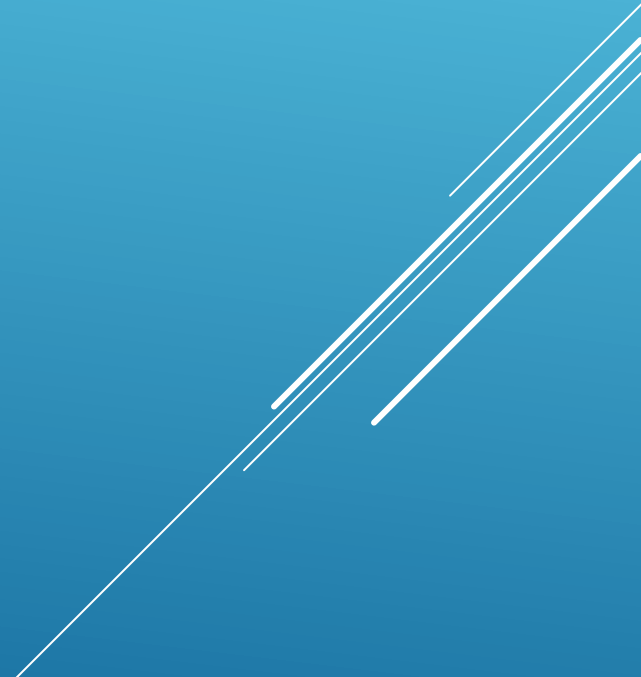


PARASITOLOGY

➤ Reproduction



Reproduction

- Reproductive organs and reproductive functions of parasites are affected from parasitism. Reproduction of parasites is same with other living being; it can be sexual or asexual. At the same time, there are some special situations. The main of these:
- Make it easier to find male and female each other.
- Increase the number of young stages.
- Increase durability of free young stages.

a) Make it easier to find male and female each other.

- Generally, when they live in host, male and female parasites find each other with pheromone. **Pheromone** is exocrine secretion that make neurohumoral effect with special smell and accelerate reproduction and sexual function between opposite gender of same species.
- This situation is not easy for some species that live places where they can easily throwing outside.
- Female ***Schistosoma*** sp. lives in male's canal named canalis gynocophoris.
- Male ***Trichosomoides crassicauda*** live into female's uterus.
- Female and male of ***Syngamus trachea*** always live permanent copulating position.
- ***Schistosoma*** species live in circulatory system and if they separate from one another, it is very hard to find each other again. ***T. crassicauda*** lives in urinary bladder and ***S. trachea*** lives in trachea. Mobility is so much in these places and couples must live together.

- **PARTENOGENESIS** and **HERMAFRODITISM** are seen in parasite reproduction
- **Parthenogenesis** is an asexual reproduction form in which, new generation are produced by females without the genetic assistance of a male.
- Exm: ***Strongyloides stercoralis*** have male and female individual on the land in outside but only female parasite is seen in the intestinum. Male is absent in here. Female produce first stage of larva without male's helping.
- **Hermaphroditism**, the condition of having both male and female reproductive organs.

b) Increase the number of young stages

- ▶ Most of the parasites die during the transition from one host to another. For compensating this situation, parasite species increase the number of young stages such as;
- ▶ **Eggs numbers** of helminths are increase,
- ▶ **Scolex and protoscolex** numbers are increased in some trematod and cestod species (**Pedogenesis, budding**)
- ▶ **Proliferation** becomes within cyst in protozoa.

c) Increase durability of free young stages.

In order to protect young stages of parasites, especially the freeform,

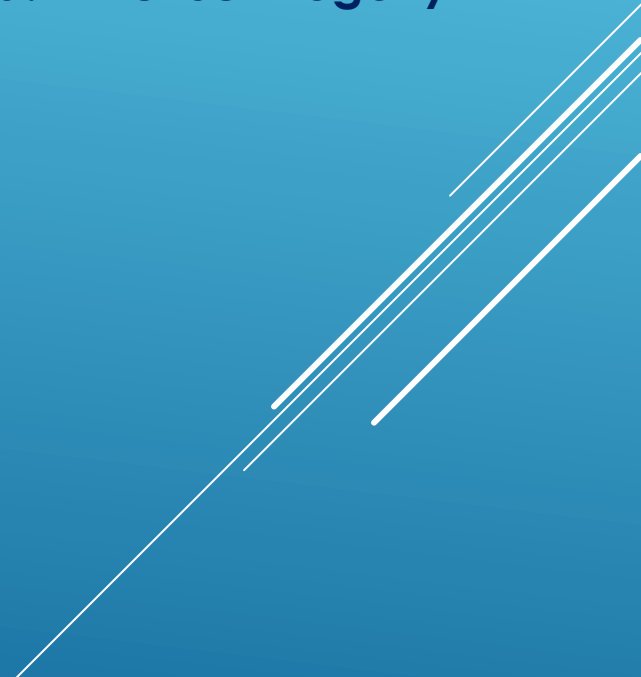
- Thick shell for helminths eggs,
- Sheath for larvae stages have developed to avoid harmful effects of the environment.

