscope** An instrument used to magnify specimens using lenses and light.

**Lime water** Solution of calcium hydroxide, used to test for carbon dioxide.

**Limiting factors** Factors which limit the rate of a reaction, e.g. photosynthesis.

**Line graphs** Used when the

independent and the dependent variables are both continuous.

**Line of best fit** Used to show the underlying relationship between the independent and the dependent variables. It should fit the pattern in the results and have roughly the same number of plots on each side of the line. It could be a straight line or a curve. Remember to ignore any anomalies!

**Linear** These are straight line graphs that can be positive (as the concentration increases so too does the oxygen produced) or negative (as the concentration increases the oxygen produced decreases).

**Link due to association** When two variables change together, but they are both linked by a third variable. E.g. lack of carbon dioxide in soil and poor growth of plants, both could be linked to too much water in the soil.

**Link due to chance** When there is no scientific link between the two variables. E.g. increased sea temperatures and increased diabetes.

**Lipids** Fats and oils.

**Liver** A large organ in the abdomen which carries out a wide range of functions in the body.

**Low-density lipoproteins (LDLs)** Chemicals which carry cholesterol in the blood and raises the risk of heart disease.

## M

**Magnesium** A metallic element. Magnesium ions are needed by plants to make chlorophyll.

**Malting** The process, important in making beer, of soaking barley grains in water and keeping them warm so germination begins and enzymes break down the starch in the barley grains into a sugary solution.

**Mean** Add up all of the measurements and divide by how

many measurements there are. Don't forget to ignore any anomalous results.

**Meiosis** The two-stage process of cell division which reduces the chromosome number of the daughter cells. It is involved in making the gametes for sexual reproduction

**Menstrual cycle** The reproductive cycle in women controlled by hormones.

**Metabolic rate** The rate at which the reactions of your body take place, particularly cellular respiration.

**Methane** The main, flammable component of biogas, chemical formula CH<sub>4</sub>.

**Microbiology** The study of microorganisms.

**Microorganism** Bacteria, viruses and other organisms which can only be seen using a microscope.

**Mitochondria** The site of aerobic cellular respiration in a cell.

**Mitosis** Asexual cell division where two identical daughter cells are formed.

**Model** Description of a theory or theories that suggests further ideas that could test those theories. E.g. 'plum pudding' model of the atom that was tested and found not to be correct. A better model was then suggested.

**Mutation** A change in the genetic material of an organism.

**Mycoprotein** A form of food derived from fungi grown in giant fermenters on sugar solution from waste carbohydrates.

## N

**Natural selection** The process by which evolution takes place. Organisms produce more offspring than the environment can support so only those which are most suited to their environment – the 'fittest' – will survive to breed and pass on their useful characteristics.

**Net** Overall.

**Neurones** Basic cells of the nervous system which carry minute electrical impulses around the body.

**Nicotine** Colourless, poisonous substance which is the addictive drug in tobacco smoke.

**Nitrates** Mineral ions needed by plants to form proteins.

**Nitrogen** Inert gas making up around 80% of the Earth's atmosphere.

**Nucleus (of a cell)** An organelle found in many living cells containing the genetic information.

## O

**Opinion** Opinions are personal judgements. Opinions can be formed from scientific evidence or non-scientific ideas.

**Ordered variable** Variables that can be put into an order, e.g. small, large, huge lumps of rock.

**Organ** A group of different tissues working together to carry out a particular function.

**Organ systems** A group of organs working together to carry out a particular function.

**Organelles** Membrane-bound structures in the cytoplasm of a cell which carry out particular functions.

**Osmosis** The net movement of water from an area of high concentration (of water) to an area of low concentration (of water) along a concentration gradient.

**Ova** The female sex cells, eggs.

**Ovaries** Female sex organs which contain the eggs and produce sex hormones during the menstrual cycle.

**Ovulation** The release of a mature egg from the ovary in the middle of the menstrual cycle.

**Oxyhaemoglobin** The molecule formed when haemoglobin binds to oxygen molecules.

## P

**Pancreas** An organ which produces the hormone insulin and many digestive enzymes.

**Partially permeable** Allowing only certain substances to pass through.

**Pathogens** Microorganisms which cause disease.

**Pay-back period (or time)**

Length of time for the savings from an improvement to match the actual cost of the improvement.

**Penicillin** The first broad spectrum antibiotic to be produced commercially.

**Percentage yield** The percentage of product formed in a chemical reaction compared with the maximum possible amount of product that could be formed.

**Petri dish** The flat glass dishes often used to culture microorganisms in the laboratory.

**Phloem** The living transport tissue in plants which carries sugars around the plant.

**Photosynthesis** The process by which plants make food using carbon dioxide, water and light energy.

**pH scale** A scale running from 0 to 14 that describes the degree of acidity of a solution.

**Pituitary gland** Small gland in the brain which produces a range of hormones controlling body functions.

**Platelets** Fragments of cells in the blood which are vital for the clotting mechanism to work.

**Pollution** The contamination of air, water or soil by substances which are harmful to living organisms.

**Population** A group of individuals of the same species living in the same habitat.

**Precision** Where your repeat results are very close to each other. This is related to the smallest scale division on the measuring instrument used.

**Predator** An animal which preys on other animals for food.

**Prediction** A hypothesis that can be used to design an investigation e.g. I predict that if I increase the amount of water given to plants there will be an increase in the mass of the plants.

