

Department of Zoology, Guru Ghasidas Vishwavidyalaya

Major Course: Animal diversity of non-chordates (Protista to Pseudocoelomate)

B.Sc. Ist semester

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramecium*

Amoeba proteus

Classification:

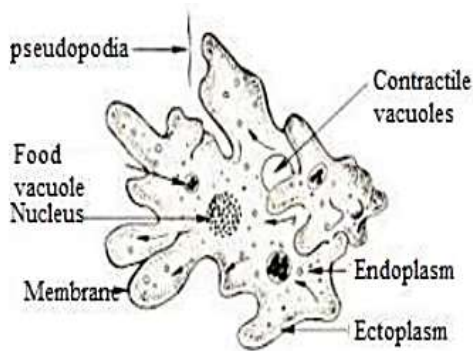
Phylum.....Protozoa

Subphylum.....Plasmodroma

Class..... Rhizopoda

Order.....Lobosa

Type..... *Amoeba proteus*



Comments:

1. It is a minute and free living commonly found in fresh water ponds, ditches, and lake
2. Unicellular and, microscopic animal which can see only under the microscope.
3. It is irregular in shape with branched pseudopodia. Holozoic nutrition.
4. Reproduction is by fission and encystment.
5. It moves with the help of finger like, temporary processes called pseudopodia.

Euglena

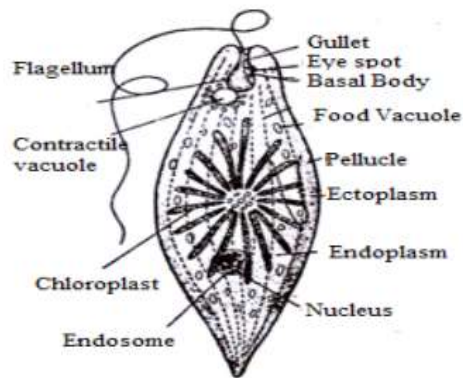
Classification: Phylum..... Protozoa

Subphylum..... Plasmodroma

Class..... Mastigophora

Order..... Euglenoidiana

Type..... *Euglena*



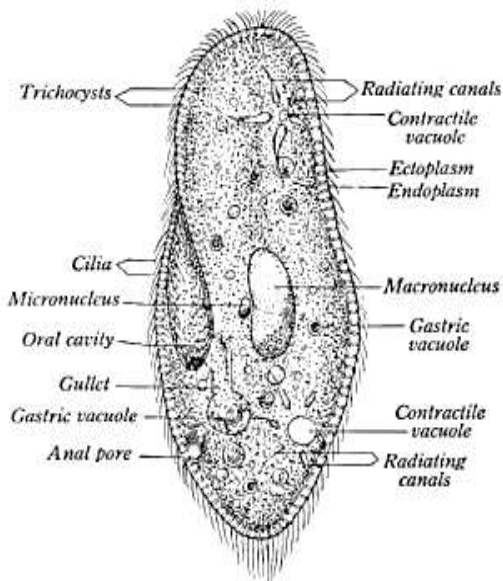
Comments:

1. It is a microscopic, solitary, and free-living organism, commonly found in fresh water, Pond, Pools and slow- running streams.
2. It is elongated and spindle shaped.
3. Nutrition is holophytic and saprophytic.
4. Cytoplasm differentiated into ectoplasm and endoplasm.
5. Reproduction by longitudinal binary fission or multiple fission.
6. Euglena performs two different kinds of movement flagellar and euglenoid.
7. A single large spherical vesicular nucleus is present Nucleus contains nuclear membrane cell membrane chromatid bodies.

Paramecium

Classification:

- Phylum..... Protozoa
- Subphylum..... Ciliophorans
- Class..... Ciliata
- Subclass..... Holotricha
- Order..... Hymenostomatida
- Family..... Paramecidae
- Genus..... Paramecium



