

# Glossary

**abomasum** The last of four chambers in the complex ruminant stomach; homologous to the stomach of other vertebrates. *See* omasum, reticulum, and rumen.

**acceleration** Rate of change of velocity, or how fast velocity is changing.

**accommodation** The eye's ability to bring an object into focus.

**acoustic** Pertaining to hearing or perception of sound.

**action potential** An all-or-none membrane depolarization propagated along a nerve fiber without loss of amplitude.

**activation** Changes in an egg initiated by fertilization that begin cell division.

**acuity** The sharpness or keenness of sensory perception, as in sharp vision and keen hearing.

**adaptation** A phenotypic feature of an individual that contributes to that individual's survival; a feature's form or function and associated biological role with respect to a particular environment.

**adrenergic** Pertaining to nerve fibers that release adrenaline or adrenaline-like neurotransmitter.

**advanced** Referring to an organism or species that is derived from others within its phylogenetic lineage. *See* derived and compare with primitive.

**aerial locomotion** Active flapping in flight; volant.

**aerobic** Using or requiring oxygen.

**afferent** Refers to the process of bringing to; for example, sensory afferent fibers convey impulses to the central nervous system. Compare with efferent.

**agnathan** A vertebrate lacking jaws.

**air bladder** A gas bladder for respiratory exchange or buoyancy control.

**air capillary** A small compartment within a bird lung in which gas exchange occurs. Compare with alveolus and faveolus.

**airfoil** Any object that produces lift when placed in a moving stream of air (as a bird wing).

**akinetic skull** A skull lacking cranial kinesis, that is, movable joints between skull bones.

**allantois** An extraembryonic extension of the hindgut of amniote embryos that functions in excretion and sometimes in respiration.

**allometry** The study of a change in size or shape of one part correlated with a change in size or shape of another part; this relationship can be followed during ontogeny or phylogeny.

**alpha motor neuron** A nerve cell that innervates extrafusal muscle cells. Compare with gamma motor neuron.

**alveolus** The smallest subdivision of respiratory tissue in mammalian lungs located at the ends of the branching respiratory tree. Compare with air capillary and faveolus.

**amble** A slow gait characterized by the two feet on the same side coming in contact with the ground simultaneously; a slow pace. Compare with pace.

**ammonotelism** Excretion of ammonia directly through the kidneys.

**amnion** A saclike membrane that holds the developing embryo in a compartment of water.

**amniote** A vertebrate whose embryo is wrapped in an amnion.

**amphystyly** Jaw suspension via two major attachments: the hyomandibula and the palatoquadrate.

**amplexus** A mating embrace of male frogs.

**anadromous** Characterizing fishes that hatch in fresh water, mature in salt water, and return to fresh water to breed; for example, salmon. Compare with catadromous.

**anaerobic** Not requiring oxygen.

**analogy** Features of two or more organisms that perform a similar function; common function.

**anamniote** A vertebrate whose embryo lacks an amnion.

**anastomoses** A network of connections between blood vessels.

**angiogenesis** Blood vessel formation.

**angle of attack** The orientation of the edge of a wing as it meets the oncoming airstream.

**angular acceleration** Rate of change of velocity around a point of rotation; rotational acceleration.

**anlage** (pl., anlagen) A primordium or formative embryonic precursor to a later development structure.

**antagonist** A muscle with an action opposite to that of other muscles. Compare with synergist and fixator.

**antler** A branched, bare bone that grows outward from skull bones on some artiodactyl species; usually grows annually in mature males and is shed during the nonreproductive season. Compare with horn.

**apnea** Temporary cessation of breathing.

**aponeurosis** A broad, flat tendon.

**arboreal locomotion** Movement through trees. Compare with brachiation and scansorial locomotion.

**archetype** The fundamental type or basic underlying blueprint or model on which a definitive animal or animal part is thought to be based.

**archinephric duct** A general term for the urogenital duct; alternative names (wolffian duct) are given it at different embryonic stages (pronephric duct, mesonephric duct, opisthonephric duct) or in different functional roles (vas deferens).

**archipterygial fin** A basic fin type in which the axis (metapterygial stem) runs down the middle of the fin. Compare with metapterygial fin.

**arcualium** An embryonic, cartilaginous anlage to parts of the adult vertebra.

**artery** Blood vessel carrying blood away from the heart; blood carried may be high or low in oxygen tension. Compare with vein.

**artificial taxon** A group of organisms not corresponding to an actual unit of evolution. Compare with natural taxon.

**aspidospondyly** The condition in which the centra and spines of vertebrae are anatomically separate. Compare with holospondyly.

**aspiration** Drawing in by suction.

**aspondyly** The condition in which centra are absent from vertebrae.

**atmosphere** The weight that a column of air exerts on an object at sea level; 1 atmosphere = 101,000 Pa = 14.7 lb/sq in.

**atrophy** A decrease in size or density. Compare with hypertrophy.

**auditory** Pertaining to the perception of sound.

**autostyly** Jaw suspension in which the jaws articulate directly with the braincase.

**axon** A nerve fiber of a neuron carrying an impulse away from the cell body.

**baculum** A bone within the penis.

**baleen** Keratinized straining plates that arise from the integument in the mouth of some species of whales.

**benthic** Bottom dwelling. Compare with pelagic and planktonic.

**bilateral symmetry** A body in which left and right halves are mirror images of each other.

**biogenetic law** Ernst Haeckel's claim that ontogeny recapitulates (repeats) phylogeny; now discredited.

**biological role** How the form and function of a part perform in an environmental context in order to contribute to the organism's survival. Compare with function.

**biomechanics** The study of how physical forces affect and are incorporated into animal designs.

**bipedal** Walking or running by means of only two hindlegs. Compare with quadrupedal.

**blastocyst** The mammalian blastula.

**blastopore** The opening into the primitive gut formed at gastrulation.

**blastula** The early embryonic stage that follows cleavage and consists of a hollow, fluid-filled ball of cells.

**bolus** Soft mass of food in the mouth or stomach. Compare with chyme.

**bound** A gait in which all four feet strike the ground in unison; a pronk in artiodactyls. Compare with half bound.

**boundary layer** The fluid layer closest to and flowing over the surface of a body.

**brachiation** Arboreal locomotion by means of arm swings and grasping hands, with the body suspended below the underside of branches. Compare with scansorial locomotion.

**brachyodont** Pertaining to teeth with low crowns. Compare with hypsodont.

**bradycardia** Abnormally slow heart rate. Compare with tachycardia.

**braincase** That part of the skull containing the cranial cavities and housing the brain.

**brain stem** The posterior part of the brain comprising the midbrain, pons, and medulla.

**branchial basket** The expanded chordate pharynx that functions in suspension feeding.

**breaking strength** The maximum force a structure reaches just before it fails or breaks.

**budding** A form of asexual reproduction wherein parts separate from the body and then differentiate into a new individual.

**bunodont** Pertaining to teeth with peaked cusps. Compare with lophodont and selenodont.

**bursa** A pouch or sac.

**calcification** A specific type of mineralization involving calcium carbonates (invertebrates) or calcium phosphates (vertebrates) in the matrix of special connective tissue.

**cannon bone** Hindlimb bone resulting from fusion of metatarsals III and IV (as in horses).

**canter** A slow gallop.

**capillary** The smallest blood vessel, which is lined only by endothelium.

**carapace** The dorsal, dome-shaped bony part of a turtle shell. Compare with plastron.

**carnassials** Sectorial teeth of carnivores, including upper premolars and lower molars.

**catadromous** Characterizing fishes that hatch in salt water, mature in fresh water, and return to salt water to breed; for example, some eels. Compare with anadromous.

