

## Glossary

'a' axis.	A vector direction defined by the space group and crystal structure for a particular crystalline form; a term used in crystallography.
Absorption	The process by which a substance or a xenobiotic is brought into a body (human or animal). Also: incorporated into the structure of a mineral.
Adsorption	The binding of a chemical compound to a solid surface
Acanthosis	Increase in thickness of stratum spinosum (specific layer in epidermis/skin)
Acid rain	Contamination of rain by artificial pollutants or natural emissions (such as sulphur dioxide from volcanic activity) which produces an acid composition
Acute myocardial infarction (AMI)	Gross necrosis of the heart muscle as a result of interruption of the blood supply to the area
Activity	The thermodynamically effective concentration of a chemical species or component.
Advection	A transport process in which dissolved chemicals move with flowing ground water
Aetiology	Causes of a particular disease.
Albedo	The percentage of the incoming solar radiation reflected back by different parts of the Earth's surface.
Aldosterone	A steroid hormone produced by the adrenal gland that participates in the regulation of water balance by causing sodium retention and potassium loss from cells
Aliquot	A known amount of a homogeneous material, assumed to be taken with negligible sampling error
Alkali Disease	Diseases affecting animals that ingest feed with a high selenium concentration, characterized by dullness, lack of vitality, emaciation, rough coat, sloughing of the hooves, erosion of the joints and bones, anaemia, lameness, liver cirrhosis and reduced reproductive performance
Alkalinity	The capacity of solutes in a solution to react with and neutralise acid; determined by titration with a strong acid to an end point at which virtually all solutes contributing to the alkalinity have reacted. In general the alkalinity equates with the bicarbonate concentration.
Allergy	Immunologic state induced in a susceptible subject by an antigen (allergen)
Alluvial	Deposited by rivers
Alteration (Earth science)	A process due to high temperature fluids and gases that occurs within the Earth's crust and results in the formation of new mineral suites that are in equilibrium with their environment. Alteration can also occur at low temperatures.
Aluminosilicate	A mineral composed dominantly of aluminium, silicon and oxygen, and lesser amounts of cations such as sodium,

	potassium, calcium, magnesium and iron.
Amorphous	A lack of crystallinity or the regular extended three-dimensional-order of the atoms in a solid
Anaerobic/Aerobic	Environmental conditions in which oxygen is absent/present.
Analyte	Any substance whose identity or concentration is being determined.
Anemia	Any of several conditions in which the oxygen-carrying capacity of the blood is below normal due to reductions in the numbers of red blood cells (hypocytic) and/or the amount of hemoglobin per red blood cell (hypochromic).
Aneuploidy	Cellular state where there is an abnormal number of chromosomes not a multiple of the haploid number of chromosomes
Aneurism, aneurysm	Localised ballooning of the aorta or an artery, potentially causing pressure on adjacent structures and liability to rupture.
Angiotensin	A vasoconstrictive hormone.
Antisense	Nucleic acid that has a sequence exactly opposite to an mRNA molecule made by the body; binds to the mRNA molecule to prevent a protein from being made.
Apo	Without, especially metalloproteins without the metal/metals.
Apoptosis	Programmed cell death, in which a cell brings about its own death and lysis, signalled from outside or programmed in its genes, by systematically degrading its own macromolecules.
Aqueous speciation	The partitioning of chemical components between various aqueous species in a solution: bare species (e.g. $\text{Ca}^{++}$ ), ion pairs (e.g. $\text{CaCO}_3^0$ ), and complexes (e.g. $\text{Fe}(\text{CN})_6^{3-}$ ).
Aquifer	A water-bearing rock formation
Aquitard	A rock formation with poor permeability and hence a poor water-bearing unit
Archaea	Prokaryotes lacking nucleus as bacteria but they are as different from bacteria as are humans. They represent an own evolutionary pathway. They live in extreme places with high temperatures.
Arenosols	Sandy soils with >65% sand-sized (0.05-2mm) particles. These soils have low moisture, low concentrations of most elements and are highly prone to causing deficiencies of micronutrients in crops.
Aridisol	Soils found in arid and semiarid environments. Characterized by a light colour, poorly developed soil horizons, high soluble salt content, little organic material, and a coarse texture
Arrhythmia	Irregularity of the heart beat.
Arthroconidia	Fungal spores released by fragmentation or separation of the cells of a hypha.
Asbestos	A commonly used term for a group of fibrous silicate minerals that includes extremely fibrous serpentine

	(chrysotile) and the amphibole minerals crocidolite, amosite, tremolite, actinolite, and anthophyllite.
Asbestosis	Degenerative fibrosis of the lung resulting from chronic inhalation of asbestos fibers
Ascariasis	An infection caused by the parasitic worm <i>Ascaris lumbricoides</i> that is found throughout temperate and tropical regions. Intestinal infection may result in abdominal cramps and obstruction, while passage through the respiratory tract causes symptoms such as coughing and wheezing. In children, migration of the adult worms into the liver, gallbladder or peritoneal cavity may cause death.
Ascidian	Any minute marine invertebrate animal of the class <i>Ascidacea</i> , such as the sea squirt.
Ash	Fine particles of pulverised rock ejected from volcanoes.
Asphyxiant	Gas which produces suffocation by replacing oxygen in the respiratory system
Ataxia	Lack of coordination of muscle for voluntary movement
Atelectasis	Absence of gas in lung tissue from nonexpansion
Atherosclerosis	Irregularly distributed intimal deposits of lipid
Atomisation	The dispersion of fluids into fine particles
Atrium	The upper chamber of each half of the heart.
Atrophy	Diminished cellular proliferation
Attribute	Information about geographic features contained within GIS data layers, or <i>themes</i> .
Auger Effect	Phenomenon occurring when an electron is released from one of the inner orbiting shells, thereby creating two electron vacancies of the residual atom and repeated as the new vacancies are filled or x-rays are emitted.
Autosome	A chromosome not involved in sex determination. The diploid human genome consists of 46 chromosomes, 22 pair of autosomes and 1 pair of sex chromosomes (the X and Y chromosomes).
Auxotroph	An <i>auxotroph</i> is a microorganism possessing a mutation in a gene that affects its ability to synthesise a crucial organic compound.
Atypia	Reactive cellular state, which does not correspond to normal form
Background	The property, as applied to a location or measurements from such locations, of being due natural processes alone and unaffected by anthropogenic processes. In some instances the term "natural background" is used to reinforce the non-anthropogenic aspect. With the global atmospheric transport of anthropogenic contaminants, e.g., Persistent Organic Pollutants (POPs), it is a moot point whether background sites exist for some substances.
Basal cell carcinoma	Slow growing, locally invasive neoplasm derived from basal cells of epidermis or hair follicles
Baseline	A measure of the natural background or ambient level of an element/substance.

	Some people also suggest that baseline is the current background which includes natural and anthropogenic.
Basolateral membrane	Part of the plasma membrane that includes the basal end and sides of the cell.
Basophilic degeneration	Pathologic change in tissue noted by blue staining of connective tissue with hema toxylin-eosin stain
Beneficiation	Process of concentrating ores.
Benign	Usual or normal the opposite of cancerous when applied to cells or tumors
Bioaccumulation	Process by which an element is taken into an organism, possibly transformed into another chemical species, and retained so that the element=s concentration in the biota is greater than its concentration in the media in which the biota is sustained.
Bioapatite	The name given to the complex calcium phosphate mineral that forms in biological tissues and is characterized by extremely small crystallite size, maximum dimension typically less that $20 \times 10^{-9} \text{ m}$ (200Å). Generalized chemical formula: $(\text{Ca,Na,Mg,}\dots[\ ])_10(\text{PO}_4, \text{HPO}_4, \text{CO}_3, \text{SO}_4\dots)_6(\text{OH, F, Cl, CO}_3, \text{O}, [\ ])_2$ where ... indicates the possible addition of other cations and [ ] indicates vacancies in the crystal structure at the cation or halogen sites.
Bioavailability	The property of a substance that makes its chemical uptake by biota possible.
Bioessential/Bioessentiality	Present in sufficient amounts to support essential biochemical processes is imperative for sustaining life.
Biogeochemical cycle	Model encompassing the movement of elements (and some compounds) from the lithosphere through the hydrosphere, atmosphere and biosphere.
Bisphosphonates	A group of phosphorus- and carbon-containing compounds which have carbon connected to the phosphorus atom in place of one of the oxygen atoms of the tetrahedral phosphate ( $\text{PO}_4$ ) groups.
Birefringence	The ability of anisotropic (non isometric) crystalline materials to split plane polarized light into two non-equal rays of distinct velocities depending on the direction of the transmission relative to the orientation of the atomic structure of the compound. When the two rays emerge from the crystal, one is retarded relative to the other. Precise measurements of the interference colors of the rays define the optical characteristics and identify the compound.
Biosphere	The sum of all organisms on earth.
Blind Staggers	Blind staggers occurs in cattle and sheep ingesting high concentrations of selenium and is characterized by impaired vision leading to blindness, anorexia, weakened legs, paralyzed tongue, labored respiration, abdominal pain, emaciation and death.
Bombs (volcanic)	Clots of lava which are ejected in a molten or semi-molten state and which congeal before striking the ground

