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الثانية	المرحلة
اللافقریات	اسم المادة باللغة العربية
Invertebrates	اسم المادة باللغة الانكليزية
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Platyhelminthes	عنوان المحاضرة باللغة الإنكليزية
5	رقم المحاضرة

LEC 5

Phylum: Platyhelminthes

Platyhelminthes (from the Greek , platy, meaning "flat" and, helminth-, meaning "worm"). This Phylum includes more than 13,000 species of free-living and parasitic species.

Characteristics of Phylum Platyhelminthes

1. Three germ layers (triploblastic).
2. Bilateral symmetry.
3. Body flattened dorsoventrally.
4. Epidermis may be cellular or syncytial.
5. Muscular system primarily of a sheath form and of mesodermal origin; layers of circular, longitudinal, and sometimes oblique fibers beneath the epidermis.
6. No internal body space other than digestive tube.
7. Digestive system incomplete or absent in some.
8. Nervous system consisting of a pair of anterior ganglia with longitudinal nerve cords connected by transverse nerves .
9. Simple sense organs; eyespots in some.
10. Excretory system of two lateral canals with branches bearing flame cells
11. Respiratory, circulatory, and skeletal systems lacking.
12. Most forms monoecious; reproductive system complex.
13. Class Turbellaria mostly free living; classes Monogenea, Trematoda, and Cestoda entirely parasitic.

Classification:

Platyhelminthes divided in to three classes: Cestoda, Trematoda and Turbellaria

CLASS I: TURBELLARIA :

1. Mostly free - living forms found in fresh or sea waters or on land.
2. Body is unsegmented and is dorsiventrally flattened.
3. Epidermis is cellular or syncytial.
- 4 Intestine is either absent (Acoela) or simple and sac like (Rhabdoceola) or branched.

Order (1): Acoela: They are marine and small. Mouth and pharynx are simple or absent. Oviducts 2 yolk glands are absent. Ex : *Convoluta*.

Order (2) : Rhabdoceola : They are small. A digestive bad is present and intestine is sac like. Many are free swimming. Reproductive organs are present.

Ex : *Microstomum*, *Temnocephala*.

Order 3 : Alloeoceola : Small sized worms are included in this order.

Intestine is simple or branched.
They are mostly marine.

Ex : *Otoplana*, *Bothnoplana*.

Order 4 :Tricladida : Dorsiventrally flat body is seen. Intestine has two lateral limbs and one median limb
Genital aperture is single.

Ex: *Planaria*.

CLASS II : TERMATODA :

1. These are commonly known as flukes.
2. These are ectoparasitic or endoparasitic forms.
3. Body is unsegmented and elongated.
4. Adhesive organs are, one or two suckers without hooks and spines.
4. Digestive tract is bifurcated and highly diverticulated. Anus is absent.

Order 1 : Monogenea : These are ectoparasitic forms. An oral sucker may be present, or absent or poorly developed. Posterior end with adhesive discs with hooks is common

Ex : *Monocells*, *Polystomum*.

Order 2 : Aspidobothria : These are endoparasites. Oral sucker is absent. Hooks are absent.

Development is direct. Ex .
Aspidogaster.

Order 3 : Digenea : Endoparasites are included. Suckers are present without loops. Life cycle is complicated.

Ex : *Fasciola*, *Opiathorchis*.

CLASSIII:CESTODA:

1. Totally endoparasitic forms.
2. Body covered with thick cuticle.
3. Mouth, digestive tract and sense organs are absent.
4. Fertilization is internal. It is divided into 2 sub-classes.

Class I: Cestodaria or Monozoa:

These are simple fish parasites.
Body without a scolex and strobila.

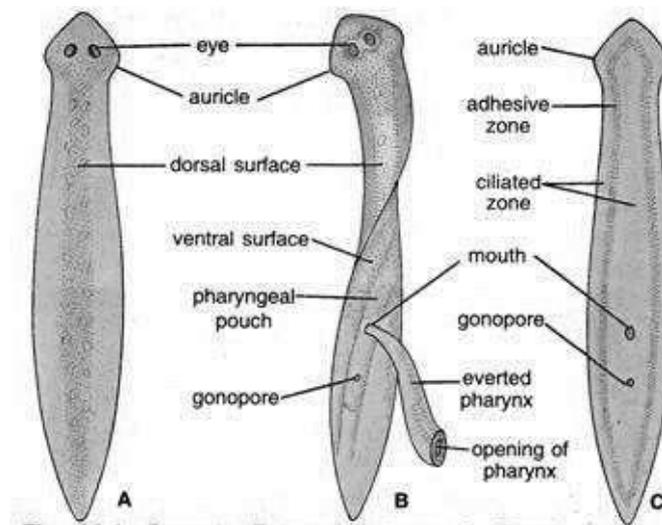
Ex: *Amphilian*

Class II: Eucestoda (or) Merozoa

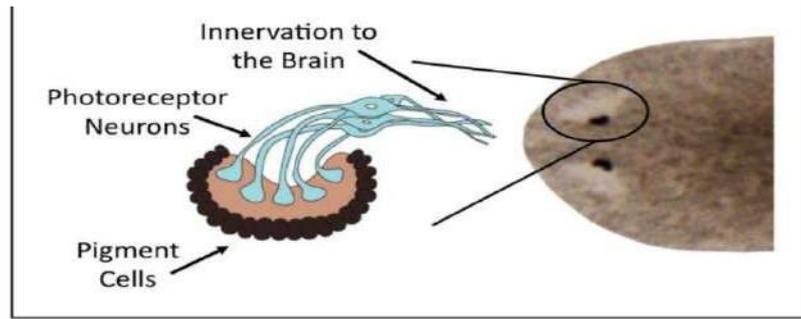
: Scolex with adhesive organs. More than one set of reproductive organs. Larva has 6 hooks.