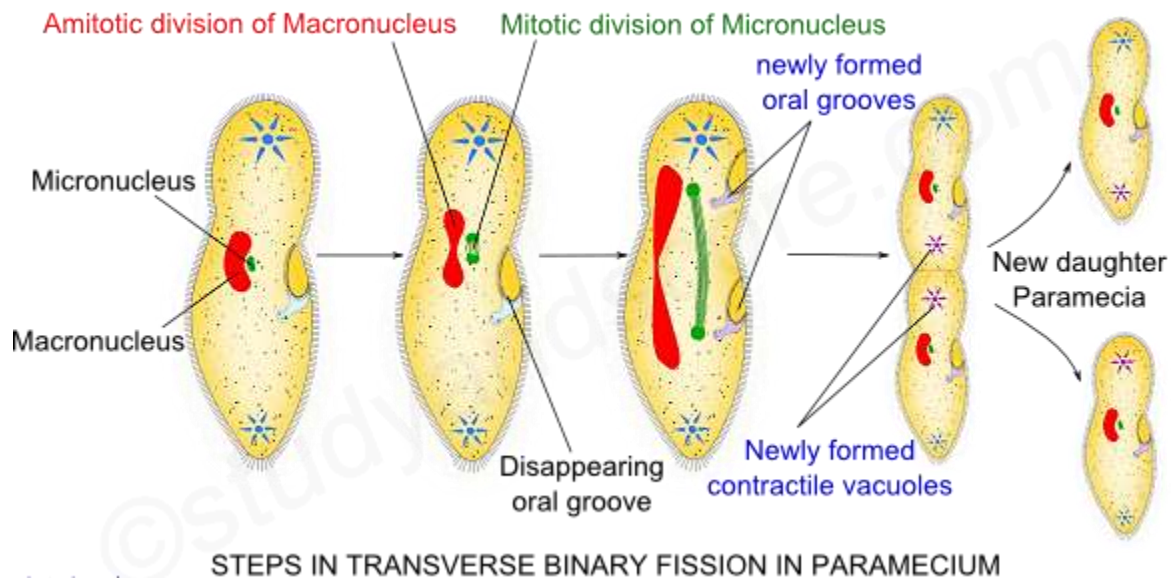
Comments:

1. It is found in fresh water, pond, rivers, lakes, streams, and pools
2. Microscopic, slipper, shaped, cigar shaped or spindle shaped.
3. The entire body surface is covered by numerous, tiny hair –like fine protoplasmic processes called cilia.
4. Endoplasm is semi-fluid and less granular.
5. Ciliary locomotion and body contortions are present.
6. Reproduction asexually by transverse binary fission under good conditions of food.
7. Micronucleus and macronucleus are present
8. Nutrition heterotrophic and holophytic.

2. Binary fission and Conjugation in Paramecium

Binary fission in *Paramecium*:

Binary fission occurs in transverse fashion in *Paramecium*. It is a common method of reproduction in *Paramecium* which occurs during favorable condition. A fully grown *Paramecium* is divided into two daughter individuals. Division occurs at the right angle to the longitudinal axis of the body. Nuclear division is followed by the cytoplasmic division.



Paramecium stops feeding before initiating binary fission and then its oral groove disappears. Macronucleus divides by amitosis and micronucleus divides by mitosis. After division, they move towards the opposite end. At the same time, the constriction develops at the middle part of the body which divides cytoplasm into two equal parts. In this way, two daughter-*Paramecia* are produced.

Daughter from anterior end is called protor and another daughter from posterior end is called opisthe. They are of equal size and contain a complete set of cell organelles as in parents. Oral groove and cytopharynx are newly formed in both the daughters. One contractile vacuole goes to protor and another to opisthe. Other two are newly formed. The whole process is completed within 2 hours and may occur one to four times a day.

SEXUAL REPRODUCTION: CONJUGATION

In *Paramecium*, Conjugation is a form of sexual reproduction. It is a temporary union of two individuals of same species for mutual exchange of genetic materials. Continuous multiplication by binary fission is interrupted by conjugation as it is necessary for the survival and rejuvenation of the race.