Bone	A term applied to one of the many individual organs that make up vertebrate skeletons, or alternatively to the fragments or the tissues that are found within these organs.
Bowen's Disease	An intraepidermal carcinoma characterized as a small, circumscribed elevation on the skin
Buffer	A chemical compound which controls pH by binding to hydrogen ions.
Bulk analysis	Chemical analysis of an entire body/substance, rock, soil or a sub part with little or no segregation of specific areas or components.
Calcisols	Soils with a high content of free calcium carbonate either developed on limestones, or which have become calcified by the deposition of calcium carbonate in pores and voids as a result of the evaporation of soil solution in arid environments. These soils generally have neutral or alkaline pHs and can adsorb some trace elements very strongly.
Calcitonin	Hormone secreted by the thyroid gland; important in the homeostatic regulation of serum calcium levels.
Capillary electrophoresis	Electrophoretic separation technique performed in a small fused silica capillary
Carbonatite	An igneous rock composed of carbonate minerals
Carbon dioxide	A colourless odourless gas; in high concentrations, CO <sub>2</sub> acts as an inert asphyxiant in humans
Carcinogen	A substance that can directly or indirectly cause a cell to become malignant
Carcinogenesis	The mechanism by which cancer is caused
Cardiomyopathy	Disease of the heart muscle (myocardium)
Cardiovascular disease (CVD)	Diseases pertaining to the heart and blood vessels, including for example both AMI and cerebrovascular disease (stroke).
Catecholamines	Category of compounds including the neurotransmitters adrenaline and noradrenaline
Cation exchange	Exchange of cations between a solution and a negatively-charged solid phase (e.g. a clay mineral) in response to a change in solution conditions. This is especially important in geochemistry for major cations such as calcium and sodium
Cation Exchange Capacity (CEC)	The ability of a soil or soil constituent (e.g. clay mineral or humus) to adsorb cations on permanent, or pH-dependent, negatively charged sites on surfaces. Cations of different elements can replace each other as counter-ions to the negative charges.
'c' axis	A vector direction defined by the space group and structure of a particular crystalline form. A crystallographic term
cDNA	Complementary DNA: A DNA molecule copied from an mRNA template by the enzyme reverse transcriptase
Cementum	The thin tissue that forms the outer covering of a tooth below the gum line, similar in composition to dentine.
Chaperones	Proteins that help in folding proteins correctly and discourages incorrect folding. Metallochaperones assists in

	the delivery of metal ions to target proteins or compartments
Chelate	The complex formed through the bonding of a metal ion with two or more polar groupings within a single molecule
Chitin	A tough white to semitransparent substance that forms the major structural component of arthropod exoskeletons and the cell walls of certain fungi.
Chloroplast	Chlorophyll-containing photosynthetic organelle in some eukaryotic cells.
Choroid plexus	A network of intersecting blood vessels of the cerebral ventricles that regulate intraventricular pressure
Chromatin	The complex of DNA and proteins that make up eukaryotic chromosomes.
Chromatography	The separation of a mixture of compounds using solid, liquid or gas phases based on affinity of molecules for the phase.
Chromosome aberrations	Any deviation from the normal number or morphology of chromosomes
Clay minerals	Phyllosilicate minerals with a small grain size, commonly <4 $\mu\text{m}$ but ranging down to colloidal dimensions. When mixed with a limited amount of water they develop plasticity. Clay minerals are formed by high temperature hydrothermal alteration processes, e.g., kaolinite in altered granitic rocks; or by low temperature weathering processes, e.g., montmorillonite, smectite, chlorite, kaolinite and illite.
Clearance	Output of particles previously deposited in the respiratory tract
Coccidioidomycosis	A respiratory disease of humans and animals caused by inhalation of arthroconidia of the soil inhabiting fungus <i>Coccidioides immitis</i> . Fever, cough, weight loss, and joint pains characterize the disease, also called valley fever
Code (biological)	the presentation of the content (of a molecule) in terms of symbols such as ATC and G for the DNA code where ATC and G are nucleotide bases.
Codon	The fundamental unit of the genetic code consisting of a triplet sequence of nucleotide bases that specifies the ribosomal binding of a specific amino acid-bearing tRNA during protein synthesis or the termination of that process.
Coenzyme	a small molecule which binds to a protein to create a catalytic centre
Collagen	Protein making up the white fibers (collagenous fibers) of skin, cartilage and all connective tissue
Collimator	A device for producing a beam of parallel rays
Compartment	a separated solution volume of a cell by an enclosing membrane not at equilibrium with any other separated volume.
Complex system	Natural or manmade systems composed of many simple nonlinear agents that operate in parallel and interact locally

	with each other at many different scales. The behaviour of the system cannot be directly deduced from the behaviour the component agents and the system sometimes produces behaviour at another scale, which is called emergent behaviour
Composite	A mixture of several components or parts blended together to form a functional whole.
Condensation polymer	a polymer formed by loss of water molecules from monomers.
Confined aquifer	Aquifer overlain and underlain by impermeable or near-impermeable rock strata
Cooling	The decrease of the activity of a radioactive material by nuclear decay
Coordination.	The association of one atom with another in three-dimensional arrays. The coordination number reflects the atomic size of an atom. Octahedral or 6-fold coordination is typical of metal atoms with oxygen
Coronary heart disease (CHD)	Disease caused by deficiency of blood supply to the heart muscle due to obstruction or constriction of the coronary arteries
Cortical	The tissue that forms the external portions of bones heavily mineralized with bioapatite containing cells and exhibiting a variety of textures.
Cretaceous/Tertiary (K/T) boundary	The Cretaceous period was the last in the Mesozoic era and was succeeded 64 million years ago by the Tertiary period of the Cenozoic era. It is marked by the sudden extinction of genera of living organisms, most famously the dinosaurs.
Crust	The outermost solid layer of a planet or moon.
Crystallinity	The three-dimensional regular array typical of solids with definite chemical composition and crystal structure
Crystalline basement	Solid igneous, sedimentary or metamorphic rock; may crop out at the ground surface or be overlain by superficial deposits (unconsolidated sediments or soils).
Crystallite	A general term applied to very small size materials, usually minerals, in which a crystal form or crystal faces may be observed, usually with magnification. The morphology of a crystallite suggests a material with a regular crystal structure and may be used to identify a specific compound or mineral species.
Cytochrome P <sub>450</sub>	Iron-containing proteins important in cell respiration as catalysts of oxidation-reduction reactions
Cytoplasm	The central compartment of all cells which contains genes, DNA as well as synthetic systems
Database	A structured set of persistent data, that in a GIS context, contains information about the spatial locations and shapes of geographic features, and their <i>attributes</i>
Decay ("radioactive")	The disintegration of the nucleus of an unstable atom by spontaneous fission or emission of an alpha particle or beta particle
Deconvolution	A mathematical procedure used for separation of

	overlapping peaks
Definitive host	The host in which a parasite reaches sexual maturity and reproduces
Dental calculus	Calcium phosphate mineral materials deposited around the teeth at and below the gum-line, probably the result of bacterial action
Dental caries	Cavities in teeth arising from tooth decay
Dentine	The tissue composed of greater than 70% bioapatite that forms the predominant segment of a tooth. This tissue is capped by enamel.
Deposition	Fraction of particles in inspired air that are trapped in the lung and fail to exit with expired air. In geology: laying down of sediments.
Derivatization	The chemical modification of a naturally occurring compound so that it may be more volatile for gas chromatographic separation.
Dermis	Inner aspects of skin that interdigitates with epidermis and contains blood and lymphatic vessels, nerves, glands and hair follicles
Desorption	Release of a bound chemical compound from a solid surface (the opposite of adsorption)
Detection limit	Minimum amount of the characteristic property of element that can be detected with reasonable certainty under specific measuring conditions.
Diagenesis	Changes to the original organic composition of a material caused by low temperature processes, often involving bacterial action. Diagenesis can occur in sediments where minerals are altered as well as organic matter. Diagenesis changes the original chemistry of many minerals and bone when they are buried.
Dioxygenase	A class of oxidoreductases that catalyze the binding of diatomic oxygen to a product of the reaction.
DOC (Dissolved organic compounds, or dissolved organic carbon)	The soluble fraction of organic matter in soils, ground and surface waters comprising low molecular weight organic compounds which have the ability to complex many elements and render them more available to plants and more prone to leaching down the soil profile.
Dose	A general term for the quantity of radiation. The <i>absorbed dose</i> is the energy absorbed by a unit mass of tissue whereas the <i>dose equivalent</i> takes account of the relative potential for damage to living tissue of the different types of radiation. Also: Quantity of a substance taken in by the body in general
Dose-response	The relationship between an exposure dose and a measurable biological effect
Dowagers Hump	The abnormal concave bending of the upper or thoracic spine as a result of osteomalacia or osteoporosis often obvious in older women.
Drift	A slow change in the response of analytical instrument. In geology: a superficial sediment
Dry matter; d.m.	Remaining solid material after evaporation of all water.

