

Glossary - Introduction into Zoology

- Acrosom:** (Gk. acros, tip; soma, body) A caplike structure covering the head of the spermatozoon of many animals; releasing enzymes that enable the sperm to penetrate the jelly membrane covering the egg.
A.-Reaction: Polymerization of actin filaments extending the acrosomal processes to contact the eggs plasma membrane (exocytosis).
- Actin:** Minute protein filaments found in most contractile cells. In striated muscle cells, thin filaments of actin overlap and alternate with thicker filaments of myosin to form myofilaments. The interactions between actin and myosin lead to muscle contraction.
- Action Potential:** The rapidly moving, progressive depolarization of nerve and other cell membranes produced by the inflow of Na^+ ions. The depolarization is responsible for the conductance of the nerve impulse in neurons.
- Adenosine Phosphate:** A class of molecules that are based on modified nucleotide monomers containing N-base adenine, sugar ribose, and a P-group; ATP is the major source of chemical energy of metabolisms (energy supply for the production of enzymes and proteins. $\text{ATP} \leftrightarrow \text{ADP} + \text{P}$ (\leftarrow exergonic, \rightarrow endergonic). ATP can be synthesized W/ (respiration; yielding 32 ATPs) or W/O (fermentation; yielding 2 ATPs) oxygen.
 AMP - Adenosine Mono Phosphate
 ADP - Adenosine Di Phosphate
 ATP - Adenosine Tri Phosphate
- Anatomical Planes:** Used in organisms displaying bilateral symmetry, in which the body can be divided into:
Anterior P. Front or anterior end of the body; also called cranial plane.
Distal: away from the base.
Dorsal P.: Opposing the ventral surface - facing away.
Frontal P.: Passes from the anterior to posterior and across lateral sides (parallel to ground; Z-axis).
Proximal: Close to the base.
Posterior P.: Rear or posterior end of the body; also called caudal plane.
Sagittal P.: Parallel plane running from the anterior to posterior end, dividing the organism in a dorsal-ventral axis into mirrorlike halves (perpendicular to ground, like an egg-slicer; X-axis). Midsagittal (middle, along the center axis); Parasagittal (lateral, towards dorsal or ventral).
Transverse P.: Perpendicular to sagittal and frontal plane dividing the organism laterally, like slices of a sausage; Y-axis).
Ventral P.: Body-surface facing the bottom or ground.
- Anatomy:** The science of biological structures.
- Annelida:** (Lt. annello; ring) segmented worms of the class polychaeta (many bristled), oligochaeta (few bristled), hirudinea (leeches).
- Archenteron:** The central cavity of the gastrula, lined with endoderm, which forms the rudiment of the digestive system.
- Axon:** The part of a neuron that conducts electrical impulses, often over long distances through the progressive depolarization of the membrane.
- Axonema:** Associated proteins like dynein and nexin; cause the motion of cilia and flagella.
- Basal Body:** The organelle from which a cilium or flagellum arises; also called a basal granule. For the ultra-structure see centriole.
- Basal Lamina:** Fibrous membrane located at one side, usually the basal side, of many epithelial cells; sometimes called the basement membrane.
- Blastocyst:** The modified blastula stage of embryonic mammals; it consists of an inner cell mass, which develops into the embryo, and a peripheral layer of cells (trophoblast) which contributes to the placenta.
- Blastomere:** An embryonic cell resulting from the cleavage division of the egg (or blastula stage).
- Blastopore:** The opening in the gastrula stage of the development, from the archenteron to the surface.
- Blastula:** (Gk. a small bud) A spherical structure of embryonic development produced by cleavage of a fertilized ovum, consisting of more layers of cells surrounding a fluid-filled cavity at or near the end of cleavage and immediately preceding gastrulation (fluid-filled ball of cells).
- Body Cavity:** Fluid filled cavity between body wall and central gut.
- Cell:** The basic unit of life; cells are bounded by a lipid containing membrane and are generally capable of independent reproduction; contains organelles, cytoplasm and the nucleus.
4d-cell: In the 8-celled stage; the cell in spiralians which will form the mesoderm
- Cephalisation:** Head formation, concentration of nervous tissue, sense organs at the anterior end of the body.
- Cladogram:** (L. clado, branch) Classification system that gathers groups occupying all branches from one stem (compare dendrogram).
Monophyletic: Sharing a single ancestral trait.

Paraphyletic: Some but not all of the descendants of a common ancestor.

Polyphyletic: Displaying hereditary characteristics from two or more distinct ancestral lineage as a result from convergent evolution.

Cleavage: After fertilization a series of rapid mitotic division that converts a single cell zygote into a multicellular hollow (blastocoel) ball (blastula). Gastrulation follows during which morphogenetic movements (invagination, ingression, epiboly) rearrange the cell. A new cavity (archenteron) forms opens to the surface (blastopore) and three germ layers (endo-, meso-, ectoderm) usually develop. Mesodermal tissues separates, either by enterocoelomic pouches (enterocoel) or by schizocoelomic patterns (see coelom).