**catecholamines** Epinephrine and norepinephrine hormones produced by chromaffin and other tissues.

**caudal** Toward the tail or back end of the body; posterior.

**cecal fermentation** Process by which microorganisms digest food in the ceca of the intestines. See intestinal fermentation.

**cecum** A blind-ended outpocketing from the intestines.

**cementum** Cellular and acellular layers that usually form on the roots of teeth, but in some herbivores, may contribute to the occlusal surface. *See* enamel and dentin.

**central nervous system** Nervous tissue comprising the brain and spinal cord.

**centrum** The body or base of a vertebra.

**ceratotrichia** Fan-shaped array of keratinized rods internally supporting the elasmobranch fin. Compare with lepidotrichia.

**cheek** The lateral fleshy wall of the mouth, especially in mammals.

**chemoreceptor** A sense organ that responds to chemical molecules. Compare with radiation receptor and mechanoreceptor.

**chiasma** Crossing of fibers.

**choana** The internal naris; the openings of the nasal passage into the mouth.

**cholinergic** Nerve fibers that release the neurotransmitter acetylcholine.

**chondrocranium** That part of the skull formed by endochondral bone or cartilage that underlies and supports the brain; also includes the fused or associated nasal capsules.

**chromaffin tissue** Endocrine tissue and source of catecholamines (e.g., epinephrine); becomes the medulla of the adrenal gland.

**chromatophore** General term for a pigment cell.

**chyme** The liquified bolus of partially digested food after it leaves the stomach and enters the intestine; digesta. Compare with bolus.

**ciliary body** The tiny ring of muscle in the eye that focuses the lens.

**clade** A natural evolutionary lineage including an ancestor plus all and only its descendants.

**cladogram** A branching dendrogram representing the organization and relationships of clades.

**claw** A sharp, curved, laterally compressed nail at the end of a digit; talon.

**cleavage** A rapid series of cell divisions that follows fertilization and produces a multicellular blastula.

**cleidoic egg** The shelled container in which the fetus is laid, as in reptiles, birds, and primitive mammals. Compare with egg.

**coelom** The fluid-filled body cavity formed within the mesoderm.

**collagen** Protein fibers secreted by connective tissue cells.

**collateral** Accompanying, ancillary, or subordinate.

**colloid** A gelatinous or mucoid substance.

**composite theory** The hypothesis that jaws evolved from several fused anterior branchial arches.

**compressive force** The direction of an applied force that tends to press or squeeze an object together.

**concurrent** Flow of adjacent currents in the same direction.

**contralateral** Occurring on the opposite side of the body. Compare with ipsilateral.

**coprophagy** The eating of feces, a behavior performed usually to process undigested material again; refection.

**copulation** Coitus involving an intromittent organ.

**coracoid** Posterior coracoid; an endochondral bone of the shoulder that first evolved in early synapsids or their immediate ancestors. Compare with procoracoid.

**cornified** Having a layer of keratin; keratinized.

**cortex** The outer portion or rim of an organ.

**corticosteroids** Steroid hormones.

**cosmine** An older term designating a derivative of dentin that covers some fish scales; cosmoid scale.

**countercurrent** Flow of adjacent currents in opposite directions.

**cranial** Toward the head or front end of the body; anterior or rostral.

**cranial kinesis** Movement between the upper jaw and braincase about joints between them; in restricted sense, skulls with a movable joint across the roofing bones. Compare with akinetic skull, prokinesis, mesokinesis, metakinesis.

**cranial nerve** Any nerve entering or leaving the brain. Compare with spinal nerve.

**crista** A mechanoreceptor within the semicircular canals of the vestibular apparatus of the ear; specialized neuromast organ detecting angular acceleration. Compare with macula.

**crop** A baglike expansion of the esophagus.

**cursorial locomotion** Rapid running.

**cutaneous respiration** Gas exchange directly between the blood and the environment via the skin.

**dead space** The volume of used air not expelled upon exhalation. Compare with tidal volume.

**decussation** A crossing tract of nerve fibers passing from one side to the other side of the central nervous system.

**deglutition** The act of swallowing.

**delamination** Splitting of sheets of embryonic tissues into parallel layers.

**dendrite** A nerve fiber of a neuron carrying impulses toward the cell body.

**dendrogram** A branching diagram that represents the relationships or the history of a group of organisms.

**dental formula** Shorthand expression of the characteristic number of each type (incisor, canine, premolar, molar) of upper and lower teeth in a mammalian species.

**dentin** A material that forms the bulk of the tooth and is similar in structure to bone but harder; yellowish in color and composed of inorganic hydroxyapatite crystals and collagen; secreted by odontoblasts of neural crest origin. *See* enamel and cementum.

**dentition** A set of teeth.

**derived** Denoting an organism or species that evolved late within its phylogenetic lineage; advanced; opposite of primitive.

**dermal papilla** The part of the tooth-forming primordium that is derived from neural crest cells, becomes associated with the enamel organ, and differentiates into odontoblasts that secrete dentin. *See* enamel organ.

**dermatocranium** That part of the skull formed from dermal bones.

**dermatome** An embryonic skin segment.

**dermis** The skin layer that lies beneath the epidermis and is derived from mesoderm.

**design** The structural and functional organization of a part related to its biological role.

**deuterostome** An animal whose anus forms from or near the embryonic blastopore; the mouth forms at the opposite end of the embryo.

**diarthrosis** A joint permitting considerable rotation of articulated skeletal elements, and characterized by a joint capsule, synovial membrane, and articular cartilages on joined elements; synovial joint.

**differentiation** During embryonic development, the process of cellular diversification.

**diffusion** The movement of molecules from an area of high concentration to an area of low concentration; if the movement is random and unaided, it is known as passive diffusion.

**digestion** The mechanical and chemical breakdown of foods into their basic end products—usually simple carbohydrates, proteins, fatty acids—that are absorbed by the bloodstream.

**digitigrade** A foot posture in which the balls of the feet (middle of the digits) support the weight, as in cats and dogs. Compare with plantigrade and unguligrade.

**dikinetic skull** A kinetic skull with two joints passing transversely through the braincase. Compare with monokinetic skull.

**dioecious** Pertaining to female and male gonads in separate individuals. Compare with monoecious.

**diphyodont** A pattern of tooth replacement involving only two sets of teeth, usually milk teeth and permanent teeth.

**dipleurula** A hypothetical invertebrate larva proposed as the common ancestor of echinoderms and hemichordates.

**diplospondyly** The condition in which a vertebral segment is composed of two centra. Compare with monospondyly.

**discoidal cleavage** Early mitotic divisions restricted to the animal pole; extreme case of meroblastic cleavage. Compare with holoblastic cleavage.

**dissection** The careful exposure of anatomical parts, allowing students to discover and master the extraordinary morphological organization of an animal in order to understand the processes these parts perform and the remarkable evolutionary history out of which they come. Pronounced *dis*-section, as opposed to *di*-section, which means chopping into two halves.

**distal** Toward the free end of an attached part, such as the limb. Compare with proximal.

**diurnal** Active during daylight. Compare with nocturnal.

**dorsal** Toward the back or upper surface of the body; opposite of ventral.

**down-regulation** Return of the gut, and other organs, to a resting state following digestion. Compare with up-regulation.

**drag** The force that resists the movement of an object through a fluid; total drag includes parasitic drag and induced drag.

**ecomorphology** The study of the relationship between the form and function of a part and how it is actually used in a natural environmental setting; the basis for determining biological role.