	Often used to express concentration of minerals and trace elements to eliminate variation due to differences in water content of plant material
Ectodermal	Relating to ectoderm, the outer layer of cells in the embryo
Eco-district/eco-classification	A relatively ecologically homogeneous area of the earth=s surface, an element of a classification based on climatic, biological, pedological and geological criteria that becomes more specific from eco-zones, through eco-provinces and eco-regions to eco-districts.
Effluent	The material that is coming from a chromatographic separation. Can also be the waste outfall from industries. Also is the term for sewage (sewage effluent).
Eggshell calcification	A thin calcified layer surrounding an intra-thoracic lymph node.
Elastosis	Degenerative changes of collagen fibers with altered taining properties
Electromagnetic Spectrum	The full range of frequencies, from radio waves to cosmic rays.
Electrospray ionization (ESI)	Ionized molecules by application of a high voltage (approx. 5 kV) to the spray needle.
Elimination	How xenobiotics are removed from the bloodstream, either by metabolism or excretion
Emissions (volcanic)	Any liquid, solid or gaseous material produced by volcanic activity
Enamel	The tissue composed of greater than 96% bioapatite that forms the outer surface of teeth.
Enantiomer	One of two indistinguishable forms of a compound that differ only in the orientation in space; a stereoisomer.
Endemic	Where a disease is confined to specific geographical areas
Endocytosis	The process in which the plasma membrane engulfs extracellular material, forming membrane-bound sacs that enter the cytoplasm and thereby move material into the cell.
Endosome	A small vesicle resulting from the invagination of the plasma membrane transporting components of the surrounding medium deep into the cytoplasm
Endospore	An asexual spore formed by some bacteria, algae, and fungi within a cell and released.
Endothelium	A tissue consisting of a single layer of cells that lines the blood and lymph vessels, heart and some other cavities.
Enterovirus	Group of viruses transient in the intestine which includes poliovirus, echovirus and coxsackievirus
Entisol	Entisols are soils that formed recently and are often found on floodplains, deltas, or steep slopes where soil development is inhibited. They are weakly developed and lack distinct soil horizons. Entisols have a wide geographic and climatic distribution.
Enzootic	A disease that affects animals in a specific area, locale, or

	region
Enzyme	A protein which acts as catalysts driving plant and animal metabolism.
Eosinophils	A specific type of white blood cell
Epidermis	Outer aspect of skin with multiple layers
Epidemiology	The study of the prevalence and spread of disease in a community
Eruption ("volcanic")	The ejection of tephra, gas, lava or other materials onto the earth's surface as a result of volcanic or geothermal activity
Erythrocyte	A mature red blood cell. Erythrocytes are the major cellular element of the circulating blood, transporting oxygen as their principal function. An increase in the number of cells normally occurs at altitudes greater than 3000 m.
Erythron	A collective term describing the erythrocytes and their predecessors in the bone marrow.
Erythropoiesis	The formation of erythrocytes in the bone marrow
Estrogen	Category of steroid hormones produced by ovarian and adipose tissues that can effect estrus and a number of secondary sexual characteristics and is involved in bone remodeling
Etiological	The cause of a disease determined by etiology, the branch of medical science which studies the causes and origins of disease. The etiological agent of coccidioidomycosis is <i>Coccidioides immitis</i> .
Etiology	The process underlying development of a given disease
Eubacteria	True bacteria so named to differentiate them from archaea (earlier known as archaebacteria).
Eukaryote	Cells of organisms of the domain Eukarya (kingdoms Protista, Fungi, Plantae and Animalia). Eukaryotic cells have genetic material enclosed within a membrane-bound nucleus and contain other membrane-bound organelles.
Eutrophication	Nutrient enrichment of waters that stimulate phytoplankton and plant growth and can lead to deterioration in water quality and ecosystems.
Evapotranspiration	Transfer of water from the soil to the atmosphere by combined evaporation and plant transpiration; results in a concentration of solutes in the remaining water
Excretion	Excretion is the mechanism whereby organisms get rid of waste products.
Exon	A DNA sequence that is ultimately translated into protein
Exposure-response relationship	The relationship between how much of a xenobiotic is presented to a person or animal and what happens in their body
Extracellular	Space in tissue that is outside of cells
FAO/Unesco Soil classification system	The soil classification system developed for the joint project by the UN Food and Agriculture Organisation and Unesco to produce a Soil Map of the World (1:5000000) published from 1974 onwards.

Felsic	Igneous rock rich in feldspar and siliceous minerals (typically light-coloured)
Ferralsols	Reddish iron oxide-rich soils characteristic of the tropical weathering and soil forming environment (humid tropics). These soils generally have a low fertility with low CECs and nutrient contents. Also called Oxisols (US Soil Taxonomy), ferralitic or lateritic soils.
Ferritin	A soluble protein storage form of iron containing as much as 23% iron.
Ferromagnesian	A silicate mineral dominated by iron, magnesium, sometimes with aluminium
Fibroblastic cells	Secretory cells of connective tissue
Fibroblasts	Cells that produce collagen molecules
Fibrosis	Formation of fibrous tissue.
Fluorapatite	A mineral, ideal formula $\text{Ca}_5(\text{PO}_4)_3\text{F}$ , one of the members of the calcium apatite mineral group
Fluoride	$\text{F}^-$ , the dominant form of fluorine found in water
Fluorite	The dominant fluorine mineral, $\text{CaF}_2$ ; occurs as an accessory mineral in some sediments and igneous rocks and in some hydrothermal mineral veins
Fluorosis	Disease affecting bones and teeth, caused at least in part by exposure to high doses of fluoride. Dental fluorosis causes weakening and possible loss of teeth, skeletal fluorosis causes bone deformation and disability
Fluvial	Pertaining to rivers and streams.
Forestomachs	Two or three sac like dilations of the oesophagus seen in ruminants and kangaroos. The physiological function of these structures are to serve as fermentation tanks to make cellulose and other carbohydrates in the feed available for absorption in the gastro-intestinal tract of the animal.
Fraction	In this context, a term used in sedimentology, pedology and other physical sciences, to describe the mechanical size range of a material.
Fuzzy system	A system that uses fuzzy sets and if-then rules to store, compress, and relate many pieces of information and/or data in order to build a model free estimator.
Gamma ray	A distinct quantity of electromagnetic energy, without mass or charge, emitted by a radionuclide.
Genome	The DNA (or for some viruses, RNA) that contains one complete copy of all the genetic information of an organism or virus.
Genotoxic	The ability of a substance to cause damage to DNA
Geothermal	Pertaining to the internal heat of the earth. Geothermal zones are areas of high heat flow, where hot water and/or steam issue at the earth's surface. They are found close to tectonic plate boundaries or associated with volcanic systems within plates. Heat sources for geothermal systems may be from magmatism, metamorphism or tectonic movements

