

Glossary - Zoology - Intro

- Abdomen:** Posterior part of an arthropoda' body; in vertebrates: abdomen between thorax and pelvic girdle.
- Acoelous:** See coelom.
- Amixia:** A restriction that prevents general intercrossing in a species leading to inbreeding.
- Anabiosis:** Resuscitation after apparent death.
- Archenteron:** See coelom.
- Aulotomy:** Capacity of separating a limb; followed by regeneration; used also for asexual reproduction; see also fissipary (in echinodermata and platyhelminthes).
- Basal Lamina:** Basal plate of developing neural tube; the noncellular, collagenous layer that separates an epithelium from an underlying layer of tissue; also basal membrane.
- Benthic:** Organisms that live on ocean bottoms.
- Blastocoel:** See coelom.
- Blastula:** Stage of embryonic development, at / near the end of cleavage, preceding gastrulation; generally consisting of a hollow ball of cells (**coeloblastula**); if no blastocoel is present it is termed **stereoblastulae** (arise from isolecithal and moderately telolecithal ova); in **meroblastic** cleavage (only the upper part of the zygote is divided), the blastula consists of a disc of cells lying on top of the yolk mass; the **blastocoel** is reduced to the space separating the cells from the yolk mass.
- Blastoporus:** The opening into the archenteron (the primitive gastric cavity of the gastrula = gastrocoel) developed by the invagination of the blastula = protostoma.
- Cephalisation:** (Gk. kephale, little head) A type of animal body plan or organization in which one end contains a nerve-rich region and functions as a head.
- Cilium:** (pl. cilia, long eyelash) A short, centriole-based, hairlike organelle: Rows of cilia propel certain protista. Cilia also aid the movement of substances across epithelial surfaces of animal cells.
- Cleavage:** The zygote undergoes a series of rapid, synchronous **mitotic** divisions; results in a ball of many cells. Pattern of cleavage is based on the amount of yolk. Eggs with a small yolk divide completely through.
1. **Telolecithal** (yolk concentrated on the vegetal pole) undergoes total but unequal cleavage, the large mass of yolk remains undivided; therefore termed **partial** or **meroblastic**.
 2. **Centrolecithal** (yolk formed as a central mass) cytoplasm is concentrated in the periphery; cleavage takes place only in the outer shell, consequently typed as **superficial**.
 3. **Isolecithal** (little yolk equally distributed throughout cytoplasm) 1st cleavage follows the primary axis, passing from animal to vegetal pole, producing a two-celled embryo; said to be **total** or **holoblastic**.
 - **Radial Cleavage** (mostly resulting in **deuterostomes**, mouth comes second); cleavage planes are alternately vertical and horizontal so that the cells are stacked in rows one upon another.
 - **Spiral Cleavage** (mostly resulting in **protostomes**, mouth comes first); embryonic development follows several patterns characterizing a grouping of phyla.
- Coelenterata:** (Gk. Coel, hollow + enteron, gut) A phylum of animals with radially symmetrical bodies, a saclike internal cavity, tentacles, and nematocysts, including jellyfish, hydras, sea anemones, and corals.
- Coelenteron:** The internal cavity in coelenterates
- Coelom:** (Gk, koiloma. A hollow) The main body cavity of animals, formed between layers of mesoderm, in which internal organs are suspended. A secondary body cavity of vertebrates and most invertebrates, having a membranous lining composed of specialized cells containing the internal organs; developed between the mesoderm layers and forms, peritoneum and pericardial cavities. A similar secondary body cavity found in members of lower invertebrate phyla, such as roundworms and rotifers; it develops within the mesoderm and serves some of the functions of a true coelom.
- Acoelous:** Without a true alimentary canal, without a true coelom or body cavity.
- Archenteron:** The central cavity of the gastrula, lined with endoderm, which forms the rudiment of the digestive system.
- 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.
- Pseudocoel:** (Gk. pseudos, false) Body cavity between the meso- and endoderm; persistent blastocoel.
- Schizocoel:** (Gk. schizein, to split) Coelomic cavity formed by the internal splitting of embryonic mesoderm.

- Cryptobiosis:** (Gk, crypto, hidden + biosis, life) All activity ceases and metabolism declines to almost undetectable levels; can also survive conditions that would quickly kill an active individual (Nematoda, Rotaria, Tardigrades).
- Cuticula:** A waxy or fatty non-cellular, waterproof outer layer on epidermal cells in plants and some invertebrates. In parasitic flatworms: prevents worm from being digested in the gut of the host organism.
- 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.
- Deuterostome:** See stoma.
- Early Embryonic Development:** A series of mitotic divisions, termed **cleavage** (see there) results in many cells, **morula** followed by the **blastula** stage (see there) arising from a single fertilized egg. It involves organization of 3 main cell layers during **gastrulation** (endo-, meso-, ectoderm), formation of body organs during **neurulation** completed with **organogenesis**. Specialization of cells for particular functions (**differentiation**), increase in body size (growth) and sexual maturation. Meiosis in new individuals results in the production of eggs or sperm (**gametogenesis**).
- Ectoderm:** See dermis.
- Endoderm:** See dermis.
- Endostyle:** A longitudinal groove in the floor of the pharynx of certain protochordates and larval cyclostomes; its glandular and ciliated cells secrete mucus that is moved by ciliated cells through the pharynx and entraps minute food particles.
- Enterocoelia:** Group of animals, including the echinodermata, chaetognata, hemichordata and chordata, of which the primary distinguishing morphological characteristic is the body cavity or coelom.
- Epidermis:** See dermis.
- Epifauna:** Those living organisms that inhabit the surface of water and sediments.
- Epithelium:** Is a group of cells covering a surface. One of the four main tissue types; covers the body surface and lines the body cavities, ducts, and vessels.
- Epizoa:** Commensal animal living as ectoparasites on other animals.
- Eutely:** The peculiar feature of having a constant number of cells in the body, the number being characteristic for each species but varying among species (many Loricifera, Nematoda and Rotaria).
- Extracellular Matrix (ECM):** A meshwork of secreted molecules that act as a scaffold and glue that anchors cells within multicellular organisms.
- Fissipary:** Capacity of forming entire new organisms out of a fragmented body part; see also alotomy.
- Flagellum:** (pl. flagella) Long whiplike organelle protruding from the surface of the cell that either propels the cell acting as a locomotory device, or moves fluids past the cell, becoming a feeding apparatus.
- Gamete:** (Gk. gamos, wife) A specialized sex cell such as an ovum (egg) or a sperm; is haploid. A male (sperm) and a female gamete (ovum) fuse and give rise to a diploid zygote, which develops into a new individual.
- Gamogony:** See schizogony
- Ganglion:** A distinct clump of nerve cells that acts like a primitive brain, found in the head region of many invertebrates, an aggregation of nerve cell bodies located outside the central nervous system.
- Gastrocoel:** = Archenteron; see coelom.
- Gastrodermis:** See dermis.
- Gastrula:** The blastula is transformed into a gastrula by cell movements known as **gastrulation**.
- Gastrulation:** ("gut formation") Movement of embryonic cells generates three cell layers - the ecto-, meso-, and endoderm - each layer in turn giving rise to specific body organs and tissue.
1. **Invagination:** The vegetal hemisphere of the blastula grows inwards forming a pouchlike space, it opens to the exterior through the blastopore.
 2. **Epiboly** (in theolecithal ova): The large amount of yolk in the vegetal hemisphere makes inward growth of the blastomeres difficult; epiboly results in a gastrula with a blastopore at the vegetal pole and with a vestige of gastrocoel.
 3. **Involution** (in theolecithal ova): Produces a doubled surface layer separated from yolk by a small space, the rudiment of the **gastrocoel**.
 4. **Delemination:** Surface cells migrate to the interior (unipolar), occurring only at one pole or occurring at various points of the blastula surface (multipolar).

- Gland:** A group of cells organized into a discrete secretory organ.
- Gonad:** An animal reproductive organ that generates gametes.
- Hermaphrodites:** The presence in one individual of both ovarian and testicular tissue.
- Heterogenic:** The production of offspring unlike the parents.
- Holotrich:** typically with uniform body ciliation, but variable (subclass of Ciliates)
- Invertebrates:** An animal that does not have a backbone.
- Mesenchyme:** Embryonic connective tissue; made of loosely, often stellate cells and a dispersed ECM.
- Mesocoel:** (see also meta- and protocoel; in Lophophorates)
- Mesoderm:** See dermis.
- Mesogloea:** A jellylike substance lying between the epidermis and gastrodermis in cnidarians such as jellyfish.
- Metacoel:** (see also proto- and mesocoel; in Lophophorates)
- Metagenesis:** The Phenomenon in which one generation of certain plants and animals reproduce asexually, followed by a sexually reproducing generation (alternation of a/sexual generations) i.e. *Aurelia sp.*: Spawning - fertilisation (outside, is sexually) - formation of blastula (with cilia inside) - gastrulation - free swimming planula larvae - settlement - stationary polyp - differentiation into a stack of polyps (asexually formed colony, strobilisation) - each saucer forms tentacles and separates to swim away.
- Metamerism:** The division of the body into a linear series of similar parts or segments.
- Metamorphosis:** (Gk. meta, after + morphe, from + osis, state of) The process in which there is a marked change in morphology during postembryonic development; in insects the change in body form that takes place as the individual changes from larva, such as a caterpillar, and emerges as an adult, such as a butterfly. Also refers to the change from a tadpole to a frog in amphibians.
- Metazoa:** An animal; a many-celled eukaryote that obtains its energy from other organisms.
- Morula:** (L. mulberry) An embryo during the process of cleavage, preceding blastula stage; consists of a solid ball of cells.
- Nephron:** The morphological and functional unit of the vertebrate kidney; each of the million nephrons in a kidney consists of a glomerulus enclosed by a Bowman's capsule and a long attached tubule (tube of Henle) and a collecting duct; removes waste from the blood.
- Neurula:** Formation of the neural plate in early embryo out of the ectoderm, followed by its closure forming the neural tube.
- Osculum:** (little mouth) Large excurrent opening of a sponge - not a mouth.
- Osmoregulation:** Maintenance of constant internal salt and water concentration in an organism.
- Osmosis:** The movement of water through a semipermeable membrane from an area of high water concentration (low solute concentration) to one of low water concentration (high solute concentration).
- Parenchyma:** Living, loosely packed, thin-walled cells; usually found in plants.
- Parthenogenesis:** Asexual reproduction, or agamogenesis in which the female reproduces its kind without fecundation by the male (Rotifera).
- Pelagic:** Inhabiting open waters with body designs that allow them to float and swim.
- Periderm:** A large-celled outer layer of the epidermis.
- Peristalsis:** (Gk. peristaltikos, compressing around) In animals, waves of contraction and relaxation of muscles along the length of a tube, such as those in digestive tract that help move food.
- Peritrichous:** Belonging to protozoa, having flagella distributed over the entire cell surface.
- Pharynx:** In vertebrates, a tube leading from nose and mouth to the larynx and esophagus; conducts air during breathing and food during breathing and food during swallowing; the throat; it is also used in invertebrates (flatworms) to describe a short tube connecting the mouth and intestines.
- Polymorphism:** occurrence in several forms, the existence in the same species, or other natural group of several morphological types
- Proboscis:** An eversible (with retractor muscle), hollow, muscular organ (sometimes dotted with a stylet) used for prey capture, defense, and locomotion that lies in a fluid-filled cavity (Neurida, Polychaeta, Echiura, Gastropoda, Insecta, Nemertinea).
- Protonephridium:** An excretory organ, used in discharging water and waste products, in which the nephridial canal does not open internally through a funnel but is closed and contains beating flagella.
- Protostome:** See stoma.
- Prototroch:** Ciliated ring around the equatorial plane of a free-swimming larvae used for locomotion and for the generation of food bearing currents.
- Protozoa:** Literally the first animal; any one of the single-celled eukaryotic organisms that is primarily animal-like in its method of obtaining food.
- Pseudocoel:** See coelom.
- Rhynchocoel:** Refers to the cavity in which the proboscis lies. Any such body cavity is lined by mesoderm.
- Setae:** Attached to each segments of earthworms, no true legs but pairs of bristle that pushes against the ground and enables movement.

Schizocoel: See coelom.

Schizogony: Life cycle of the malaria parasite, *Plasmodium vivax*; fertilization in the **midgut** of a female mosquito; motile **zygote** burrows into the midgut wall forming a **cyst**, this **oocyst**, undergoes meiosis and multiple fission (**schizogony**) to emerge in large numbers of slender **sporozoites**; are released into the body cavity of that mosquito invading tissues - including the salivary glands; now saliva and sporozoites can be injected into the blood stream of the vertebrate host when bitten; within an hour, the sporozoites have entered cells of the liver and other tissues; grow into syncytia and undergo schizogony. Great numbers of **merozoites** are liberated, some may enter new liver cells and repeat the cycle; others initiate cycles of replication in red blood cells, with formation of **plasmodial trophozoite**; cycles of **syncytial growth**, **schizogony**; are release into the plasma, and reinvasion of red blood cells; produce the repeated periodic attacks of chills and fever characterizing malaria (24 or 48h). After one or more cycles, some merozoites enter red blood cells and grow into male or female **gametocysts**, a stage that develops no further until ingested by a suitable mosquito;. Differentiation of the female gametocyte into eggs, and male gametocyte into **8** slender flagellated sperms, takes place in the **midgut** of the mosquito.

Spirotrich: Order of ciliated protozoa; have cilia cells around the cytostome and few elsewhere on the body.

Stoma: (Gk. stomakhos, stomach) see also table below.

Deuterostomes: (Gk. deuterō, real) An animal in which the blastopore becomes the anus, while the second opening becomes the mouth; hemichordates, echinodermata, and chordates; usually notoneuralia with chord ventrally.

Protostomes: (Gk. proto, first) Any bilateral animal whose first opening in the embryo (deriving from blastopore) becomes the mouth and the second opening the anus; also characterized by spiral cleavage during development; includes annelids, mollusks, arthropods, etc. usually gastroneuralia with the chord at the dorsal side.

Symbiosis: (Gk. syn together with; bios, life) A long-term association with other organisms, sometimes limited to another single species which can be commensal, mutualistic, and parasitic.

Facultative S.: If both members are found separately.

Obligat S.: For members which are never found living independently. The smaller member, symbiont, is described as an ecto-symbiont or endo-symbiont according to whether it resides on the outside or inside of the larger member, or host.

Taxonomy: (Gk. taxis, arrangement; nomos, law) The science of identification and classification into categories of varying rank, based on similarities and differences, and naming them.

Taxonomic Classification of the animal kingdom: see table below.

Tissue Types: A group of cells of the same type performing the same function within the body.

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

Epithelial T.: (Gk. epi, on; thele, nipple) Covers body surface, lines body cavities, ducts, vessels, and forms glands; can be squamous (flat), cuboidal (cube-shaped), columnar (column-like), or stratified (in layers).

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

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

Trends in Animal Evolution: Major anatomical and physiological trends lead to adaptations like a head, mouth, nervous system, heart, stomach and appendages.

- 1 The trend away from a circular body plan (radial-symmetry) toward symmetrical right and left halves (**bilateral symmetry**),
- 2 **Cephalization**, the development of a head, with its centralized sensory apparatus and a brain.
- 3 Invertebrates evolved away from a simple, saclike body with a single opening at one end toward a more complex, elongated body containing a **food-digesting tube**, the gut, with openings at both ends.
- 4 **A tube- within-a tube body plan**, away from enclosure of the tube in solid tissues toward suspension of the tube in a fluid-filled, tissue lined space called **coelom**.
- 5 **Segmentation**, the development of a series of body units, each containing similar sets of muscles, blood vessels, nerves, and other structures.

Zygote: (Gk. zygotos, paired together) The diploid cell that results from the fission of an egg and a sperm cell (fertilization). A zygote may either form a line of diploid cells by a series of mitotic cell divisions or undergo meiosis and develop into haploid cells.