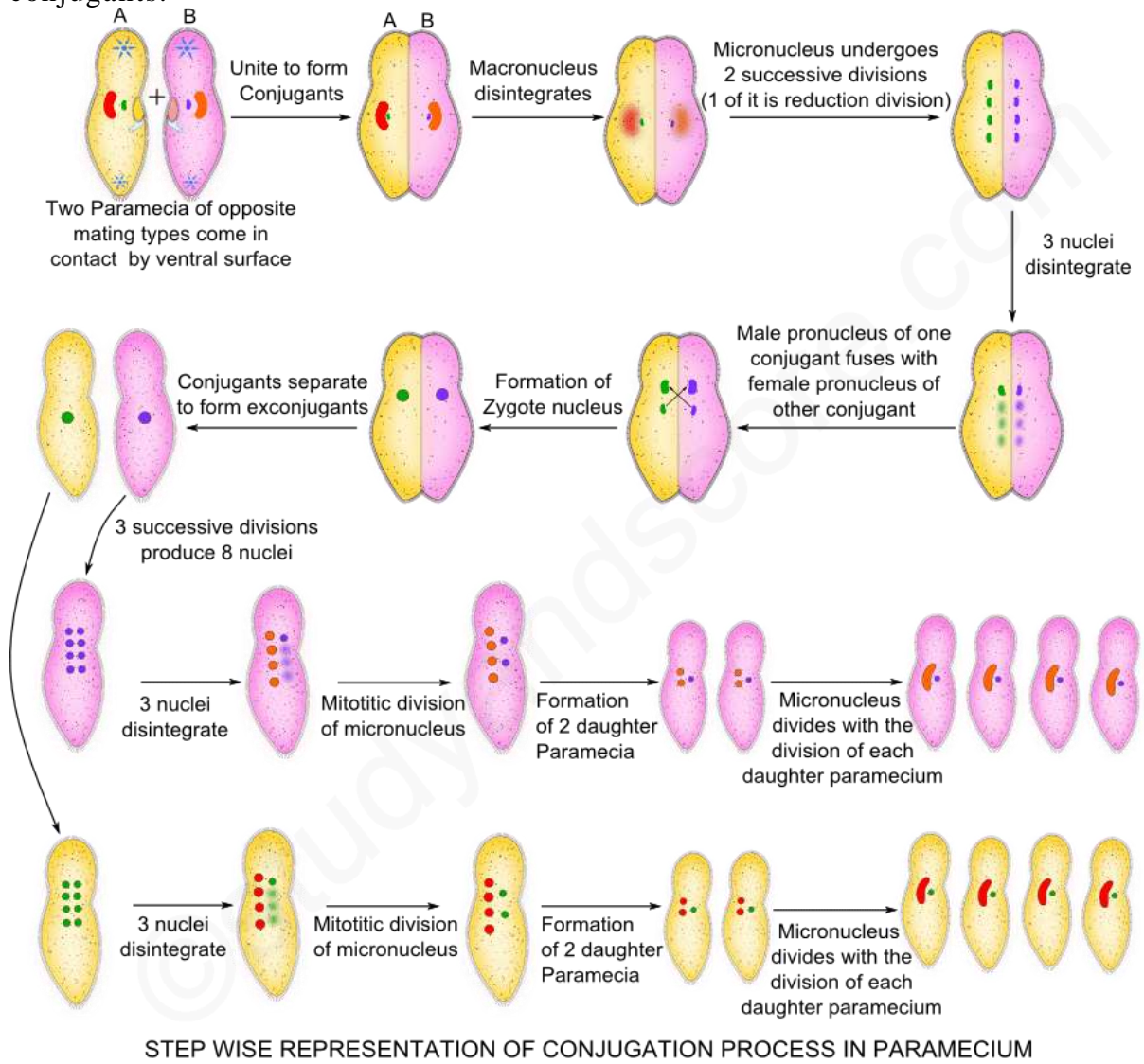
Conjugation inducing factors: The following are the factors which induce conjugation,

- Unfavourable conditions like some degree of starvation, shortage of food, a particular bacterial food, a certain range of light and temperature and certain chemicals induce conjugation.
- Also, conjugation is induced after certain number of asexual binary fissions to rejuvenate the paramecium.

Types of mating systems in paramecium: Each variety of the species of paramecium has two mating types which differ in chemical characteristics of their surface membranes. Conjugation can occur only between different mating types of the same variety or syngen.

Conjugation process: The two *Paramecium* of opposite mating types come in contact by their ventral surface during swimming. They stick together through their oral groove region. Following this attachment their cilia, Trichocysts, feeding apparatus degenerate. Pellicle and ectoplasm degenerate at the point of contact and a cytoplasmic bridge. This cytoplasmic bridge is also known as

protoplasmic bridge or Conjugation Bridge. These united parametia are called conjugants.



The conjugants attach with each other for several hours during which complicated reorganization and exchange of nuclear material occurs as described below,

Changes in macronucleus: The macronucleus breaks up into fragments and these fragments are later absorbed into the cytoplasm.

Changes in micronucleus: Lot of complicated changes and divisions take place in the micronucleus.

- The diploid micronucleus in each conjugant grows and then divides by meiosis (in meiotic division a single cell gives four haploid daughter cells)
- As a result of meiotic division four haploid daughter micronuclei are produced. Out of these four micronuclei, three degenerate and disappear.
- The remaining one micronucleus divides by mitosis to form two unequal pronuclei or gamete nuclei. The smaller gamete nuclei are active in migratory in nature and is called migratory gamete nucleus. The larger gamete is passive and stationary in nature and is called stationary gamete nucleus.

- The migratory gamete nucleus of one conjugant passes through the protoplasmic bridge into other conjugant and fuses with its stationary gamete nucleus. This fusion results in the formation of a single diploid zygote nucleus. This zygote nucleus is also known as synkaryon. And this process of complete fusion of two nuclei from two different individuals to form a zygote nucleus is called as amphimixis.
- After the formation of zygote nucleus, the attached conjugants separate and now they are called ex-conjugants.
- The zygote nucleus in each exconjugants divides thrice by mitosis finally forming eight nuclei.
- Four of these eight nuclei grow to become macronuclei. The remaining four small nuclei are called micronuclei.
- Out of the four micronuclei, three degenerate and disappear. And the remaining one micronucleus divides mitotically into two. Simultaneously the exconjugants also divide into two daughter paramecia.
- Each daughter paramecia thus obtained from exconjugants has 2 macronuclei and 1 micronucleus.
- A micronucleus of daughter individuals again divides mitotically with the division of cytoplasm to produce four daughter individuals each with one macronucleus and one micronucleus.