Glays	Soils under reducing conditions caused by permanent or intermittent waterlogging; characterized by pale colours and low concentrations of iron oxides.
Gliososis	A chronic reactive process in neural tissue
Glutathione Peroxidase	A detoxifying enzyme in humans and animals that eliminates hydrogen peroxide and organic peroxides, it has a selenocysteine residue in its active site
Glycolysis	The energy-yielding metabolic conversion of glucose to lactic acid in muscle and other tissues.
Gneiss	Banded, usually coarse-grained metamorphic rock, having been modified from its original mineralogy and texture by high heat and pressure (high-grade regional metamorphism)
Goitrogen	A substance which causes or enhances the symptoms of iodine deficiency, e.g. – goitre formation
Granite	A coarse-grained igneous rock, composed mainly of quartz, alkali feldspar and mica. Accessory minerals may also include apatite, zircon, magnetite and sphene. Granite characteristically has a high proportion of silica (>70% SiO <sub>2</sub> ) with high concentrations of sodium and potassium
Granitization	A metamorphic process by which sedimentary and metamorphic rocks with a chemistry similar to granites (granitoids) are transformed mineralogically into rocks that look like the granites formed by igneous intrusive processes.
Granulomatous inflammation	Inflammatory reaction where tissue cells of monocyte/macrophage cells predominate
Granulomatous reaction	Reaction leading to the formation of granuloma, or chronic inflammatory lesions.
Grazing	Feeding behavior of cattle, sheep and horses meaning that they are eating grass and other plants from the ground mostly rather indiscriminately.
Ground water	Subsurface water in the zone of saturation in which all pore spaces are filled with liquid water (although sometimes “ground water” is used inclusively for all water below the land surface, to distinguish it from “surface water”).
Half-Life	The time in which one half of the atoms of a particular radioactive substance decay to another nuclear form.
Haemorrhage	Profuse bleeding from ruptured blood vessels.
Haversian bone	The tissue type found throughout the skeleton in humans that signifies sites of resorption and remodeling. Characterized in cross section by a circular outline and a lamellar distribution of cells and mineralized tissue around a central blood vessel, the haversian canal.
Heavy metal	A metal with a density more than 4500 kgm <sup>-3</sup> .
Helminth	A multicellular worm, generally parasitic, often with a complex reproductive system and life cycle. Generally 50 to 2,000 m in length, but may be longer
Heme	The protoporphyrin component of hemoglobin (in

	erythrocytes) and myoglobin (in myocytes), the proteinaceous chelation complexes with iron that facilitate transport and binding of molecular oxygen to and in cells.
Hemolysis	Lysis of erythrocytes, potentially causing anemia
Hemosiderin	An insoluble iron-protein complex that comprises a storage form of iron mainly in the liver, spleen and bone marrow
Hepatolenticular	Hepato: belonging to the liver, lenticular: lens shaped refers to the basal ganglia of the brain.
Herbivores	Animals normally feeding on plant material like cattle, horses, sheep, antelopes, deer and elephants but also rodents like mice, rabbits and hares. As vertebrates lack enzymes in the gastro-intestinal tract that can digest cellulose and other complex carbohydrates present in plants they utilize micro-organisms living in their gastro-intestinal tract for this process (see ruminants and large intestine fermenters).
Hexagonal	A description of a specific crystallographic form in which the 'c' axis is perpendicular to three axes, usually designated as 'a' axes, which are 120 <sup>0</sup> relative to each other. Apatite crystals often show hexagonal prisms with a 60 <sup>0</sup> angle measured between adjacent vertical or prism crystal faces.
Histology	Science concerned with the minute structure of cells, tissue and organs utilizing light microscopy
Histomorphometry	The study of the textures of tissues using sections of samples embedded in paraffin or epoxy. The sections cut from the embedded blocks maybe stained to assist in the identification of specific tissue components, i.e. collagen or special components in the nucleus of a cell.
Histones	The family of five basic proteins that associate tightly with DNA in the chromosomes of eukaryotic DNA
Homeostasis	The state of equilibrium in the body with respect to various functions and the chemical compositions of fluids and tissues, including such physiological processes as temperature, heart rate, blood pressure, water content, blood sugar, etc., and the maintenance of this equilibrium.
Homeostatic Control	The ability or tendency of an organism or cell to maintain internal equilibrium by adjusting its physiological processes
Homologue	A member of a chromosome pair in diploid organisms or a gene that has the same origin and functions in two or more species. To an organic chemist this is series of compounds which are similar in structure. For instance methanol, ethanol and the other alcohols represent an homologous series of compounds.
Hormone	A circulating molecule released by one type of cell or organ to control the activity of another over the long term e.g. thyroxine.
Host	A human or other animal in which another organism, such as a parasite, bacteria, or virus, lives.
Humus	The fraction of the soil organic matter produced by

	secondary synthesis through the action of soil micro-organisms. It comprises a series of moderately high molecular weight compounds which have a high adsorptive capacity for many metal ions
Hydraulic conductivity	The volume of water that will move in unit time under a unit hydraulic gradient through a unit cross-sectional area normal to the direction of flow
Hydraulic gradient	The change in static head (elevation head + pressure head) per unit distance in a given direction; it represents the driving force for flow under Darcy's Law
Hydrodynamic dispersion	The irreversible spreading of a solute caused by diffusion and mechanical dispersion (which, in turn, is caused by indeterminate advective transport related to variations in velocity about the mean).
Hydroxylapatite	Name of the mineral, ideal chemical formula $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ , one of the members of the calcium apatite mineral group. Hydroxylapatite occurs naturally throughout the different types of rocks on the surface of the earth, and closely resembles the mineral deposits in normal and pathological tissues. See also Bioapatite.
Hyperchromatic	Excessive dark staining
Hyperkeratosis	Hyperplasia of the stratum corneum (specific layer in epidermis/skin), the outermost layer in the epidermis
Hyperplasia	An increase in the number of cells in tissue or an organ
Hypertension	High blood pressure
Hyphae	The branching threadlike filaments, generally 2-10 $\mu\text{m}$ across, characteristic of the vegetative stage of most fungi
Hyphenated techniques	Generally, two analytical methods connected in series; e.g. a chromatographic technique directly connected to a spectroscopic technique
Hypoxia	Less than the physiologically normal amount of oxygen in organs/tissues
ICP	Inductively coupled plasma, an argon plasma with a temperature of approximately 7000 – 10000 K, produced by coupling inductively electrical power to an Ar stream with a high frequency generator (transmitter). Then plasma is used as an emission source (atomic emission spectrometry) or as an ionization source (mass spectrometry)
Idiopathic	Describing a disease of unknown cause
Igneous Rocks	Formed from the cooling and solidification of molten rock originating from below the Earth's surface, includes volcanic rocks.
Incidence	Quantifies the number of new cases/events that develop in a population at risk during a specified time interval
Inselberg	An isolated peak of hard rocks which has stubbornly resisted erosion; most commonly found in the tropics.
Integrin	A membrane protein that convey information in both directions across the plasma membrane.
Internal dose	Amount of an agent penetrating the absorption barriers via physical or biological processes.

Iodothyronine deiodinase	Selenoproteins responsible for the production and regulation of the active thyroid hormone from thyroxine.
Ischaemia	Ischaemia occurs due to the disruption of the supply of blood and oxygen to organs and cells.
Isoform	The descriptor for a specific form of a protein that exists in multiple molecular forms; also, for enzymes, isozyme.
Isotachopheresis	Separation mode in capillary electrophoresis, separating according to analyte conductivity
Isotope	One of two or more atoms with the same atomic number but with different atomic weights.
Kashin-Beck Disease	An endemic osteoarthropathy (stunting of feet and hands) causing deformity of the affected joints; occurs in Siberia, China and North Korea.
Keratinocytes	Cells of the epidermis that produce the protein keratin
Keshan Disease	An endemic cardiomyopathy (heart disease) that mainly affects children and women of childbearing age in China
Kinase	An enzyme catalyzing the conversion of a pro-enzyme, or zymogen, to its metabolically active form, frequently via phosphorylation or proteolytic cleavage
$K_m$	The Michaelis constant in enzyme kinetics.
Lahar	A hot or cold flow of water-saturated volcanic debris flowing down a volcanic slope
Lamellar bone	The tissue that shows sequential layers of mineralized matrix, cells and the blood system required to maintain its viability. This tissue probably represents a second stage after the initial deposition of woven bone.
Large intestine fermenters	Different animal species utilizing bacteria and protozoa in their large intestine (caecum or colon) to digest cellulose and starch in plants eaten so the nutrients can be absorbed in the gut of the animal. Horses, donkeys, zebras, rabbits and hares are examples of animal species utilizing large intestine fermentation to facilitate digestion.
Lattice	An array with nodes repeating in a regular three-dimensional pattern. A crystal lattice is the array distinctive for the chemical and physical structure of the crystalline compound.
Lava	Magma which erupts onto the earth's surface; lava may be emitted explosively, as lava fountains, or by oozing from the vent as lava flows
Leachate	A liquid that carries dissolved compounds from a material through which it has percolated (e.g. water which carries adsorbed elements from settled volcanic ash into soil or water)
Lewis acid	A chemical centre which accepts electron pair donation from a donor base e.g. $M^{2+}$ is a Lewis acid in the complex $M^{2+} \leftarrow OH_2$
Lewy Bodies	Intracytoplasmic inclusion seen in Parkinson's Disease
Lichenoid:	Accentuation of normal skin markings

