Invertebrates

Animals species that do not develop a vertebral column. Includes many species like Insects – Worms –Clams – Octopus and others. The largest phylum or Super- Sub phylum is also included within Invertebrates:

Protozoa – Porifera – Cnidaria – Aschelminthes – Mollusca – Annelida – Echinodermata – Arthropoda –Chordata.

There are many methods to classified animal's kingdom:

- **According to cellular constriction to:**

1. Protozoa: One cell animals.
2. Parazoa: Multicellular animals which loosely aggregated cells.
3. Metazoa: Multicellular animals in which cells are arranged in germ layers.

We can classify Metazoa according to their germ layers into:

1. Diploblastea: animals with two germ layers Ectoderm & Endoderm.

Triploblastea: animals with three germ layers Ectoderm – Mesoderm – Endoderm.

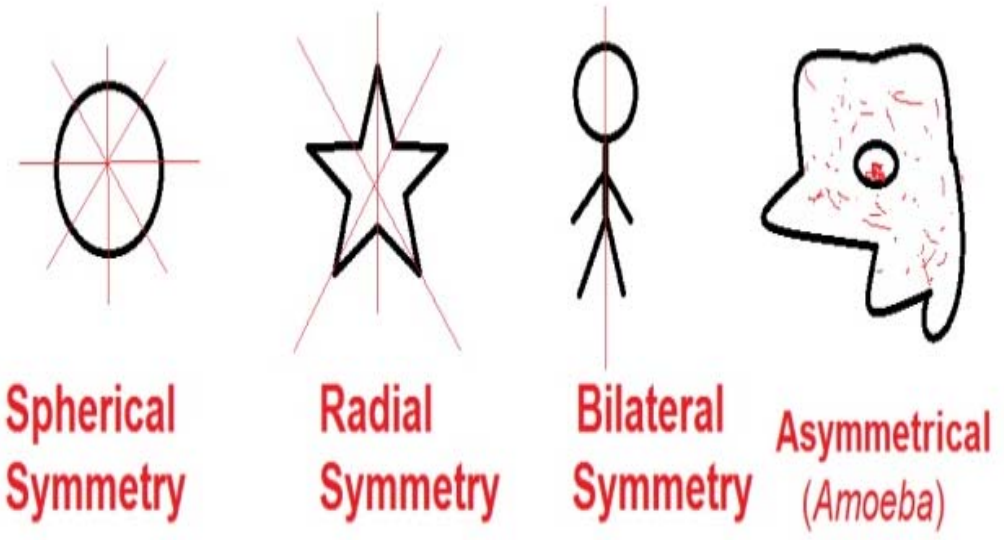
Animals also divided according to their symmetry. term symmetry refers to the arrangement of body parts in relation to a line or point

1-Asymmetrical Symmetry: which cannot be divided into two equal halves along any plane which pass through the center. Example: Sponges.

2-Bilateral Symmetry: When the body of an animal can be divided into identical left and right halves along only one plane.

3-Spherical symmetry the shape of the body is spherical and lack any axis. The body can be divided into two identical halves in any plane that runs through the organism’s center: (Volvox).

4-Radial Symmetry: When the body of an animal can be divided into two equal halves along any plane passing through the central axis (: equal parts are arranged around a central point) Example: Cnidarians



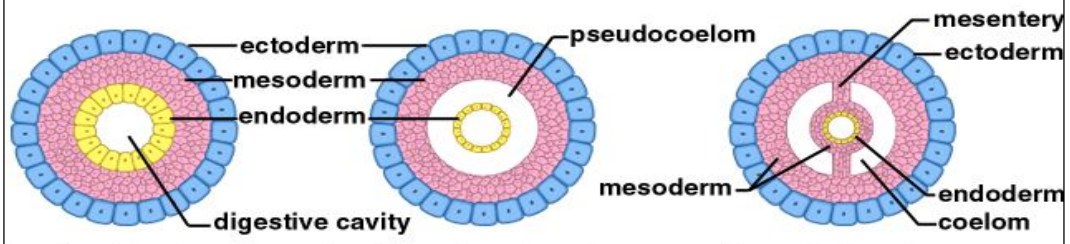
Coelom:

The space between the body wall and the alimentary canal. Triploblast animals may be classified according to their Coelom into:

1.Acoelomate : their mesoderm region is completely filled with tissue

2. A pseudocoelom: is a body cavity that lies between mesodermal and endodermal tissue and is, therefore, not completely surrounded by mesodermal tissue.
3. Eucoelomate : A true coelom arises entirely within the mesoderm germ layer and is lined by an epithelial membrane.