In this way, 8 paramecia are produced because of conjugation four from each mating conjugant.

3. Examination of pond water collected from different places for diversity in Protista

Materials

- Glass microscope slides
- Plastic cover slips
- Paper towels or tissues
- Samples of protists and/or volvox
- Plastic pipette or dropper

Methods

1. Place a drop of pond water or commercially bought Volvox or protozoa on a microscope slide with a pipette or dropper.

TIPS:

- Too small a drop may result in the specimens being crushed, so be prepared to make another slide if necessary.
 - Larger volvox can be prevented from being crushed using a **chamber made of tape**.
 - A stereomicroscope may be helpful to find organisms for transferring to a slide.
2. Place a coverslip on top and observe under the microscope.

4. Study of Sycon (T.S. and L.S.), *Hyalonema*, *Euplectella*, *Spongilla* Transverse Section of Sycon/Scypha

You will observe the prepared slides of T.S of Sycon so that you can learn what forms the body of this sponge. You can observe the slide in low as well as high power and try to recapitulate the following features.

t.

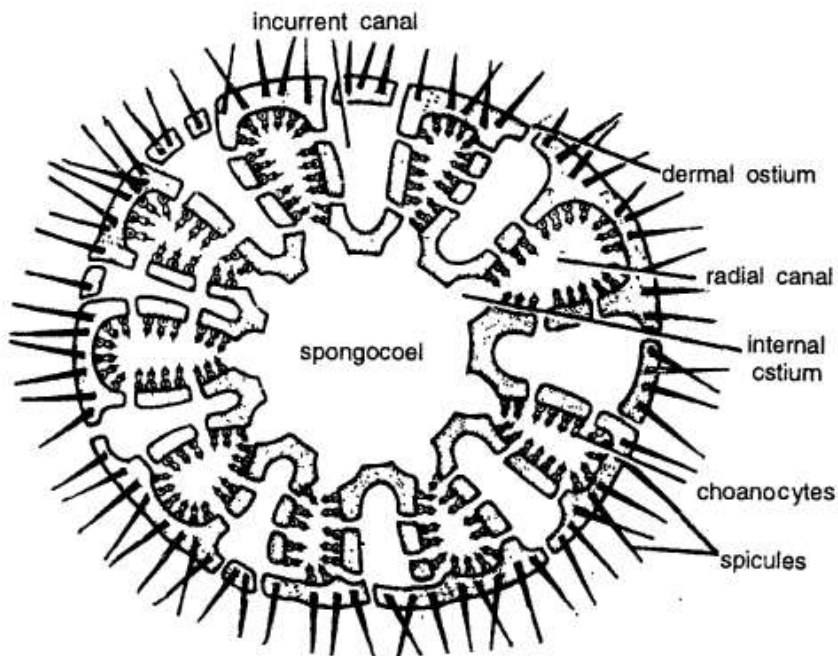
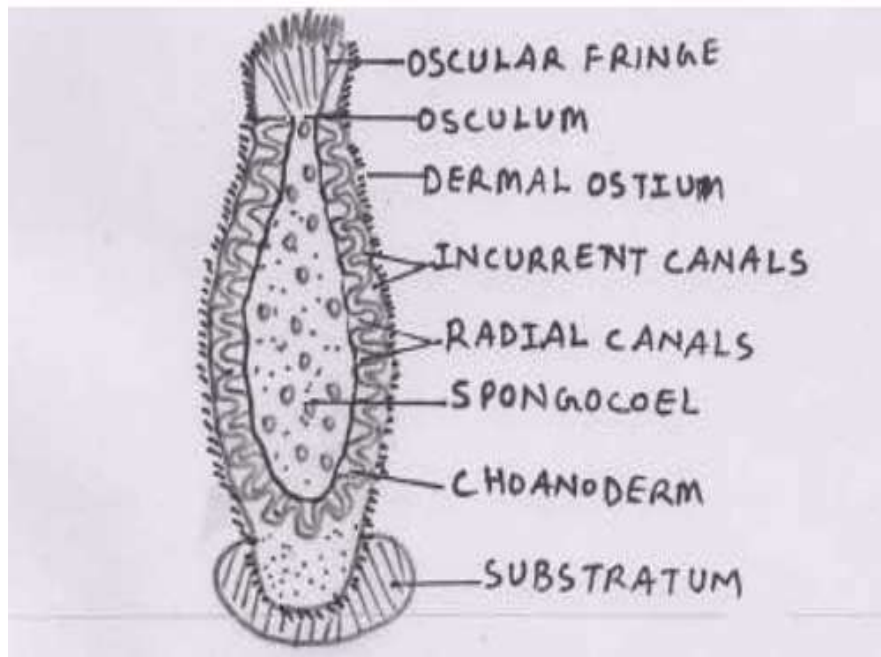


Fig. T.S. Sycon.