**ectomesenchyme** Loose association of cells derived from neural crest.

**ectotherm** An animal that depends on environmental sources of heat to reach its preferred body temperature. Compare with endotherm.

**edema** Swelling due to collection of fluid in body tissues.

**effector** An organ, such as a muscle or a gland, that responds to nervous stimulation.

**efferent** Refers to the process of carrying away; for example, motor neurons carry impulses away from the central nervous system.

**egg** The haploid cell produced by the female; ovum.

**elastic** In physical terms, the measure of a structure's ability to return to its original size following deformation.

**electric organ** A specialized block of muscles producing electrical fields and often high jolts of voltage.

**electromagnetic radiation** Energy waves through a spectrum that includes radio waves, infrared light, visible light, ultraviolet light, X rays, and gamma rays.

**electromyogram** The electrical record of a muscle contraction.

**electromyography** The study of the pattern of muscle contraction based on detecting its electrical activity.

**electroreceptor** A sensory organ that responds to electrical signals or fields.

**emargination** Large notches in the bony braincase. Compare with fenestra.

**embolomeros vertebral** A dispondylous vertebra in which both centra are separate (aspidospondylous) and of about equal size. Compare with stereospondylous vertebra.

**emulsify** To break up fats into smaller droplets. Compare with digestion.

**enamel** Forms the occlusal cap on most teeth; hardest substance in vertebrate body, consisting almost entirely of calcium salts as apatite crystals; secreted by ameloblasts of epidermal origin. See dentin and cementum.

**enamel organ** The part of the tooth-forming primordium that is derived from epidermis, becomes associated with the dermal papilla, and differentiates into the ameloblasts that secrete enamel. See dermal papilla.

**encapsulated sensory receptor** The terminus of a sensory nerve fiber that is wrapped in accessory tissue. Compare with free sensory receptor.

**endochondral bone formation** Embryonic formation of bone preceded by a cartilage precursor that is subsequently ossified; cartilage or replacement bone. Compare with intramembranous bone formation.

**endocrine** Denoting a gland that releases its product directly into blood vessels. Compare with exocrine.

**endocytosis** A phagocytic process in which materials, such as food particles and foreign bacteria, are engulfed by a cell.

**endoskeleton** The supportive or protective framework within the body that lies beneath the integument. Compare with exoskeleton.

**endothelium** The single-celled inner lining of vascular channels. Compare with mesothelium.



**endotherm** An animal capable of maintaining an elevated body temperature with heat produced metabolically from within. Compare with ectotherm.

**enteric nervous system** The network of nerves intrinsic to the digestive system.

**enterocoelom** The body cavity formed within outpocketings of mesoderm. Compare with schizocoelom.

**ependyma** The layer of cells lining the central canal of the chordate spinal cord.

**epiboly** The spreading of surface cells during embryonic gastrulation.

**epidermis** The skin layer over the dermis that is derived from ectoderm.

**epigenetics** The study of developmental events above the level of the genes; embryonic processes not directly arising from the genes that contribute to the developing phenotype.

**epiphysis** 1. The secondary center of ossification on the end of a bone; also refers to the end of a bone. 2. The pineal gland.

**estivation** A prolonged resting state or hibernation during times of heat or drought that is characterized by lowered metabolic levels and breathing rates.

**euryhaline** Having a wide tolerance to salinity differences.

**evolutionary morphology** The study of the relationship between the change in anatomical design through time and the processes responsible for this change.

**excretion** Removal of wastes and excess substances from the body.

**exocrine** Denoting a gland that releases secretions into ducts. Compare with endocrine.

**exocytosis** A process by which the cell releases products.

**exoskeleton** A supportive or protective framework lying on the outside of the body. Compare with endoskeleton.

**extant** Living.

**exteroceptor** A sensory receptor that responds to environmental stimuli. Compare with proprioceptor and interoceptor.

**extinct** Dead.

**extraembryonic** Pertaining to a structure formed by or around the embryo but not retained by or directly contributing to the adult body.

**extrafusal muscle cell** The fiber of striated muscles that actually contributes to the force moving a part. Compare with intrafusal muscle cells and alpha motor neuron.

**extrinsic** Originating outside the part on which it acts. Compare with intrinsic.

**failure** In mechanics, loss of functional integrity and ability to perform; a material may fail but not break. Compare with fracture.

**fascicle** A bundle of muscle fibers defined by a connective tissue coat within a muscle organ.

**fatigue fracture** Reduced breaking strength of an object after prolonged use.

**faveolus** A tiny respiratory compartment within the lung that opens to a central air chamber and results from the subdivisions of the lung lining. Compare with alveolus.

**fenestra** An opening within the bony braincase.

**fermentation** A process in which microorganisms anaerobically extract energy from food in vertebrates by releasing cellulase enzymes that break down plant material.

**fertility** The ability to produce viable eggs or sufficient sperm to propagate offspring; infertility results from nonviable eggs or insufficient sperm. Compare with potency.

**fetus** The embryo at a later stage in development.

**fin** An external plate or membrane that projects from the body of an aquatic animal (as in fishes).

**fixator** A muscle that functions to stabilize a joint. Compare with synergist and antagonist.

**flight** Aerial locomotion accomplished by active flapping of wings. Compare with gliding and parachuting.

**follicle** A small bag that holds cells containing hormones (e.g., thyroid follicle) or one that holds an ovum (e.g., ovarian follicle).

**footfall** Foot contact with the ground during locomotion.

**foramen** A perforation or hole through a tissue wall.

**foramen of Panizza** A connecting vessel between the bases of the left and right aortic arches in crocodylians.

**foramen ovale** The one-way connection between the right and left atria of an embryonic mammal; closes at birth.

**foregut** Anterior embryonic gut that gives rise to the pharynx, esophagus, stomach, and anterior intestine. Compare with hindgut.

**foregut fermentation** See gastric fermentation.

**formed elements** The cellular components of blood, excluding the plasma. Compare with plasma.

**fossorial locomotion** Active removal of soil to produce a burrow; digging.

**fracture** In mechanics, a break or loss of structural integrity; actual separation of material under load. Compare with failure.

**free sensory receptor** The terminus of a sensory nerve fiber that lacks any associated structures. Compare with encapsulated sensory receptor.

**frontal plane** A plane passing from one side of an organism to the other so as to divide the body into dorsal and ventral parts. Compare with transverse plane.

**fulcrum** The point of pivot or the axis of rotation.

**function** How a part performs within an organism. Compare with biological role.

**functional morphology** The study of the relationship between the anatomical design of a structure and the function or functions it performs.

**fusiform** Refers to a narrow shape tapering toward each end.

**gait** The pattern or sequence of foot movements during locomotion.

**gallop** A gait characterized by a high rate of speed and an uneven footfall pattern.

**gametogenesis** The production of mature male and female reproductive cells.

**gamma motor neuron** A nerve cell that innervates intrafusal muscle cells. Compare with alpha motor neuron.

**ganglion** A gathering of nerve cell bodies within the peripheral nervous system.

**ganoin** An older term for a derivative of the enamel that covers some fish scales; ganoid scale.

**gas bladder** A gas-filled bag in fishes derived from the gut. Because the composition of the gases can vary, the term *air bladder* is less appropriate. Compare with swim bladder and respiratory bladder.

**gastralia** Rib-shaped dermal bones located in the abdominal region.

**gastric fermentation** Process in which microorganisms digest food in a specialized stomach; also known as foregut fermentation. *See* intestinal fermentation.