Taxonomic Classification of the animal kingdom:

Subkingdom Parazoa	Animals with poorly differentiated tissues and no organs
• Phylum Protista	Protists.
• Phylum Placozoa	Macroscopic, flattened marine animals, composed of ventral and dorsal epithelial layers enclosing loose mesenchyme-like cells. (1)
• Phylum Porifera	Sponges. Sessile; no anterior end; some primitive radially symmetrical, but most are irregular. Mouth and digestive cavity absent; body organized about a system of water canals and chambers. Marine, but a few also in freshwater (ca. 5000)

Subkingdom Eumetazoa	Animals with tissues and organs
• Phylum Cnidaria (radiata)	Cnidarians. Hydras, hydroids, jellyfish, sea anemones, and corals. Free-swimming or sessile, with tentacles surrounding the mouth. Specialized cells bearing stinging organelles called nematocysts. Solitary or colonial. Marine, with a few found in freshwater (ca. 9000)
• Phylum Ctenophora (radiata)	Comb jellies. Free swimming, biradial, with two tentacles and eight longitudinal rows of ciliary combs. Entirely marine (ca 90)

Protostomes	Cleavage is determinate and commonly spiral; mouth arising from blastopore.
Aceolomates	Area between body wall and internal organs filled with parenchyma. Is probably an artificial grouping, since it is not certain at all that Mesozoa and Gnathostomulida are closely related to the Platyhelminthes and Rhynchocoela
• Ph. Platyhelminthes (bilateria)	Flatworms. Body dorso-ventrally flattened; digestive cavity (when not secondarily lost) with a single opening, the mouth. The turbellarians are free-living in the sea and freshwater, a few terrestrial. Flukes and tapeworms are parasitic. (ca 18500)
• Ph. Rhynchocoela (bilateria)	Nemertean. Long dorso-ventrally flattened body with a complex eversible proboscis apparatus. Digestive cavity with mouth and anus: Marine, with a few found in freshwater and terrestrial (ca 900)
• P. Gnathostomulida (bilateria)	Gnathostomulids. Minute worm-like animals. Body covered by a single layer of epithelial cells, each of which bears a single cilium. Anterior end with bristle-like sensory cilia. Mouth cavity with a pair of cuticular jaws. Entirely marine. (ca 80)
• Phylum Mesozoa (bilateria)	Mesozoans. An enigmatic group of minute parasites of marine invertebrates. Organs absent, and body composed of few cells (ca 50)
Pseudocoelomates	Animals in which the blastocoel sometimes persists, forming a body cavity. Digestive tract with mouth and anus. Body usually covered with a cuticle.
• Ph. Gastrotricha (bilateria)	Gastrotrichs. Elongated body with flattened ciliated ventral surfaces. Few to many adhesive tubes present; cuticle commonly ornamented. Microscopic with marine and freshwater representatives (ca. 460).
• Phylum Nematoda (bilateria)	Roundworms. Slender cylindrical worms with tapered anterior and posterior ends. Cuticle thick and complex. Free-living species usually only a few millimeters or less in length; many parasitic species; both marine, freshwater and terrestrial (ca 12000)
• Phylum Rotifera (bilateria)	Rotifers. Anterior end bearing a ciliated crown; posterior end tapering to a foot. Pharynx containing movable cuticular pieces. Microscopic; largely found in freshwater, some marine, some inhabitants of mosses. (ca 1500)
• Ph. Acanthocephala (bilateria)	Acanthocephalans. Small, wormlike endo-parasites of arthropods and vertebrates. Anterior retractile proboscis bearing recurved spines (ca 1150)
• Ph. Kinorhyncha (bilateria)	Kinorhynchs. Somewhat elongated body; cuticle segmented and bearing posteriorly directed spines. Spiny, retractile anterior end. Less than 1mm in length. Marine. (ca 100)
• Phylum Loricifera (bilateria)	Loriciferans. Body composed of a spiny, anterior introvert and a trunk encased within a cuticular armor (lorica). Microscopic in marine shelly gravel. (ca 1)
• Phylum Priapulida (bilateria)	Priapulids. Cucumber-shaped or wormlike marine animals, with a retractile anterior introvert. Body covered with spines and tubercles. (ca 13)

	Schizocoelus Coelomates	Body cavity a coelom, formed embryonically by a splitting of the mesoderm, or, if a body cavity is absent, the coelom has been lost. Digestive tract with mouth and anus.
•	Phylum Spinucula (bilateria)	Spiniculans. Cylindrical marine worms. Retractable anterior end, bearing lobes or tentacles around mouth. (ca 320)
•	Phylum Mollusca (bilateria)	Molluscs. Snails, chitons, clams, squids, and octopods. Ventral surface modified in the form of a muscular foot, having various shapes; dorsal and lateral surfaces of body modified as a shell secreting mantle. Although shell may be reduced or absent. Marine, freshwater, and terrestrial species. (ca 60000)
•	Phylum Echiura (bilateria)	Echiurans. Cylindrical marine worms, with a flattened nonretractile proboscis. Trunk with a large pair of ventral setae. (ca 140)
•	Phylum Annelida (bilateria)	Annelids. Segmented worms - polychaetes, earthworms, and leeches. Body wormlike and metameric. A large longitudinal ventral nerve cord. Marine, freshwater, and terrestrial species. (ca 11000)
•	Ph. Pogonophora (bilateria)	Pogonophorans. Deepwater marine animals, with a long body housed within a chitinous tube. Anterior end of body bearing from one to many long tentacles; posterior end segmented with setae. Digestive tract absent. (ca 80)
•	Phylum Tardigrada (bilateria)	Water bears. Microscopic segmented animals. Short cylindrical body bearing four pairs of stubby legs terminating in claws. Freshwater and terrestrial in lichens and mosses; few marine species. (ca 400)
•	Ph. Onychophora (bilateria)	Onychophorans. Terrestrial, segmented, wormlike animals, with an anterior pair of antennae and many pairs of short conical legs terminating in claws. Body covered by a thin cuticle. (ca 70)
•	Phylum Arthropoda (bilateria)	Arthropods. Crabs, shrimp, mites, ticks, scorpions, spiders, and insects. Body metameric with jointed appendages and encased within a chitinous exoskeleton. Vestigial coelom. Marine, freshwater, terrestrial or parasitic species (ca >1.000.000)
•	Ph. Pentastomida (bilateria)	Pentastomids. Wormlike endo-parasites of vertebrates. Anterior end of body with pairs of leglike projections terminating in claws and a median snoutlike projection bearing the mouth. Phylum status very questionable; preferable with arthropods. (ca 90)
	Lophoporate Coelomates	Mouth surrounded by a crown of hollow tentacles (lophophore). An artificial but convenient grouping.
•	Phylum Phoronida	Phoronids. Marine, wormlike animals with body housed within a chitinous tube. (ca 10)
•	Phylum Bryozoa (bilateria)	Bryozoans. Colonial, sessile; the body usually housed within a chitinous or chitinous-calcareous exoskeleton. Mostly marine; a few found in freshwater. (ca 4000)
•	Ph. Brachiopoda (bilateria)	Brachiopods or lamp shells. Body often attached by a stalk and enclosed within two unequal dorso-ventrally oriented calcareous shells. Marine. (ca 335)
•	Phylum Entoprocta (bilateria)	Entoprocts. Body attached by a stalk. Mouth and anus surrounded by a tentacular crown. Mostly marine. (ca 150)

	Deuterostomes	Cleavage radial and usually indeterminate; mouth arising anteriorly from blastopore. Mesoderm and coelom develop primitively from outpocketings of the primitive gut
•	Ph. Chaetognatha (bilateria)	Arrow worms. Marine planktonic animals with dart-shaped bodies bearing fins. Anterior end with grasping spines flanking a ventral preoral chamber. (ca 150)
•	Ph. Echinodermata (bilateria)	Echinoderms. See stars, sea urchins, sand dollars, and sea cucumbers. Secondarily pentamerous radial symmetry. Most existing forms free-living. Body wall contains calcareous ossicles usually bearing projecting spines. A part of the coelom modified into a system of water canals with external tubular projections used in feeding and locomotion. Marine (ca 6000)
•	Ph. Hemichordata (bilateria)	Acorn worms. Body usually divided into proboscis, collar, and trunk. Anterior part of trunk perforated with varying number of pairs of pharyngeal clefts. Marine. (ca 85)
•	Phylum Chordata (bilateria)	Chordates. Pharyngeal pouches, notochord, and dorsal hollow nerve cord present at some time in life history. Marine, freshwater, and terrestrial species. (ca 42000)
•	SubPh. <u>Urochordata</u> (bilateria)	Sea squirts or tunicates. Sessile or planktonic non-metameric invertebrate chordates enclosed within a cellulose tunic. Notochord and nerve cord present only in larva. Solitary and colonial. Marine. (ca 2000)
•	SP <u>Cephalochordata</u>	Amphioxus. Fishlike metameric invertebrate chordates. (ca 150)
•	SPhylum <u>Vertebrata</u> (bilateria)	Vertebrates. Fish, amphibians, reptiles, birds, and mammals. Metameric. Trunk supported by a series of cartilaginous or bony skeletal pieces (vertebrate) surrounding or replacing notochord in the adult. (ca 40000)

Glossary - Zoology-2

- Abdomen:** Posterior part of an arthropoda' body; in vertebrates: abdomen between thorax and pelvic girdle.
- Acanthocephalan:** a phylum of spiny-headed, endoparasitic worms with a reversible, elongated proboscis armed with hooks; juveniles develop within crustaceans and insects, and adults are parasitic in the digestive tracts of vertebrates.
- Acanthostegous:** overlaid with two series of spines, as the ovicell or oecium of certain bryozoans.
- Acanthozoid:** in bryozoan colonies, a specialized individual that secretes tubules which project as spines above the colony's outer surface: in Cestode worms, the prosclex or head portion of a bladderworm.
- Acoela:** Order of - class of Turbellaria small (< 2 mm), primitive marine flatworms; lacking a digestive tract.
- Acoelea:** an order of gastropod mollusks, commonly called sea slugs, subclass Opisthobranchia
- Acoelomates:** Lack a digestive cavity and true coelom or body cavity, such as rotifer, nematoda and sponges; the mouth opens, sometimes through a pharynx, into a mass of loosely packed cells.
- Acoelous:** without a true alimentary canal, without a true coelom or body cavity.
- Acorn barnacle:** Small, conical, sessile barnacle; common on intertidal rocks and ship bottoms.
- Acron:** Unsegmented anterior and dorsal part of the head-bearing the eyes in arthropoda.
- Actinotroch:** A free-swimming larva in phoronida (in Lophophores).
- Amixia:** A restriction that prevents general intercrossing in a species leading to inbreeding.
- Amphineura:** nervenregion am kopf (Gastropoda).
- Anabiosis:** Resuscitation after apparent death.
- Annelida:** a phylum of ringed worms (metameric metazoans) tht have a true coelom, a closed vascular system with hemoglobin-bearing blood, and a cuticle with chitinous setae from pits in the skin.
- Anthomedusae:** an order of coelenterates in the class Hydrozoa. The medusoids (jellyfish stage) lack otocysts but may have ocelli while gonads are on the manubrium; the hydroid colony lacks a complete skeletal covering (athecate)
- Anthostele:** the thick-walled, nonretractable, aboral section of certain coelenterates.
- Anthozoid:** an individual zooid of a compound anthozoan
- Apical organ:** a ciliated plate at the anterior apex of a trochosphere larva of an annelid
- Apical plate:** a cluster of specilized cells, usually with cilia, at the apex or anterior end of certain pelagic larvae, that performs sensory and nervous functions.
- Apistobranchidae:** a family of polychaete, burrowing, deposit-feedingworms favoring sandy or muddybottoms, from shallow to deep water, cosmopolitan
- Aplacophora:** Small group of primitive, sluggish, wormlike carnivorous mollusks common to all water depths, favoring muddy substrates; various forms feed on coelenterates, protozoans, or other minute organisms.
- Arachnid.** Any predaceous spider, having eight legs, a two-part body, and spinnerets; most spiders spin webs to trap prey, many have poison glands; some harmful to humans e.g., the black widow.
- Arthrobranch:** Malacostracan gill attached to the articular membrane between the body and basal joint of the leg of a crustacean.
- Arthropoda:** The largest animal phylum, including insects, arachnids, and crustaceans, typified by segmented bodies and paired, jointed antennae, wings or legs.
- Aulotomy:** Capacity of separating a limb; followed by regeneration; used also for asexual reproduction; see also fissipary (in echinodermata and platyhelminthes).
- Benthic:** Organisms that live on ocean bottoms.
- Bivalvia:** An order of mollusks usually with two shell sections hinged at the base and controlled by adductor muscles with a laterally compressed body and a hinged double shell, each half with a valve (clams, mussels, and oysters). Brachiopoda and Lamellibranchia considered as a group.
- Bivium:** The two posterior cyst of a starfish on either side of the sieve plate (madreporite)
- Blastocoel:** Early embrionic dev.; cavity that develops in the mass of cells formed during blastula stage.
- Blastula:** A stage of embryonic development, at or near the end of cleavage and immediately preceding gastrulation, generally consisting of a hollow ball of cells.
Such hollow blastulae are called **coeloblastula**. Others are solid, without a blastocoel (hollow space within the dividing cell) and are termed **stereoblastulae** (arise from isolecithal and moderately telolecithal ova); where cleavage is **meroblastic** (only the upper part of the zygote is divided, yolk remains undivided), the blastula consists of a disc of cells lying on top of the yolk mass. The blastocoel is reduced to the space separating the cells from the yolk mass.
- Blastoporus:** The opening into the archenteron (the primitive gastric cavity of the gastrula = gastrocoel) developed by the invagination of the blastula = protostoma.
- Brachia:** the coiled arms, that collects suspended food particle in brachiopoda (lophophores).