- i) Body wall is diploblastic, consists of ectoderm, mesenchyme and endoderm enclosed within itself two type of alternating canals namely radial and incurrent canals.
- ii) Ectoderm is made of pinacocytes lining the incurrent canals.
- iii) Mesenchyme is gelatinous with calcareous spicules, amoeboid cells, collencytes and archeocyte.
- iv) Endoderm is having single layer of large flagellated collared cells or choanocytes and forms the lining of radial canals.
- v) Each radial canal opens into the large central spongocoel through an apopyle.
- vi) Radial canals communicate with the incurrent canals by prosopyles.
- vii) Incurrent canals communicate with the exterior by means of multiple pores called ostia.
- viii) Large central spongocoel is lined by the flat epithelial cells.
- ix) Canal system is of syconoid type.
- x) Water enters into the incurrent canals through the ostia → passes into the radial canals through prosopyles → from radial canals into the spongocoel by apopyles → leaves the spongocoel by terminal osculum.

b) Longitudinal Section of Sycon/Scypha

Comments: Longitudinal section of the body of Sycon or Scypha reveals the following histological structures which are same as that of the transverse section



- i) Body wall is diploblastic that consists of ectoderm, mesenchyme and endoderm and encloses two types of alternating canals, viz. incurrent and radial canals.
- ii) Ectoderm and dermal epithelium cover the entire outer surface and line the incurrent canals.
- iii) Mesenchyme is the intermediate layer between the ectoderm and endoderm; with amoebocytes, gelatinous transparent matrix and spicules.

1. Hyalonema

Classification

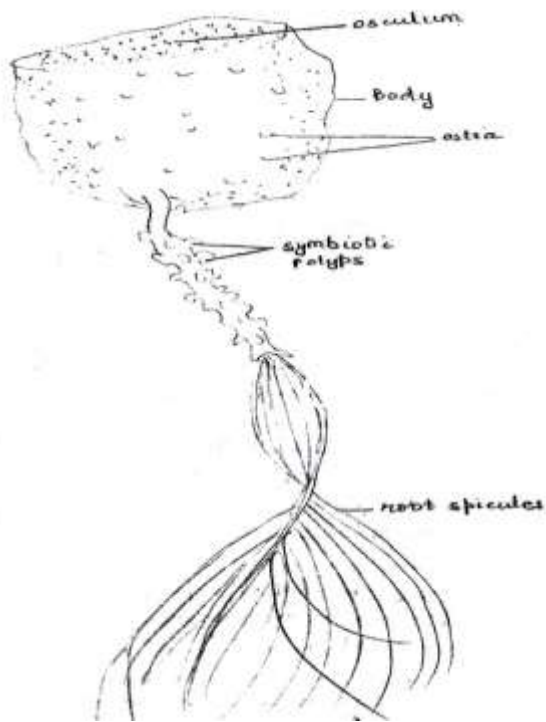
Phylum - Porifera

Class - Hexactinellida

Order - Amphidiscophora

Genus - *Hyalonema*

Common Name- Glass rope sponge



Distribution

It is found along new England coast.

Habitat

Hyalonema is a marine form found 10-15 meters deep in sea.

Identifying Characters

- It has a rounded or oval body with a spirally twisted root tuft.
- Spicules of root tuft continue through the sponge body as an axis or **collumella** and projects above as a **gastral cone**.
- Root spicules are compact, stalk-like and twisted giving the appearance of a rope.
- Middle part of collumella has symbiotic polyps.

General Characters

- Skeleton consists of small **amphidisc spicules** which are siliceous in nature.
- Extending from all over the surface are small, branching, **five-rayed spicules**.

2. Euplectella

Common name: Venus flower basket

Classification:



Phylum: Porifera

Class: Hexactinellida

Order: Hexasterophora

Genus: *Euplectella*

Distribution:

Found in abundance near the Philippine Island and West Indies.

Habitat:

Found abundantly in deep waters at the depth of 500 to 5,000 meters in slow running water.