**gastrocoel** The cavity within the early embryonic gut of the gastrula.

**gastrula** Early embryonic stage during which the basic gut is formed.

**general cranial nerve** A bundle of fibers that detect sensations from the widely distributed viscera. Compare with special cranial nerve.

**genotype** The genetic makeup of an individual.

**gestation** The time that elapses from conception to hatching or birth.

**gill** Aquatic respiratory organ.

**gill slit** Pharyngeal slit associated with a gill.

**gizzard** An especially well-muscularized region of the stomach used to grind hard foods.

**gliding** A gradual airborne descent that can be extended by the action of the body and limbs on the relative wind but is not self-powered. Compare with flight and parachuting.

**glomerulus** 1. A small bed of capillaries associated with the uriniferous tubule. 2. A small cluster of capillaries on the stomochord of hemichordates.

**gnathostome** A vertebrate with jaws.

**grade** A level or stage of evolutionary attainment; a paraphyletic group.

**graded potential** A nerve impulse proportional to the intensity of the stimulus that produces it and declining thereafter. Compare with action potential.

**gyrus** A swollen ridge on the surface of the brain. Compare with sulcus.

**hair cell** A mechanoreceptive cell with a projecting hair bundle composed of a kinocilium and several stereocilia.

**half bound** A gait in which the hindfeet contact the ground simultaneously, but the forefeet do not. Compare with bound.

**hemocoel** Blood-filled channels within connective tissue that lack a continuous endothelial lining.

**hemodynamics** The forces and flow patterns of blood circulating within vessels.

**hemopoietic tissue** Blood-forming tissue. Compare with myeloid tissue and lymphoid tissue.

**hepatocyte** A liver cell.

**heterochrony** Within an evolutionary lineage, the change in time at which a characteristic appears in the embryo relative to its appearance in a phylogenetic ancestor; usually concerned with the time of onset of sexual maturity relative to somatic development. Compare with paedomorphosis.

**heterodont** Dentition in which the teeth are different in general appearance throughout the mouth.

**hindgut** Posterior embryonic gut that gives rise to the posterior intestines. Compare with foregut.

**hindgut fermentation** *See* intestinal fermentation.

**holoblastic cleavage** Early mitotic planes pass entirely through the cleaving embryo. Compare with meroblastic and discoidal cleavage.

**holonephros** A single kidney arising from several regions of the nephric ridge rather than the three types of kidneys (pronephros, mesonephros, metanephros) arising from the nephric ridge.

**holospondyly** The condition in which the centra and spines of vertebrae are anatomically fused into a single bone. Compare with aspidospondyly.

**homeostasis** The constancy of an organism's internal environment.

**homeothermy** The condition of maintaining constant body temperature, without regard to the method.

**homodont** Dentition in which the teeth are similar in general appearance throughout the mouth.

**homology** Features in two or more organisms derived from common ancestors; common ancestry. Compare with serial homology.

**homoplasy** Features in two or more organisms that look alike; similar in appearance.

**hoof** An enlarged cornified plate on the end of an ungulate digit.

**hormone** A chemical messenger that is secreted into the blood by an endocrine organ and affects target tissues.

**horn** An unbranched keratinized sheath with a bony core located on the head; usually occurs in both males and females and is retained year-round. Compare with antler.

**hydrofoil** An object that produces lift when placed in a moving stream of water, as, for example, the pectoral fin of a shark.

**hydrostatic organ** A structure whose mechanical integrity depends on a fluid-filled core enclosed by walls of connective tissue.

**hydrostatic pressure** Fluid force, as in blood, resulting from heart contraction. Compare with osmotic pressure.

**hyostyly** Jaw suspension primarily through attachment with the hyomandibula.

**hyperosmotic** Refers to a solution whose osmotic pressure is greater than the solution that surrounds it; for example, the pressure of the tissue fluid within some fishes is greater than the pressure from the fresh water surrounding them. Compare with hyposmotic and isosmotic.

**hyperplasia** An increase in the number of cells as a result of cell proliferation; usually occurs in response to stress or increased activity. Compare with hypertrophy and metaplasia.

**hypertrophy** An increase in the size or density of an organ or part, which does not result from cell proliferation. Compare with hyperplasia and atrophy.

**hyposmotic** Refers to a solution lower in osmotic pressure than the solution that surrounds it. Compare with hyperosmotic and isosmotic.

**hypoxia** Inadequate levels of oxygen to support metabolic demands.

**hypodont** Teeth with high crowns. Compare with brachyodont.

**impedance matching** Adjustments of the sound conduction system to address the physical resistance that sound waves meet as they travel from the air to the fluid of the inner ear.

**implantation** The process by which the embryo establishes a viable residence within the wall of the uterus.

**incus** The middle ear bone of mammals derived phylogenetically from the quadrate.

**index fossil** A fossil animal widely distributed geographically but restricted to one rock layer or time horizon; defining species indicator of a stratum.

**induced drag** The resistance to forward travel resulting from the lift produced by an airfoil.

**ingression** A process by which individual surface cells migrate inward to the interior of the embryo.

**ingroup** The group of organisms actually studied. Compare with outgroup.

**insertion** The relatively movable site of attachment of a muscle. Compare with origin.

**integument** The skin covering the body.

**internode** In taxonomy, the line connecting nodes on a cladogram representing at least one ancestral species from a speciation event. Compare with node.

**interoceptor** A sensory receptor that responds to internal stimuli. Compare with proprioceptor and exteroceptor.

**interrenal tissues** Endocrine tissue that produces corticosteroids and becomes the cortex of the adrenal gland. Compare with chromaffin tissue.

**interstitial** Pertaining to the fluid-filled space between cells.

**intervertebral body** A pad of cartilage or fibrous connective tissue between articular ends of successive vertebral centra.

**intervertebral disk** A pad of fibrocartilage in the adult mammal that has a gel-like core derived from the notochord and is located between articular ends of successive vertebral centra. Compare with intervertebral body.

**intestinal fermentation** Process in which microorganisms digest food in the intestines; also known as hindgut fermentation and cecal fermentation. Compare with gastric fermentation.

**intrafusal muscle cell** The fiber of a striated muscle that is specialized as a sensory organ of proprioception; housed in a muscle spindle. Compare with extrafusal muscle cell, muscle spindle, and gamma motor neurons.

**intramembranous bone formation** Embryonic formation of bone directly from mesenchyme without a cartilage precursor; dermal bone. Compare with endochondral bone formation.

**intratarsal joint** An archosaur ankle in which the line of flexion passes *between* the calcaneus and the astragalus. Compare with mesotarsal joint.

**intrinsic** Belonging entirely to a part; that is, inherent to the part. Compare with extrinsic.

**intromittent organ** The male reproductive organ that delivers sperm into the female reproductive tract; penis or phallus.

**invagination** An indentation or infolding of the surface.

**involution** The turning of embryonic surface cells inward to spread across the interior of the embryo.

**ipsilateral** Occurring on the same side of the body. Compare with contralateral.

**ischemia** Insufficient blood flow to meet the metabolic demands of a tissue.

**isocortex** The cerebral cortex or outer layer of the mammalian cerebrum.

**isolecithal** Pertaining to an egg in which the yolk is evenly distributed throughout the cytoplasm. Compare with telolecithal.