▶ Reproduction in protozoon

- ▶ **Reproduction** is seen in different forms. The main ones;
- ▶ **1) Division in half (Binary fission):** Protozoans often multiply by dividing into two. In this type of multiplication, firstly nucleus after cytoplasm get divided. The nucleus divide into two without chromosomal division '**Amitosis**', Within the macronucleus, chromosomes and spindle-shaped fibrils occur and divide '**Promitosis**'. Divide into two after interphase, prophase, metaphase and telophase stage '**Mitosis**'

▶ 2) Budding:

- ▶ Budding is a form of asexual reproduction in which a new organism develops from an outgrowth on one particular site. This kind of reproduction can be with internal or external budding

- ▶ **3) Multiple fission, (schisogony):** This reproduction pattern is seen in multi-nucleated protozoans or protozoans that have multi-nucleated phases during their development.
 - ▶ the nucleus, undergoes several mitotic divisions, producing a number of nuclei. After the nuclear divisions are complete, the cytoplasm separates, and each nucleus becomes encased in its own membrane to form an individual cell.
 - ▶ Divided cell is called schizont.
 - ▶ Schisogony is an asexual multiplication because the gametes are not formed. After schizogony phase, sexual reproduction can take place in some protozoa (Gametogony).
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▶ 4) Gametogonie-Sporogonie:

- ▶ This is a stage in the sexual cycle of protozoa (sporozoans) in which gametes are formed
- ▶ Male and female gametes fuse to form a zygote.
- ▶ Male and female gametes are similar to each other (**isogamete**) in some protozoans,
- ▶ It is not similar in some of them (**anisogamete = heterogamete**). Anizogami are more common in protozoa parasites.
- ▶ Zygote is formed after the union of two gametes and zygote continues proliferating in nature or hosts (**sporogony**)
- ▶ The zygote nuclei are divided several times (two or more), surrounded by cytoplasm, forming **sporophyte-sporoblast-sporozoite**, respectively, and **sporozoites** are infective phase in protozoa.

▶ ARTHROPODA

- ▶ This group of organism show all of the reproduction types that seen in nature.
- ▶ They are generally diocic. Some of them are hermaphrodit or partenogenetic (natural form of asexual reproduction in which growth and development of embryos occur without fertilization).
- ▶ Arthropoda species are generally oviparous rarely viviparous (tsetse fly).
- ▶ Polyembryony (one ovum produce many ovums) and pedogenesis are sometimes seen in some of the arthropoda species.

Helminth



PLATYHELMINTHES

ASCHELMINTHES

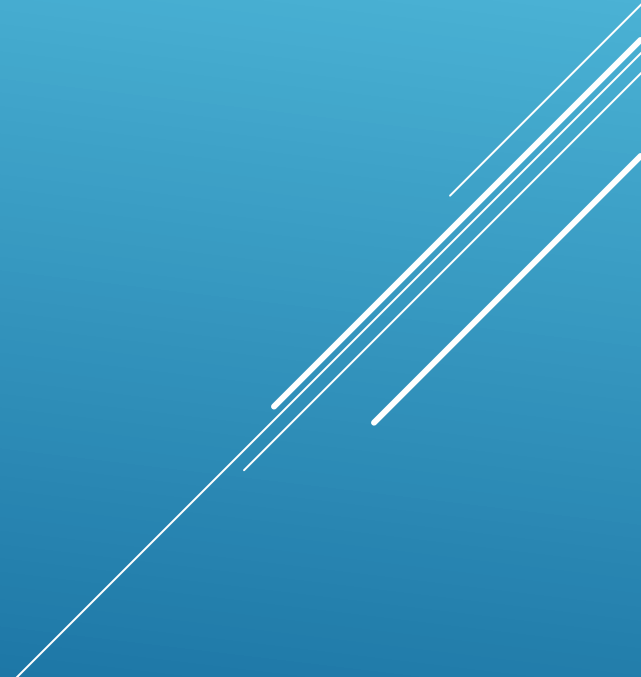
ACANTHOCEPHALA

ANNELIDA



Kök : Platyhelminthes

Flat worms

- There are about 18500 species.
 - 80% of them are parasites.
 - Their bodies are bilaterally symmetrical.
 - Their bodies are usually dorso-ventral flattened.
 - No body cavities.
 - The mouth and genital hole are in the ventral.
 - There are no circulatory systems.
- 
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Acoelomate