Radial C.: (mostly resulting in **deuterostomes**, mouth comes second); the cleavage planes are alternately vertical and horizontal so that the cells are stacked in rows one upon another in echinoderms and vertebrates.

Spiral C.: (mostly resulting in **protostomes**, mouth comes first); the embryonic development follows several patterns that characterize a grouping of phyla.

Discoidal C.: In heavily yolk in telolecithal eggs (Cephalopods, bivalves, reptiles). Only the superficial disk of cytoplasm at the animal pole in a meroblast cleaves, can be meridional as well.

Superficial C.: In centrolecithal eggs; (insects, and other arthropods) after nuclear divisions; nuclei in a meroblast migrate towards the outer edge forming a syncytium (belt around the egg, blastoderm).

Cloaca: A common chamber receiving the discharge of the digestive, excretory, and reproductive systems in most of the lower vertebrates.

Cnidocyte: Cell of cnidarian containing an explosive stinging structure, called the nematocyst.

Cilium: (L. eyelash) A short, centriole-based, hairline organelle. Rows of cilia propel certain protists. Cilia also aid the movement of substances across epithelial surfaces of substances across epithelial surfaces of animal cells (see microtubulus).

Coelom: (Gr. koiloma, hollow cavity) The main body cavity of many animal, formed between layers of mesoderm, in which internal organs are suspended.

Blastocoel: In early embryonic development, a fluid-filled cavity that develops in the mass of cells formed during blastula stage.

Enterocoel: (Gk. enteron, gut, koilia, gut) A coelomic cavity formed by the out-pocketing of the mesoderm (deriving from endoderm) to from the primitive gut.

Gastrocoel: In early embryonic development; a hollow (non fluid-filled) cavity, the archenteron.

Schizocoel: (Gk. schizein, to split) A coelomic cavity formed by the internal splitting of embryonic mesoderm.

Pseudocoel: (Gk. pseudos, falseness) Body cavity between the meso- and endoderm; persistent blastocoel.

Collagen: A fibrous protein found extensively in connective tissue and bone. Collagen also occurs in some invertebrates, as in the cuticle of nematode worms.

Contractile Vacuole: Osmoregulatory organelle of protozoa and sponges.

Cortex: the outer layer of an organ.

Cuticle: (Lt. cuticula, small skin) A waxy or fatty non-cellular, waterproof outer layer on epidermal cells in plants and some invertebrates. In parasitic flatworms it prevents the worm from being digested in the gut of the host organism.

Cyst: (Gk. kustis, bladder) Fluid containing, membranous bodily sac.

Nematocyst: A minute explosive structure found in cnidarians and used for defense, for the capture of prey, and for anchorage; located within the cnidocyte.

Cytology: (Gk. kutos, hollow vessel) The study of cell structure and function.

Cytopharynx: Gullet-like organelle of ciliates and certain other protozoa.

Cytoplasm: The living substance of a cell surrounding the nucleus and enclosed by the cell membrane.

Cytosis: (Gk. kytos, bladder) Feeding at cellular level.

Endo-C.: (Gk. endon within) Cells take in material from outside by invaginations of the cell membrane to form vesicles.

Exo-C.: (Gk. ex, out) Molecules synthesized within the cell are released in the external environment.

Pino-C.: (Gk. pinos, to drink) The uptake by cells of droplets of solution by endocytosis.

Phago-C.: (Gk. phagein, to eat) The engulfing by endocytosis of microorganisms, other cells, and foreign particles by a cell such as a white blood cell or an amoeba.

Cytostome: (Gk. kutos, vessel; stoma, body) The mouth opening of ciliates and certain other protozoans.

Dendrite: (Gk. dendron, tree) The process of a neuron that is stimulated by a receptor of another neuron, and initiates a nerve impulse by transduction.

Dendrogram: (Gk. dendron, tree) A branching diagram showing relationships between members of a group; used in numerical systematics. (compare cladiogram).

Dermis: (Gk. derma, skin) The deeper layer of the skin of vertebrates and some invertebrates.

Ectoderm: The outermost of the three germ layers of the early embryo; gives rise to epidermis of the skin and nervous system (gastroneural-tube in protostomia; notoneural-tube in deuterostomia).