Ligand	A binding unit attached to a central metal ion.
Limestone	A sedimentary rock composed of calcium carbonate
Lithosphere	The solid earth.
LOAEL	The lowest dose at which adverse effects are observed to occur in an experimental setting
Loess	Natural sedimentary formation made up of wind-lain mineral dust, mainly in the silt size range (1 – 60 µm), most of which accumulated, often in great thickness, during the Quaternary (the last ca. 2.6 million years)
Lumen	A cavity of passage in a tubular organ; “the lumen of the intestine”.
Lymphatic	Vascular channel that transports lymph, a clear fluid with predominantly lymphocytes
Lymph nodes	Small nodes along the bronchi that drain the tissues of lymph fluid.
Lysis	Destruction of a cell’s plasma membrane or of a bacterial cell wall, releasing the cellular contents and killing the cell.
Macronutrient	General term for dietary essential nutrients required in relatively large quantities (hundreds of milligrammes to multiple grams) per day; includes energy (calories), protein, calcium, phosphorus, magnesium, sodium, potassium and chloride.
Macrophage	Mononuclear phagocytes (large leukocytes) that travel in the blood and can leave the blood stream and enter tissues protecting the body by digesting debris and foreign cells
Macrophages	Mononuclear phagocytes in the lung alveoli
Magma	Any hot mobile material within the earth which has the capacity of moving into or through the crust
Marine black shales	Sedimentary rocks formed from organic-rich muds which have developed under strongly reducing conditions and are generally enriched in a wide range of trace elements.
Matrix	The basis or collection of materials within which other materials develop. The organic ‘matrix’ is the base in which mineral materials are deposited to form bone.
Matrix Effect	The combined effect of all components of the sample other than analyte on the measurement of quantity.
Melanin	Dark pigment that provides color to hair, skin and choroid of the eye.
Mesothelioma	A highly malignant type of cancer, usually arising from the pleura, which is the lining of the thoracic cavity, and characteristically associated with exposure to asbestos
Messenger (transmitter)	A molecule or ion used to convey information rapidly in or between cells e.g. Ca <sup>2+</sup> .
Metabolism	The enzymatic chemical alteration of a substance. In toxicology, how xenobiotics are converted chemically; in life sciences generally, the pathways of chemical reactions that occur in the body

Metabolome	All the metabolic machinery, e.g. enzymes, co-enzymes and small metabolites.
Metadata	Data about data, typically containing information such as time and place of database creation, <i>field</i> and <i>record</i> identifier information ( <i>attributes</i> ), data development process, map projection, and person to contact regarding the database; AKA data dictionary.
Metabolome	The small organic molecule composition in concentration units of a cell or compartment.
Metalliferous	Rich in metal.
Metamorphic rocks	Rock formed from the alteration of existing rock material due to heat and/or pressure
Metalloid	An element which behaves partly as a metal and partly as a non-metal, sometimes referred to as a “semi-metal”.
Metallome	The element composition in concentration units of a whole or a part of a cell where the element may be in free or combined form.
Micellar electrokinetic chromatography	Separation mode in capillary electrophoresis, separating according to the ability of apolar analytes to enter the (apolar) core of surface charged micelles
Micronutrient	General term for dietary essential nutrients required in relatively small amounts (less than multiple milligrammes) per day; includes the vitamins and trace elements.
Microradiograph	A picture produced using x-rays or rays from a radioactive source showing the minute internal textures of a planar thin section of a mineralized tissue sample.
Mineral	A naturally occurring compound with definite chemical composition and crystal structure, of which there exist over 4000 officially defined species.
Mineral elements	Equal to “elements”. This term is used by nutritionists.
Mineral group	An aggregate of mineral species that share structural and chemical affinities.
Mineralisation	The presence of ore and non-ore (gangue) minerals in host rocks, concentrated as veins, or as replacements of existing minerals or disseminated occurrences; typically gives rise to rocks with high concentrations of some of the rarer elements
Mineral nutrient	Mineral Nutrient A metal, non-metal or radical that is needed for proper body function and maintenance of health; also used in reference to plant nutrition.
Mitochondrion	Subcellular organelle containing the electron transport chain of cytochromes and the enzymes of the tricarboxylic acid cycle and fatty acid oxidation and oxidative phosphorylation, thus, constituting the cell’s primary source of energy.
Mitogenic	A factor that causes mitosis of cells
Mitosis	The division of a cell into two daughters with identical complements of the nucleic material (chromosomes) characteristic of the species.

Model	A conceptual, physical, or mathematical representation of a real system or process.
Monoclinic	The description of a special crystallographic form for the structure of a compound in which the three axes are not mutually perpendicular.
Monooxygenase	A class of oxidoreductases that catalyze the dissociation of molecular (diatomic) oxygen such that single oxygen atoms are bound to different products of the reaction.
MT	Metallothionein
Mucosal Cell	Cell of the mucous membranes of the gastrointestinal tract
Multichannel Analyzer (MCA)	An instrument that collects, stores and analyses time-correlated or energy-correlated events
Multistage carcinogenesis model	A mathematical model that assumes a sequential series of DNA damaging events is necessary for a single cell to become malignant. The model also assumes linearity at low doses.
Mycelium	The vegetative part of a fungus (or in some cases bacteria), consisting of a mass of branching, threadlike hyphae.
Mycorrhizae	Symbiotic fungi which colonise the outer layers of the roots of many plant species and whose external mycelium effectively increases the effective absorptive surface area of the roots
Myocyte	A muscle cell
Myxedematous Cretinism	Form of mental retardation caused by perinatal iodine deficiency
Natural Background	A term used to describe the geochemical variability, the range of data values, due to natural processes, characterizing a particular geological or geochemical occurrence. See also "background" and "baseline".
Nebulizer	Interface at plasma detectors for aerosol production
Necrosis	Cell death
Nephrotoxin	Cytotoxin specific for cells of kidney
Neurotransmitter	Any of several compounds released by neurons to stimulate other neurons.
Neutrophil	A specific type of white blood cell
NOAEL	The highest dose at which no observed adverse effects occur in an experimental setting
Nuclide	A general term applied to any atom with data on the number of protons and neutrons in its nucleus
Odds	Probability of disease divided by probability of not-disease (p/1-p) within a study group (e.g. exposed individuals).
Odds-ratio	Ratio between odds for exposed and odds for non-exposed (odds <sub>+exp</sub> /odds <sub>-exp</sub> ).
Oligonucleotide	A DNA polymer composed of only a few nucleotides
Omnivores	Animals normally feeding on both plant and animal material. Species considered omnivores are humans, dogs and swine
Oncogene	A gene that controls growth and when aberrant or when

	activated inappropriately may permit cancer to develop
Operon	A cluster of genes with related functions that are under the control of a single operator and promoter, thereby allowing transcription of these genes to be turned on and off.
Organelle	A compartment found in eukaryotes derived from captured bacteria and with residual independent genes e.g. <i>mitochondria</i> which create useful energy from oxidation of sugars and <i>chloroplasts</i> which create useful energy from light generating oxygen
Organisation	A managed flow of material and energy in contrast with static order.
Organ Systems	Part of body performing a specific function
Orthogonal (analytical) speciation concept	Analytical strategies which employ combinations of various separation and/or detection methods are called orthogonal analytical concepts.
Orthologue	A gene in two or more species that has evolved from a common ancestor.
Osteoblasts	A bone-forming cell; function with bone-removing cells (osteoclasts) in the normal process of bone remodeling.
Osteoclasts	Multinucleate cells that destroy bone tissue.
Osteomalacia	Impaired mineralization of bone tissues resulting in areas where mineral is missing. One possible cause of osteomalacia is a deficiency of Vitamin D the hormone required for adequate calcium absorption and deposition as bioapatite in bone tissues
Osteon	The bulls eye pattern of concentric rings of lamellar bone around a vascular canal. This structure is detected in tissue sections that form as a result of bone tissue remodeling. See haversian bone.
Osteoporosis	A generalized term for the loss of bone tissues in bone organs. There are multiple possible causes of osteoporosis and the loss may occur at any age but is more prevalent in older individuals. The variations of osteoporosis remain active areas for investigation
Osteosclerosis	Disease characterized by abnormal hardening of bone due to excessive calcification.
Oxalic Acid	A dicarboxylic acid (ethane dioic acid, C <sub>2</sub> H <sub>2</sub> O <sub>4</sub> ) found in some plants and produced by molds; forms stable chelation complexes with divalent cations (Ca <sup>++</sup> , Mg <sup>++</sup> , Fe <sup>++</sup> , Zn <sup>++</sup> , Cu <sup>++</sup> ) rendering them unavailable from the diet.
Oxidation	Chemical process which can lead to the fixation of oxygen or the loss of hydrogen, or the loss of electrons; the opposite of reduction
Oxidoreductase	An enzyme that catalyzes an oxidation-reduction reaction
P53 gene	A tumour suppressor gene that codes for a transcription factor involved in preventing genetically damaged cells from proliferating.
Paget's Disease	A disorder in which the normal resorption and sculpting of bone is compromised and superfluous or more dense