- Brachiopoda:** Phylum of marine animals; bivalve shell and a pair of cilia-covered arms used to collect food.
- Bryozoa:** Moss-animals, a phylum of minute marine and freshwater creatures with distinct alimentary canals, that form permanent colonies and reproduce by budding (polyzoa).
- Budding:** A type of asexual reproduction in which some cells differentiate and grow outward from the parental body, eventually breaking off and forming a new individual; occurs in sea anemones and corals.
- Byssus:** Secretions that generate a cement-like holdfast to a substrate (Bivalvia).
- Calcarea:** Class of the phylum Porifera, that include sponges with calcium carbonate skeletons.
- Calcarea:** Subclass of sponges, in the class calcarea with free-swimming flagellate larvae.
- Calciferous Gland:** Gland that secretes calcium membrane into the esophagus of certain oligochaete worms
- Calyx:** (meaning cup) Anus and mouth are located in the same cup-shaped opening (Kamptozoa).
- Carapace:** The exoskeleton covering the cephalothorax of many arthropoda. Also refers to the tough outer coverings of turtle and armadillo, used as gill-chamber, filter-chamber or breeding-chamber.
- Cephalisation:** (Gk. kephale, little head) A type of animal body plan or organization in which one end contains a nerve-rich region and functions as a head.
- Cephaloidea:** False longhorn beetles, a small family of colepteran insects in the superfamily Tenebrionoidea.
- Cephalopoda:** Group of marine animals (squid, octopus, and nautilus), the most advanced class of mollusca
- Cercaria:** A non-feeding stage of a flatworms life cycle with a muscular tail and a sucker, able to find a second intermediate host (commonly a fish), giving rise to a metacercaria (Trematoda).
- Cestoda:** Subclass of tapeworms in the class Cestoidea; endoparasites of vertebrates.
- Cestodaria:** Subclass of tapeworms in the class Cestoidea; endoparasites of fish.
- Cestoidea:** Tapeworms, endoparasites (Platyhelminthes), consisting of scolex and a chain of proglottides.
- Chela:** (Gk. chele, claw) (in Chelicerata).
- Cephalothorax:** Combined head and thorax, (in Arachnida, Crustacea, Lobsters, Scorpions etc.).
- Chelicera:** (Gk. chele, claw + keras, horn) One of the first pair of legs (feeding appendages in front of the mouth) of an arachnid (spiders and their close relatives), which possess poison fangs that kill prey.
- Chelicerata:** Part of the phylum arthropoda, including spiders, ticks, mites, scorpions, and king crabs.
- Chitin:** A complex nitrogen-containing polysaccharide that forms the cell walls of certain fungi, the major component of exoskeleton of insects and some arthropoda, and the cuticle of some invertebrates.
- Choanocyte:** (Gk. choano, funnel + cyte, cell) Liquids flow inward through the sides of the collar and out at the top. Food particles are caught on the outside of the collar, moved downward, and ingested by the cell as a food vacuole. Sometimes also referred as collar-cell. (Porifera, Metanephridium).
- Chordata:** The phylum composed of animals which at some developmental stage have a dorsal nerve cord, a notochord, and pharyngeal gill slits; includes mammals, birds, reptiles, amphibians, fish, and certain marine lower forms (such as lancelets, sea squirts, and tunicates).
- Cilium:** (pl. cilia, long eyelash) A short, centriole-based, hairlike organelle: Rows of cilia propel certain protista. Cilia also aid the movement of substances across epithelial surfaces of animal cells.
- Cirripedia:** Subclass of Crustacea, like barnacles and goosebarnacles - free-swimming larvae; sessile adults.
- Cleavage:** After fertilization, the newly formed zygote undergoes a series of rapid, synchronous **mitotic** uninterrupted divisions, which results in a ball of many cells. The amount of yolk in an egg cell affects the pattern of cleavage divisions. Eggs with a small yolk divide completely through.
- Three different**, early cell divisions, are described: **Telolecithal** (yolk concentrated on the vegetal pole), it undergoes total but unequal cleavage, the large mass of yolk can remain undivided, this cleavage is termed **partial** or **meroblastic**. **Centrolecithal** (yolk formed as a central mass) in which the cytoplasm is concentrated in the periphery, therefore cleavage takes place only in the outer shell, consequently it is typed **superficial**. **Isolecithal** (little yolk equally distributed throughout the cytoplasm) in which the first cleavage follows the primary axis of the ovum, passing from animal to vegetal pole, producing a two-celled embryo. Cleavage is said to be **total** or **holoblastic**.
- **Radial Cleavage** (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
 - **Spiral Cleavage** (mostly resulting in **protostomes**, mouth comes first); the embryonic development follows several patterns that characterize a grouping of phyla.
- Coelenterata:** (Gk. Coel, hollow + enteron, gut) A phylum of animals with radially symmetrical bodies, a saclike internal cavity, tentacles, and nematocysts, including jellyfish, hydras, sea anemones, and corals.
- Coelenteron:** The internal cavity in coelenterates

- Coelom:** (Gk, koiloma. A hollow) The main body cavity of animals, formed between layers of mesoderm, in which internal organs are suspended. A secondary body cavity of vertebrates and most invertebrates, having a membranous lining composed of specialized cells containing the internal organs; developed between the mesoderm layers and forms, peritoneum and pericardial cavities. A similar secondary body cavity found in members of lower invertebrate phyla, such as roundworms and rotifers; it develops within the mesoderm and serves some of the functions of a true coelom.
- Collembola:** Springtails, tiny primitive, wingless insects with biting mouthparts; short antenna; abdomen fused in 6 segments, live in damp places; jump by releasing an abdominal spring held in place by a hook.
- Colloblast:** Adhesive cells with a sticky surface and a coiled spiral filament (provides springiness) that is able to adhere small animal food such as eggs, larvae etc. (Ctenophora).
- Commensalism:** A relationship between two organisms, in which the smaller (commensal) derives some benefit from the larger (host) without causing significant harm (Turbellaria).
- Compound Eye:** Eye made of many functionally independent photoreceptor units separated by pigment cells, producing a mosaic image; such eye is typically of insects, crustacea, centipedes, and horseshoe crabs.
- Contifera:** 3-schichtige dorsale schale bei Mollusca.
- Conjugation:** The temporary union of two unicellular organisms of different mating strains, during which time the genetic material is transferred from one to the other (some protozoa and some bacteria). Makronuclei break down, micronuclei undergoes meiosis resulting in 4 haploid nuclei (3 of them disintegrate); conjugates exchange the 4th nuclei and fuse it with the old micronuclei after separation of the conjugates. New micronuclei undergoes meiosis to form 8 nuclei - 3 disintegrate, 4 become macro-nuclei, and the rest remain micronuclei resulting in 4 offsprings.
- Contractile Vacuole:** An organelle that pumps excess water out of the cell to maintain osmotic balance (Protista and certain animals).
- Copepoda:** Order of crustacea, in the group entomostraca; contain parasitic, symbiotic and free-living forms.
- Ctenophora:** Phylum of the comb jellies, gelatinous marine organisms; eight rows of combs locomotory cilia.
- Crustacea:** Class of arthropoda (Mandibulata), with two pairs of antennae, a pair of mandibles, and often many other appendages modified for various purposes. They are mostly aquatic, but a few are terrestrial.
- Crustacean:** Any of the various members of the class Crustacea; included are such edible aquatic forms as lobsters, crabs, shrimp, and crayfish, as well as barnacles, wood lice, and water fleas.
- Cyphonautes Larva:** Free-swimming larva of bryozoa; drifts in plankton for weeks or longer; triangular-shaped, flattened animal with lateral chitinous valves; feed on phytoplankton collected by cilia on ridges within a large vestibule.
- Cryptobiosis:** (Gk, crypto, hidden + biosis, life) All activity ceases and metabolism declines to almost undetectable levels; can also survive conditions that would quickly kill an active individual (Nematoda, Rotaria, Tardigrades).
- Cuticula:** A waxy or fatty non-cellular, waterproof outer layer on epidermal cells in plants and some invertebrates. In parasitic flatworms: prevents worm from being digested in the gut of the host organism.
- Cyphonautes:** The free-swimming, ciliated, conical, bivalved-larvae of certain bryozoa.
- Cyprid:** Final naupliar molt results in a cyprid (Crustacea).
- Cyst:** bei niederen Pflanzen u. Tieren auftretendes kapselartiges Dauerstadium (z. B. bei ungünstigen Lebensbedingungen).
- Cytophyge:** Cell-anus in ciliated protozoa (Protista).
- Cytostome:** Cell mouth in flagellated protozoa (Protista).
- Demospongiae:** a class of sponges with skeleton of spongin fibers alone or in combination with siliceous spicules including commercial sponges.
- Deuterostome:** An animal in which the blastopore becomes the anus, while the second opening to develop becomes the mouth; includes echinoderms and chordates.
- Dipleurula Larva:**
- Ectoderm:** The outer cell layer of an embryo; it gives rise to skin and nervous system.
- Ectoparasit:** Pflanzlicher od. tierischer Schmarotzer, lebt auf der Körperoberfläche (i.e. mosquito).
- Echinodermata:** A phylum of usually radially symmetrical marine animals with a calcareous exoskeleton, including starfish, sea urchins, sea lilies, and sea cucumbers.
- Echiurida:** Phylum of unsegmented marine worms; have a proboscis, live in muddy and sandy sea bottoms
- Endoderm:** The inner cell layer of an embryo; gives rise to the inner linings of the gut and the organs that branch from it, including the lungs.
- Endofauna:**
- Endoparasit:** Parasit, der im Innern anderer Tiere u. Pflanzen lebt.
- Endopod:** The inner branch of a multipurpose appendage; used in seizing and handling of food (Crustacea).

- Endostyle:** A longitudinal groove in the floor of the pharynx of certain protochordates and larval cyclostomes; its glandular and ciliated cells secrete mucus that is moved by ciliated cells through the pharynx and entraps minute food particles.
- Enterocoelia:** Group of animals, including the echinodermata, chaetognata, hemichordata and chordata, of which the primary distinguishing morphological characteristic is the body cavity or coelom.
- Enteropneusta:** Tongue worms and arcon worms, a class of free-living wormlike, burrowing hemichordata.
- Epidermis:** The outer layer of cells of an organism.
- Epifauna:** Those living organisms that inhabit the surface of water and sediments.
- Epipentic:**
- Epithelium:** Is a group of cells covering a surface. One of the four main tissue types; covers the body surface and lines the body cavities, ducts, and vessels.
- Epizoa:** Commensal animal living as ectoparasites on other animals.
- Esophagus:** (in lophophores)
- Eucoelomata:** the major division of the invertebrates including mollusks, annelids, arthropods, echinodermata, chordates, all having a separate mouth and anus, a true coelom well-developed circulatory system.
- Eumetozoa:**
- Eutely:** The peculiar feature of having a constant number of cells in the body, the number being characteristic for each species but varying among species (many Loricifera, Nematoda and Rotaria).
- Exopod:** Outer branch of multipurpose appendages; used in swimming (Crustacea).
- Exoskeleton:** The thick cuticle of arthropods.
- Extracellular Matrix (ECM):** A meshwork of secreted molecules that act as a scaffold and glue that anchors cells within multicellular organisms.
- Fissipary:** Capacity of forming entire new organisms out of a fragmented body part; see also aulotomy (in echinodermata and platyhelminthes).
- Flagellum:** (pl. flagella) Long whiplike organelle protruding from the surface of the cell that either propels the cell acting as a locomotory device, or moves fluids past the cell, becoming a feeding apparatus.
- Furca:** The fork-tail of a crustacea.
- Gamete:** (Gk. wife) A specialized sex cell such as an ovum (egg) or a sperm; is haploid. A male (sperm) and a female gamete (ovum) fuse and give rise to a diploid zygote, which develops into a new individual.
- Gamogony:** See schizogony
- Ganglion:** A distinct clump of nerve cells that acts like a primitive brain, found in the head region of many invertebrates, an aggregation of nerve cell bodies located outside the central nervous system.
- Gastrocoel:** = Archenteron; the primitive gastrovascular cavity of the gastrula (Cnidaria)
- Gastropoda:** A class of snails, slugs, limpets, and conches in the phylum Mollusca, having a well-developed head, a flattened foot, and viscera that usually undergo some degree of torsion.
- Gastrostyle:** In corals, a spiculated projection arising from the gastropore and extending into the gastrozoid.
- Gastrotricha:** A small class of microscopic marine and freshwater animals related to rotifers, belonging to the phylum Aschelminthes or sometimes classified as a separate phylum
- Gastrula:** The blastula is transformed into a gastrula by cell movements known as **gastrulation**.
- Gastrulation:** ("gut formation") The movement of cells in the embryo that generates three cell layers - the ectoderm, mesoderm, and endoderm - each layer in turn giving rise to specific body organs and tissue. There are **four** major methods of gastrulation: **Invagination** in which the vegetal hemisphere of the blastula grows inwards to form a pouchlike space, the - it opens itself to the exterior through the blastopore. **Epiboly** (in theolecithal ova) where the large amount of yolk in the vegetal hemisphere makes inward growth of the blastomeres difficult; epiboly results in a gastrula with a blastopore at the vegetal pole and with a vestige of gastrocoel. **Involution** (in theolecithal ova, produces a doubled surface layer separated from yolk by a small space, the rudiment of the **gastrocoel**. Invagination, epiboly, and involution result in a central cavity or hollow blastulae called coelogastrula. **Delemination** may occur in two ways: (surface cells migrate to the interior) unipolar (occurring only at one pole) or multipolar (occurring at various points of the blastula surface)
- Gemulae:** Asexual larva in sponges protected by spiculi (amphidisk).
- Gland:** A group of cells organized into a discrete secretory organ.
- Gnathostomidae:** A family of parasitic nematode roundworms in the order Spirurida.
- Gnathostomulida:** A group of marine worms.
- Gonad:** An animal reproductive organ that generates gametes.
- Gynogenetic:** Eientwicklung durch Scheinbefruchtung, bei der männliche Gamet zwar in die Eizelle eindringt, eine Verschmelzung der Geschlechtskerne aber unterbleibt u. die Eizelle sich parthenogenetisch zum Embryo weiterentwickelt.
- Haptocyst:** Knobbed tip of a tentacle; used to paralyze and dissolve prey pellicula; in ciliophora (Protista).
- Hemocoel:** Blood filled cavity in arthropoda.

- Hermaphrodites:** The presence in one individual of both ovarian and testicular tissue.
- Heterogenic:** The production of offspring unlike the parents.
- Heterotrichous:** Having more than one type of cilium or flagellum (Ciliates).
- Hexactinellida:** Class of sponges (phylum Porifera), with a skeleton composed of six-rayed siliceous spicules.
- Holometabola:** Order of insects; undergo metamorphosis through the stages of egg, larva, pupa, and adult.
- Holotrich:** typically with uniform body ciliation, but variable (subclass of Ciliates)
- Hydrophilic:** Compounds that dissolve readily in water, such as salt.
- Hydrophobic:** Compounds that do not dissolve in water, such as oil.
- Hydrozoa:** Class of coelenterates including many small jellyfish, some corals, freshwater hydras, and marine hydroids; most are colonial, alternating sessile polyp generations with free-swimming medusae
- Insecta:** Class of air-breathing arthropods; have a segmented body with a chitinous exoskeleton, a pair of compound eyes, and of segmented antennae and wings, three pairs of mouth-parts, and legs.
- Knorhyncha:** Phylum of free-living, segmented, marine invertebrates; live in subtidal mud; feed on diatoms.
- Labium:** (in insecta)
- Labrum:** (in insecta)
- Lophophore:**
- Macrodasyida:** An order of tiny, marine, littoral, hermaphroditic, worms in the phylum Gastrotricha, having anterior, lateral, and posterior adhesive suckers.
- Mandible:** In arthropoda, one of the first mouthparts used to pierce and suck food.
- Mastax:** the muscular pharynx in rotifera bearing the masticatory tropharynx (D: Kaumagen).
- Maxilla:** (Crustacea).
- Maxilliped:**
- Meiofauna:** Intertidal habitats and other organisms that harbor tiny animals (Gnathomulida).
- Mericidium:** A egg-like structure containing a ciliated larvae, forms to a sporocyst (Flatworms - Trematoda).
- Mesenchyme:** Embryonic connective tissue; made of loosely, often stellate cells and a dispersed ECM.
- Mesocoel:** (see also meta- and proto-coel; in Lophophorates)
- Mesoderm:** The middle cell layer of an embryo; gives rise to muscles, bones, connective tissue, and reproductive and excretory organs.
- Mesofauna:**
- Mesogloea:** A jellylike substance lying between the epidermis and gastrodermis in cnidarians such as jellyfish.
- Mesozoa:** einfach gebautes mehrzelliger parasit, das in Körper- u. Fortpflanzungszellen differenziert ist.
- Metacercaria:** Encysted stage within a 2nd intermediate host (found in the fleshy parts of a fish) of a Flatworm; when eaten raw, develops into a parasitic adult within the intestine of humans and other higher animals, develop eggs, which leave the main host by its feces, giving rise to miracidia (Trematoda).
- Metacoel:** (see also proto- and mesocoel; in Lophophorates)
- Metagenese:** The Phenomenon in which one generation of certain plants and animals reproduce asexually, followed by a sexually reproducing generation (alternation of a/sexual generations) i.e. *Aurelia sp.*: Spawning - fertilisation (outside, is sexually) - formation of blastula (with cilia inside) - gastrulation - free swimming planula larvae - settlement - stationary polyp - differentiation into a stack of polyps (asexually formed colony, strobilisation) - each saucer forms tentacles and separates to swim away.
- Metamorphosis:** (Gk. meta, after + morphe, from + osis, state of) The process in which there is a marked change in morphology during postembryonic development; in insects the change in body form that takes place as the individual changes from larva, such as a caterpillar, and emerges as an adult, such as a butterfly. Also refers to the change from a tadpole to a frog in amphibians.
- Metanephridium:** An excretory structure consisting of a ciliated tubular body that opens to the coelom (D: Wimpertrichter).
- Metazoa:** An animal; a many-celled eukaryote that obtains its energy from other organisms.
- Mollusca:** Phylum of bilateral symmetrical invertebrates, including snails, clams, octopuses, squids, and others; soft-bodied animals, most with a calcium carbonate shell secreted by the mantle, a muscular foot for locomotion, and gills.
- Monogenea:** a subclass of trematodes that are primarily ectoparasites of fishes and amphibians.
- Monoplacophora:** Small class of primitive marine molluscs with a single dorsal shell; signs of segmentation.
- Nauplius Eye:** The single median eye characteristic of the nauplius larvae, composed of 3 to 4 small ocelli containing a few photoreceptors (in Crustacea).
- Nauplius Larvae:** A free-swimming larval stage of most marine crustacea, with a simple eye, 2 pairs of antenna, and one pair of mandibles.
- Nematocyst:** A stinging capsule found in cnidarians, which, when stimulated by the cnidocil, shoots out a tiny barb containing a poisonous substance that immobilizes or kills the prey or predator.
- Nematoda:** The roundworms and threadworms, a phylum of smooth-skinned unsegmented worms with a long cylindrical body tapered at the ends; includes free-living and parasitic forms; aquatic and terrestrial.