**isometry** Geometric similarity in which proportions remain constant with changes in size.

**isosmotic** Refers to two solutions with equivalent solute levels. Compare with hyperosmotic and hyposmotic.

**jaws** Skeletal elements of bone or cartilage that reinforce the lower borders of the mouth.

**keratin** Fibrous protein.

**keratinization** The process by which the skin forms proteins, especially keratin.

**kinesis** Movement; usually refers to the relative movement of skull bones. *See* cranial kinesis.

**kinocilium** A modified, rigid cilium of the ear. Compare with microvillus.

**lactation** The release of milk from mammary glands to suckling young.

**lacuna** A small space.

**lamina** A thin sheet, layer, or plate; for example, gill lamella.

**laminar flow** The movement of fluid particles along smooth paths through layers that glide over one another. Compare with turbulent flow.

**larva** An immature (nonreproductive) stage that is morphologically different from the adult.

**lateral** Toward or on the side of the body.

**lecithotrophic** Pertaining to the nutrition that the embryo receives from the yolk of the ovum. Compare with matrotrophic.

**lepidotrichia** A fan-shaped array of ossified or chondrified dermal rods that internally supports the fin of bony fishes. Compare with ceratotrichia.

**lepospondyly** A holospondylous vertebra with a husk-shaped centrum usually pierced by a notochordal canal.

**lever arm** The perpendicular distance from the point at which the force is applied to the point about which a body rotates (moment arm). *See* moment.

**lift** The force produced by an airfoil perpendicular to its surface.

**lines of arrested growth (LAGs)** A period when annuli or rings are deposited in bones as a result of cessation or even resorption of bone.

**lingual feeding** The capture of prey with the tongue.

**load** In mechanics, the forces to which a structure is subjected.

**loop of Henle** A region of the mammalian nephron that includes parts of the proximal and distal tubules (thick limbs) and all of the intermediate tubule (thin limb).

**lophodont** Teeth having broad, ridged cusps useful in grinding plant material. Compare with bunodont and selenodont.

**lumen** The space within the core of an organ, especially a tubular organ.

**lymph** Clear fluid carried in lymphatic vessels.

**lymphoid tissue** Blood-forming tissue outside of bone cavities; found, for example, in the spleen and lymph nodes.

**macrolecithal** Pertaining to eggs with large quantities of stored yolk.

**macula** A mechanoreceptor within the vestibular apparatus of the ear; specialized neuromast organ detecting changes in body posture and acceleration. Compare with crista.

**malleus** One of the three middle ear bones in mammals, phylogenetically derived from the articular bone.

**mastication** The mechanical breakdown of a large bolus of food into smaller pieces, usually with the teeth; chewing of food.

**matrotrophic** Pertaining to the nutrition the embryo receives through the placenta or from uterine secretions. Compare with lecithotrophic.

**meatus** A canal or opening.

**mechanoreceptor** A sense organ that responds to small changes in mechanical force. Compare with chemoreceptor and photoreceptor.

**medulla** The inner portion or core of an organ.

**meroblastic cleavage** Early mitotic planes that do not complete their passage through the embryo before subsequent division planes form. Compare with holoblastic and discoidal cleavage.

**merycism** Remastication together with microbial fermentation of food in nonruminants. Compare with rumination.

**mesenchyme** Loosely associated cells of mesodermal origin.

**mesokinesis** Skull movement via a transverse joint passing through the dermatocranium posterior to the ocular orbit. Compare with prokinesis and metakinesis.

**mesolecithal** Pertaining to eggs with moderate amounts of stored yolk. Compare with microlecithal and macrolecithal.

**mesonephros** A kidney formed of nephric tubules arising in the middle of the nephric ridge; usually a transient embryonic stage that replaces the pronephros, but is itself replaced by the adult opisthonephros or metanephros. Compare with pronephros, opisthonephros, and metanephros.

**mesotarsal joint** An archosaur ankle in which the calcaneus and astragalus fuse and the line of flexion passes between them and the distal tarsals. Compare with intratarsal joint.

**mesothelium** A single-celled lining of body cavities.

**metakinesis** Skull movement via a transverse hinge that lies posterior between the deep neurocranium and outer dermatocranium. Compare with prokinesis and mesokinesis.

**metamorphosis** An abrupt transformation from one anatomically distinct stage (juvenile) to another (adult).

**metanephric duct** Ureter; distinct from the pronephric and mesonephric ducts.

**metanephros** A kidney formed of nephric tubules arising in the posterior region of the nephric ridge and drained by a ureter; usually replaces the embryonic pronephros and mesonephros. Compare with pronephros, mesonephros, and opisthonephros.

**metaplasia** Change of a tissue from one type to another type. Compare with hypertrophy.

**metapterygial fin** Basic fin type in which the axis (metapterygial stem) is located posteriorly in the fin. Compare with archipterygial fin.

**metapterygial stem** The chain of endoskeletal elements within the fish fin that define the major internal supportive axis.

**microcirculation** The capillary beds and arterioles that supply them and venules that drain them.

**microlecithal** Pertaining to eggs that contain small quantities of stored yolk. Compare with mesolecithal and macrolecithal.

**microvillus** A small cytoplasmic projection from a single cell. Compare with villus.

**midsagittal plane** Median parallel plane passing dorsoventrally through the long central axis of the body.

**mineralization** A general process wherein various metallic ions are deposited, under the control of living cells of the tissue, in the organic matrix of the connective tissue.

**molariform** A general term describing premolar and molar teeth that appear similar; cheek teeth.

**molt** The shedding of parts or all of the cornified layer of the epidermis; loss of feathers or hair that usually occurs annually; ecdysis.

**moment** The measure of the tendency of a force to rotate a body; the product of force times the perpendicular distance from the point at which the force is applied to the point of rotation (lever arm).

**moment arm** A lever arm.

**monoecious** Refers to female and male gonads within the same individual; hermaphrodite.

**monokinetic skull** Skull movement via a single transverse joint passing through the braincase.

**monophyletic group** A clade, all organisms in a lineage plus the ancestor they have in common, therefore a natural group. Compare with paraphyletic and polyphyletic groups.

**monospondyly** The condition in which a vertebral segment is composed of one centrum. Compare with diplospondyly.

**morph** A term referring to the general form or design of an animal; for example, juvenile morph (tadpole) and adult morph (sexually mature stage) of a frog.

**morphogenesis** During embryonic development, the processes that result in the reorganization of tissues into organs and the basic body configuration of the embryo.



**morphological cross section** A plane or cut through the area of a muscle perpendicular to its longitudinal axis at its thickest part. Compare with physiological cross section.

**morphology** The study of anatomy and its significance.

**motor end plate** The neuromuscular junction; specialized ending through which the axon of a motor neuron makes contact with the muscle it innervates.

**motor neuron** A nerve cell carrying impulses to an effector organ. Compare with sensory neuron.

**motor pattern** A defined local pattern of activity produced by muscles that shows little variation when repeated.

**motor unit** One motor neuron and the subset of muscle fibers that it supplies; important in producing graded muscle force.

**mucous gland** An organ secreting a protein-rich mucin that is usually a thick fluid. Compare with serous gland.

**muscle fiber** A muscle cell, that is, the contractile part of a muscle organ.

**muscle organ** Muscle cells together with the noncontractile tissues that support them (connective tissue, blood vessels, nerves).

**muscle spindle** A fusiform bundle in striated muscles that houses specialized sensory receptors known as intrafusal muscle cells.

**myeloid tissue** Blood-forming tissue housed inside bones.

**myoepithelial cell** A cell lining (hence, *epithelial*) a channel or gland and possessing contractile abilities (hence, *myo-*).

**myofibril** A contractile unit of a muscle cell; a chain of repeating sarcomeres composed of myofilaments.

**myofilaments** Thick and thin filaments in the fine structure of muscles composed predominantly of myosin and actin, respectively.