- Endoderm:** The innermost of the three germ layers of the early embryo, lining the archenteron; forms the epithelial cells of the digestive tract and its outgrowths the liver, lungs and pancreas of vertebrates.
- Mesoderm:** The middle layer of the three primary germ layers of the embryo, lying between the ecto-, and endoderm; gives rise to muscles, connective tissue, blood, kidney and the dermis of the skin.
- Epidermis:** (Gk. epi, upon; desma, skin) The outermost layer of cells of an organism (integument); consisting of a single layer of epithelial cells.
- Gastrodermis:** Epithelial tissue lining the gut cavity; in cnidarians does digestion and absorption.
- Desmosome:** Structure involved in cell adherence;
- Belt D.:** Ring of actin filaments encircling a cell, aiding in the adherence of adjacent cells.
- Spot D.:** A tiny bottom joining two cells and anchoring intermediate filaments.
- Digestion:** In heterotrophic organisms, the conversion of complex, usually insoluble foods into simple, usually soluble forms (absorption) by means of enzymatic activity. Ingested food is broken up mechanically then chemically and finally absorbed. Enzymes aid in the catalytic breakdown (see enzyme).
- Extracellular D.:** As seen in animals and others, absorption takes place in the intestinal tube.
- Intracellular D.:** Digestion via endocytosis as seen in hydras and others; where enzymatic activity is inhibited due to constant flow of water into the gastric cavity.
- Extraintestinal D.:** Digestive enzymes are injected into the prey; as seen in arachids, echinoderms, and others.
- Disseptiment:** Separates fluid-filled coelomic cavities as seen in annelids (septum).
- Dollo's Law:** Law of irreversibility; organs no longer used, hence reduced in function cannot be regained once lost; vestigial organs. (if you don't use it, you lose it!)
- Embryo:** (Gk. en, in; bryein, to swell) An organism in the earliest stages of development. In humans this phase lasts from conception to about two months and ends when all the structures of a human have been formed; then the embryo becomes a fetus (cleavage).
- Embryology:** The study of embryonic development.
- Enzyme:** A protein catalyst produces within a living organism that accelerates specific chemical reactions.
- Digestive E:** Aid digestion along with pancreas, bile etc. Lipase cleaves ester bonds joining fatty acid groups. Peptidase cleaved proteins. Sucrase: cleaves sugars. Amylase cleaves starches and Glycogen. Nuclease cleaves nucleic acids. Cellulase: hydrolyzes cellulose.
- Epiboly:** One of the gastrulation processes by which the smaller blastomers at the animal pole of the embryo grow over and enclose the cells of the vegetal hemisphere.
- Epithel:** one of the four tissue types (see tissue)
- Excretion:** The removal of metabolic wastes in organs like the lungs, or kidneys.
- Feces:** (L. faex, dregs) Semi solid undigested waste products, stored in the colon until excreted; contains mostly indigestible food particles (bulkage) i.e. collagen, cellulose, lignin, bacteria and also enzymes and epithelial tissues, bile, etc.
- Fertilization:** The fusion of two haploid gamete nuclei (egg and sperm) which forms a diploid zygote.
- F. in animals:** Acrosomal cap of spermatozoon lyses jelly mantle of ovum; acrosomal process fuses spermatid with the plasma of the egg; cortical granules release materials resulting in the enlargement of the cortical belt leading to the fertilization envelope once the sperm nucleus has entered the egg's cytoplasm (karyogamy) leaving behind the middle piece and the tail of the spermatozoon.
- Flagellum:** (L. flagellare, to whip) Long whiplike organelle protruding from the surface of the cell that either propels the cell (locomotion), or moves fluids past the cell (feeding apparatus - see microtubulus).
- Follicle:** (L. folliculus, little bag) In the mammalian ovary; oocyte surrounded by follicular cells.
- Food:** Organic compounds used in the synthesis of new biomolecules and as fuel in the production of cellular energy; i.e. carbohydrates (glucose), starch (amylose, amylopectin), proteins (from aminoacids), fatty acids, vitamins, trace elements.
- Food Chain:** A sequence of organisms through which energy captured from sunlight by photosynthesis is transferred from one consumer (or trophic level) to the next; each organism in the chain eats the preceding and is eaten by the following member of the sequence.
- Gamete:** (Gk. gamos, husband, wife) A specialized sex cell such as an ovum (egg) or a sperm, which is haploid. A male gamete (sperm) and a female gamete (ovum) fuse and give rise to a diploid zygote, which develops into a new individual.
- Gastrula:** (Gk. gaster, stomach bud) Early embryonic stage that follows the blastula; consists initially of two layers, the ecto-, and endoderm; contains an internal cavity (archenteron), that opens to the exterior through a blastopore.
- Gastrulation:** The movement of cells (from the blastula stage) in the embryo that generates three cell layers (ecto-, meso-, endoderm); each layer in turn gives rise to specific body organs and tissues.
- Genesis:** The beginning; origin; generation.
- Anagenesis:**
- Epigenesis:** Gradual development of an embryo in which structures do not preexist but newly arise.
- Paedogenesis:**

Metagenesis: Alternation of reproduction methods (asexually/bisexually).

Morphogenesis:

Parthenogenesis: Asexual reproduction, or agamogenesis in which the female reproduces its kind without fecundation by the male (Rotifera - see neoteny).

Oogenesis: The origin, development, and maturation of the ovum or egg.

Progenesis: (see neoteny, paedomorphosis).