- Nematomorpha:** Small phylum of pseudocoelomate wormlike animals that are free-living as adults and parasitic on arthropods when juveniles.
- Nemertean:** Belonging to the phylum Rhynchocoela.
- Nephron:** The morphological and functional unit of the vertebrate kidney; each of the million nephrons in a kidney consists of a glomerulus enclosed by a Bowman's capsule and a long attached tubule (tube of Henle) and a collecting duct; removes waste from the blood.
- Neurulation:** Formation of the neural plate in early embryo, followed by its closure forming the neural tube.
- Nuda:** Class of comb jellies, ctenophores with no tentacles.
- Ocellum:** A single eye that is composed of a few sensory cells and a single lens; present in some insects larvae or adults and capable of sensing light, darkness and movement.
- Oligochaeta:** Earthworms, a class of hermaphroditic annelids having no larval stage, few chaetae, no parapodia, and a conspicuous girdle around the body that secretes mucus for copulation and to cocoon the eggs.
- Onychophora:** A phylum of small terrestrial, caterpillar-like invertebrates having characteristics of both annelida and arthropoda.
- Opisthosoma:** (Arthropoda).
- Osculum:** (little mouth) Large excurrent opening of a sponge - not a mouth..
- Osmoregulation:** Maintenance of constant internal salt and water concentration in an organism.
- Osmosis:** The movement of water through a semipermeable membrane from an area of high water concentration (low solute concentration) to one of low water concentration (high solute concentration).
- Ostium:** The heart valves in a long stretched (linear) heart of crustacea.
- Palmella Stage:** A forming cyst which loses its flagella, rounds up, coats itself in a sheet of mucilage, and proceeds to divide repeatedly within.
- Parapod:** Two axially extended foot-like appendices found in each segment in annelida.
- Parthenogenesis:** Asexual reproduction, or agamogenesis in which the female reproduces its kind without fecundation by the male (Rotifera).
- Pedipalps:** (in Chelicerata).
- Pereon:** Locomotory appendages in the middle segments of Crustacea.
- Pelagic:** Inhabiting open waters with body designs that allow them to float and swim.
- Periderm:** A large-celled outer layer of the epidermis.
- Pericardium:** The connective-tissue sac that encloses the heart.
- Peristalsis:** (Gk. peristaltikos, compressing around) In animals, waves of contraction and relaxation of muscles along the length of a tube, such as those in digestive tract that help move food.
- Periostracum:** The outer layer of the shells of mollusks and branchiopoda, composed of a horny section.
- Peritoneum:** The serous membrane lining the abdomino-pelvic (of or relating to the abdomen and the pelvis) walls and investing the viscera. (pelvic: the ring of bones forming a bowl in which the digestive organs are housed and to which the thigh bones are attached - pelvic cavity).
- Peritrichous:** Belonging to protozoa, having flagella distributed over the entire cell surface.
- Pharynx:** In vertebrates, a tube leading from nose and mouth to the larynx and esophagus; conducts air during breathing and food during breathing and food during swallowing; the throat; it is also used in invertebrates (flatworms) to describe a short tube connecting the mouth and intestines.
- Phagocytosis:** Portion of the cell membrane surrounds the food, pinched off to form a complete envelope, and incorporates it into the cytoplasm (amoebic Protista and some Slime Molds).
- Pinocytosis:** (cell drinking) Cell membrane invaginates forming a narrow canal breaking up into small vesicles filled with liquid to be incorporated into the cytoplasm (amoebic Protista and some Slime Molds)
- Planula:** A ciliated, actively free-swimming larva of cnidarians (Coelenterata) and some invertebrates.
- Pleon:** The abdomen of crustacea.
- Pluteus:** A free-swimming ciliated larvae of ophiuroda and echinoda, having long armlike appendages.
- Podocyte:** füsschenzelle (nephridial tissue in onychophora?)
- Polymorphism:** occurrence in several forms, the existence in the same species, or other natural group of several morphological types
- Polyp:** (L. polypus, many footed) The sedentary stage in the life cycle of cnidarians; a cylindrical organism with a whorl of tentacles surrounding a mouth at one end. Sea anemones and hydras are examples of polyps living alone; corals are example of colonial polyps.
- Polychaeta:** a class of mostly marine worms in the phylum Annelida, with anterior tentacles and palps and most segments bearing parapodia with bristles; free-swimming or sessile in tubes or burrows; often brightly colored, most 5-10 cm in length.
- Polyplacophora:** Chitons, marine mollusks in the class Amphineura, with a dorsal-ventrally compressed oval body and a shell of eight overlapping plates on the back.
- Priapulida:** A small phylum of marine worms that are cylindrical and ringed, having many spines and wartlike appendages on the proboscis, abdomen, and tail; mud-dwelling predators.

- Proboscis:** An eversible (with retractor muscle), hollow, muscular organ (sometimes dotted with a stylet) used for prey capture, defense, and locomotion that lies in a fluid-filled cavity (Neirida, Polychaeta, Echiura, Gastropoda, Insecta, Nemertinea).
- Prosoma:** (Arthropoda).
- Protista:** The kingdom comprising single-celled animals.
- Protocoel:** (see also Meta- and mesocoel; in Lophophorates)
- Protonephridium:** An excretory organ, used in discharging water and waste products, in which the nephridial canal does not open internally through a funnel but is closed and contains beating flagella.
- Protopodit:** (Crustacea).
- Protostome:** (Gk. proto, first + stoma, mouth) Any bilateral animal whose first opening in the embryo (blastopore) becomes the mouth and the second opening the anus; also characterized by spiral cleavage during development; includes annelids, mollusks, and arthropods.
- Prototroch:** Ciliated ring around the equatorial plane of a free-swimming larvae used for locomotion and for the generation of food bearing currents.
- Protozoa:** Literally the first animal; any one of the single-celled eukaryotic organisms that is primarily animal-like in its method of obtaining food.
- Pseudocoel:** In certain bilateral metazoans such as rotifers and roundworms, a type of body cavity derived from the blastocoel of the embryo; there is no peritoneum in the cavity, and mesoderm may line the inner surface. Including: Entoprocta, Aschelminthes, and Acanthocephala.
- Pseudocoelom:** (Gk. pseudos, false + koiloma, cavity) A body cavity that is not surrounded by mesoderm-derived cells; found in roundworms and rotifers.
- Pseudopod:** (Gk, pseudos, false + pous, foot) A limblike cytoplasmic extension used in feeding and locomotion (some protozoa and animal cells, as well as slime molds).
- Radula:** A rasping organ that shreds plant material by rubbing it against the hardened (dotted with tiny teeth) surface of the mouth (Mollusca).
- Redia:** Following development of a sporocyst - normally occurring within the first intermediate host (commonly a snail), giving rise to cercarias (Flatworms - Trematoda).
- Rostrum:** (Crustacea).
- Rotifera:** The wheel animalcules, a class of free-water wormlike or spherical animals in the phylum Aschelminthes; they are minute, often microscopic, but many-celled; the corona of cilia by which they move and feed gives the appearance of a revolving wheel.
- Rhynchocoel:** Refers to the cavity in which the proboscis lies. Any such body cavity is lined by mesoderm.
- Scaphopoda:** The tusk or tooth shells, a class of burrowing mollusks, having a foot and tentacles projecting from a curved conical shell that is open at both ends.
- Schizogony:** Life cycle of the malaria parasite, *Plasmodium vivax*; fertilization in the **midgut** of a female mosquito; motile **zygote** burrows into the midgut wall forming a **cyst**, this **oocyst**, undergoes meiosis and multiple fission (**schizogony**) to emerge in large numbers of slender **sporozoites**; are released into the body cavity of that mosquito invading tissues - including the salivary glands; now saliva and sporozoites can be injected into the blood stream of the vertebrate host when bitten; within an hour, the sporozoites have entered cells of the liver and other tissues; grow into syncytia and undergo schizogony. Great numbers of **merozoites** are liberated, some may enter new liver cells and repeat the cycle; others initiate cycles of replication in red blood cells, with formation of **plasmodial trophozoite**; cycles of **syncytial growth**, **schizogony**; are release into the plasma, and reinvasion of red blood cells; produce the repeated periodic attacks of chills and fever characterizing malaria (24 or 48h). After one or more cycles, some merozoites enter red blood cells and grow into male or female **gametocysts**, a stage that develops no further until ingested by a suitable mosquito;. Differentiation of the female gametocyte into eggs, and male gametocyte into **8** slender flagellated sperms, takes place in the **midgut** of the mosquito.
- Sclerospongiae:** A class of sponges that secrete a basal skeleton of crystalline calcium carbonate.
- Scolex:** A hold fast dotted with suckers, leaf-like sucking grooves, or crown of thorns (used to hook onto the intestinal wall) and is not referred as a head (Flatworms - Cestoda).
- Scyphozoa:** The true jellyfish, a class of the phylum Coelenterate; the umbrella is shaped like a bell or saucer, with many marginal tentacles and the mouth on a stalk dangling from the center.
- Sea anemone:** The common name for various anthozoan coelenterates in the order Actiniaria that attach to surfaces by a foot; characterized by a cylindrical body that lacks a skeleton and numerous tentacles surrounding the mouth; they are often bright-colored and flowerlike.
- Segmentation:** Offers the same general possibility as the dividing-up of an organism into cells - the potential for the different segments to become specialized for different functions (Annelida).
- Septum:** (pl. septa) A dividing wall or partition between structures, such as the segments of an earthworm.
- Seta:** Attached to each segments of earthworms, no true legs but pairs of bristle that pushes against the ground and enables movement - in annelida.

Symbiosis: (Gk. syn together with; bios, life) A long-term association with other organisms, sometimes limited to another single species which can be commensal, mutualistic, and parasitic.

Facultative S.: If both members are found separately.

Obligate S.: For members which are never found living independently. The smaller member, symbiont, is described as an ecto-symbiont or endo-symbiont according to whether it resides on the outside or inside of the larger member, or host.

Spirotrich: Order of ciliated protozoa; have cilia cells around the cytostome and few elsewhere on the body.

Sporocyst: A saclike cyst, without cilia, which begins asexual reproduction in which thousands of young may result, giving rise to redias (Flatworms - Trematoda).

Sporogony:

Statocyst: A small sac containing a calcareous concretion, the statolith; a special gravitational sense-organ which occurs in cnidarians to figure out up and down.

Stigma: The tiny, light-sensitive eyespot of an euglenoid. But also the sticky top of a flower.

Syncytium: A larvae sheds its layer of ciliated cells, and the inner cells give rise to a amoeboid syncytia, containing several developing sexual forms within the cytoplasm (Mesozoa, Rotifera, Nematoda, Orthonectida and Tapeworms).

Tardigrada: Water bearers; class of mine arthropods having sucking mouthparts and four pairs of stubby clawed legs; are able to survive dehydration and are distributed from sea floors to ditches and gutters.

Telson: Unsegmented posterior end of the abdomen-bearing the anus in arthropoda (Crustacea).

Telotroch: Locomotory ring of cilia around the anus in phoronida (Lophophores).

Tentaculata: A class of comb jellies having long tentacles, including most Ctenophora.

Thorax: The central region of the body of an arthropoda or vertebrate between head and abdomen.

Trachea: Any of the air-conveying tubules composing the complex branched respiratory system in insecta, myriapoda, and some arichnids.

Trematoda: The flukes, a class of parasitic flatworms in the phylum Platyhelminthes, hermaphrodites with a spiny cuticle, suckers, and a complex life cycle involving several hosts; many infest various human organs, generally form the ingestion of undercooked fish, crustaceans, and vegetation.

Trichocyst: A long sticky proteinous thread, ready to be discharged to deter predators, Paramecium (protista)

Trochophora Larvae: A top-shaped larvae equipped with a prototroch ciliated ring and an apical tuft. Sometimes dotted with shell glands (Bivalvia, Gastropoda; Chitons, Echiura, Polychaeta, Scaphopoda).

Turbellaria: a class of free-living, ciliated flatworms in the phylum Platyhelminthes, having a ventral mouth; hermaphrodites that also reproduce by fission.

Uropod: (Crustacea).

Umbo: Elevated knob on both sides of the outer shell in Bivalvia (Mollusca).

Uropod: (Crustacea).

Veliger: A free-swimming larval stage developed from the trochophore (in mollusca).

Xiphosura: (Gk. xipho, sword + sur, over, above, in addition)

Zygote: (Gk. zygotos, paired together) The diploid cell that results from the fission of an egg and a sperm cell. A zygote may either form a line of diploid cells by a series of mitotic cell divisions or undergo meiosis and develop into haploid cells.

Apicomplexa: Growth phase takes place outside the host. Spores are ingested by beetle and release sporozoites within the gut lumen. Each sporozite grows into a many gamont (**gamogony**). The gamonts subsequently mate, becoming enclosed within the mating cyst, which leaves the host with its feces. Repeated mitotic division within the cyst produce anisogametes which ultimately fuse to produce many zygotes, which eventually becomes spores (**sporogony**). The first divisions within the spores are meiotic, giving rise to haploid gametes (growth phase).

Glossary - Zoology Cnidaria

Basal Disk: Holdfast of Polyps; an adhesive disk, at the stalk of the polyp on the aboral end.

Budding: A type of asexual reproduction in which some cells differentiate and grow outward from the parental body, eventually breaking off and forming a new individual; occurs in sea anemones and corals.

Cnidaria: (Gk. knide, nettle) Group of water animals which include the translucent hydras, the gossamer jellyfish, the sea anemones, and the colorful corals. Most live in the oceans, but a few such as the hydras inhabit fresh water. Body is radially symmetrical, with the mouth as the only opening. Surrounded by tentacles located at one end of the radial axis. Few organs; two principal layers - outer epidermis and inner gastrodermis, separated by mesogloea or jelly-like layer. Have explosive stinging and adhesive cells (cnidocytes) used for prey capture. Nervous system is commonly in the form of a net, ring with receptor cells dispersed over the body surface. Gonads are only aggregations of developing gametes, no gonoducts; fertilization is external and leads to the development of free-living planula larvae.

Classes of C.: Mostly marine, free-swimming (medusa, jellyfish) or attached (polyp) organisms.

Anthozoa: (Gk. anthos, flower + zoon, animal) Solitary or colonial polyploid cnidarians; medusoid stage completely absent. Mouth opens into pharynx; gastrovascular cavity partitioned by mesenteries.