**myomeres** Differentiated segments of a muscle in an adult.

**myotomes** Undifferentiated embryonic blocks of presumptive muscles.

**naris** A nostril.

**natural selection** The process by which organisms with poorly suited features, on average, fare less well in a particular environment and tend to perish, thereby leaving (preserving) those individuals with more favorable adaptations; survival of the fittest.

**natural taxon** A group of organisms that represent an actual result of evolutionary events. Compare with artificial taxon.

**neomorph** A new morphological structure in a derived species that has no equivalent evolutionary antecedent.

**neoteny** Paedomorphosis produced by delayed onset of somatic development that is overtaken by normal sexual maturity. Compare with progenesis.

**nephric ridge** The posterior region of the intermediate mesoderm.

**nephridium** A tubular excretory organ.

**nephron** That portion of the uriniferous tubule in which urine is formed; composed of proximal, intermediate, and distal regions; nephric tubule.

**nephrotome** Segmental forerunner of the nephron in the urinary structure of the early embryo.

**nerve** A collection of nerve fibers coursing together in the peripheral nervous system.

**nerve fiber** The cytoplasmic process of a neuron; an axon or a dendrite.

**network** Any structure reticulated or decussated at equal distances with interstices between the intersections.

**neural crest** A paired strip of tissue that separates from the dorsal edges of the neural groove as it forms the neural tube.

**neurocranium** That part of the braincase that contains cavities for the brain and associated sensory capsules (nasal, optic, otic).

**neuroglia** Nonnervous supportive cells of the nervous system.

**neurohormone** A chemical secreted directly into a blood capillary by a neurosecretory neuron at the terminus of its axon.

**neuromast organ** A mechanoreceptive organ composed of several hair cells, as in the lateral line of the inner ear.

**neuron** A nerve cell.

**neurotransmitter** A chemical released at the synapse of a nerve fiber, usually an axon.

**nocturnal** Active at night. Compare with diurnal.

**node** In taxonomy, the branching point on a cladogram representing a speciation event. Compare with internode.

**notochord** A long axial rod composed of a fibrous connective tissue wall around cells and/or a fluid-filled space.

**nucleus** 1. A membrane-bound organelle within the body of a cell. 2. A group of nerve cell bodies within the central nervous system.

**occlusion** The meeting or closure of the upper and lower tooth rows.

**odor** A chemical detected by sensory cells in the nasal epithelium through the olfactory process. Compare with vomodor.

**olfaction** The act of smelling.

**omasum** The third of four chambers in the complex ruminant stomach; a specialization of the esophagus. *See* abomasum, reticulum, and rumen.

**ontogeny** The course of an individual's development from egg to death.

**operculum** A lid or cover, as over the gills of fishes.

**opisthonephros** The adult kidney formed from the mesonephros and additional tubules from the posterior region of the nephric ridge. Compare with pronephros, mesonephros, and metanephros.

**origin** The relatively fixed site of attachment of a muscle. Compare with insertion.

**osmoregulation** The active maintenance of water and solute balance.

**osmotic pressure** The tendency for fluid solutes to move across a membrane in order to equalize the concentrations of solutes on both sides. Compare with hydrostatic pressure.

**ossification** A specific type of mineralization, unique to vertebrates, wherein hydroxyapatite (calcium phosphate) is deposited on the collagenous matrix leading to bone formation.

**osteoderm** A dermal bone located under and supporting an epidermal scale.

**osteon** A highly ordered arrangement of bone cells into concentric rings, with bone matrix surrounding a central canal through which blood vessels and nerves run; the Haversian system.

**otoconia** Small calcareous crystals on the maculae of the inner ear; small otoliths.

**otolith** A single calcareous mass in the cupula of hair cells.

**outgroup** Any group used for taxonomic comparison but not part of the taxon under study. Compare with ingroup.

**oviduct** A urogenital duct transporting ova and often involved in protection and nourishment of the embryo; müllerian duct.

**oviparity** The reproductive pattern of egg laying.

**oviposition** The act of laying eggs.

**ovulation** The release of the ovum from the ovary.

**pace** A high-speed gait characterized by the two feet on the same side coming in contact with the ground simultaneously; fast amble. Compare with amble.

**paedomorphosis** The retention of general juvenile features of ancestors in the late developmental stages of descendants. Larval stages of ancestors become the reproductive “adult” stages of descendants. *See* neoteny and progenesis.

**parachuting** An airborne fall slowed by the use of canopy-like membranes or body shape that increase drag.

**paradaptation** The concept that some aspects of a feature may not be adaptive or owe their properties to natural selection.

**parallax** The difference in the appearance of an object when it is viewed from two different points.

**parallel muscle** A muscle organ in which all its muscle fibers lie in the same direction and are aligned with its long axis. Compare with pinnate muscle.

**paraphyletic group** An incomplete clade resulting from removal of one or more component lineages. Compare with monophyletic and polyphyletic groups.

**parasagittal plane** A sagittal plane parallel with the midsagittal plane.

**parasitic drag** Resistance to the passage of a body through a fluid as a result of the body’s surface friction and adverse backflow in the wake.

**paraxial mesoderm** Paired strips or mesodermal populations forming along the neural tube; in the head, it remains as strips of mesoderm called somitomeres, but in the trunk it becomes segmentally arranged as somites.

**partition** The general term for parturition and oviposition.

**partial pressure** The pressure one gas contributes to the total pressure in a mixture of gases.

**parturition** The act of giving birth via viviparity. Compare with oviposition.

**patagium** A stretched fold of skin that forms an airfoil or flight control surface.

**pelagic** Living in open water. Compare with benthic and planktonic.

**pentidactyl** Having five digits per limb; thought to be the basic pattern characteristic of tetrapods but modified by functional demands.

**perfusion** The driving of blood through capillary beds of an organ. Compare with ventilation.

**perichondrium** The sheet of fibrous connective tissue around cartilage.

**perikaryon** The nucleus of a cell and its adjacent cytoplasm, especially applied to nerve cells.

**periosteum** The sheet of fibrous connective tissue around bone.

**peripheral nervous system** The cranial and spinal nerves and their associated ganglia composing that part of the nervous system outside the central nervous system.

**peristalsis** Progressive waves of muscle contractions within the walls of a tubular structure, as within the walls of the digestive tract.

**permissive** Pertaining to hormones that relax insensitive target tissues allowing them to respond to hormonal, neuronal, or environmental stimuli; permitting target tissues to respond.

**pharyngeal slit** An elongated opening in the lateral wall of the pharynx.

**phasic** Recurring cycles of muscle contractions.

**phenotype** The physical and behavioral characteristics of an organism; somatic features. Compare with genotype.

**pheromone** A chemical released into the environment by one individual that influences the behavior or physiology of another individual of the same species.

**photopic vision** Color vision in bright light. Compare with scotopic vision.

**photoreceptor** A radiation sensory receptor responsive to visible light stimuli.

**phylogeny** The course of evolutionary change within a related group of organisms.

**physiological cross section** A plane or cut through the area of all muscle fibers perpendicular to their long axes. Compare with morphological cross section.

**piezoelectricity** Low-level electrical charges arising on the surface of stressed crystals; load stress on bones may produce surface electrical charges.

**pinnate muscle** A muscle organ in which all muscle fibers are aligned obliquely to its line of action. Compare with parallel muscle.

**pituicyte** A nonendocrine cell of the neurohypophysis.

**placenta** A composite organ formed of maternal and fetal tissues through which the embryo is nourished.

**placode** A distinct thickened plate of embryonic ectoderm.

**planktonic** Pertaining to a free-floating microscopic plant or animal that is passively carried about by currents and tides. Compare with benthic and pelagic.