Spermatogenesis: The origin, development, and maturation of sperm.

Germ Layer: One of the three primary embryonic layers - ecto-, meso-, endoderm - laid down in gastrulation and from which adult tissues arises (see dermis).

Glands: A group of cells organized into a discrete secretory organ (part of epithelial tissue).

Endocrine: A ductless gland that secretes its hormones into extracellular spaces from where they diffuse into the bloodstream or lymph, targeting specific organs or has any other effect. In vertebrates these glands include the pituitary, adrenal, thyroid, and others.

Exocrine: A gland with its own transporting duct that carries its secretions to a particular region of the body; includes the digestive and sweat glands.

Gonads: (Gk. gonos, procreation) An animal reproductive organ that generates gametes (ovaries, testis).

Gonoduct: General term for the reproductive duct of any animal.

Gonopore: External opening of any reproductive system.

Growth: Process of growing or developing, with an increase in size or number.

Logistic G.: Population growth under environmental constraints that set a maximum population size.

Exponential G.: The rate of growth increases as the size of population does; $dN/dt = rN \times [(K-N)/K]$.

Hemoglobin: (Gk. haima, blood) The red, iron-containing respiratory pigment found in the blood of vertebrates and some invertebrates; transports gases and aids in the regulation of pH.

Hermaphroditism: (Gk. Herma, son of Aphrodite) A state characterized by the presence of both male and female sex organs in the same organism.

Heterothermic: Animals which can function as endotherms like insects, lizards and active fish.

Histology: Anatomical study of the microscopic structure of animals and plants.

Homeostasis: The tendency to maintain uniformity or stability in the internal environment of the organism.

Homeothermic: Constant temperature animals; e.g. birds, mammals, maintained a constant body temperature in spite of variations in environmental temperatures (endothermic compare poikilothermic).

Hormone: (Gk. hormaen, to excite) A chemical substance produced usually in minute amounts in one part of that organism, from which it is transported to another part of that organism on which it has a specific effect.

Integument: (L. integumentum, covering) Outer skin and underlying muscle, skin covering the body; provides mechanical and chemical protection, allows gas exchange and sensory functions; structure into cuticle (+microvilli), epithel and basal lamina.

Invagination: The infolding of one part within another, specifically a process of gastrulation in which one region infolds to form a double-layered cup.

Keratin: A horny, water-insoluble protein found in the epidermis of terrestrial vertebrates and in nails, feathers, and horn.

Kybernetik: Study of temperature regulating processes and systems in animals (hetero, homo, poikilotherms).

- Larva:** A motile and sometimes feeding stage in the early development of many animals.
- Planula L.:** Larval stage of cnidarians (hydras, jellyfish, sea anemons, and corals).
- Trochophore L.:** The top-shaped larva of marine molluscs, polychaete annelids and some other marine invertebrates that bears an apical tuft and girdles of cilia.
- Veliger L.:** In many marine clams and snails; is a second larval stage deriving from the trochophore.
- Lumen:** (L. lumen, an opening for light) The central cavity; e.g. of a blood vessel, the central space where the blood flows.
- Lysis:** (Gk. lysis, loosening) Decomposition or dissolving.
- Glycolys.:** Splitting of glucose molecules; ($C_6H_{12}O_6$) into two molecules of pyruvate, resulting in the release of energy (exothermic) in the form of two ATP molecules; does not require O_2 .
- Hydrolys.:** The splitting apart of two covalently bound subunits by the insertion of a molecule of water; the OH-group being incorporated into one fragment and the H-atom in the other; reverse process of synthesis occurs in digestion.
- Lysosome:** (Gk. lysis, loosening; soma, body) Spherical single-membrane-bounded vesicle within the cell containing digestive (hydrolytic) enzymes that are released when the lysosome is ruptured; important in recycling worn-out mitochondria and other cell debris.
- Marine Environments:** (L. mare, sea)
- Euphotic:** Light penetrated zone. **Aphotic:** No light zone. **Neritic:** Belonging to the continental shelf.
- Oceanic:** Beyond the shelf, open water. **Pelagic:** 200m Epi- , 200-1000m Meso- , 1000-4000m Bathy-, >4000m Abyssopelagic. **Bentic:** Living on the bottom of oceans or lakes. **Litoral:** intertidal, sublittoral
- Matrix:** A network of fibers, secreted by and surrounding the connective tissue cells.
- Meiosis:** (Gk. meion, to make smaller) Kind of nuclear division, involving two separate cell divisions that results in daughter cells with the haploid number of chromosomes, one-half the number of chromosomes in the original diploid cell; in germ-cells (sex) only; compare mitosis.
- Mesenchym:** A meshwork of loosely associated, often stellate cells, found in the embryos of many animals.(see also parenchym).
- Mesentery:** Membranes in vertebrates that extend from the body wall to the visceral organs or from one organ to another; consists of two layers of coelomic epithelium and enclosed connective tissue, vessels, and nerves; a septum extending inward from the body wall of some cnidarians; aufhängenetz des darms.
- Mesogloea:** A membrane or gelatinous matrix located between the epidermis and gastrodermis of cnidarians.
- Metabolism:** (Gk. metabole, to change) The sum of all the physical and chemical processes by which living substance is produced and maintained; the biochemical reactions by which energy and matter are made available for the uses of the organism.
- Metachronal waves:** (Gk.metacronos, done afterwards) Integrated undulating movements of rows of cilia across the surface in a stroke and recovery manner (protozoa).
- Metamerism:** (Gr. meta, after; mero, part) Division of the body into linear segments, in annelids & chordates.
- Metazoa:** Motile, multicellular, heterotrophic organisms; animals (see also Protozoa).
- Microvillus:** Ultrastructural finger-like projections of the free surface of some epithelial cells, such as the intestinal epithelium (smaller in size in cilia; does not have a $9 \times 2 + 2$ structure as seen in microtubuli).
- Microscope:** An instrument containing optical lenses that reflect (bend) light rays magnifying the object.
- Electron M.:** Instrument that uses beams of electrons with wavelengths shorter than light, allowing higher magnification; e.g. **SEM** (Scanning) used to observed outer surfaces with great depth of field rendering the objects three dimensional. **TEM** (Transmission) used to observed inner structures of thin, stained sections of cells. **TSEM** (Tunnel Scanning) for objects even smaller to be viewed with a SEM/TEM allowing images of atomic structures.
- Microtubulus:** $9 \times 2 + 2$ structure; a transverse section of a cilium flagellum revealing a central pair of microtubules, connected by radial spokes to a ring nine outer pairs of microtubules, every outer pair started with 2 dynein arms (axonema) altogether surrounded by the plasma membrane. Cilium or flagellum emerge from the basal body projecting into the surrounding environment.
- Mitosis:** (Gk. mitos, thread) Cell or nuclear division in which each of the two daughter nuclei receive exactly the same diploid complement of chromosomes present in the parent cell; in soma-cells (body) only.