	mineralized tissue is deposited.
Parakeratosis	Retention of nuclei in the cells of the stratum corneum
Parasitimia	The condition of having parasites within the bloodstream. Usually the parasite is a protozoan.
Parathyroid Hormone	Hormone secreted by the parathyroid gland; important in the homeostatic regulation of serum calcium levels
Parenteral	Administration of substance into organism not through gastrointestinal tract but through intramuscular, subcutaneous or intravenous injection
Parent material	The weathered rock material on which a soil is formed. Can be either fragments of the underlying solid geology, or transported drift material overlying the solid geology.
Parkinsonism	Clinical syndrome characterized by diminished facial expression, slowness of voluntary movement, rigidity, tremor and stooped posture
Pedogenesis	The process of soil formation involving various physical and chemical processes which give rise to the formation of a soil profile. The nature of soil formed is determined by the interactions of the climate, vegetation, parent material, topography and time.
Periodic Table	A tabular classification of the chemical elements whereby they are organised into (vertical) groups based on progressive increases in numbers of electron shells surrounding the atomic nucleus and (horizontal) rows based on changes in the internal complexities of the electron shells. Elements within any group have similar chemical properties.
Periplasm	a secondary enclosed compartment of a prokaryote outside the cytoplasm and surrounding it
Permafrost	Permanently ice-bearing frozen ground, found in Arctic, Antarctic and some high altitude regions.
pH	A measure of the acidic (or alkaline) nature of an aqueous solution, expressed as the negative base-10 logarithm of the activity of protons in the solution. Solutions with pH values below 7 are considered acidic; values greater than 7 indicate basic (or alkaline) conditions
Phagocytosis	A type of endocytosis in which extensions of a plasma membrane engulf extracellular particles and transport them into the interior of the cell.
Pharmacognosy	The study of the useful drug effects of natural products
Phase	A volume of space, solid, liquid, or gas in equilibrium with other volumes and described by a boundary. A homogeneous, distinct portion of a chemical system
Phase diagram	A graphical representation of the stability relationships between phases in a chemical/physical system usually representing states at equilibrium. The presentation usually depicts relationships based on changes in composition, temperature or pressure..
Phenotype	The physical characteristics of an organism: can be defined as outward appearance (such as flower colour), as behaviour

	or in molecular terms (such as glycoproteins on red blood cells).
Phosphorite	A sedimentary rock with a high percentage of phosphate materials, shell or bone fragments, that may be mined for use as fertilizer. Prominent textural features are often nodules, and pellets, of extremely fine-grained calcium phosphate.
Photoelectron	Electron that is ejected from the surface when light falls on it
Phyllosilicate	A group of aluminosilicate minerals that have a sheeted crystal structure that permits cations to be trapped between the sheets and around the sheet edges. Because of these properties some are capable of sequestering geochemically significant amounts of cations, metals.
Phytic Acid	Inositolhexaphosphoric acid ( $C_6H_6O_6[H_2PO_3]_6$ ) found in plants; forms stable chelation complexes with divalent cations ( $Ca^{++}$ , $Mg^{++}$ , $Fe^{++}$ , $Zn^{++}$ , $Cu^{++}$ ) rendering them unavailable from the diet
Phytoavailability	A specific instance of bioavailability with reference to plants. In some instances it is useful to differentiate between phytoavailability and bioavailability along the food chain. Phytoavailability controls the transfer of a trace element from soil to a plant, and bioavailability controls the transfer of the trace element from the plant material to the receptor organism, the transfer factors are unlikely to be the same.
Phytosiderophores	Organic compounds released by the roots of some plants suffering from a deficiency of iron or certain other micronutrients. They mobilize iron and elements co-precipitated onto iron oxides and render them available for uptake by the plant
Phytotoxic	Toxic to plants
Pica	A craving for unnatural articles of food. The name pica comes from the Latin for magpie, a bird that picks up a variety of things either to satisfy hunger or out of curiosity. Geophagy, the deliberate ingestion of soil, is a form of pica
Placer deposits	Alluvial deposits which contain ore minerals: (commonly native gold, platinum, diamond, cassiterite) in economic quantities; these are heavy minerals which are concentrated by reworking of primary ore bodies; they typically concentrate in low-energy environments such as floodplains and deltas. Many important placer deposits occur also as beach placers where they have been concentrated by the seawater movement.
Platelet	A non-nucleated, hemoglobin-free cellular component of blood that functions in clotting; also called a thrombocyte
Platform	A term used in geology to describe a large stable section of the Earth's crust that is unaffected by current mountain building. Commonly formed over long periods of time by

	the erosion of the Earth=s surface to relatively low relief.
Plaque	The unwanted deposition of mineral materials in tissue areas such as in the vascular system or around teeth within the gum tissues.
Pleiotropy	A situation in which a single gene influences more than one phenotypic characteristic.
Pleural plaques	A fibrous thickening of the parietal pleura, characteristically caused by inhalation of the fibers of asbestiform minerals
PM standard	The PM (particulate matter) standard is based on the total mass of particles measuring 2.5 microns or less observed in a 24-hour period.
Pneumoconiosis	A chronic fibrosing lung disease from contact with respirable mineral dusts; examples include silicosis and asbestosis
Podsol	A type of soil which can be found in cool, humid environments on freely drained parent materials usually under coniferous trees or ericaceous vegetation. Typically has an iron pan as a result of leaching. Also called Spodosols in the USDA Soil Taxonomy classification.
Polymorph	A term applied in mineralogy to describe minerals with the same composition that can crystalize in multiple crystallographic forms. Possibly the most well-known polymorphic minerals are calcite and aragonite, both have the chemical composition CaCO <sub>3</sub> .
Primary/Secondary	Secondary and primary, terms used to describe position in the biogeochemical cycle. Primary refers to bedrock, and secondary refers to weathering products and processes resulting from, or acting on, primary rock material.
Primitive cell	A cell thought to have existed some 3 to 4 billion years ago though a related form can be found in extreme anaerobic conditions today.
Prions	An infectious microscopic protein that lacks nucleic acid thought to be responsible for degenerative diseases of the nervous system called transmissible spongiform encephalopathies (TSEs). They are transmissible within and between species
Progesterone	The steroid hormone produced by the corpus luteum, adrenal cortex and placenta that prepares the uterus for reception and development of the fertilized ovum.
Progestins	A general term for the natural or synthetic progestinal agents.
Prokaryote	Cells of the domains Bacteria or Archaea. Prokaryotic cells have genetic material that is not enclosed in a membrane-bound nucleus; they lack other membrane-bound organelles.
Proteome	The full complement of proteins produced (eller expressed) by a particular genome.
Protista	Eukaryotic one-celled living organisms distinct from multicellular plants and animals: protozoa, slime molds and eukaryotic algae.

Protozoa	Comprises flagellates, ciliates, sporozoans, amoebas and foraminifers
Pulmonary alveoli	Out-pouchings on the fine lung passages in which oxygen exchange between the alveoli and the blood stream occurs.
Pump (in the context of organisms)	A mechanical protein-based device in a cell membrane for transferring material from one compartment to another.
Purkinje cells	Large nerve cells found in the cerebellum, a large portion of the posterior aspect of the brain
Pyrite	Iron sulphide (FeS <sub>2</sub> ), otherwise known as fool's gold; occurs commonly in zones of ore mineralisation and in sediments under strongly reducing conditions
Pyroclastic flow	A fast-moving heated cloud of gas and volcanic particles produced by explosive eruptions or volcanic dome collapse
Quaternary structure	The three-dimensional structure of a multisubunit protein; particularly the manner in which the subunits fit together.
Quaternary	The most recent period of geological time, spanning 0–2 million years before present; divided into the earliest period, the Pleistocene (ending with the last glacial maximum), and the subsequent Holocene (the last 13,000 years)
Radioactivity	Atoms (known as radionuclides) which are unstable and will change naturally into atoms of another element accompanied by the emission of ionizing radiation. The change is called radioactive decay
Radionuclides	A radioactive nuclide.
Radon	A colourless radioactive element; comprises the isotope radon-222, a decay product of radium. <sup>222</sup> Rn (radon) is a gas. It occurs in the uranium-238 decay series and provides about 50% of the total radiation dose to the average person
Radon potential map	A map showing the distribution of radon prone areas delineated by arbitrary grid squares, administrative or geological boundaries. The radon potential classification may be based on radon measurements in existing dwellings, measurements of radon in soil gas, or proxy indicators such as airborne radiometric measurements
Raman microprobe	Vibrational spectroscopic technique where light scatter allows for characteristic spectra of materials to be obtained
Raster	A model of spatial data using an x,y coordinate system, rows and columns, and representing features as cells, or pixels, within.
Reactive Oxygen Species	General descriptor for the superoxide (O <sub>2</sub> <sup>-</sup> ), singlet oxygen (O) and hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ), each of which has a much greater chemical reactivity with intracellular nucleophiles (proteins, DNA) than molecular oxygen from which it is derived metabolically.
Recessive	A mode of inheritance in which a gene must be present from both parents for the trait to become manifest in an offspring.
Recharge	Process by which water is added from the atmosphere or ground surface to the saturated zone of an aquifer, either