**plantigrade** A foot posture in which the entire sole comes in contact with the ground. Compare with digitigrade and unguligrade.

**plasma** The fluid component of blood without any formed elements.

**plastron** The ventral bony part of a turtle shell. Compare with carapace.

**platysma** An unspecialized muscle derived from hyoid arch musculature that spreads as a thin subcutaneous sheet into the neck and over the face.

**plexus** A network of intermingling blood vessels or nerves.

**podocytes** Specialized excretory cells associated with blood capillaries of the kidney.

**polydactyly** An increase in the number of digits over the basic pentadactylous number. Compare with polyphalangy.

**polyphalangy** An increase in the number of phalanges in each digit. Compare with polydactyly.

**polyphyletic group** An artificial group characterized by features that are not homologous. Compare with monophyletic and paraphyletic groups.

**polyphyodont** A pattern of continuous tooth replacement. Compare with diphyodont.

**polyspondyly** The condition in which a vertebral segment is composed of two or more centra.

**portal system** A set of venous vessels beginning and ending in capillary beds or sinuses of the liver.

**potency** The ability of a male to engage in copulation; impotency is an inability to copulate. Compare with fertility.

**power** The amount of work that can be done per unit of time.

**preadaptation** The concept that features possess the necessary form and function to meet the demands of a particular environment before the organism experiences that particular environment. Compare with paradaptation.

**prehension** The rapid grasping and capturing of the prey, usually with the jaws or claws.

**primary neurulation** Formation of the embryonic neural tube via folds in the edges of the neural plate that uplift and subsequently fuse, thereby defining the neuralcoel. Compare with secondary neurulation.

**primitive** Denoting an organism or species that appeared early within its phylogenetic lineage; opposite of derived.

**procoracoid** Anterior coracoid (or precoracoid); endochondral bone of the shoulder that first evolved in fishes. Compare with coracoid.

**proctodeum** The embryonic invagination of surface ectoderm that contributes to the hindgut, usually giving rise to the cloaca.

**progenesis** Paedomorphosis produced by precocious onset of sexual maturity in an individual still in the morphologically juvenile stage. Compare with neoteny.

**project** In the nervous system, to transmit neural impulses to.

**prokinesis** Refers to skull movement via a transverse joint that passes through the dermatocranium anterior to the ocular orbit. Compare with mesokinesis and metakinesis.

**pronephros** A kidney formed of nephric tubules arising in the anterior region of the nephric ridge; usually forms only as a transient embryonic structure. Compare with mesonephros, opisthonephros, and metanephros.

**proprioceptor** A specialized interoceptor that responds to limb position, joint angle, and state of muscle contraction. Compare with interoceptor and exteroceptor.

**protandry** Reproduction in which the same individual produces sperm and then later in life produces eggs, but does not do both concurrently.

**protostome** An animal whose mouth forms from or near the embryonic blastopore.

**proximal** Toward the base of an attached part where it joins the body. Compare with distal.

**pterylae** Feather tracks.

**punctuated equilibrium** A description of phylogenetic patterns in which long periods of little or no change are punctuated by short periods of prolific change before returning to a period of little change. Compare with quantum evolution.

**quadrupedal** Walking or running by means of four legs. Compare with bipedal.

**quantum evolution** Adaptive evolutionary change within a lineage characterized by long periods of little change that are suddenly interrupted by short bursts of rapid change. Compare with punctuated equilibrium.

**radial symmetry** A regular arrangement of the body about a central axis.

**radiation receptor** A sensory organ that responds to light and other forms of electromagnetic radiation.

**raptors** Predatory birds that use talons, including hawks, eagles, falcons, and owls.

**rate modulation** The proportionate increase in the contractile force of a muscle as the rate of nerve impulses increases. Compare with motor unit.

**receptor** The end of a nerve fiber that responds to stimuli. Compare with effector.

**recrudescence** Renewal of reproductive interest and readiness of reproductive tracts, usually on a seasonal basis.

**recruitment** The process of initiating contraction of additional muscle cells within a muscle organ during its activity.

**reflex** Involuntary action of effectors mediated by the nervous system.

**refractive index** A measure of the light-bending properties of an object.

**refractory** Not responsive; usually time dependent.

**relative wind** The apparent direction of the airstream across an airfoil; depends on the angle of attack, speed of the airfoil, and so forth.

**release-inhibiting hormone** A hormone that depresses the responsiveness of target tissues.

**releasing hormone** A hormone that initiates target tissue activity. Compare with release-inhibiting hormone.

**renal capsule** The expanded end of the uriniferous tubule that surrounds the vascular glomerulus; ultrafiltrate first forms in the renal capsule; also known as Bowman's capsule.

**respiratory bladder** A gas bladder enriched with capillaries that allow it to function primarily in gas exchange.

**rete** A compact, dense network of capillaries.

**reticulum** The second of four chambers in the complex ruminant stomach; a specialized region of the esophagus. Compare with abomasum, omasum, and rumen.

**rhachitinous vertebra** An aspidospondylous vertebra characteristic of some crossopterygians and early amphibians.

**roe** Fish eggs still within the ovary.

**rumen** The first of four chambers in the complex ruminant stomach; an expanded specialization of the esophagus. Compare with abomasum, omasum, and reticulum.

**ruminant** A placental mammal with a rumen, a specialized expansion of the digestive tract that processes plant material; Ruminantia.

**rumination** Remastication together with microbial fermentation in ruminants.

**sagittal plane** Any plane parallel with the long axis of the animal's body and oriented dorsoventrally.

**sarcolemma** The plasma membrane of a muscle cell.

**sarcomere** A repeating unit of overlapping myofilaments that composes the contractile myofibril of a muscle cell.

**sarcoplasm** The cytoplasm of a muscle cell.

**scaling** Compensatory adjustments in proportion to maintain performance with changes in size.

**scansorial locomotion** Climbing of trees with claws. Compare with brachiation.

**schizocoelom** The body cavity formed by splitting of the mesoderm. Compare with enterocoelom.

**scotopic vision** Sensitivity to dim light. Compare with photopic vision.

**secondary cartilage** Cartilage that forms after initial bone ossification is complete; formed usually in response to mechanical stress, especially on the margins of intramembranous bone.

**secondary neurulation** Formation of the embryonic neural tube via cavitation, the later neurocoel, within a solid rod of cells, the neural keel. Compare with primary neurulation.

**secondary plant compounds** Chemicals produced by plants that are toxic or unpalatable to herbivores.

**sectorial teeth** Teeth with opposing sharp ridges specialized for cutting.

**segmentation** A body made up of repeating sections or parts; metamerism.

**seismic** Relating to an earth vibration.

**selection force or pressure** The biological or physical demands arising from the environment that affect the survival of the individual living there.

**selenodont** Teeth with crescent-shaped cusps, as in artiodactyls. Compare with bunodont and lophodont.

**sensory neuron** A nerve cell carrying responses from a sensory organ to the brain or spinal cord. Compare with motor neuron.

**serial homology** Similarity between successively repeated features in the same individual.

**serial theory** The hypothesis that jaws evolved from one of the anterior branchial arches. Compare with composite theory.

**serous gland** An organ secreting a thin, watery fluid.

**sesamoid bone** A bone that develops directly in a tendon, for example, the patella (kneecap).

**sessile** Pertaining to an animal attached to a fixed substrate in its environment.

**sheer force** The direction of an applied force that tends to slide sections of an object across each other.

**sinusoids** Tiny vascular channels that are slightly larger than capillaries and lined or partially lined only by endothelium.