Morphology: (Gk. morphe, shape) Study of the external shape of organisms, and positions of their organs.

Apomorphic: New emerging trait in a species.

Dimorphism: (Gk. di, two; morphe, form) The existence of two distinct forms of an organism or organ; e.g. winged and wingless generations in the life of aphids, or sterile and fertile leaves in ferns ect.

Isomorphic: (Gk. isos, equal; morphe, form) Identical in form.

Paedomorphosis: The retention of certain larval or juvenile features by sexually mature individuals; may result from a retardation of somatic development relative to sexual development (neotony), or less commonly from an acceleration of sexual development relative to somatic development (progenesis).

Plesimorphic: Originally unchanged trait as found in their ancestors.

Polymorphism: Differences in form among the members of a species; occurrence of several distinct phenotypes in a population.

Synapomorphic: A trait found only in two species.

Synplesiomorphic: Traits found in many organisms.

Morula: (L. little mulberry) An embryo during the process of cleavage; consists of a solid ball of cells.

Motility: The self-generated motion of an individual or its part (see sessile).

Muscle fiber: see tissue.

Myosin: Thick protein filaments found in muscles and some other contractile cells; usually associated w. actin.

Nematocyst: A minute explosive structure found in cnidarians and used for defense, for capture of prey, and for anchorage located within a cnidocyte.

Neoteny: A type of paedomorphosis in which the retention of certain larval features into adult stage results from the retardation of somatic development relative to the development of reproductive organs; common in salamanders (see pro-genesis).

Nephridium: (Gk. nephros, kidney) The excretory tubules of many invertebrates.

Metaneph: Excretory tubule of invertebrates; the inner end opens into the coelom by a ciliated funnel.

Protoneph: A type of nephridial tubule in which the inner end is blind and bears one or more cilia.

Nerve: Bundle of neuron axons connecting the central nervous system with peripheral receptors and effectors.

-Neuralia: (Gk. neuro, nerve) Nerve cord.

Gastroneuralia: Neural chord at the dorsal side; commonly found in deuterostomes.

Notoneuralia: Neural chord at the ventral side; commonly found in protostomes.

Neuron: A nerve cell with its processes (dendrites, axons), collaterals, and terminations; the structural and functional unit of the nervous system.

Neurotransmitter: A chemical released by an axon terminal in response to a nerve impulse that mediates the transmission of that impulse across a synapse to a post-synaptic neuron or across a myoneural junction to a muscle cell.

Niche: (L. nidus, nest) The role, function or position of an organism in a biological community.

Nomenclature, Binominal: The system, developed by Linnaeus, of giving each type of organism two names; a genus and a species name.

Notochord: A rod of turgid cells located along the back of chordate embryos ventral to the nerve cord. Acts as a hydroskeleton; usually replaced by the ventral column in adult vertebrates.