Hydrozoa: (Gk. hydra, water serpent + zoon, animal) Class of coelenterates including many small jellyfish, some corals, freshwater hydras, and marine hydroids; most are colonial, alternating sessile polyp generations with free-swimming medusae. Mesogloea is acellular; cnidocytes entirely epidermal; gametes usually formed within epidermis.

Cubozoa: (Gk. kybos, cube + zoon, animal) Similar to scyphozoa in having a large conspicuous medusoid stage and a small larval polyploid stage. Gonads are gastrodermal. Bell margin turns inwards as a shelf-like projection; no rhopalia present.

Scyphozoa: (Gk. skyphos, cup + zoon, animal) Large free-swimming cnidarians in which medusoid stage is conspicuous and the polyploid stage is small and larval. Mesogloea contains cells; some cnidocytes are located in the gastrodermis and are shed through the mouth.

Food Capture: Cannot grasp prey actively with their tentacles. To become successful carnivores, cnidarians use an immobilizing agent and something to attach prey to the tentacles. Food is digested extra corporal via phagocytosis.

Locomotion: Medusas contract the velum and elasticity of bell margin to make use of propulsion principle. Polyps creep with their slippery and muscularized basal disk; sometimes with both basal disk and their tentacles (similar like a worm); other polyps literally somersault.

Reproduction: Medusas possess gonads; individuals spawn; Fertilization takes place outside the animals, resulting in a free-swimming planula. It attaches onto a substrate, develops into a stationary polyp, and differentiate then into a colony of polyps, or strobila. Each saucer in the stack develops tentacles and swims away as a new medusa and the cycle continues.

Polyps (hydras) undergo asexual reproduction by budding, which develop into new polyps. Sexual reproduction is managed by ectodermal sex cells. Some polyps are hermaphrodites but the major part is separated in fe/male.

Respiration: Cnidarians have very low oxygen requirements, in some, the little they need is provided by zooxanthellae. Freshwater polyps regulate their osmotic balance not via contracting vacuoles instead by secreting salts into the gastrovascular cavity, thus drawing out excess water from the tissue.

Cnidocil: A modified sensing cilium of the nematocyst, which when stimulated causes the nematocyst to open its operculum (lid) and to eject the exploding stinging structure.

Cnidocyte: see nematocyst.

Coelom: (Gk. koiloma. A hollow) The main body cavity of animals, formed between layers of mesoderm, in which internal organs are suspended. A secondary body cavity of vertebrates and most invertebrates, having a membranous lining composed of specialized cells containing the internal organs; developed between the mesoderm layers and forms, peritoneum and pericardial cavities. A similar secondary body cavity found in members of lower invertebrate phyla, such as roundworms and rotifers; it develops within the mesoderm and serves some of the functions of a true coelom.

Coelenterata: (Gk. Coel, hollow + enteron, gut) A phylum of animals with radially symmetrical bodies, a saclike internal cavity, tentacles, and nematocysts, including jellyfish, hydras, sea anemones, and corals; today split into cnidaria and ctenophora.

Cyst: (Gk. cutis. Bladder) A fluid-containing membranous body sac.

Hypostome: (Gk. hype, below + stome, mouth) The round mouth at the apex of a cone-shaped manubrium in hydras; i.e.: the base of the tentacles.

Manubrium: The feeding tube, everted in medusas, and inverted in hydras.

Medusa: (Gk. mythology, a female monster with white-snake-entwined hair) A jellyfish, or the free-swimming stage in the life cycle of cnidarians; an inverted umbrella-shaped version of a polyp, with the mouth and tentacles pointing downwards.

Mesentery:

Mesogloea: A membrane or gelatinous matrix located between the epidermis and gastrodermis of cnidaria.

Metagenese: The Phenomenon in which one generation of certain plants and animals reproduce asexually, followed by a sexually reproducing generation (alternation of a/sexual generations) i.e. *Aurelia sp.*: Spawning - fertilisation (outside, is sexually) - formation of blastula (with cilia inside) - gastrulation - free swimming planula larvae - settlement - stationary polyp - differentiation into a stack of polyps (asexually formed colony, strobilisation) - each saucer forms tentacles and seperates to swim away.

Nematocyst: A stinging capsule found in cnidarians, which, when stimulated by the cnidocil, shoots out a tiny barb containing a poisonous substance that immobilizes or kills the prey or predator.

Types of N.:

- Volvent N.: When stimulates winds about bristles and protuberances, holding prey.
- Defendant N.: Effective in killing or repelling animals not accepted as food.
- Penetrant N.: Large barbs pierce hard coverings open the wound through which the long barbed tube enters the soft tissue of prey to release its toxin.
- Adherent N.: Prolonged coil, allowing to anchor hard barbs with a solid object.

Ocellum: A single, everted eye that is composed of a few sensory cells and a single lens; present in some adult cnidarians, hence capable of sensing light. If ocelli are present, then they are located at the base of every tentacle.

Phagocytosis: Portion of the cell membrane surrounds the food, pinched off to form a complete envelope, and incorporates it into the cytoplasm (Endo- and exocytosis).

Planula: A ciliated, actively free-swimming larva of cnidarians (Coelenterata); is a small, flat, immature larva, propelled by cilia.

Polyp: (L. polypus, many footed) The sedentary stage in the life cycle of cnidarians; a cylindrical organism with a whorl of tentacles surrounding a mouth at one end. Sea anemones and hydras are examples of polyps living alone; corals are example of colonial polyps.

Coral P.: Belong to class of anthozoa; Individual polyps living in symbiosis with zooxanthellae; these polyps group together in a colony; many corals deposit a hard stony secretion (CaCO_3), forming huge banks of living aggregations (reefs).

Sea anemone: The common name for various anthozoan coelenterates in the order Actiniaria that attach to surfaces by a foot; characterized by a cylindrical body that lacks a skeleton and numerous tentacles surrounding the mouth; they are often bright-colored and flowerlike.

Sphincter: A ring muscle surrounding a rube or tubal opening that controls the size of the opening, in anthozoa.

Statocyst: A small sac containing a calcareous concretion, the statolith; a special gravitational sense-organ which occurs in cnidarians to figure out up and down.

Statolith: A small calcareous concretion used in the statocyst to sense gravity.

Strobilus: Stack of polyps (resembles a stack of saucers) of budding medusas, which after maturation are released gradually one by one.

Tentacle: A flexible, unjointed, projecting appendage.

Velum: In Medusa, the bell margin of the sub-umbrella; a band of circular muscles (striated muscle cells) providing the pulsating contraction.

Zooxanthellae: Dinoflagellates living symbiotically with certain marine animals, especially corals, providing oxygen to the host and in return utilizing metabolic byproducts of the host.

Glossary - Zoology-(Platyhelminthes)

- Abdomen:** Posterior part of an arthropoda' body; in vertebrates: abdomen between thorax and pelvic girdle.
- Acoelous:** without a true alimentary canal, without a true coelom or body cavity.
- Aulotomy:** Capacity of separating a limb; followed by regeneration; used also for asexual reproduction; see also fission (in echinodermata and platyhelminthes).
- Benthic:** Organisms that live on ocean bottoms.
- Bilateria:** Group of animals in which the right and the left sides (sagittal) of the body are mirror images of each other.
- Budding:** A type of asexual reproduction in which some cells differentiate and grow outward from the parental body, eventually breaking off and forming a new individual; occurs in sea anemones and corals.
- Cephalisation:** (Gk. kephale, little head) A type of animal body plan or organization in which one end contains a nerve-rich region and functions as a head.
- Commensalism:** A relationship between two organisms, in which the smaller (commensal) derives some benefit from the larger (host) without causing significant harm (Turbellaria).
- Cuticula:** A waxy or fatty non-cellular, waterproof outer layer on epidermal cells in plants and some invertebrates. In parasitic flatworms: prevents worm from being digested in the gut of the host organism.
- Dermis:** (Gk. derma, skin) The deeper layer of the skin of vertebrates and some invertebrates.
- Gastrodermis:** The region between the outer protective epithelium, or epidermis, and the inner digestive epithelium; it is filled with various organs surrounded by mesenchyme in the form of amoeboid cells.
- Mesoderm:** The middle cell layer of an embryo; gives rise to muscles, bones, connective tissue, and reproductive and excretory organs. It lies inbetween the ecto- and endoderm.
- Digestive Cavity:** The anterior attached end of the pharynx to the rest of the branching digestive tract.
- Ectoparasit:** Pflanzlicher od. tierischer Schmarotzer, lebt auf der Körperoberfläche (i.e. mosquito).
- Endoparasit:** Parasitic organism, living in inner organs of its host.
- Fission:** Capacity of forming entire new organisms out of a fragmented body part; see also aulotomy (in echinodermata and platyhelminthes).
- Flame bulbs:** Numerous fine side branches from the tubulus originate in the mesenchyme in tiny enlargements known as flame bulbs; see protonephridia.
- Ganglion:** A distinct clump of nerve cells that acts like a primitive brain, found in the head region of many invertebrates, an aggregation of nerve cell bodies located outside the central nervous system.
- Haptor:** A complex adhesive organ at the ventral end of the body to allow clinging on slippery surfaces - in parasitic flatworms.
- Hermaphrodites:** The presence in one individual of both ovarian and testicle tissue.
- Metazoa:** An animal; a many-celled eukaryota that obtains its energy from other organisms.
- Monogenea:** see platyhelminthes.
- Neoblast:** These regeneration cells are unspecialized cells with large nuclei; can differentiate into all of the many different types of specialized planarian cells. Are distributed throughout the mesenchyme of the worm.
- Pharynx:** In vertebrates, a tube leading from nose and mouth to the larynx and esophagus; conducts air during breathing and food during swallowing; the throat; it is also used in invertebrates (flatworms) to describe a short tube connecting the mouth and intestines.
- Planarians:** derives from lying in one plane - see plathelminthes.
- Platyhelminthes:** (Gk. platy, flat + helminthes, worm) Most flatworms are carnivorous and can be found besides as harmless clear water inhabitants also live as parasites in beef or other tissues of later hosts. Flatworms show bilateral symmetry, are greatly flattened, with differentiated anterior and posterior ends, and dorsal and ventral surfaces. Have a definite head (cephalisation) with a concentration of sense organs, and a central nervous system. They also have an extensively developed third layer of cells (mesoderm). The body surface of free-living flatworms is covered by cilia (used in locomotion), whereas adult parasitic flatworms have a non-ciliated tegument. No internal transportation system present; excretion is possible via protonephridia. The nervous system is composed of a varying number of longitudinal cords.
- Digestion:** The mouth is the only opening in which food enters and wastes exits is present. The feeding organ, (pharynx), can be greatly lengthened, secretes enzymes to soften the prey and sucking movements tear the tissue into microscopic bits, which are then swallowed and absorbed by diffusion.
- Locomotion:** Free-living planarians do not swim freely through water but glide on a thread of mucus supported by means of cilia on their external surfaces, whereas adult parasitic are sessile.
- Reproduction:** Most flatworms are hermaphroditic; development is usually direct. Some planarians multiply asexually; all have the capability of regeneration; these neoblastic cells are distributed throughout the mesenchyme, especially adjacent to the brain and nerve cords.

Respiration: Flatworms are thin; oxygen and carbon dioxide diffuse directly to every cell.

Classes of P.: This phylum includes free-living marine and freshwater flatworms, parasitic flukes and tapeworms.

Cestoidea: (Gk. cestos, girdle) Endoparasitic tapeworms of vertebrates found in the intestine, hence lack a digestive tract; have a very complex scolex and a long trailing a chain of proglottides.

Monogenea: (Gk. mono, single + genea, birth) Ectoparasites of fishes and amphibians. Body elongate or oval and covered by a non-ciliated body. Posterior end bears a large opisthaptor (adhesive organ) provided with suckers and hooks. Have a digestive system. Life cycle does not require an intermediate host.

Trematoda: (Gk. trematodes, pierced) Flukes, endoparasitic flatworms of vertebrates, hermaphrodites with a spiny cuticle, anterior and posterior suckers. Body elongate or oval and covered by a nonciliated tegument. Have a complex life cycle involving several hosts; many infest various human organs, generally form the ingestion of undercooked fish, crustaceans, and vegetation.

- **Digenea:** Flukes, endoparasitic subclass of trematoda - see life cycle of *Schistosoma m.*

Turbellaria: (L. turbellae, disturbance) Mostly free-living, ciliated flatworms, have a ventral mouth; hermaphrodites that also reproduce by fission.

- **Acoela:** (Gk. a, without + koiloma, cavity) Very small (< 2 mm) primitive marine flatworms; with a simple pharynx, but lack digestive tract, protonephridia and distinct gonads. No oviducts and yolk glands.

Live Cycle of Parasitic Flatworms (Chinese Liver Fluke): Adult individuals usually live in liver and bile tissue of mammals. These hermaphroditic adults produce eggs which pass into the intestine of the host and out with the feces.

- **Meridium:** A egg-like structure containing a ciliated larvae is set free once the egg has been ingested by first intermediate host (snail), borrows into the gut wall, loses its cilia and forms into a sporocyst.
- **Sporocyst:** A saclike cyst, without cilia, which begins asexual reproduction in which thousands of young may result.
- **Redia:** Following development of a sporocyst - normally occurring within the first intermediate host (commonly a snail), giving rise to cercarias.
- **Cercaria:** A non-feeding stage of a flatworms life cycle with a muscular tail, eyes and a sucker, able to find a second intermediate host (commonly a fish).
- **Metacercaria:** Encysted stage within a 2nd intermediate host (found in the fleshy parts of a fish) of a Flatworm; when eaten raw, develops into a parasitic adult within the intestine of humans and other higher animals, develop eggs, which leave the main host by its feces, giving rise to miracidia.

Live Cycle of Parasitic Flatworms (*Schistosoma mansoni*): The egg is shed from the human host with fecal matter; hatches in freshwater to become a free-swimming miracidium. It penetrates a snail, sheds its cilia, and turns into a sporocyst. Before producing cercarias it multiplies in the first intermediate host. Cercarias escape into the water and bore themselves into the skin of the final host. The adult worm lives in the vein of the human host - even for years.

Proboscis: An eversible (with retractor muscle), hollow, muscular organ (sometimes dotted with a stylet) used for prey capture, defense, and locomotion that lies in a fluid-filled cavity (Neirida, Polychaeta, Echiura, Gastropoda, Insecta, Nemertinea).

Proglottids:

Protonephridium: An excretory organ found in most flatworms, rotaria (rotifera), and certain polychaeta, used in discharging water and waste products, also known as flame bulbs.

Rhabdite: A long-necked gland lowered into the mesenchyme producing packets of mucoid material, which is tough to swell on contact with water producing a protective mucus.

Scolex: A hold fast dotted with suckers, leaf-like sucking grooves, or crown of thorns (used to hook onto the intestinal wall) and is not referred as a head (Flatworms - Cestoda).

Syncytium: A larvae sheds its layer of ciliated cells, and the inner cells give rise to a amoeboid syncytia, containing several developing sexual forms within the cytoplasm (Mesozoa, Rotifera, Nematoda, Orthonectida and Tapeworms).

Glossary - Zoology (Annelids)

Annelids: (L. anello, ring) Phylum of ringed worms (metameric metazoans) and linear body; external segments are usually demarcated by grooves and serial repetition of appendages. Metamerism is reflected in the internal compartmentalization of the coelom by septa in-between segments. Body wall is composed of an outer layer of circular and an inner layer of longitudinal muscles. Pharynx and intestine are the most conspicuous part of the generally straight gut tube. Paired excretory cells (nephridia) and chitinous setae from pits in the skin (locomotion) are present in each segment. The closed vascular system (w. hemoglobin) is powered by a transverse vessel-like heart. A cuticle with chitinous setae from pits in the skin.