Ex: *Taenia solium*

Example: Planaria: Body of *Planaria* is elongated, bilaterally symmetrical and dorsoventrally flattened. They are 2-15 mm in length. Head is triangular with auricles and two eyes. Digestive system consist of mouth, proboscis, pharynx and branched intestine. Mouth is situated on the ventral surface behind the middle of worm. Proboscis is enclosed in the proboscis sheath. Intestine forks into three diverticulitis branches, one anterior and two posterior. Genital pore is situated a little posterior to the mouth. Planarians are used for experimental purpose.



Eyes : Eyes are two round dark spots on the dorsal surface of the head. The eye has a pigment cup with its open facing laterally forward. Projecting into the pigment cup are several retinal cells, they are bipolar nerve cells with expanded inner ends which are striated, and outer ends joined to the brain. Eyes are capable of a crude discrimination of the direction of light. The pigment cup serves as a shield and light can enter only through its opening to stimulate the photosensitive expanded ends of retinal cells, thus, the animal can detect the direction of light.

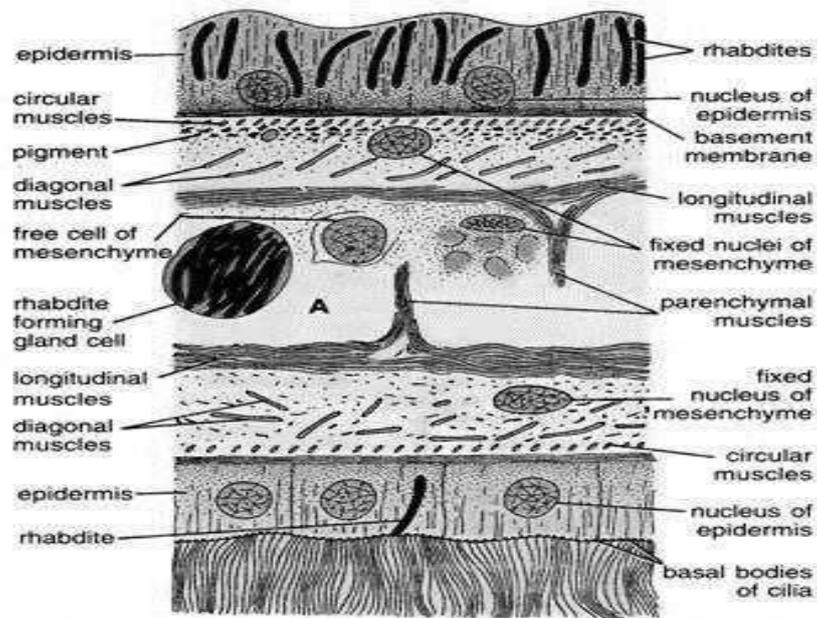


Body Wall

The body wall is made of an outer epidermis and inner muscle layers. Both these layers are separated by a basement membrane. The space between muscle layer and the alimentary canal is filled with a special type of tissue called mesenchyme or parenchyma, therefore, no coelom or body cavity is found in it.

(1) Epidermis: It is single cell-layered thick and made of cuboidal epithelial cells. The epidermis is ciliated all over in most planarians. Between the epidermal cells are sensory cells and mucous gland cells

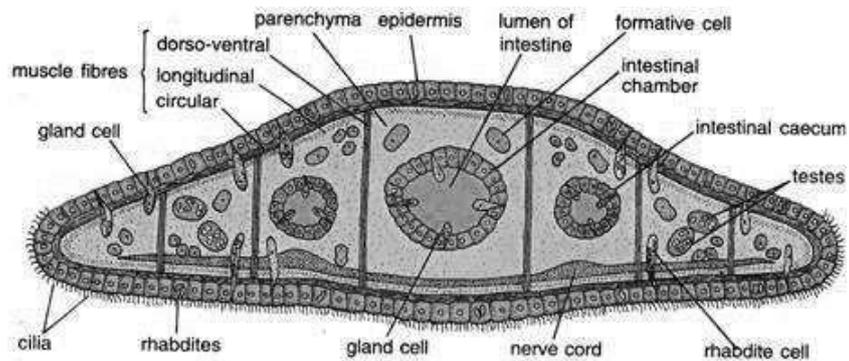
in certain areas. The gland cells provide a mucus coating for the animal locomotion. In the epidermal cells are hyaline rods called **rhabdites**, they are more abundant on the dorsal than the ventral side. **Rhabdites** are secreted by rhabdite gland cells usually located in mesenchyme. After the rhabdites are secreted in the rhabdite gland cells, they migrate to the epidermal cells where they lie. The function of rhabdites is not known, but they form a slimy substance on discharge to the exterior which may be protective, and help in obtaining living food.