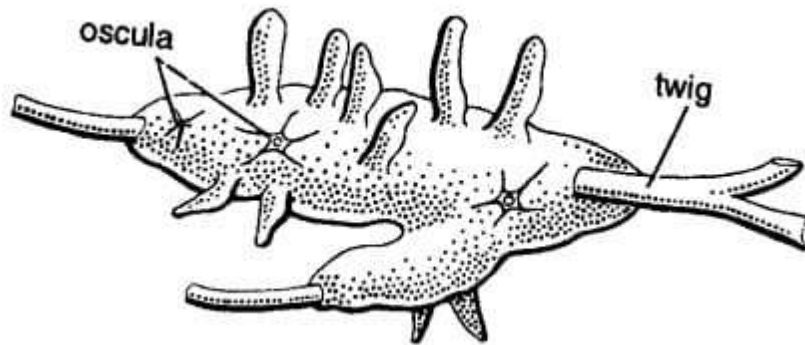
Identifying Features

- Long curved, cylindrical body fastened in the mud of sea bottom by a mass of long siliceous root spicules.
- Size of individual varies from 15-30 cm in length and 2-5 cm in diameter.

Common Characters

- Skeleton consists of four and six- rayed siliceous spicules which are interlaced and fused at their tips forming a three-dimensional network with parietal gaps.
- Canal system simple leuconoid, having thimble-shaped radial canals.
- Parietal gaps in the in the network of spicules connect with the spongocoel.

3. *Spongilla*



Classification

Kingdom - Animalia

Phylum - Porifera

Class – Demospongiae

Subclass - Monaxonida

Order - Haplosclerina

Genus - *Spongilla*

Habitat: Abundantly found in ponds, lakes and slow stream growing on submerged sticks and plants.

Identifying Features

- Colony is profusely branched exhibiting various shades of green colour due to the presence of zoochlorellae a green alga in the tissues.
- Body wall consists of very thin dermal membrane provided with dermal pores of ostia and several oscula.

Common Characters

- Canal system is rhagon type.
- Skeleton consists of siliceous spicules in form of network of smooth or spiny large and small oxeas (curved monaxons) embedded in the spongin fibres.
- Reproduction both sexual and asexual. Asexual by gemmules and sexual through an unusual free swimming larva characteristic of *Spongilla*.

5. Study of *Obelia*, *Physalia*, *Millepora*, *Aurelia*, *Tubipora*, *Corallium*, *Alcyonium*, *Gorgonia*, *Metridium*, *Pennatula*, *Fungia*, *Meandrina*, *Madrepora*