Classes of A.:

- **Branchiobdellida:** (Gk. branchio, gill + bdella, leech) A small group of little, ectoparasitic (crayfish gills) freshwater worms of about 14 to 15 segments only, without setae, and only one sucker.
- **Hirudinea:** (Gk. hirudo, leech) Marine, freshwater, and terrestrial leeches. Body dorso-ventrally flattened, with no parapodia but with modified posterior and anterior segments (suckers). Metamerism reduced. Most ectoparasitic (reduced coelom), hermaphroditic, with a clitellum.
- **Polychaeta:** (gk. polys, many + chaite, hair) Marine bristle worms in which setae are carried on lateral segmental parapodia. Metamerism well developed; Prostomium variable, commonly bears sensory or feeding structures; separate sexes; gametes are produced by the peritoneum of numerous segments.
- **Oligochaeta:** (Gk. oligo, few + chaite, hair) Freshwater annelids and terrestrial species (earthworms) Parapodia absent, setae present. Prostomium is a simple lobe without sensory or feeding structures. Hermaphroditic with gonads present in a few specific segments; Certain segments modified to clitellum used for the secretion of the cocoon containing offspring.

Digestion: Have specialized regions, a **crop**, which stores food, and a **gizzard**, (calciferous glands excrete concretions needed for grinding), followed by the **intestine**, which absorbs nutrients released from the food via digestive enzymes.

Excretion: In annelids, both proto- and metanephridia can be found throughout the phylum.

Locomotion: Longitudinal and circular muscles squeeze against the incompressible fluids in the coelom and gut, force is transmitted to adjacent segments, creating a hydroskeleton, an internal skeleton made of fluid. Contractions in sequential segments produce waves of force that propel the animal forward.

Nervous System: Two pairs of eyes and several pairs of projections and pits which are sensitive to touch and to food and other chemicals in the water at the head, sending sensory information to the large paired dorsal ganglion, the brain (Cephalization). A pair of connectives around the gut, and a pair of longitudinal ventral nerve cords (commonly fused) runs from the posterior to the anterior end. Paired lateral nerves arise from ganglionic swellings of the ventral nerve cords in each segment.

Reproduction: Many marine annelids reproduce sexually; earthworms and leeches are hermaphrodites (when two individuals couple, they exchange sperm so that fertilizes the each other's eggs); but some are even parthenogenetic.

The gametes flow freely in the coelom, and are nourished by the coelomic fluid.

Embryonic development is characterized spiral cleavage, by protostomial development (mouth of blastopore comes first), schizocoel (split cavity, coelom arises from spaces of the mesoderm), and determinate cleavage, (each cell evolves into specific tissue type) resulting in a trochophora larvae.

Respiration: In all members of this phyla by absorption of dissolved oxygen from water from air via skin.

Chloragog Cell: Important site of intermediary metabolism, surrounding the intestine; synthesis and storage of glucagon and fat, deamination of amino acids and synthesis of urea.

Clitellum: In earthworms, at the anterior end of the worm, near the sex organs, a thickened ring containing a number of gland cells, important for mating and protecting the embryos.

Coelom: (Gk, koiloma. A hollow) The main body cavity of animals, formed between layers of mesoderm, in which internal organs are suspended. A secondary body cavity of vertebrates and most invertebrates, having a membranous lining composed of specialized cells containing the internal organs; developed between the mesoderm layers and forms, peritoneum and pericardial cavities. A similar secondary body cavity found in members of lower invertebrate phyla, such as roundworms and rotifers; it develops within the mesoderm and serves some of the functions of a true coelom.

Cirrus: See parapod.

Cuticle: A waxy or fatty non-cellular, collagenous, waterproof outer layer on epidermal cells in plants and some invertebrates. In earthworms only 7 [µm] thin.

Epithelium: Is a group of cells covering a surface. One of the four main tissue types; covers the body surface and lines the body cavities, ducts, and vessels.

- Hermaphrodites:** The presence in one individual of both ovarian and testicula tissue.
- 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, the coelom and coelomic fluid of an annelid worm.
- Mesentery:** Membranes 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 i.e.: dividing the annelid body into two symmetrical halves (bilateria).
- Metamerism:** Pattern of repeated segments; metamerism evolved as a adaptation for locomotion; in annelids is an adaptation for peristaltic burrowing.
- Metanephridium:** See nephridium.
- Nephridium:** The excretory tubules of many invertebrate animals, which may be a proto- or metanephridium:
Metanephridium: The most common excretory structure of annelids, consisting of a ciliated tubular body that opens to the coelom.
Protonephridium: An excretory organ, used in discharging water and waste products, in which the nephridial canal does not open internally through a funnel but is closed and contains beating flagella.
- Palpus:** See peristomium.
- Parapod:** (Gk. para, side + poda, leg) Two axially extended foot-like appendices found in each segment in annelids. Each parapod is supported by a chitinous rod (acicula) with a bundle of chitinous bristles protruding outwards and function like legs in crawling.
Cirrus: Gills, dorsal evaginations of integument on parapods (in polychaeta), needed for respiration.
Neuropodium: In polychaeta; the ventral section of the parapodial pair dotted with setae.
Notopodium: In polychaeta; the dorsal section of the parapodial pair dotted with setae.
Seta: Attached to each segment; no true legs but pairs of chitinous bristle which enables movement either by pushing against the ground (oligochaeta) or as swimming appendages in aquatic annelids (polychaeta).
- Parthenogenesis:** Asexual reproduction, or agamogenesis in which the female reproduces its kind without fecundation by the male.
- Periproct:** The last segment of an annelid.
Pygidium: The non-segmented posterior part of metameric animals that usually bears the anus.
- Peritoneum:** Coelomic epithelium and supporting connective tissue that lines a coelomic cavity.
- Peristomium:** (Gk, peri, around + stoma, mouth) The unsegmented anterior end of an annelid, the mouth.
Palpus: An external appendage-like process, usually located near the mouth.
Prostomium: The preoral lobe (head) which bears sensory organs (antennae and eyes, in polychaeta) and feeding structures (pharynx).
- Protonephridium:** See nephridium.
- Prostomium:** See peristomium.
- Protostomium:** (Gk. proto, first + stoma, mouth) Any bilateral animal whose first opening in the embryo (blastopore) becomes the mouth and the second opening the anus; also characterized by spiral cleavage during development; includes annelids, mollusks, and arthropods.
- Prototroch:** See trochophora larvae.
- Pygidium:** See periproct.
- Segmentation:** Offers the same general possibility as the dividing-up of an organism into cells - the potential for the different segments to become specialized for different functions.
- Septum:** (pl. septa) A dividing wall or partition between structures, such as the segments of an earthworm.
- Seta:** See parapodium.
- Trochophora Larvae:** A top-shaped larvae equipped with a prototroch (band around the equatorial plane) ciliated ring and an apical tuft.
Prototroch: Ciliated ring around the equatorial plane of a free-swimming trochophora larvae used for locomotion and for the generation of food bearing currents.

Glossary - Zoology-Arthropod

Abdomen: see body plan of arthropods.

Acron: Unsegmented anterior and dorsal part of the head-bearing the eyes in arthropoda.

Arthrobranch: Malacostracan gill attached to the articular membrane between the body and basal joint of the leg of a crustacean.

Arthropoda: (Gk. arthro, jointed + poda, feet) The largest animal phylum, typified by the chitinous jointed exoskeleton, segmented bodies and paired, jointed antennae, wings or legs, which is periodically molted. Are metameric, although strongly reduced in many. Have an open circulatory system with a primitive dorsal tubular heart, filled with hemolymph. The nervous system consists of a paired longitudinal cord with ganglions for each segment, where lateral nerves arise. The anterior and posterior ganglions, as well as the ones near legs are usually more conspicuous than the others. Sexes are usually separate with eggs generally centrolecithal, and cleavage commonly superficial.

Digestion: Ectoderm and cuticle line the anterior and posterior regions of the digestive tract.

Excretion: The principal excretory organs are the Malpighian tubules.

Larval Stages:

- Cyprid: The distinct crippled larva of final naupliar molt in crustaceans (barnacles).
- Megalopa: The more crablike stage of crustaceans, which can both swim and walk.
- Nauplius L.: A free-swimming larval stage of most marine crustacea (barnacles), with a simple eye, 2 pairs of antenna, and one pair of mandibles.
- Trilobite L.: Free-swimming young larva of chelicerates (horse-shoe crab).
- Zoea: The swimming larva of crustaceans with a short rounded cephalothorax and a long slender, segmented abdomen; this stage consists of up to 8 molts.

Reproduction: Many miniature arthropods directly develop from the egg to the sexually mature adult within a few days or weeks, allowing many generations per year; others undergo direct development (arachnids, centipedes, some insects, etc.) where the young hatch as miniature versions of adults. The majority instead (lepidoptera, insects, etc.) run through a complex series of metamorphosis (egg, larva, pupa).

Respiration: Most aquatic arthropods have gills, terrestrial respire via trachea or books lungs.

Subphyla of A.:

Chelicerata: (Gk. cheile, claw + keras, horn) Arthropoda with a body divided into cephalothorax and abdomen. Lack antennae, first cephalothoracic appendages are chelicerae, followed usually by a pair of pedipalps and four walking legs. Abdomen without appendages. Arachnids (scorpions, spiders, etc.), Merostomata (horseshoe-crab), Pycnogonida (sea-spiders), etc.

Arachnid. Any predaceous spider, having eight legs, a two-part body, and spinnerets; most spiders spin webs to trap prey, many have poison glands; some harmful to humans e.g., the black widow.

Crustacea: (L. crusta, hard surface) Head with two pairs of antennae, first postoral appendages are mandibles, followed by two pairs of maxillae. Appendages primitively branched; mostly aquatic.

Brachiopoda (fairy-shrimps, etc.), Malacostraca (lobster, crabs, etc.), Maxillopoda (pentastomides, fish-lice, barnacles, etc.) Ostracoda (seed-shrimps), etc.

Uniramia-Myriapoda: (L. unus, one + ramus, branch) Head with one pair of antennae; first postoral appendages are a pair of mandibles. Appendages unbranched; mostly terrestrial; e.g.: Chilopoda (centipedes), Diplopoda (millipeds), etc.

Uniramia-Insecta: (L. insectus, segmented) Class of air-breathing arthropods; have a segmented body with a chitinous exoskeleton, a pair of compound eyes, and of segmented antennae and wings, three pairs of mouth-parts, and legs. Collembola (springtails), Thysanura (silverfish), Pterygota (winged insects), Hemiptera (true bugs), Coleoptera (beetles), Lepidoptera (butterflies), Diptera (flies) Hymenoptera (bees, wasps, ants), Siphonaptera (fleas), etc.

A. **Body Regions:** Arthropods typically have three distinct body regions:

Abdomen: Posterior part of an arthropods body; usually filled with soft organs of the digestive and reproductive systems.

Head: The anteriormost part of the first body region, typically bears paired jointed appendages (sensory and feeding), feelers (antennas), jaws (Mandibles and maxilla), some have pincers (cheliceras and pedipalps) and eyes (simple to compound eyes).

Thorax: The central region of the body of an arthropod or vertebrate between head and abdomen. Often bear appendages for walking, or wings in insects.

A. **Leg Sections:** Part of the thorax:

Coxa: The basal segment of the leg.

Femur: The 3rd leg segment, located between the trochanter and the tibia.

Tarsus: The part of the leg beyond the tibia, consisting of one or more segments or subdivisions.

Tibia: The 4th segment of the leg, between the femur and the tarsus.

Trochanter: The 2nd segment of the leg, between the coxa and the femur.

A. Mouth Parts: Part of the head:

Glossa: One of a pair of lobes at the apex of the labium between the paraglossae.

Labium: Lower lip of insect head.

Labrum: Upper lip of insect head.

Mandible: One of the first mouth parts used to pierce and suck food; in crustacean.

Maxillae: Accessory mouth parts; aid in feeding, particularly in handling food and holding it to the mouth.

Mentum: The more or less triangular, distal plate of the labium, bearing the palpi and ligula.

Palpus: Segmented process borne by the maxillae or labium.

Book Gills: Group of thin-plated, blood-filled respiratory organs.

Carpace: A single large shield, an outgrowth of the last head segment, spreading posteriorly, completely covering the dorsal and lateral surfaces of the cephalothorax; in crustacea.

Cercus: One of a pair of appendages at the end of the abdomen dotted with sensory organs (hair cells).

Chela: (Gk. chele, claw) see chelipeds.

Cephalothorax: Combined head and thorax, (in Arachnida, Crustacea, Lobsters, Scorpions etc.).

Chelicera: (Gk. chele, claw + keras, horn) One of the first pair of legs (feeding appendages in front of the mouth) of an arachnid (spiders and their close relatives), which possess poison fangs that kill prey.

Chelicerata: Part of the phylum arthropoda, including spiders, ticks, mites, scorpions, and king crabs.

Chelipeds: Large pincers (chelas) of the 4th thoracic segment used for defense and offense in crustacean.

Chitin: A complex nitrogen-containing polysaccharide that forms the cell walls of certain fungi, the major component of exoskeleton of insects and some arthropoda, and the cuticula of some invertebrates.

Cuticle: The waterproof, non-living chitinous exoskeleton. In arthropods structured into epicuticle (outermost, thin non-chitinous layer), the sclerotized exo-, and soft endocuticle (composite of chitin and proteins), followed by the living epidermis and the basement membrane.

Endopod: The inner branch of a multipurpose appendage protruding from protopod; used in seizing and handling of food; in crustacean.

Epiproct: An appendage situated above the anus and appearing to arise from the 10th abdominal segment.

Exopod: Outer branch of multipurpose appendages protruding from protopod; used in swimming; in crustacean.

Exoskeleton: The thick cuticle of arthropods.

Eye: Some distinct types of eyes can be found in the phylum of arthropoda.

Compound E.: Eye made of many functionally independent photoreceptor units (ommatidia) separated by pigment cells, producing a mosaic image; such eye is typically of insects, crustacea, centipedes, and horseshoe crabs.

Nauplius E.: The single median eye characteristic of the nauplius larvae, composed of 3 to 4 small ocelli containing a few photoreceptors of crustaceans.

Ocellum: A single eye that is composed of a few sensory cells and a single lens; present in some insects larvae or adults and capable of sensing light, darkness and movement.

Furca: The fork-tail of a crustacean.

Gnathobase: Processes on basal parts of walking legs which aid in locomotion of chelicerates (horse-shoe crab)

Hemocoel: Blood filled coelomic cavity in arthropoda.

Hemimetabola: See metabola.

Hemolymph: The blood-like fluid of animals with open circulatory systems; combines the properties of blood and lymphlike interstitial fluid. Lack respiratory pigments, since tracheoles provide organs with oxygen.

Holometabola: See metabola.

Instar: A newly hatched free-swimming larva, going through a series of molts and intermolt stages.

Malpighian Tubule: Fine, thin-walled excretory tubule of many arthropods that discharge into the gut.

Mandible: One of the first mouthparts used to pierce and suck food; in crustacean.

Maxilliped: Pairs of serially homologous feeding appendages on every segment of the thorax of crustacean.

Metabolism: (Gk. metabole, change)

Hemimetabolism: Incomplete metamorphosis, in which the juvenile form looks like a miniaturized adult.

Holometabolism: Insects, which undergo metamorphosis through the stages of egg, larva, pupa, and adult.

Metamorphosis: (Gk. meta, after + morphe, from + osis, state of) The process in which there is a marked change in morphology during postembryonic development; in insects the change in body form that takes place as the individual changes from larva, such as a caterpillar, and emerges as an adult, such as a butterfly. Also refers to the change from a tadpole to a frog in amphibians.

Molting: The process in which the tanned outer layers (exocuticle) of the old cuticle is shed off. The softer endocuticle is dissolved and reabsorbed. The steroid hormone ecdysone is responsible for molting. Molting is promoted by neurohormones which are released only before a molt and trigger the release of ecdysone.

Nauplius Eye: See eye.