internal organs are located in the parenchyma

- **Ectoderm**
- **Mesoderm**
- **Endoderm**

It is triploblastic and consists of 3 different layers (ectoderm, endoderm, mesoderm).

Muscles, organs and parenchyma are formed from the mesoderm (three layers).

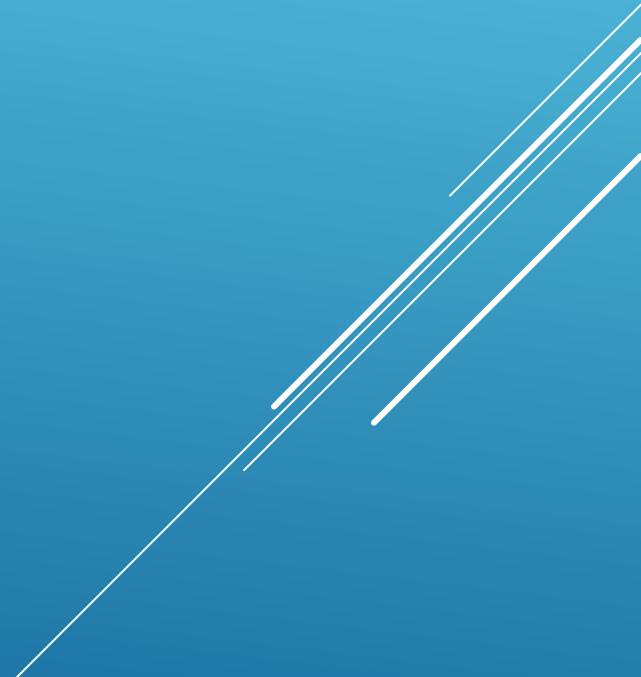
Digestive system

It consists of the mouth, pre-pharynx, pharynx, esophagus and intestines.

The intestines end up blind.

There is no anus.

There are no mouths in the cestodes.



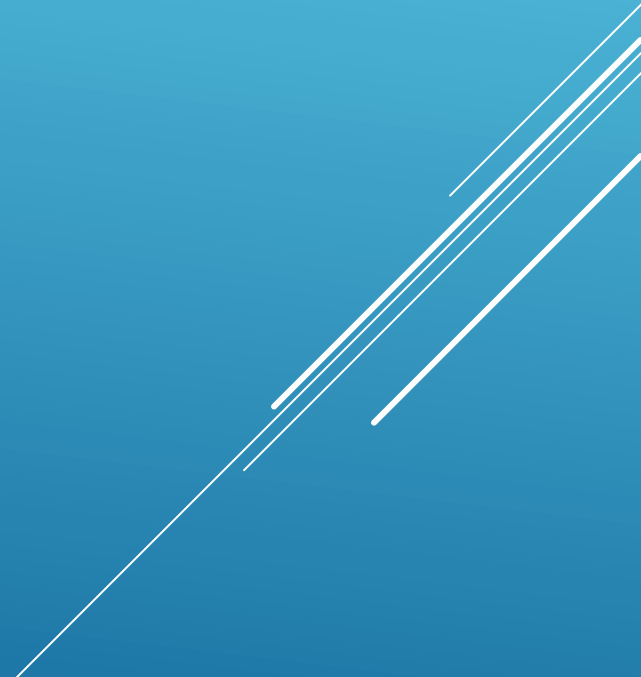
Nervous system

It consists of a nerve ball located around the esophagus and nerve strands that extend longitudinally and transversely to the front and back of the body.



Excretion system

Ciliated flame cells distributed symmetrically in the parenchyma and small discharge channels coming out of them, the excretion channel formed by the combination of these channels. The excretion hole usually opens outside at the back of the body.



Reproductive System



Phylum

Class

PLATYHELMINTHES

TREMATODA

ASCHELMINTHES

CESTODA

ACANTHOCEPHALA

ANNELIDA

TURBELLARIA

Classification of Platyhelminthes