Nucleus: (L. nux, nut, kernel) The organelle of a eukaryotic cell containing the hereditary material; a group of nerve cell bodies in the central nervous system.

Oocyte: (Gk. oion, egg) The precursor of a mature egg cell (ovum).

Organelle: In eukaryotic cells, a complex cytoplasmic structure with a characteristic shape that performs one or more specialized functions.

Basal Body: Organelle from which a cilium or flagellum arises (basal granule).

Centriol: A pair of small barrel shape, dark staining organelles near the nucleus in the cytoplasm of animal cells, that form the spindle during mitosis and meiosis.

Endoplasmic Reticulum: (Lt. rete, net) A system of membranous tubes, channels and sacs that form compartments within the cytoplasm of eukaryota; synthesis and manufacture of proteins, steroids destined for secretions from the cell (smooth / rough ER).

Golgi Apparatus: In eukaryota, a collection of flat sacs that process proteins for export from the cell.

Lysosome: Membrane-bounded intracellular organelle in eukaryotic cells; contains hydrolytic enzymes.

Mitochondrion: Spherical or elongate cytoplasmic organelle having a double membrane and containing the electron transport system and certain other enzymes; site of oxidative phosphorylation, and principal site of >ATP synthesis in aerobic organisms.

Plastid: Organelles found in plants and in some protozoa that harvest solar energy and produce or store carbohydrates, pigments such as chloro-, leuco-, and chromoplasts.

Vacuole: A spherical intracellular vesicle bounded by a membrane (food-, contractile vacuole).

Vesicle: Transport unit surrounded by a lipid-bilayer membrane.

- Organs:** A body structure composed of two or more tissues that together perform a specific function.
- Excretory O.:** Nephrons, and lungs.
- Homologue O.:** A similarity shared by two species due to inheritance from a common ancestor; e.g., hair in cows and bats.
- Analogue O.:** AOrgans of different evolutionary origin which perform the same role in different organisms; e.g., flight in birds and in bats.
- O. Systems:** Uniformly and functionally connected units with specific tasks; e.g. nervous, skeletal, circulatory, lymphatic systems.
- Osmoregulation:** (Gk. osmos, trush) In marine animals, where the level of salt content of the body is maintained at a different level from that of the environment (homeostasis).
- Ovary:** Egg-producing organ.
- Oviduct:** The duct that carries eggs from the ovary or coelom to the outside of the body; differentiates in mammals into part of the vagina, the uterus, and the uterine tube.
- Oviparous:** Laying eggs.
- Ovulation:** The release of a mature egg from the ovary.
- Ovum:** An unfertilized egg cell; substantially larger than spermatozoa; consist of yolk surrounded by a ring of centriol granules; enclosed in a plasma membrane and an outer protective jelly.
- Parapodium:** A pair of appendages extending laterally from each segment; in polychaete; bear setae.
- Parenchym:** Tissue composed of living, loosely packed, thin wall cells; found in plants (see mesenchym).
- Peristalsis:** (peristellein, to wrap around) Powerful, rhythmic waves of muscular contraction and relaxation in the walls of hollow tubular organs (ureter or digestive tract); move the contents through the tube.
- Peritoneum:** Coelomic epithelium and supporting connective tissue that lines a coelomic cavity; in mammals, limited to the abdominal cavity.
- Phagus:** (Gk. phagein, to eat);
- Coprophag:** (Gk. kotro, feces); The consumption of feces.
- Cytophag:**
- Europhag:** (Gk. eurys, wide or broad);
- Macrophag:** big eater, e.g. snake eats mouse.
- Microphag:** small eater, e.g. blue whale feeds on plankton;
- Monophag:** feeds exclusive on one food source, e.g. panda, koala.
- Necrophag:** feeding on death organisms.
- Oligophag:** (Gk. oligo, few or little); **P**
- hytophag:** feeds on plants.
- Sacrophag:** Feeds on meat
- Saprophag:** (Gk. sapro, decay), feeds on nonliving organic matter.
- Stenophag:** (Gk. steno, narrow) feeds on limited types of food only.
- Pheromone:** A compound produced by one individual that affects another individual at a distance; e.g.: pheromones are secreted by certain female insects and attract males.
- Phylogeny:** (phulon, class, race) The study of the evolutionary history of different groups of organisms.
- Phylum:** The highest subdivision of a kingdom in the biological system of classification of animals.
- Porifera:** Sponges
- Cnidaria:** Hydras, jellyfish, sea anemons, corals.
- Platyhelminthes:** flatworms (flukes and tapeworms).
- Nematoda:** Roundworms.
- Rotifera:** Rotifera.
- Mollusca:** Equipped with a ventral muscular locomotor and integument - Gastropoda (snails, conches, slugs); Bivalvia (clams, mussels, oysters, scallops); Cephalopoda (squids, cuttlefish, octopoda).
- Annelida:** Segmented worms.
- Arthropoda:** Body encased in chitinous exoskeleton and joined appendages - Chelicerata (horse-shoecrab, arachids = spiders, mites, scorpions); Crustacea (waterflees, sopepoda, barnacles, shrimps, lobsters, crabs); Uniramia (cenetpedes, millipeds, insects).
- Bryozoa:** Marine colonial organisms.
- Echinodermata:** Sea-stars, -lilies, -urchins, -cucumbers, sand dollars.
- Chordata:** With parencheal pouches (gill slits), notocord (skeletal rod) and dorsal hollow nerve cord; Urochordata (tunicata, sea squids); Cephalochordata (amphioxus = branchiostoma); Vertebrata (sharks, bony fish, amphibians, reptiles, birds, mammals).
- Physiology:** The biological science of life processes of organisms.
- Planula:** See Larval Stages.