Phylum: Coelenterata

A) *Physalia*

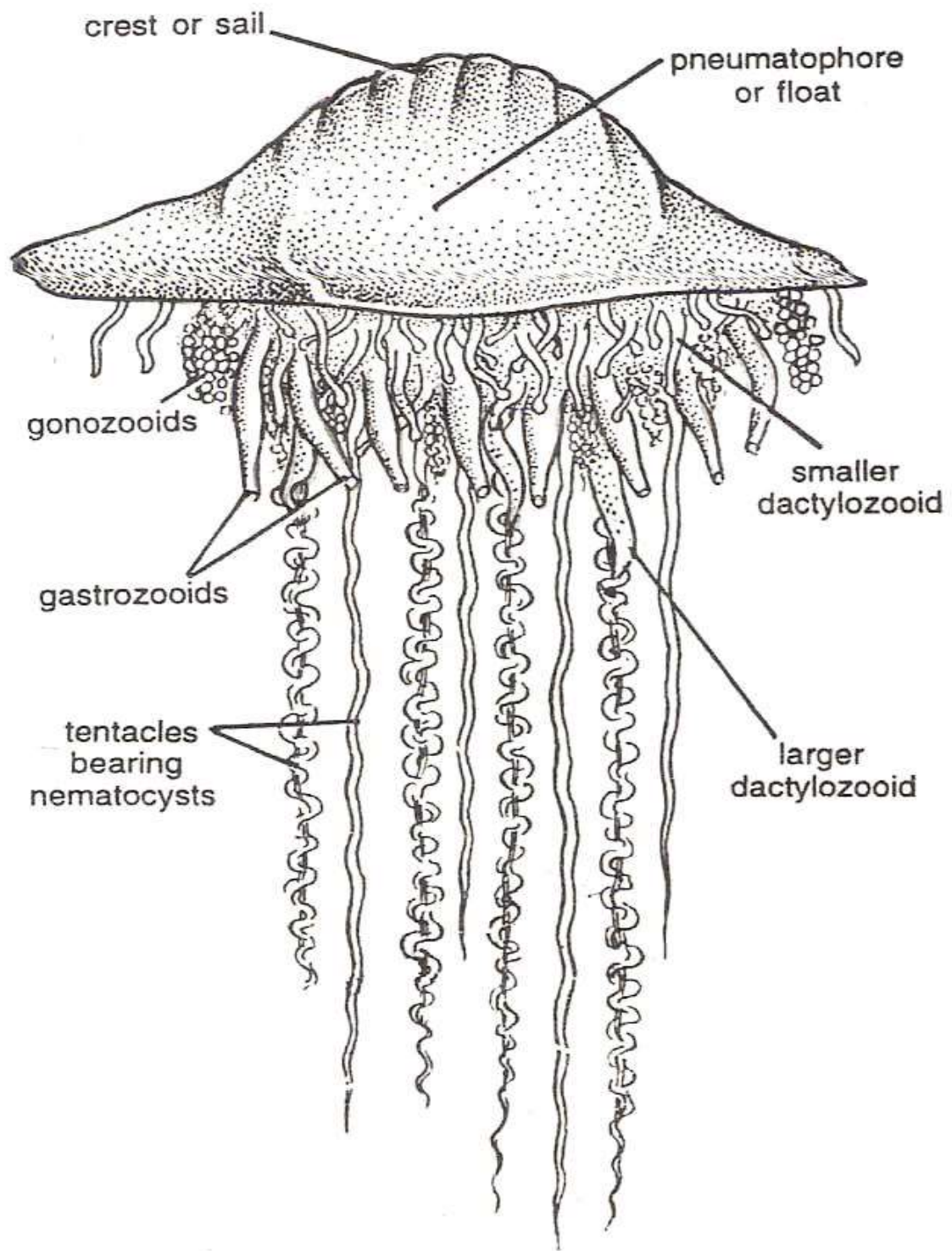
Classification

1. Phylum: Coelenterata (Multicellular; tissue grade; diploblastic and acoelomate).

2. Class: Hydrozoa (Hydroids bearing medusa with true velum.)
3. Order: Siphonophora (Polymorphic, free-swimming or floating colonial; colony consists of several types of polypoid and medusoid individuals; polyps without tentacles; medusa always incomplete and rarely freed)
4. Suborder: Physophorida (Upper end of the colony bears a float or pneumatophore.)
5. Genus: *Physalia*

Salient features

1. *Physalia* (Fig. 10) is a colonial hydroid commonly known as **Portuguese man of war**.
2. Colony has a large pneumatophore or float which is brightly coloured as blue or purple.
3. The float or pneumatophore is bladder-like, elongated pointed at both the ends, 6 to 12 cm long. The upper surface of the float is produced into a crest or sail.
4. A gas gland present inside the float secretes a gas of a composition similar to air. This helps the animal in floating over the surface of water.
5. The swimming bells or nectocalyces are absent.
6. Colony exhibits remarkable polymorphism and the phenomenon of division of labour.
7. Beneath the float are hanging down the three types of zooids and tentacles.
 - (i) Gastrozooids are simple polyps with mouth but without tentacles. These are nutritive in function.
 - (ii) Dactylozooids are of two types, large as well as small. These are provided with tentacles bearing numerous nematocysts. These catch the fishes and other prey.
 - (iii) Gonozooids are branching blastostyles bear clusters of medusae. Male medusa are reduced and remain attached. Female medusae are free-swimming.
8. Tentacles are large and bear stinging batteries or nematocysts to kill the large fishes and prey.
9. Habit and habitat: *Physalia* is a marine, colonial, swimming or floating pelagic animal.
10. Distribution: *Physalia* is found in tropical and subtropical seas.



Physalia

B) AURELIA (JELLY-FISH)