(2) **Basement Membrane:** marks the boundary between the epidermis and muscle layers and it helps in maintaining general form of the body.

(3) **Muscle Layer:** It contains elongated contractile muscle cells. The muscle layer is differentiated into an outer layer of circular muscles, middle layer of diagonal muscles and inner layer of longitudinal muscles. The longitudinal muscle layer is more developed on the ventral side. The dorso-ventral muscles extend across the body between dorsal and ventral surfaces.

(4) **Parenchyma or Mesenchyme:** It is a special type of connective tissue of mesodermal origin. It is filled in the spaces between various internal organs and body wall. It is a net-like syncytium containing nuclei, free wandering mesenchyme. The mesenchyme cells serve to transport digested food and excretory wastes.

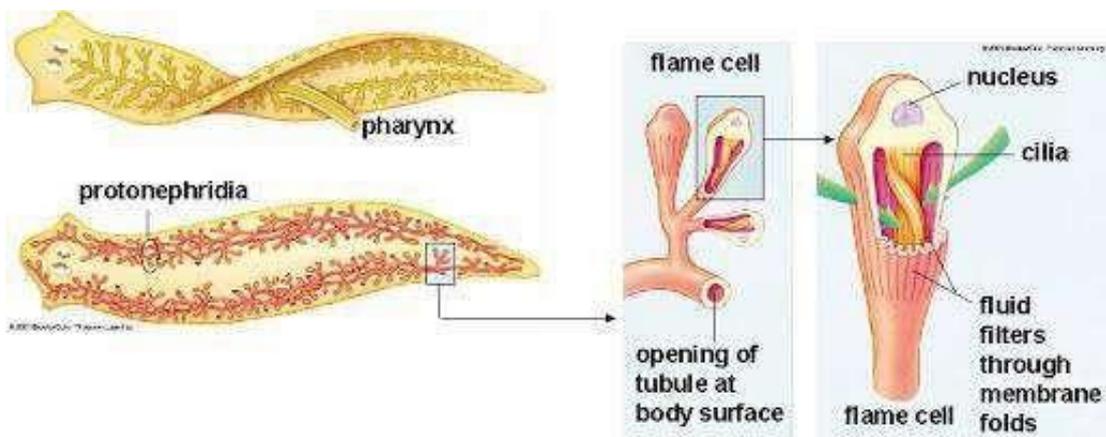


Digestive System: The flatworms are the first in the animal kingdom to possess the alimentary canal which is incomplete because anus is not found. However, the alimentary canal consists of mouth, pharynx and intestine. Digestion is both extracellular and intracellular; the mesenchyme helps to distribute digested food.

Rejuvenation: Planarians can live without food for long periods, they obtain nourishment by dissolving their reproductive organs, parenchyma, and muscles, they get smaller in size. The missing parts are regenerated when they feed again.

Respiratory System: There are no respiratory organs. Exchange of gases takes through the body surface, i.e., respiratory exchange is by diffusion.

Excretory System: The excretory system consists of a system of excretory tubules having many excretory cells called **flame cells** or protonephridia. The flame cell is nucleated and has many protoplasmic processes reaching into the mesenchyme. The flame cell has an intracellular space which is continued into the capillary. In the space of the flame cell are many flagella which vibrate giving the appearance of a flickering candle flame, hence, the name.



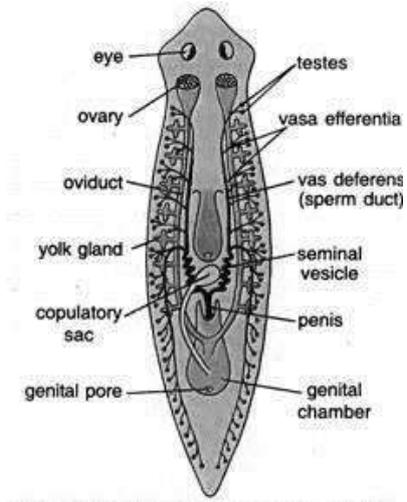
Nervous system: The nervous system represents the primitive type of centralized nervous system of higher animals. It consists of the brain, nerve cords and peripheral nerves.

Reproduction:

(i) Asexual Reproduction: Fission occurs when the animal has attained maximum size; the posterior end adheres firmly, while the anterior region advances forward so that the animal ruptures into two behind the pharynx.

(ii) Sexual Reproduction: Reproductive organs are temporary, they are formed during the breeding season, after which the reproductive organs degenerate and the animal becomes an asexual strain which will reproduce by fission till early summer of the following year.

The sexual strain develops hermaphrodite organs and it reproduces sexually every year in early summer.



Regeneration: *Planaria* has great powers of regeneration. Regeneration is a process of restitution and involves the development of lost part of the body automatically.