Acoelomate, pseudocoelomate, coelomate comparison



a. Acoelomate
flatworms

b. Pseudocoelomate
roundworms

c. Coelomate
molluscs
annelids
arthropods
echinoderms
chordates

Did you know?

Most invertebrates are not 'pests'!

Good things different invertebrates do.....

1. Pollinate
2. Clean the environment (including water)
3. Aerate and create soil
4. Eat 'pest' invertebrates
5. Provide food themselves for birds, mammals, fish and other invertebrates when they are eaten!

Protozoa

General attributes:

1. Unicellular (clonal) and microscope animals.
2. Most are motile by flagella, cilia or pseudopodia.
3. Most protozoal species are aerobic, but some an aerobic species have been found in the human intestine and animal rumen.
4. They occur in all habitats including marine, freshwater and terrestrial including soil.
5. The food inters to the cell (body of animal) by mouth of cell or by body wall but the digestive happens in food vacuole in cytoplasm.
6. Osmoregulation in freshwater protozoans is accomplishes by contractile vacuoles that pump a hypoosmotic urine from the cytoplasm back into the environment.
7. Most protozoa reproduce by asexual methods (Binary fission, Budding) Or sexual reproduction (Syngamy, Conjugation).
8. Some species are parasites on plants, human and animals.

Classification of Protozoa:

Phylum: Protozoa

1. Class: Flagellata

Order 1: Cryptomonadina ……. *Chilomonas*.

Order 2: Phytomonadina …… *Volvox.*

Order 3: Euglenoidina ……*Euglena.*

Order 4: Diplomonadina ……*Giardia.*

Order5: Opalinina …….. *Opalina.*

2. Class: Sarcondina

Order: Amoebina …… *Amoeba*

3. Class: Sporozoa

Order 1: Gregarinida ……. *Gregarina*.

Order 2: Coccidia …… *Plasmodium*

4. Class: Ciliata

Order: Holotricha …….*Paramecium.*

Nutrition:

Heterotrophic, micro organisms and most species obtain large food particles by phagocytosis. The food particle is ingested into a food vacuole, lysosomal enzymes then digest the nutrients in the particle throughout the cell. Some species have specialized structures called cytostomes through which particles pass in phagocytosis.

Locomotor Organelles:

Flagella - Cilia- Pseudopodia.

Cilia

1. Are short hair like appendages extending from the surface of living cell.
2. Rotational like a motor very fast moving.
3. Many (handered) per cell.
4. Eukaryotic cells.

Flagella

1. Are long, thread like appendages on the surface of a living cells.
2. Wave – like undulating, slow movement compared to cilia.
3. Few (less than 10) per cell.
4. Eukaryotic and Prokaryotic cells.

Pseudopodia: divided into:

1. Lobopoda ……..*Amoeba*
2. Filopodia ……*Euglypha*
3. Rhizopoda (Reticulopodia) ……..*Elphidium*.
4. Axopodia…….*Actinospherium.*

Nucleus

contain from:

1. Nuclear membrane
2. Chromatin.
3. Plastine.
4. Nuclear juice.

The nucleus in protozoa divided into two kind of :

1. Compact nuclei: contain a large amount of chromatin and small a mount of Nuclear juice.
2. Vesicular nuclei: contain a little amount of chromatin and large amount of Nuclear juice, have nucleolus - like ball shape called **endosome**

There are two types of nucleolus:

- Plasmosome: Empty from chromatin.
- Karyosome: contain chromatin.

Cytoplasm:

organized complex of inorganic and organic substances external to the nuclear membrane of a cell and including the cytosol and membrane-bound organelles (such as mitochondria or chloroplasts)

Divided into:

- Ectoplasm and Endoplasm

Ectoplasm	Endoplasm
• near the cell membrane.	• near the nuclei membrane.
• Is a gel containing the basal bodies of cilia.	• Sol more fluid than ectoplasm and contain organelles such as nuclei, mitochondria, vacuoles and vesicles of various types.

Protoplasm

The colorless material comprising the living part of a cell, that constitutes of :

- Nucleus
- Cytoplasm
- Organelles