**Protease** An enzyme which breaks down proteins.

**Protein synthesis** The process of building up protein molecules from amino acids on the surface of a ribosome.

**Puberty** The stage of development when the sexual organs and the body become adult.

**Pyramid of numbers** A model of feeding relationships based on the numbers of organism at each level of a food chain.

## R

**Random changes** Changes that cannot be predicted.

**Random error** Measurements when repeated are rarely exactly the same. If they differ randomly then it is probably due to human error when carrying out the investigation.

**Range** The maximum and minimum values.

**Recessive** The characteristic that will show up in the offspring only if both of the alleles are inherited.

**Recipient** The person who receives a donor organ.

**Red blood cells** Blood cells which contain the red pigment haemoglobin. They are biconcave discs in shape and they give the blood its red colour.

**Reflexes** Rapid automatic responses of the nervous system which do not involve conscious thought.

**Reliable** Describes data we can trust. E.g. others get the same results.

**Reliability** The trustworthiness of data collected.

**Renewable energy** Energy from sources that never run out, including wind energy, wave energy, tidal energy, hydroelectricity, solar energy and geothermal energy.

**Respiration** The process by which food molecules are broken down to release energy for the cells.

**Ribosomes** The site of protein synthesis in a cell.

## S

**Salt glands** Special glands which enable some animals to remove excess salt from their bodies.

**Sankey diagram** Diagram to show the energy transfer through a system.

**Saturated** A hydrocarbon which contains as many hydrogen atoms as possible in each molecule.

**Selective breeding** Choosing parents with a desired characteristic for breeding.

**Sense organ** Collection of special cells known as receptors which respond to changes in the surroundings (e.g. eye, ear).

**Sensitivity** The smallest change that an instrument can measure, e.g. 0.1 mm.

**Sewage treatment plant** A site where human waste is broken down using microorganisms.

**Sex chromosomes** The chromosomes which carry the information about the sex of an individual.

**Social issues** How science influences and is influenced by its effects on our friends and neighbours. E.g. building a wind farm next to a village.

**Spiracles** The openings in the outer coat of an insect which allow air in and out of the breathing system.

**Statins** Drugs which lower the blood cholesterol levels and improve the balance of HDLs to LDL.

**Stem cell research** Research

into the stem cells found in embryonic tissue and in some adult tissues.

**Stimulus** A change which causes a response in the body.

**Soluble** Able to dissolve in a given solvent.

**Solute** The solid which dissolves in a solvent to form a solution.

**Solvent** A liquid in which some solids will dissolve.

**Specialised** Adapted for a particular function.

**Sperm** The male sex cells.

**Stem cells** Undifferentiated cells with the potential to form a wide variety of different cell types.

**Stomata** Openings in the leaves of plants (particularly the underside) which allow gases to enter and leave the leaf. They are opened and closed by the guard cells.

**Sugars** Simple carbohydrates.

**Sustainable development** Using natural resources in a way which also conserves them for future use.

**Synapses** The gaps between neurones where the transmission of information is chemical rather than electrical.

**Systematic error** If the data is inaccurate in a constant way, e.g. all results are 10 mm more than they should be. This is often due to the method being routinely wrong.

## T

**Tar** Thick, black chemical found in tobacco smoke which can cause cancer.

**Technology** Scientific knowledge can be used to develop equipment and processes that can in turn be used for scientific work.

**Territory** An area where an animal lives and feeds which it may mark out or defend against other animals.

**Testes** Male sex organs which produce sperm and sex hormones.

**Theory** A theory is not a guess or a fact. It is the best way to explain why something is happening. E.g. Sea levels are rising, and the global warming theory is the best way to describe why they are. Theories can be changed when better evidence is available.

**Thermoregulatory centre** The area of the brain which is sensitive to the temperature of the blood.

**Thorax** The upper (chest) region of the body. In humans it includes the rib cage, heart and lungs.

**Tissue** A group of specialised cells all carrying out the same function.

**Tracheoles** Minute breathing tubes in insects with a large surface area which penetrate right through the tissues.

**Transpiration** The loss of water vapour from the leaves of plants through the stomata when they are opened to allow gas exchange for photosynthesis.

**Transpiration stream** The movement of water through a plant from the roots to the leaves as a result of the loss of water by evaporation from the surface of the leaves.

**Trial run** Carried out before you start your full investigation to find out the range and the interval measurements for your independent variable.

## U

**Unsaturated** A hydrocarbon which contains a carbon-carbon double bond.

**Urea** The waste product formed by the breakdown of excess amino acids in the liver.

**Urine** The liquid formed by the kidneys.

**Urobilins** Yellow pigments that come from the breakdown of haemoglobin in the liver, and which colour the urine yellow.

## V

**Valid** Describes an investigation that successfully gathers the data needed to answer the original question. Data may not be valid if you have not carried out a fair test.

**Valid data** Evidence that can be reproduced by others and answers the original question.

**Villi** The finger-like projections from the lining of the small intestines which increase the surface area for the absorption of digested food into the blood.

## W

**Wilting** The process by which plants droop when they are short of water or too hot. This reduces further water loss and prevents cell damage.

## X

**Xenotransplantation** Transplanting tissues or organs from one species to another, e.g. pig organs into people.

**Xylem** The non-living transport tissue in plants, which transports water around the plant.

## Y

**Yield** The amount of product formed in a chemical reaction.

## Z

**Zero error** A systematic error, often due to the measuring instrument having an incorrect zero. E.g. forgetting that the end of the ruler is not at zero.