Ocellum: See eye.

Ostium: The heart valves in a long stretched (linear) heart of crustacea.

Ovipositor: The external genitalia of the female; the egg-laying apparatus.

Paraproct: One pair of lobes bordering the anus lateroventrally; see also epiproct.

Pedipalps: Part of the pincers (chelicerata) of chelicerata and arachnids, used for sensory, feeding walking, mating or other purposes.

Pereon: Locomotory appendages in the middle segments of crustacea.

Pleon: The abdomen of crustaceans.

Protopod: The basal part of the appendages which bears the exo-, and endopods; in crustacea.

Protostome: (Gk. proto, first + stoma, mouth) Any bilateral animal whose first opening in the embryo (blastopore) becomes the mouth and the second opening the anus; also characterized by spiral cleavage during development; includes annelids, mollusks, and arthropods.

Spinnerets: Jointed finger-like organs located at the abdominal end of arachnids (spiders), that have at their tips a battery of minute spinning tubes.

Spiracle: See trachea.

Sternite: A sclerite on the ventral side of the abdomen.

Stinger: Injecting organ at last abdominal segment of arachnids (scorpions) used for capturing prey and defense.

Stridulate Organ: The noise generating structure of insects in the order Orthoptera (crickets, cockroaches, grasshoppers, etc.); male crickets “sing” by rubbing the hind legs against the front wings, producing a rasping sound; the hind femora usually provide a series of short peglike structures that function something like a file.

Swimmeret: Two-branched appendages of the abdomen, aiding forward locomotion and for depositing eggs in females

Tergite: A sclerite of the dorsal part of the abdomen.

Telson: Unsegmented posterior end of the abdomen-bearing the anus of crustacean.

Thorax: see body plan of arthropods.

Thympanal Organ: Auditory organs (oval eardrums) located either at the sides of the 1st abdominal segment (short-horned grasshoppers) or at the base of the front tibia (crickets, and long-horned grasshoppers).

Trachea: Any of the air-conveying tubules composing the complex branched respiratory system in insects, myriapoda, and some arachnids, lined with taenidia (circular or spiral thickening in the inner wall), ending externally at a spiracle, and terminating internally in the tracheoles.

Spiracle: An external opening of the tracheal system; a muscular breathing pore.

Tracheole: The fine terminal branches of the respiratory tubes.

Uropod: The 6th and last abdominal segment, resembling modified and enlarged swimmerets of crustacean.

Glossary - Zoology- Hemi- and Chordata

Abdomen: Posterior part of a vertebrate body, between thorax and pelvic girdle.

Caecum: A pouch that forms off a tube, especially on that forms off the gut, such as the one that develops at the junction of small and large intestine.

Chordates: (Gk. chorde, cord) A large and diverse assemblage of marine, freshwater, and terrestrial animals, and includes sea squirts, lancelets, fishes, amphibians, reptiles, birds, and mammals. All of the organisms have a pharyngeal pouch (at least at some stage of their life cycle) which open via slits to the body surface. Primitive species are filter feeders with mucus-secreting endostyle. A dorsal rodlike notochord is present in the developmental stage. A single dorsal, hollow nerve cord is found in the embryonic stage.

Subphyla of C.:

Urochordata (Tunicata): (Gk. ouro, tail + chorda, cord) Mostly sessile, non-metameric invertebrate chordates enclosed within a tunic containing a cellulose-like material. Pharynx highly developed and used in filter feeding; notochord and nerve cord present only in the larva.

- Ascidiacea: Sea squirt. Solitary and colonial.
- Tahliaacea: Salps. Free-swimming planktonic urochordates; solitary and colonial.
- Larvacea: Small paedomorphic, planktonic urochordates living within or attached to a delicate gelatinous house.

Cephalochordata: (Gk. kephale, head + chorda, cord) Lancelets. Small fish-shaped invertebrate chordates. Metameric; body supported by well developed notochord; no vertebrate, no brain, no anterior array of sensory organs. Jawless filter feeders; mouth surrounded by an oral hood (Branchiostoma = amphioxus).

Vertebrata: (L. vertebratus, having a backbone) More active metameric chordates with the trunk supported by a linear series of cartilaginous or bony skeletal pieces surrounding or replacing the notochord in the adult. Neural tube differentiated into a brain and spinal cord. Head well developed with the brain encased in a cranium and major sensory organs located within. Most vertebrates have a mouth supported by jaws. The gut is muscularized, and a pancreas and liver are present.

- Agnatha: Extinct ostracoderms, present day lampreys and hagfishes.
- Placodermi: Extinct primitive jawed fishes.
- Chondrichthyes: Sharks and rays.
- Osteichthyes: Bony fishes.
- Amphibia: Cold blooded animal that starts life (externally fertilized egg) as an aquatic larva, breathing through gills, and metamorphoses into an air-breathing adult; thin, moist and scaleless skin; frogs, toads, salamanders.
- Reptilia: Cold blooded, scaly, lung-breathing animal that lays eggs (internal fertilization) which usually have a shell, horny scales or plates; turtles, lizards, snakes, alligators.
- Aves: Endothermic animals with light bones and a complicated one-way respiratory organ; horny scales are retained on the legs; birds.
- Mammalia: Endothermic animals with hairy body cover, nourishing young with milk from mammary glands, and generally give birth to live young; lions, whales, rabbits, kangaroos and others.

Dual Circuit Heart: A heart that pumps two separate circuits, specifically the pulmonary and systemic circuits.

Endostyle: A longitudinal groove in the floor of the pharynx; its glandular and ciliated cells secrete mucus that is moved by ciliated cells through the pharynx and entraps minute food particles.

Enterocoelia: Group of animals, including the echinodermata, chaetognata, hemichordata and chordata, of which the primary distinguishing morphological characteristic is the body cavity or coelom.

Epithelium: Is a group of cells covering a surface. One of the four main tissue types; covers the body surface and lines the body cavities, ducts, and vessels.

Hemichordata: (Gk. hemi, half + chorde, cord) Little known phylum of deuterostomic, marine animals; have three basic sections - an anterior proboscis, a short middle collar and a long posterior trunk. The pharyngeal pouches evaginate from each side of the pharynx and open as pores on the body surface. Most organisms of this phylum are deposit feeders, with separate sexes, external fertilization, and the occurrence of a tornaria larva.

Classes of H.:

Enteropneusta: Worm-like species belonging (acorn worms). Live in sandy sediments and burrow U-like tunnels with a funnel-like opening on one, and fecal castings on the other side. Organisms have an open circulatory system; glomeruli excrete metabolic waste products through the proboscis. Posses a dorsal hollow nerve cord.

Pterobranchia: Suspension feeders of deep water organisms living in colonies within tubes they secrete. Individuals in a colony can reach up to 2m in length.

Mesentery: One of the membranes 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.

Metanephridium: An excretory structure consisting of a ciliated tubular body that opens to the coelom (D: Wimpertrichter).

Nephrostome: The ciliated funnel-like opening into the coelom of the inner end of a metanephridium.

Notochord: The primitive axial skeleton of all chordates and related animals that consists of a long dorsal rod of cells that lies beneath the nerve cord. The notochord prevents the body from telescoping under locomotory muscle contraction and acts as a base for those contractions. During development, the notochord induces the development of the nerve cord. 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.

Pericardium: The connective-tissue sac that encloses the heart.

Peritoneum: The serous membrane lining the abdomino-pelvic (of or relating to the abdomen and the pelvis) walls and investing the viscera. (pelvic: the ring of bones forming a bowl in which the digestive organs are housed and to which the thigh bones are attached - pelvic cavity).

Segmentation: Offers the same general possibility as the dividing-up of an organism into cells - the potential for the different segments to become specialized for different functions.

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; compare visceral.

Thorax: The central region of the body of a vertebrate between head and abdomen.

Visceral: Pertaining to the internal organs, or viscera, as opposed to structures in the body wall; compare somatic.

Glossary - Zoology (Brain)

Amygdala: Connection of numerous nuclei to the hypothalamus, hippocampus, and thalamus, and gives rise to the stria terminalis, and the ventral amygdalofal pathway.

Axon: (or **neurite**) The process of a neuron that transports the nerve impulse.

Brain: The neural tube forms the spinal cord and the three brain vesicles:

ForeB.: The anterior part of the brain, which includes both cerebral hemispheres (*telencephalon*) and thalamus, hypothalamus, and epithalamus (*diencephalon*), and neural retina (eye formation).

MidB.: The middle part of the embryonic brain, the *Mesencephalon* with the cerebral aqueduct and the midbrain roof (*optic tectum*). This area seems to coordinate activity between hindbrain and forebrain, such as visual activity with behavior.

HindB.: (or **rhombencephalon**) The most posterior of the primary brain divisions which includes cerebellum, pons (*metencephalon*), medulla (*myelencephalon*), and the fourth ventricle.

Spinal Cord: The most caudal part of the CNS - see CNS.

Central Nervous System CNS: The brain and spinal cords.

Spinal Cord: The portion of the vertebrate CNS that is encased in the vertebral column, extending from the caudal end of the medulla oblongata to the upper lumbar region; constructed of a core of gray matter and an outer layer of white matter. The most caudal part of the CNS receives information from the skin, joints, and muscles in the trunk and limbs, and it is the final way station for issuing commands for movement. The spinal cord contains an orderly arrangement of motor and sensory nuclei controlling the limbs and trunk; Afferent pathways carry information to the CNS, efferent pathways carry commands put of the CNS. The spinal cord comprises of the three main divisions:

- **Medulla:** (*myelencephalon*) The most direct rostral extension of the spinal cord and resembles the spinal cord in aspects of its organization.
- **Pons:** (*metencephalon*) Lies rostral to the medulla, contains a massive set of neurons that relay information from the cerebral hemispheres to the cerebellum.
- **Midbrain:** (*mesencephalon*) Lies rostral to the pons and is important in the control of eye movement. Contains also an essential relay in the auditory pathway and several structures critically involved in motor control of skeletal muscles.

These 3 divisions of the brain contain motor and sensory nuclei from the head and neck, innervations of blood vessels and glands in the head and neck, and the viscera of the body. But are also involved in mediating some special senses like hearing and taste.

Diencephalon: In-between *Corpus Callosum* and *Midbrain*, contains two key subdivisions:

- **Thalamus:** (Gk., inner chamber) Processes and relays most of the information coming from the lower regions of the CNS en route to the cerebral cortex.
- **Hypothalamus:** (Gk. hypo, below) An important

Cerebral Hemisphere: (or **cerebrum**) The large paired structures of the cerebrum, connected by the corpus callosum, and are concerned with perception, cognitive, and higher motor functions.

- **C. Cortex:** (or **neocortex**) The cortical or cellular region of the cerebrum, excluding hippocampus and pyriform lobe. The thin layer of gray matter that covers the cerebrum of mammals; separates the brain into distinctive regions subdivided into fissures (e.g.: *sagittal fissure*) and sulci. In humans the proportion of white matter (myelinated fibers) and gray matter (cell bodies and unmyelinated fibers) differ from right to left hemispheres.
- **Basal Ganglia:** consists three subcortical nuclei: *caudate nucleus* (L. tail-shaped), *putamen* (L. shell), and *globus pallidus* (L, pale body). Together, caudate n. and putamen, make the *striatum*, and constitute the input components of the basal ganglia, receiving data from the entire neocortex, and substantia nigra. The cells of caudate n. and putamen send their axons to the globus pallidus (projects back to the motor and premotor cortex by way of the ventral anterior nucleus of the thalamus).

Cephalon: (Gk. kephale, little head) Concentration of nervous tissue and sense organs of the embryonic brain.

DienC.: The posterior segment of the embryonic forebrain (b/w telen- and mesencephalon), which contains the thalamus, hypothalamus, and epithalamus.

MesenC.: The middle part of the embryonic brain (b/w the dien- and rhombencephalon); with the cerebral aqueduct and the midbrain roof (*optic tectum*). This area seems to coordinate activity between hindbrain and forebrain, such as visual activity with behavior.

RhombonC. (hindbrain): The most posterior of the primary brain divisions which includes meten-, myelencephalon, and the fourth ventricle; see CNS - spinal cord.

- **MetenC.:** The anterior part of the hindbrain, the medulla, which develops the pons and cerebellum.

- **MyelenC.:** The posterior part of the hindbrain, which produces the medulla.

TelonC.: Anterior part of the brain from which includes the olfactory lobes and the two cerebral cortexes; and the lateral ventricles; see also ventricular system.

Cerebellar Brachia: Bundles of nerve fibers that connect cerebellum to pons or cerebrum.

Cerebellar Cortex: The outer layer of the cerebellum that is primarily composed of cell bodies.

Cerebellum: (L. small brain) An independent unit of the hindbrain but not part of the brain stem, dorsal to the pons, right above the medulla. Determining the timing sequences and the pattern of muscles activated during movement (muscle coordination - each side of the cerebellum controls the same side of the body).

NeoC.: The most recently expanded part of the cerebellum, which coordinates special attributes such as finger coordination.

Cerebral Aqueduct: The neural canal connects the midbrain with the forebrain; aqueduct of Sylvius.

Cerebral Cortex: (or **neocortex**) The cortical or cellular region of the cerebrum, excluding hippocampus and pyriform lobe - see CNS, cerebral hemispheres.

Cerebral Vesicle: The enlarged anterior end of the cephalocordate nervous system; a primitive brain.

Cerebrospinal Fluid CNS: A fluid extracted from blood by choroid plexi of the brain that fills the central canals and ventricles of the brain and the arachnoid spaces of the meningeal membrane; also called **neurolymph**.

Cerebrum: The largest part and highest center of the mammalian brain; it evolved from the olfactory center of the lower vertebrates - see CNS, cerebral hemispheres.

Choroid Plexus: Any of several convoluted vascular structures that project into lateral, third, and fourth ventricles of the brain, and that produce cerebrospinal fluid.

Cisterna Chyli: The dilated part of thoracic duct in the lumbar region.

Colliculi: (L. colliculus, little hill) The optic and auditory lobes of mammals.

Inferior C.: A major site of audio reflex control.

Superior C.: A principal visual center of mammals in roof of midbrain.

Commissure: (L. joining together) The surface at which two structures unite; the neural pathways that unite two structures.

Anterior C.: It interconnects the temporal lobe or cortex and olfactory lobes of the cerebral cortex.

Gray C.: The interneuron pathways around the central canal of the spinal cord that unite right and with left gray columns and gray columns with funiculi.

Posterior C.:

Corpus Callosum: (L. hard body) The largest commissure (L. joining together) and the largest fiber bundle in the brain which interlinks the right and the left cerebral hemispheres.

Corpus Striatum: The encapsulated caudate and lenticular nuclei of cerebral hemispheres; center of many involuntary activities.

Cortex (or **pallium**): The outer layer of the brain that overlies the medulla; either hemisphere is divided into lobes:

- **Frontal L.:** The most anterior region of cerebral hemisphere.
- **Occipital L.:** The most posterior region of the cerebral hemisphere.
- **Parietal L.:** Upper posterior region of the brain, located in-between the frontal- and the occipital cortex.
- **Temporal L.:** Lower posterior region of the brain, located in-between the frontal- and occipital cortex.

Cerebral C.: The thin layer of gray matter that covers the cerebrum of mammals; separates the brain into distinctive regions subdivided into fissures (e.g.: *sagittal fissure*) and sulci.

NeoC.: The cortex that is visible when the brain is viewed from the outside; the brain's most recent evolutionary addition.

Cingulate Gyrus: A component of the limbic system, overlying the corpus callosum.

Decussation: A crossing of nerve fibers that carries impulses to or from one side of the body from or to the opposite side of the brain.

Dendrite: Any fiber of a neuron that carries an impulse toward the cell body.

Gray Column: The columnlike masses of nerve cells in the spinal cord.