**sister group** In taxonomy, the particular outgroup most closely related to the ingroup. Compare with ingroup, outgroup.

**solenocyte** A single excretory cell with a projecting circle of microvilli around a central flagellum.

**solute** Molecules dissolved in solution.

**somatic** Pertaining to the body, usually to the skeleton, muscles, and skin but not to the viscera.

**somatosensory system** All proprioceptive neurons and neurons receiving stimulation from the skin.

**special cranial nerve** A bundle of fibers that detect stimuli from the local senses: sight, smell, hearing, balance, and lateral line. Compare with general cranial nerve.

**spermatophore** A package of sperm ready for delivery or presentation to the female.

**sphincter** A band of muscle around a tube or opening that functions to constrict or close it.

**spinal nerve** Any nerve entering or departing from the spinal cord. Compare with cranial nerve.

**spiracle** A reduced gill slit that is first in series.

**splanchocranium** That part of the skull arising first to support the pharyngeal slits and later contributing to the jaws and other structures of the head; branchial arches and derivatives; visceral cranium.

**spontaneous generation** The concept that fully formed organisms arise directly and naturally from inanimate matter.

**stall** Loss of lift due to the onset of turbulent flow across an airfoil.

**stapes** One of the three middle ear bones in mammals, phylogenetically derived from the columella (hyomandibula).

**stenohaline** Having a narrow tolerance to salinity differences.

**stereocilia** Very long microvilli.

**stereoscopic vision** Denoting the ability to see images in three dimensions.

**stereospondylous vertebra** A monospondylous vertebra in which the single centrum (an intercentrum) is separate (aspidospondylous). Compare with embolomeres vertebra.

**stigmata** An extensively subdivided pharyngeal slit.

**stolon** A rootlike process of ascidians and other invertebrates that may fragment into pieces that asexually grow into more individuals.

**stomodeum** The embryonic invagination of surface ectoderm that contributes to the mouth.

**stratified** Formed of layers.

**stratigraphy** The geology of the origin, composition, and relative chronology of strata.



**stratum** (pl., strata) The geological term for a layer of rocks deposited during about the same geological time.

**strength** The load a structure withstands before failing or breaking.

**streptostyly** The condition in which the quadrate bone is movable relative to the braincase.

**subcortical region** That portion of the telencephalon exclusive of the cerebral cortex.

**subterranean** Pertaining to life lived underground.

**suction feeding** The capture of prey by means of a sudden muscular expansion of the buccal cavity that creates a vacuum to draw in water carrying the prey.

**sulcus** A furrow on the surface of the brain. Compare with gyrus.

**surfactant** A soluble compound that reduces surface tension, as in the lungs.

**suspension feeding** Feeding based on filtering suspended food particles from water; usually involves cilia and secreted mucus; filter feeding or ciliary-mucus feeding.

**swim bladder** A gas bladder functioning primarily in buoyancy control.

**synapse** The region of contact between two neurons or between a neuron and an effector organ.

**synapticules** Cross-linking connections between pharyngeal bars in amphioxus.

**synarthrosis** A joint through which little or no movement is permitted between articulated skeletal elements.

**syncytium** Multinucleated cytoplasm; an aggregation of cells without cell boundaries.

**synergist** Two or more muscles cooperating to produce motion in the same direction. Compare with antagonist and fixator.

**synovial joint** A diarthrosis.

**tachycardia** Abnormally fast heart rate. Compare with bradycardia.

**tactile** Pertaining to touch.

**talons** Specialized bird claws used in striking or catching live prey.

**target tissue** A group of related cells that respond to a particular hormone.

**teleolecithal** Pertaining to eggs in which yolk stores are concentrated at one pole.

**tendon** A noncontractile, fibrous connective tissue band joining a muscle organ to a bone or cartilage. Compare with aponeurosis.

**tensile force** 1. The direction of an applied force that tends to pull apart an object. 2. The force produced by muscle contraction.

**thermoreceptor** A radiation receptor sensitive to infrared energy.

**thermoregulation** The process by which body temperature is established and maintained.

**tidal volume** The total quantity of air inhaled and exhaled in one breath. Compare with dead space.

**tissue fluid** A clear liquid outside of blood or lymphatic vessels that bathes cells.

**tonic fibers** Slow contracting muscle fibers that produce prolonged, sustained contractions with low force. Compare with twitch fibers.

**tonus** Partial muscle contraction with low force when a muscle is in a relaxation state.

**tract** A collection of nerve fibers coursing together in the brain or spinal cord. Compare with nerve.

**transverse plane** A plane passing from one side of an organism to the other so as to divide the body into anterior and posterior parts.

**transverse process** A general term for any bony or cartilaginous projection from the centrum or neural arch.

**trophoblast** The outer cellular layer of the mammalian blastocyst.

**trot** A gait characterized by diagonally opposite feet coming in contact with the ground simultaneously.

**turbulent flow** The movement of fluid particles in irregular paths. Compare with laminar flow.

**tusks** Specialized, long teeth protruding from the mouth; elongate incisors (elephants), left upper incisor (narwhal), canines (walruses).

**twitch fibers** Fast contracting muscle fibers whose force may or may not fatigue quickly; phasic fibers. Compare with tonic fibers.

**tympanum** The eardrum or tympanic membrane.

**ungulate** A hoofed placental mammal belonging to the orders Perissodactyla (horses) and Artiodactyla (cattle, deer, pigs).

**unguligrade** A foot posture in which the weight is carried on the tips of the toes (as in horses).

**up-regulation** Increased food intake prompts increased anatomical and metabolic prominence of the alimentary canal, termed *up-regulation*. Reduced food intake reverses this response, termed *down-regulation*.

**ureotelism** Excretion of nitrogen in the form of urea.

**ureter** The metanephric duct arising as a uterine diverticulum and draining the metanephros.

**uricotelism** Excretion of nitrogen in the form of uric acid.

**uriniferous tubule** The functional unit of the kidney composed of the nephron and collecting tubule.

**vasoconstriction** The narrowing of a blood vessel; usually resulting from smooth muscle contraction. Compare with vasodilation.

**vasodilation** The widening of a blood vessel; may be active or passive enlargement. Compare with vasoconstriction.

**vasoreceptor** Monitors pressure and gas levels in blood passing through the heart and systemic arches.

**vein** A blood vessel carrying blood toward the heart blood carried may be low or high in oxygen tension. Compare with artery.

**velocity** The rate of change of displacement; how fast a body is traveling in a particular direction.

**ventilation** The active movement of water or air across respiratory exchange surfaces. Compare with perfusion.

**ventral** Toward the belly or bottom of an animal; opposite of dorsal.

**vertebra** One of several bone or cartilage blocks firmly joined into a backbone that defines the major body axis of vertebrates.

**vestibular apparatus** A sensory organ of the inner ear composed of semicircular canals and associated compartments, such as the sacculus, utriculus, and cochlea (lagena).

**villus** A fingerlike projection of a tissue layer, as in the small intestine. Compare with microvillus.

**viscosity** The resistance of a fluid to flow.

**viviparity** The reproductive pattern of live birth; birth of young not encased in a shell.

**vomeronasal organ** A chemosensory organ present in the nasal chamber or roof of the mouth of some tetrapods.

**vomodor** A chemical detected by sensory cells of the vomeronasal organ. Compare with odor.

**warren** An underground maze of excavated passageways used by animals, usually rabbits.

**wolffian duct** Mesonephric duct.

**zygapophysis** The projection of a neural arch that articulates with the adjacent neural arch.