	directly into the aquifer, or via another formation.
Record	a unique entity, commonly in GIS a location, that possesses different values for its <i>attributes in fields</i> .
Redox reactions	Coupled chemical oxidation and reduction reactions involving the exchange of electrons; many elements have changeable redox states, in groundwater the most important redox reactions involve the oxidation or reduction of iron and manganese, introduction or consumption of nitrogen compounds (including nitrate), introduction or consumption of oxygen (including dissolved oxygen) and consumption of organic carbon
Redox potential (pe or Eh)	pe and Eh are related variables that express a measure of the ratio of the aqueous activity of an oxidized species (an electron acceptor, such as $\text{Fe}^{3+}$ ) to that of a reduced species (an electron donor, such as $\text{Fe}^{2+}$ ). The redox potential of a solution can provide a sense of the oxidizing or reducing nature of a solution or aqueous environment (oxic, suboxic, sulfidic, methanic).
Reduction	Chemical process leading to the loss of oxygen or increase of electrons by a compound; the opposite of oxidation
Reducing condition	Anaerobic conditions, formed where nearly all of the oxygen has been consumed by reactions such as oxidation of organic matter or of sulphide; reducing conditions commonly occur in confined aquifers
Reference Nutrient Intake (RNI)	The daily dietary value of a nutrient above which the amount will almost certainly be adequate for everybody.
Regolith	A deposit of physically and/or chemically weathered rock material which has not developed into a soil due to the absence of biological activity and the presence of organic matter.
Reitfield refinement	A method of calculating the three dimensional structure of compounds
Relational database	Database where data are organised according to the relationships between entities.
Repair (DNA)	The action of biological machinery to fix damage, especially referring to maintenance of DNA integrity.
Reservoir (biological)	A host, carrier, or medium (such as soil) that harbors a pathogenic organism, without injury to itself in the case of carriers, and can directly or indirectly transmit that pathogen to individuals.
Residence time	Period during which water, solutes or particles remain within an aquifer or organisms as a component part of the hydrological cycle.
Respiratory distress	Impairment of lung function, often resulting in uncomfortable respiratory symptoms, lowered oxygenation and/or elevated carbon dioxide levels in the blood
Retention time	Elution time of a compound in a chromatographic system depending on its interaction at the stationary phase
Rheumatoid	Indefinite term applied to conditions with symptoms related to the musculoskeletal system

Rhizosphere	The zone surrounding the roots of plants which has chemical properties are quite different from the bulk of the soil.
Rhizosphere	The zone around plant roots (2mm thick) in which there is intense microbial activity due to root exudates.
Ribozyme	RNA molecule with catalytic activity.
Rickets	Disease of children characterized by undre-mineralization of growing bone, leading to physical deformities of the weight-bearing bones most notably of the legs, wrists and arms.
Risk assessment	A systematic way of estimating the probability of an adverse outcome based on the known properties of a hazard such as a chemical
RR	Relative risk. A risk is the number of occurrences out of the total. Relative risk is the risk given one condition versus the risk given another condition. Used in epidemiology.
Ruminants	Several groups of animal species utilizing bacteria, fungi and protozoa in their forestomachs to digest cellulose and starch in plants eaten so the nutrients can be absorbed in the gut of the animal. Cattle, sheep, goats, antelopes, deer and camels are examples of ruminants.
Saline intrusion	Phenomenon occurring when a body of salt water invades a body of fresh water; can occur either in surface water or groundwater bodies.
Saprophyte	An organism, often a fungus or bacterium, that obtains its nourishment from dead or decaying organic matter
Saprozoonoses	A zoonotic disease where transmission requires a non-animal development site or reservoir. Soil can often serve as the reservoir.
Sarcomatoid	Resembling a sarcoma, a neoplasm of soft tissue
Sarcoidosis	A systemic granulomatous disease of unknown cause
Scanning Electron Microscope (SEM)	A method employing an electron microscope and a finely focused beam of electrons that is moved across a sample allowing the surficial textures to be examined at high resolution and the image displayed. By collecting the emitted electrons from a single spot (size 1-10 microns) chemical analysis of portions of the sample, i.e. a specific mineral species, can be made using energy dispersive x-ray analysis (SEM/EDXA).
Screw axis	A specific translational and rotational characteristic of a lattice direction (axis) defined as part of one of the known 230 space groups. The calcium apatite group has a screw axis designated as $6_3$ . The 'c' axis has six-fold-symmetry with a screw. The screw rotates $120^\circ$ around the six-fold-axis with each $1/3$ translation along the axis, part of the space group designation of the apatite unit cell.
Sedimentary rock	Rock formed by compression of material derived from the weathering or deposition of preexisting rock fragments, marine or other organic debris or by chemical precipitation

Selenocysteine	An unusual amino acid of proteins, the selenium analogue of cysteine, in which a selenium atom replaces sulfur
Selenomethionine	2-amino-4- (methylseleno) butanoic acid.
Selenosis	Selenium toxicity.
Sesquioxide	Oxide mineral(s) containing three atoms of oxygen and two atoms of another chemical substance. Iron- and aluminium oxides are the most important in the natural environment.
Shale	A sedimentary rock composed of fine particles, mainly made up of clay.
Silicate	A mineral composed dominantly of silicon and oxygen, with or without other elements such as magnesium, iron, calcium, sodium and potassium.
Silicosis	A form of pneumoconiosis produced by inhalation of fine silica particles
Smectite	A group of clay minerals (phyllosilicates) that includes montmorillonite and minerals of similar chemical composition. They possess high cation exchange capacities, and are therefore capable of sequestering labile cations.
Soil profile (solum)	The vertical section of a soil from the surface to its underlying parent material. It comprises distinct layers (horizons) differing in appearance, or texture and chemical properties. The soil profile is the basis of soil classification (soils with characteristic combinations of horizons).
Soil texture	The relative proportions of sand (0.05-2mm), silt (0.002-0.05mm) and clay (<0.002mm) sized particles in a soil which affect both its physical and chemical properties.
Solubility	Equilibrium concentration of a solute in water at a given temperature and pressure when the dissolving solid is in contact with the solution.
Sorption	The retention of ions on solid surfaces in the soil by a combination of mechanisms: ion exchange, specific adsorption, precipitation and organic complexation.
Space group	A mathematical expression that uniquely defines the three dimensional array typical of a crystalline material.
Spallation	Splitting off, particularly applied to splitting off parts of the nucleus of an atom, resulting in the formation of a different element
Spherule	A small spherical structure of the invasive phase of <i>Coccidioides immitis</i> that fills with endospores as it matures. The spherule ruptures at maturity releasing the infective endospores into the host.
Spongiosis	Intercellular edema of epidermis
Spray chamber	Part of sample introduction system, connected to a nebulizer. Droplets from the aerosol that are too big are discarded.
Squamous cell carcinoma	Malignant neoplasm derived from stratified squamous epithelium
Stable isotope	Isotope which does not undergo radioactive decay.
Standardised mortality ratios	A statistical method for comparing the mortalities of