Poikilotherm: (Gk. poikilos, varied) Animals whose body temperatures fluctuates with that of the environment, ectothermic (compare homeothermic).

Protogeny: An hermaphroditic condition found in a few animals, such as certain fish, in which the individual is first female and then changes to male.

Protozoa: (first animals) Any of the single-celled eukaryotic organisms; feeding like animals (heterotrophic).

Schizocoel: See coelom.

Segmentation: Division of a body or structure into more or less similar parts (see metamerism).

Heteronome S.: Irregular shape segments build up the organism, e.g. insects (head, thorax, abdomen).

Homonome S.: Repetitive units formed the organisms, e.g. annelida.

Semipermeable Membrane: Selectively permeable membrane - a membrane that allows water molecules to pass freely but prevents the passage of large molecules across its surface:

Sessile: The quality of being permanently attached to a fixed surface (see motility)..

Skeleton: (Gk. skeletos, hard) The rigid body support on which muscle attach and apply force.

Cytoskeleton: (Gk. kytos, hollow vessel) The protein cable system and associated proteins (micro-tubuli, microfilaments and actinfilaments) that together form the architecture of a eukaryotic cell.

Endoskeleton: (Gk. endos, within) Internal supporting structure such as the bonny skeleton in vertebrates, sponges, echinoderms, fish, etc.

Exoskeleton: (Gk. exos, outside) An external hard excretion from the underline integument, in corals, snakes, crabs, etc.

Hydroskeleton: A turgid column of liquid within one of the body spaces that provides support or rigidity to an organism or one of its parts, e.g., the coelom and coelomic fluid of an annelid worm.

Somatic: Pertaining to the body or body cells as opposed to the germ or gamete-forming cells; pertaining to structures in the body wall as opposed to those in visceral organs.

Species: A population of similar individuals that are capable of interbreeding with each other but are reproductively isolated in nature from other interbreeding groups; a taxonomic unit having two names.

Siblings S.: One of the two or more persons having the same parents.

Spermatid: Spherical immobile cell; contains a large amount of cytoplasm and the haploid set of chromosms.

Spermatozoon: A motile haploid cell arising from spermatids; complicated process of growth and differentiation; consists of head (acrosomal cap, nucleous, centriol, mitochondria), middle piece and tail.

Stoma: (Gk. stomakhos, stomach)

Deuterostomes: A mayor branch of the animal kingdom containing animals in which the mouth forms as a new opening at the opposite end of the body from the blastopore; hemichordates, echinodermata, and chordates; usually notoneuralia with chord ventrally.

Protostomes: Members of an evolutionary line of the animal kingdom characterized by having the mouth derive from the blastopore; e.g. mollusks, kamptozoa, aschelminthes, nemertini, gnasthomulida, plathelminthes and tentaculata; usually gastroneuralia with the chord at the dorsal side.

Structures: Analogous S.; homologous S. see organs.

Symmetry: (see also anatomical planes)

Bilateral S.: Right and left sides of the body are mirror images of each other (secondary derived).

Radial S.: Type of body symmetry characteristic of cnidarians and echinoderms in which similar parts are arranged around a central axis (more primitive).

Symbiosis:(Gk. sumbiosis, companionship) The living together of two organisms of different species.

Commensalism: Members of the two species in which one member benefits and the other is neither benefited nor harmed.

Mutualism: Relationship between 2 species beneficial to both (host, plant; symbiont is the bee).

Parasitism: One member (parasite) lives in or on the living body (epi-/endoparasite) of a plant or animal (host) and obtains is nourishment at the expend of the host.

Synapse: (Gk. synopsis, point of contact) The point of communication between neurons, usually occurs between the axon terminals of one neuron and the dendrites or cell body of another via neurotransmitters; sometimes used for the junction between a neuron and muscle cell (myneural junctions).

Taxis: can either be positive or negative, depending on the source; movement toward or away from a stimulus.

Chemotaxis: Movement toward or away from a chemical.

Geotaxis:

Phonotaxis: Movement toward or away from sound.

Phototaxis: Movement toward light.