Hippocampus: A ridgelike mass located on the floor of each lateral cerebral ventricle of the brain that represents a primitive part of the cerebral cortex (archicortex or archipallium) associated with smell, emotion, experience, spatial learning, and visceral regulation.

Horn: An other term describing the ventricle.

Dorsal H.: The region of the spinal cord that receives the input from sensory neurons entering through the dorsal root of the spinal nerve; dorsal column; posterior horn (humans).

Gray H.: Gray column.

Limbic System: (L. limbus, girdle, belt or border) C-shaped tissue centrally located; it plays a relevant role in cognitive and effective functions (motivation and nourishment). It is also concerned with the motions, regulation of the autonomic nervous system, and in mediating learning and memory; basically consists of fornix and hippocampus.

Fornix: Nervous tissue connecting the hippocampus with the mamillary body; i.e.: hippocampal formation that processes information and projects them by way of the fornix to the mamillary body of the hypothalamus.

Hippocampus: A ridgelike mass located on the floor of each lateral cerebral ventricle of the brain that represents a primitive part of the cerebral cortex (archicortex) associated with smell, emotion, experience, spatial learning, and visceral regulation.

Lobe: see cortex.

Mamillary body:

Medulla Oblongata: In vertebrates, the posterior-most a cone-shaped neuronal mass part of the brain that lies between the pons and the spinal cord; it serves the heart, respiratory apparatus, gut, and inner ear; the 5th through the 12th nerve enter via the medulla.

Neocortex: Cerebral cortex or neopallium.

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

Nerves of the forebrain (dien- and telencephalon):

(I) **Olfactory N.:** Olfactory portion of the nasal mucosa (smell, somatic).

(II) **Optic N.:** Retinal nerve (sight, somatic).

Nerves of the midbrain (mesencephalon):

(III) **Oculomotor N.:** Extrinsic (operating from outside) nerve fibers to muscles of the eyeballs, with a few used for pupil and ciliary body (somatic).

(IV) **Trochlear N.:** Receptors in extrinsic muscle of eyeballs (somatic).

Nerves of the medulla (meten- & myelencephalon):

(V) **Trigeminal N.:** Jaws, and skin receptors of the head (touch, pressure, temperature, pain - somatic).

(VI) **Abducens N.:** Receptors in an extrinsic muscle of eyeball (somatic).

(VII) **Facial N.:** Taste buds of anterior 2/3rd of tongue (taste - visceral).

(VIII) **Vestibulocochlear N.:** Semicircular canals, utriculus, sacculus (balance), cochlea (hearing) somatic.

(IX) **Glossopharyngeal N.:** Taste buds of posterior 3rd of tongue; lining of pharynx (visceral).

(X) **Vagus N.:** Receptors in many internal organs (larynx, lungs, heart, aorta, stomach - visceral).

(XI) **Accessory N.:** Receptors in certain shoulder muscles (somatic).

(XII) **Hypoglossal N.:** Other receptors in tongue (somatic).

Neurite: An axon or dendrite, especially of an immature neuron.

Neuron: A nerve cell, including body, axons, and dendrites.

Nucleus: Here, a mass of nerve cells of similar type and function in the brain or spinal cord.

Septum: A partition between two cavities or structures.

Septum Pellicudium:

Striatum: Collective term for *caudate nucleus* and *putamen*; input components of the basal ganglia.

Substantia Nigra: Stark pigment, which appears to be a polymer of dopamine or its metabolites.

Ventricular System: A series of confluent fluid-filled cavities within the brain of vertebrates; the fluid in the ventricles is cerebrospinal fluid (clear fluid that fills the cavity (ventricles) within the brain and the central canal of the spinal cord). Cerebrospinal fluid also bathes and cushions the outside of the brain and spinal cord by flowing through a space that covers the surface of the entire CNS.

4th V.: The expanded part of the neural canal that lies within the hindbrain or medulla.

Lateral V.: The expanded neural canal of either cerebral hemisphere of the brain.

Olfaction: (L. olfactus, smell) The act of smelling.

Olfactory bulb: A swollen end of the olfactory pathway beneath each anterior lobe of the cerebrum; Part of the CNS, that develops from the telencephalon. There are two symmetrical OB's serving the olfactory mucosa of the two nasal cavities with long unmyelinated axons, which run from the nasal cavity to part of the brain.

Olfactory capsule: Nasal capsule.

Olfactory cortex: The part of the cerebral cortex that processes sensory input concerning smell.

Olfactory Nerve: Either of the paired 1st (I) cranial nerves; fibers of which grow out from the nasal olfactory epithelium (chemosensory lining of the nasal mucosa) to the olfactory lobe.

Optic Chiasm: A swelling under the hypothalamus of the vertebrates brain where the two optic nerves meet; depending on the species, some axons cross the midline here and project to the contralateral side of the brain; i.e.: the partial decussation of fibers of the optic nerve.

Optic Tectum: A principal sensory center, especially of vision, on the roof of the midbrain (*mesencephalon*). The optic tectum is represented by the superior colliculus in mammals.

Pons: (L. bridge) Mass of myelinated fibers (commisure) at the base of the brain, which interconnects the two sides of the cerebellum but also extends fibers to/from the cerebrum.

Pyramidal Cell: A pyramid-shaped neuron of the cerebral cortex.

Stria Terminalis: Innervates the bed nucleus of the septal area, the nucleus accumbens, and the hypothalamus.

Tectum: (Optic lobe or optic cortex) The highest center for processing visual information.

Thalamus: Either of the paired masses of nerve cell bodies that form the lateral wall of the third ventricle of the brain (diencephalon); a relay center of sensory impulses to the cerebral cortex. A major center on the midbrain of mammals that receives and transmits both sensory (except olfactory) and motor information.

Epithalamus: The dorsal part or roof of diencephalon that includes the pineal gland.

Hypothalamus: The part of the diencephalon below the thalamus that forms the floor of the third (median) ventricle of the brain; includes the optic chiasma, mamillary bodies, tuber cinereum, and infundibulum; many subregions contribute to the regulation of the autonomic nervous system and of endocrine function (glucose-, water-, salt-balance and many hormones).

Pituitary Gland: (Hypophysis): A complex endocrine organ situated at the base of the brain and connected to the hypothalamus by a stalk. It is of dual origin:

- **Anterior PG:** (Adenohypophysis) Derived from embryonic buccal epithelium.
- **Posterior PG:** (Neurohypophysis) Derived from the diencephalon.

Glossary

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Clubbed: Segments towards the tip increase in diameter.

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- Morphology:** The science of form or structure.
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- Notum:** The dorsal surface of a body segment.
- Nocturnal:** Active at night.
- Nymph:** An immature stage (following hatching) of an insect that does not have a pupal stage.

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Occiput: The dorsal posterior part of the head, between the occipetal and postoccipetal sutures.

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Operculum: Lid or cover in Mollusca.

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Palpus: A segmented process borne by the maxillae or labium in Insecta.

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Paraproct: One of a pair of lobes bordering the anus latero-ventrally.

Parthogenesis: Reproducing of eggs that develop without being fertilized.

Pectinate: With branches or processes like the teeth of a comb in Insecta.

Pedipalps: The 2nd pair of appendages of an arachnid.

Peristome: The ventral margin of the head, bordering the mouth.

Pharynx: The anterior part of the foregut, between the mouth and the esophagus.

Plecoptera: (Gr. pleco folded, plaited; ptera, wing) Stoneflies; poor fliers, elongated front wings, hind wings slightly larger but shorter, reduced or even absent; long antenna and cerci; larval stage aquatic, no pupal stage.

Pleuron: The lateral area of a thoracic segment.

Posterior: At the hind or rear.

Postmentum: The basal portion of the labium; proximated of the labial suture in Insecta.

Postnotum: A notal plate behind the scutellum, often present in wing-bearing segments in Insecta.

Postocciput: The extreme posterior rim of the head, between the postoccipital suture and the foramen magnum.

Praetarsus:

Prementum: The distal part of the labium / labial suture on which all the labial muscles have their insertions.

Proboscis: The extendible beaklike mouthparts

Pronotum: The dorsal sclerite of the prothorax.

Prothorax: The anterior of the three thoracic segments.

Pubescent: Downy, covered with short fine hairs.

Pulvilliform: Lobelike or padlike; shaped like a pulvillus;

Pulvillus: A pad or lobe beneath each tarsal claw in Diptera.

Pupa: The stage between the larva and the adult in insects with complete metamorphosis; a non-feeding and usually an inactive stage but tissues are reorganized within.

P. **Optecta:** A pupa in which the appendages are more or less glued to the body surface, as in Lepidoptera.

Pupiparous: Giving birth to larvae that are fully grown and ready to pupate.

Pygidium: The last dorsal segment of the abdomen.

Radius: The longitudinal vein connecting the R₁ and the branch of the radius immediately behind it in Insecta.

Rectum: The posterior region of the hindgut in Insecta.

Reptile:

Rostrum: Beak or snout.

Sclerite: A hardened body wall plate bounded by sutures or membranous areas.

Sclerotization: The hardening of the chitinous cuticula.

Scutellum: A sclerite of a thoracic notum; the mesoscutleum, appearing as a more or less triangular sclerite behind the pronotum in Insecta.

Scutum: The middle division of a thoracic notum, just anterior to the scutellum in Insecta.

Seta: A bristle.

Sternite: A sclerite on the ventral side of the body; the ventral sclerite of an abdominal segment in Insecta.

Stigma: A thickening of the wing membrane along the costal margin of the wing.

Stipes: A longitudinal color marking.

Stylet: A needlelike structure; one of the piercing structures on a sucking mouth parts in Insecta.

Subapical: Located just proximad of the apex.

Subcosta: The longitudinal vein between the costa and the radius.

Subimago: The first of the two winged instars of a mayfly after it emerges from the water.

Submentum: The basal part of the labium in Insecta.

Suture: An external linelike groove in the body wall; a narrow membranous area between sclerites in insects, giving them more flexibility.

Tarsal Claw: A claw at the apex of the tarsus.

Tarsal formula: The number of tarsal segments on the front, middle, and hind tarsi, respectively in Insecta.

Tarsus: The part of the leg beyond the tibia, consisting of one or more segments or subdivisions.

Tegula: A small saclike structure overlying the base of the front wing; hind wing clutches onto when flying.

Telson: The posterior part of the last abdominal segment in Crustacea.

Tergite: A sclerite of the tergum; the dorsal surface of an abdominal segment in Insecta.

Tergum: The dorsal surface of any body segment.

Terminal: At the end; at the posterior end (of the abdomen), the last of a series.

Tibia: The 4th segment of the leg, between the femur and the tarsus.

Thorax: The bodyregion behind the head, which bears the legs and the wings (sea abdomen, head).

Transverse: Across, at right angles to the longitudinal axis.

Trichoptera: (Gr. tricho, hair; ptera, wing) Caddiesflies; show similarities with lepidoptera; weak fliers with hairy wings; long antenna; pupa dectica; larvae aquatic; build case and catching nets like spiders.

Trochanter: The 2nd segment of the leg, between the coxa and the femur.

Tympanum: Auditory (membrane) organ, eardrum in nocturnal lepidoptera; used in detecting the bat's sonar.

Uropod: One of the terminal pair of abdominal appendages, usually lobelike in Crustacea.

Veine: A thickened line in the wing of Insecta.

Longitudinal V.: Costa, subcosta, radius, radial sector, media, cubitus, anal vein.

Cross-V.: Humeral, radial, sectorial, radio-medial, medial, mediocubital, cubito-anal.

Venter: The ventral side.

Ventral: Lower or underneath; pertaining to the under side of the body.

Vertex: The top of the head, between eyes and anterior to the occipital suture.

Vestigial: Small, poorly developed, degenerate, nonfunctional.

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

Glossary - Taxonomic exercises in Zoology

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Posterior: At the hind or rear.

Postmentum: The basal portion of the labium; proximated of the labial suture in Insecta.

Postnotum: A notal plate behind the scutellum, often present in wing-bearing segments in Insecta.

Postocciput: The extreme posterior rim of the head, between the postoccipital suture and the foramen magnum.

Praetarsus:

Prementum: The distal part of the labium / labial suture on which all the labial muscles have their insertions.

Proboscis: The extendible beaklike mouthparts

Pronotum: The dorsal sclerite of the prothorax.

Prothorax: The anterior of the three thoracic segments.

Pubescent: Downy, covered with short fine hairs.

Pulvilliform: Lobelike or padlike; shaped like a pulvillus;

Pulvillus: A pad or lobe beneath each tarsal claw in Diptera.

Pupa: The stage between the larva and the adult in insects with complete metamorphosis; a non-feeding and usually an inactive stage but tissues are reorganized within.

P. **Optecta:** A pupa in which the appendages are more or less glued to the body surface, as in Lepidoptera.

Pupiparous: Giving birth to larvae that are fully grown and ready to pupate.

Pygidium: The last dorsal segment of the abdomen.

Radius: The longitudinal vein connecting the R₁ and the branch of the radius immediately behind it in Insecta.

Rectum: The posterior region of the hindgut in Insecta.

Reptile:

Rostrum: Beak or snout.

Sclerite: A hardened body wall plate bounded by sutures or membranous areas.

Sclerotization: The hardening of the chitinous cuticula.

Scutellum: A sclerite of a thoracic notum; the mesoscutleum, appearing as a more or less triangular sclerite behind the pronotum in Insecta.

Scutum: The middle division of a thoracic notum, just anterior to the scutellum in Insecta.

Seta: A bristle.

Sternite: A sclerite on the ventral side of the body; the ventral sclerite of an abdominal segment in Insecta.

Stigma: A thickening of the wing membrane along the costal margin of the wing.

Stipes: A longitudinal color marking.

Stylet: A needlelike structure; one of the piercing structures on a sucking mouth parts in Insecta.

Subapical: Located just proximad of the apex.

Subcosta: The longitudinal vein between the costa and the radius.

Subimago: The first of the two winged instars of a mayfly after it emerges from the water.

Submentum: The basal part of the labium in Insecta.

Suture: An external linelike groove in the body wall; a narrow membranous area between sclerites in insects, giving them more flexibility.

Tarsal Claw: A claw at the apex of the tarsus.

Tarsal formula: The number of tarsal segments on the front, middle, and hind tarsi, respectively in Insecta.

Tarsus: The part of the leg beyond the tibia, consisting of one or more segments or subdivisions.

Tegula: A small saclike structure overlying the base of the front wing; hind wing clutches onto when flying.

Telson: The posterior part of the last abdominal segment in Crustacea.

Tergite: A sclerite of the tergum; the dorsal surface of an abdominal segment in Insecta.

Tergum: The dorsal surface of any body segment.

Terminal: At the end; at the posterior end (of the abdomen), the last of a series.

Tibia: The 4th segment of the leg, between the femur and the tarsus.

Thorax: The bodyregion behind the head, which bears the legs and the wings (sea abdomen, head).

Transverse: Across, at right angles to the longitudinal axis.

Trichoptera: (Gr. tricho, hair; ptera, wing) Caddiesflies; show similarities with lepidoptera; weak fliers with hairy wings; long antenna; pupa dectica; larvae aquatic; build case and catching nets like spiders.

Trochanter: The 2nd segment of the leg, between the coxa and the femur.

Tympanum: Auditory (membrane) organ, eardrum in nocturnal lepidoptera; used in detecting the bat's sonar.

Uropod: One of the terminal pair of abdominal appendages, usually lobelike in Crustacea.

Veine: A thickened line in the wing of Insecta.

Longitudinal V.: Costa, subcosta, radius, radial sector, media, cubitus, anal vein.

Cross-V.: Humeral, radial, sectorial, radio-medial, medial, mediocubital, cubito-anal.

Venter: The ventral side.

Ventral: Lower or underneath; pertaining to the under side of the body.

Vertex: The top of the head, between eyes and anterior to the occipital suture.

Vestigial: Small, poorly developed, degenerate, nonfunctional.

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