	different population groups by separating data according to sex and then age band
Steatosis	General terms describing fatty degeneration. t-RNA      Transfer ribonucleic acid; any of a number of such intracellular factors involved in protein synthesis by transferring in sequence individual amino acids to the ribosome.
Stereoisomer	One of two forms of a compound that is indistinguishable from the other outside of the orientation in space. An enantiomer.
Stoichiometric	A term applied when a phase or compound has the charge balance and chemical proportions expected in the ideal formula.
Swayback	Neonatal ataxia, a clinical manifestation of copper deficiency in lambs. The condition is characterized by incoordination of movement and high mortality. This nervous disorder is known by a number of local names, swayback being the most common. The disease is known as Lamkrius in South Africa, Kipsiepsiep in Kenya and enzootic ataxia in several other countries, including the former USSR
Symbiosis	The cohabiting of more than one organism which supply one another with vital material and energy.
Synergy	A positive interaction
Tachycardia	Rapid heart beat.
Tachypnea	Rapid breathing.
Tephra	Any solid material produced and made airborne by volcanic activity (including bombs, blocks, ash and dust)
Termite mounds	A common source of geophagical material in the tropics. The edible part of a termite mound is the extremely mineraliferous, soft protected interior comprising the Queen's chamber, nursing galleries and fungus gardens.
Tetrahedral orthophosphate group	The three-dimensional atomic array in which four oxygen atoms are distributed at the apices of the tetrahedron around the phosphorus atom.
Theme (GIS)	A GIS data layer, or coverage used in an overlay analysis with spatial referencing.
Threshold	(In biology) A dose level, below which, no adverse effect is expected. (In earth science) represents the upper or lower limit of background – above or below which is anomalous.
Thylakoid	A disk-shaped, membranous sac found in chloroplasts, the membranes of which contain the photosystems and ATP-synthesising enzymes used in the light-dependent reactions of photosynthesis.
Thyroxine	Also referred to as 3:5,3':5' tetraiodothyronine (T <sub>4</sub> ) is the major hormone secreted by the thyroid gland. T <sub>4</sub> is involved in controlling the rate of metabolic processes in the body and influencing physical development

TNF	Tumour necrosis factor.
Tomography	A method employing transmission x-radiological analysis to visualize the bones or bony portions of the skeleton. The x-ray source moves relative to the patient.
Tonsillar Herniation	Physical displacement of cerebellar tonsil into foramen magnum, a large opening at base of brain
Toxicodynamics	The mechanisms by which xenobiotics induce their effects in the body; the mechanisms of the toxic response
Toxicokinetics	The mechanisms by which xenobiotics are handled in the body, comprising the steps <i>absorption, distribution, metabolism</i> and <i>excretion</i>
Toxicology	Originally, the study of poisons and now the general science of the handling by and response of the body to xenobiotics and the patterns of adverse effects that result
Toxocariasis	Also called visceral larva migrans (VLM), toxocariasis is caused through infection with the larvae of <i>Toxocara canis</i> or <i>T. cati</i> (the common roundworm of dogs and cats, respectively). After infection, the eggs hatch into larvae and are carried into the circulation and to various tissues. Respiratory symptoms develop, and there is a swelling of body organs such as the liver. A complication of VLM is epilepsy and ocular larva migrans; the latter caused by microscopic worms entering the eye.
Toxoplasmosis	A disease attributable to the ingestion of <i>Toxoplasma gondii</i> , one of the most common human parasites, infecting 30-60% of the global population. Commonly caused by eating of undercooked meat with soil ingestion as secondary source. Recent research has suggested that human behavior can be adversely affected following <i>T. gondii</i> infection.
Trace Elements (in Medicine)	General term for the nutritionally essential mineral elements that are required at levels of intake less than ca. 50 mg d <sup>-1</sup> ; includes: iron, copper, zinc, iodine, selenium, manganese, molybdenum, chromium, fluoride and cobalt
Transcription	The act of producing RNA from DNA leading to <i>translation</i> , protein production.
Transfection	The uptake and expression of a foreign DNA sequence by cultured eukaryotic cells or the introduction of foreign DNA into a host cell
Transposon	A segment of DNA that can become integrated at many different sites along a chromosome (especially a segment of bacterial DNA that can be translocated as a whole).
Trichiuriasis	Infestation with the roundworm <i>Trichuris trichiura</i> that may cause nausea, abdominal pain, diarrhea, and occasionally anemia and rectal prolapse.
Triiodothyronine	Also referred to as 3,5,3' triiodothyronine (T <sub>3</sub> ) produced in the thyroid gland and involved in controlling the rate of metabolic processes in the body and physical development
Toxicity	State of being poisonous disturbing organ function
Trabecular	The porous tissues forming the internal sectors of bones.

	The trabeculae are bone tissue spicules. This type of tissue is often adjacent to the hollow core or within the marrow cavity.
TSE	Transmissible spongiform encephalopathies (TSEs) are rare forms of progressively degenerative diseases of the nervous system that affect both humans and animals. They are caused by agents called prions and generally produce spongiform changes in the brain. Examples include chronic wasting disease (CWD) in deer and elk, bovine spongiform encephalopathy (BSE) in cattle, and Creutzfeldt-Jakob disease (CJD) in humans
Type 1 collagen	The special variety of the collagen molecule typically found in the matrix of tissues that will become mineralized as bone
Ultramafic rock	Igneous rock composed substantially of ferromagnesian silicate minerals and metallic oxides and sulfides, with < 45% silica, and almost no quartz or feldspar
Ultrastructure	Morphometry of particles and cell structure based on electron microscopy
Unconfined aquifer	Aquifer containing unconfined groundwater, that is having a water table and an unsaturated zone
Unit cell	The smallest geometric volume that uniquely defines the composition and precise structure of a crystalline compound. The basis for the repetitive pattern that completely characterizes a compound, its chemistry and three-dimensional arrangements of all the constituent atoms.
USDA Soil Taxonomy	The soil classification system devised by the United States Department of Agriculture (published in 1975).
Vasodilation	Expansion of the blood vessels.
Volcano	An opening in the crust from which gases, lava and/or tephra are expelled
Vadose Zone	Also known as the 'unsaturated zone' is the part of the Earth's surface extending down to the water table
Vector (GIS)	Model of spatial data using points, lines, and polygons to represent geospatial features and boundaries. Cf. "vector" in the entomological sense, typically an arthropod that transmits disease-causing pathogens to humans, as used in the following chapter.
Vector-borne disease	Disease that are transmitted from one vertebrate host to another by an invertebrate, usually an insect, tick, or snail.
Viremia	The existence of virus or viral particles in the bloodstream.
Virulence	The capacity of a microorganism for causing disease.
$V_{\max}$	The maximum velocity (never attained) in enzyme kinetics
Volatile fatty acids (VFA)	Common name for acetic acid, butyric acid and propionic acid normally formed under anaerobic conditions in the fore-stomachs and large intestine of herbivores. After absorption from the gastro-intestinal tract VFA can be further metabolized and used mainly for energy production.

	In ruminants VFA are the dominating energy source equivalent to glucose in the metabolism of other species
Volcanic Gas	Gas produced by volcanic activity or geothermal processes. Steam is the most common gas; those of relevance to health include the inert asphyxiants, irritants gases, or noxious asphyxiants
Volcanic monitoring	Geological and epidemiological testing and surveillance prior to, surrounding, and subsequent to an eruptive event or degassing episode; includes the period of post-disaster recovery and rehabilitation
Voltammetry	An electrochemical determination method based on the characteristic redox potential of the measured compound
Water hardness	The content of metallic ions in water, predominantly calcium and magnesium, which react with sodium soaps to produce solid soaps or scummy residue and which react with negative ions to produce scale when heated in boilers
Weathering	A process at or near the Earth's surface caused by the interaction of water, oxygen, carbon dioxide and organic acids with the minerals present; includes hydrolysis and oxidation reactions. Weathering can result in the formation of new mineral suites that are in equilibrium with their environment. In Arctic and high mountainous regions chemical weathering may be limited, and weathering is largely limited to mechanical breakdown due to frost action that liberates fragments of the pre-existing minerals.
White Muscle Disease	A complex medical condition, which is multi-factorial in origin but linked to selenium deficiency. Causes degeneration of the muscles in animal species. In lambs born with the disease, death can result after a few days. Later in life, animals have a stiff and stilted gait, arched back, are not inclined to move about, lose condition, and die.
World Reference Base for Soil Resources	A classification system, data base and atlas produced by working group RB International Society of Soil Science in 1998.
Woven bone	The first deposited bone tissue that may display a haphazard distribution of matrix, cells, vascular channels, and mineral and which is usually later reworked into lamellar or Haversian bone over time.
Xenobiotic	A chemical substance foreign to the body or introduced to the body in higher quantities or by a different pathway than occurs in normal metabolism
X-ray/electron diffraction	The method employed to examine the crystallinity and crystal structure of materials.
X-ray diffraction maxima	The periodic coherent scattering of x-rays that arise from crystalline materials. The data used to determine the coordinates from which the space group and unit cell of the compound can be determined.
Zoonotic / Zoonosis	A disease which has a natural reservoir in an animal or non-

	human species, that can be transmitted to humans.
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