Rheotaxis:

Thigmotaxis:

Testis: The male reproductive organ; produces sperm and sex hormones.

Tissue: A group of cells of the same type performing the same function within the body. The four types are:

Connective T.: Connects and surrounds other tissues and whose cells are embedded in collagen matrix (large amount of intercellular space filled with viscous solutions):

- Types of CT: 1) Loose CT (fills space between muscles, and delicate membrane layer in underlying organs, connecting their epithelial tissues). 2) Cartilage (fibers in a gel-like matrix, provide the stiff framework of nose, ear-rims, etc). 3) Adipose CT, simply fat (stores fat droplets, acts as a mechanical buffer around kidneys, joints, etc.). 4) Fibrous CT (collagen- and elastic fibers, accounting for tendons, ligaments etc.).

Epithelial T.: (Gk. epi, on; thele, nipple) Covers the body surface and lines the body cavities, ducts, vessels, and forming glands (see glands for exo- / endocrine; see epithel for functions).

Can be squamous (flat), cuboidal (cube-shaped), columnar (column-like), or stratified (in layers).

- **Functions:** 1) Reception of environmental signals i.e. cochlea of inner ear, olfactory epithel of the nose, retina of the eye, etc. 2) Body protection, e.g. ciliated epithel in lungs and intestines; 3) Secretions of sweat, milk, wax, etc. 4) Excretion of waste, absorption of nutrients in the gut. 5) Absorption of nutrients, drugs, etc. in the gut.

- Epithelial tissue accounts for two major glands: Endo- and exocrine glands - see glands.

- **Coelomic E.:** Inner lining of the coelom.

Muscle T.: Enables animals to move by contraction (myosin- and actin filaments slide past each other);

- Giant muscle cell with many nuclei and more myofibrils; contracts when stimulated, consuming ATP; locomotion due to shortening of actin-myosin filaments; types of MT:

Cardiac M.: Specialized muscle tissue of the heart.

Smooth M.: Type of muscle tissue in which the actin-myosin protein fibrils are not aligned; made of spindle-shaped uninucleated cells and not striated; operating in glands, blood vessels, and internal organs such as the intestine.

Striated M.: Type of muscle tissue in which the repeating actin-myosin protein fibrils are aligned to gives the appearance of cross striations, composed of long multinucleated cells; used for movement of skeletal apparatus.

Nervous T.: Contains neurons, cells which transmit electrochemical impulses to command, skeletal muscles or secretory glands, sense environmental changes, and process information.

Transduction: Mechanical, photometric trigger is converted into an electric impulse.

Transport through the semipermeable cell membrane: Can be active or passive.

Active T.: The transfer of a substance into or out of a cell across the cell membrane against a concentration gradient (electrical membrane gradient) by a process that requires the expenditure of energy. (endergonic) from ATP, e.g. pumping of H^+ -ions into the stomach lining through channel proteins.

Passive T.: Materials passed through membrane by diffusion and osmosis; does not require energy, e.g. O_2 , CO_2 , N_2 .

Trochophora: See larval stages.

Vagile: A motile organism.

Vant Hoff: Regulation-Geschwindigkeit-Temperatur Regel: $Q_{10} = (\vartheta_T + 10) / \vartheta_T \approx 10^\circ$ temperaturanstieg nimmt die reaktionsgeschwindigkeit um das 2-4fache zu (heart-beat).

Verliger: See larval stages.

Viviparity: Giving birth to living young, not egg-laying.

-Vorous: (L. vorare, to devour) Eating or feeding on.

Carniv.: (L. carnum, meat) An animal that eats the flesh of other animals.

Detriv.: (L. detritus, decay) An organism that takes energy from dead or waste organic matter.

Herbiv.: (L. herbum, plant) An animal that consumes plants as food.

Omniv.: (L. omni, all) An animal that consumes both plant and animal matter as food.

Yolk: Stores food reserves within an egg for developing embryo; consisting of protein, carbohydrates, nucleic acids and lipids. Patterns of yolk distribution:

Alecithal: no yolk in the cytoplasm. **Oligolecithal:** little or few yolk. **Polylecithal:** rich in yolk.

Isolecithal: (Gk. isos, equal; leukitos, yolk) Yolk mass evenly distributed throughout the egg; cleavage is spiral; e.g. in echinoderms, branchiostomes (amphioxus), and mammals.

Telolecitha: (Gk. telos, end) Yolk concentrated at the lower (vegetal) pole of the egg; the upper (animal) pole contains the nucleus and less yolky cytoplasm; e.g. in flatworms, most mollusks, marine annelids and most vertebrates; moderate yolk (holoblastic, radial or spiral cleavage); much yolk (meroblastic, discoidal cleavage).

Centrolecithal: Yolk distribution concentrated at the center of cytoplasm; cleavage is superficial, e.g. arthropods.

Zygote: (Gk. zugoun, to join) The cell formed by the union of two gametes; a fertilized egg.