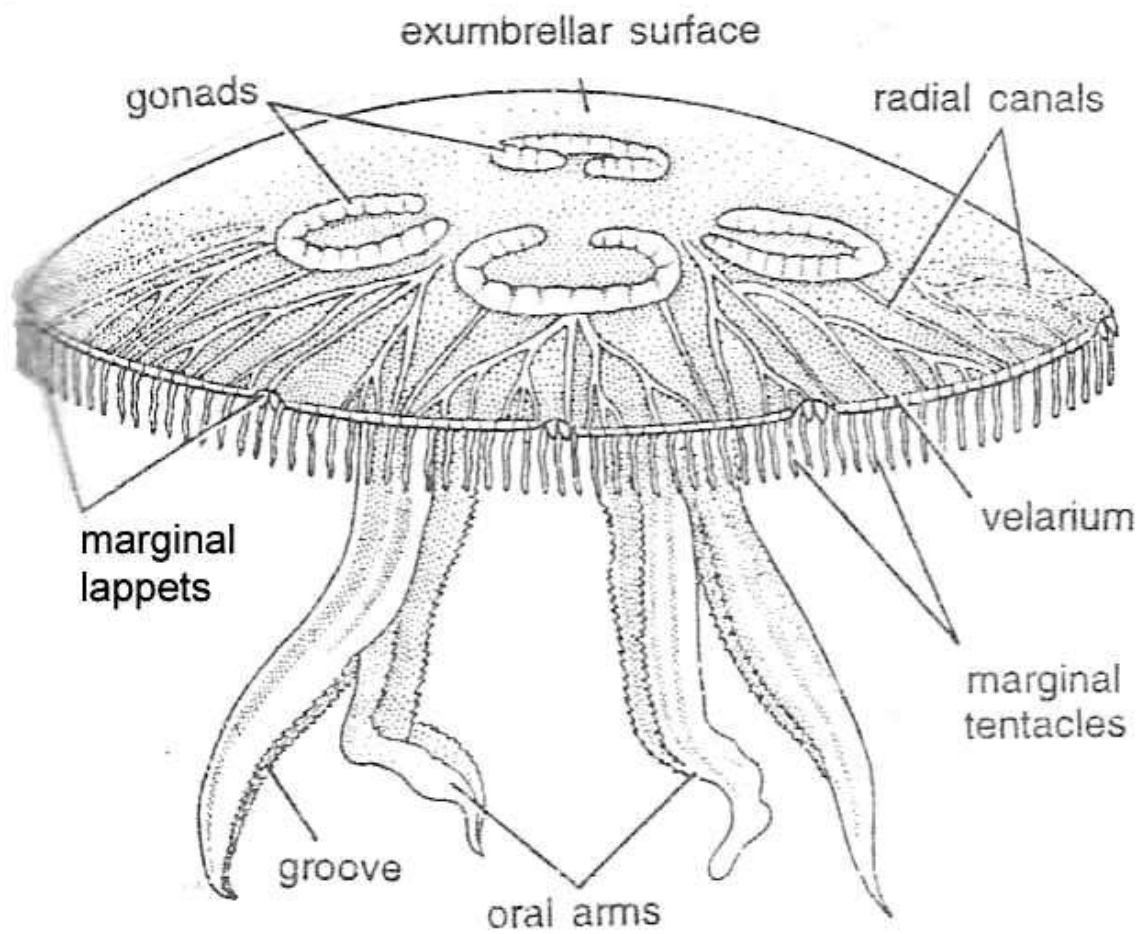
Classification

1. Phylum: Coelenterata (Multicellular; tissue grade; diploblastic and acoelomate.)
2. Class: Scyphozoa (Jelly-fishes or true medusae: exclusively marine ; medusa hinge umbrella-shaped without true velum; free-swimming or attached by an aboral stalk; marginal sense organs tentaculocysts ; polypoid generation absent or small polyp; gastrovascular system without stomodaeum, with gastric filaments; mesogloea cellular; gonads endodermal.
3. Order: Semaestomeae (Umbrella flat, saucer or bowl-shaped, mouth square, margin of umbrella fringed with hollow tentacles and eight or more tentaculocysts; gastric pouches and filaments are absent.)
4. Genus.....: *Aurelia*

Salient features

1. *Aurelia* (Fig. 11) is the commonest jelly-fish.
2. The medusa is bowl or saucer-shaped having tetramerous radial symmetry, measuring about 7.5 -10 cm in diameter.
3. The medusa or umbrella has a slightly convex upper surface known as umbrellar surface and a lower concave, the subumbrellar surface.
4. The margin of the umbrella is divided into eight lobes or lappets by notches. Each notch contains a tentaculocyst or rhopalium enclosed by a pair of marginal lappets.
5. Numerous short, hollow tentacles are present all round along the margin of the umbrella and are known as marginal tentacles.
6. The mouth is four cornered situated on the short manubrium, which hangs down in the centre of subumbrellar surface.
7. Each corner of the mouth is drawn out into a long frilled, tapering process, the oral arm. The four oral arms lie along the four per radii.
8. Mouth leads into short gullet which opens into stomach. The stomach gives rise to four interradial gastric pouches.
9. Each gastric pouch gives of branched or unbranched radial canals which open into a circular canal situated along the margin of the umbrella.
10. On the subumbrellar surface lying between the oral arms are four rounded apertures leading into shallow pouches called sub genital pits.
11. It is unisexual. The four gonads (testes or ovaries) lie on the floor of the gastric pouches. Gonads are horse-shoeshaped and reddish in colour.

12. The gametes (sperms or ova) are discharged into the stomach and passed out through the mouth.
13. The fertilized ovum develops into a freeswimming planula, and finally into fixed scyphistoma which gives rise to adult by transverse fission.
14. Habit and habitat: *Aurelia* is a solitary, marine jelly-fish.
15. Distribution: *Aurelia* is found in coastal waters of all oceans of the world.



Aurelia.

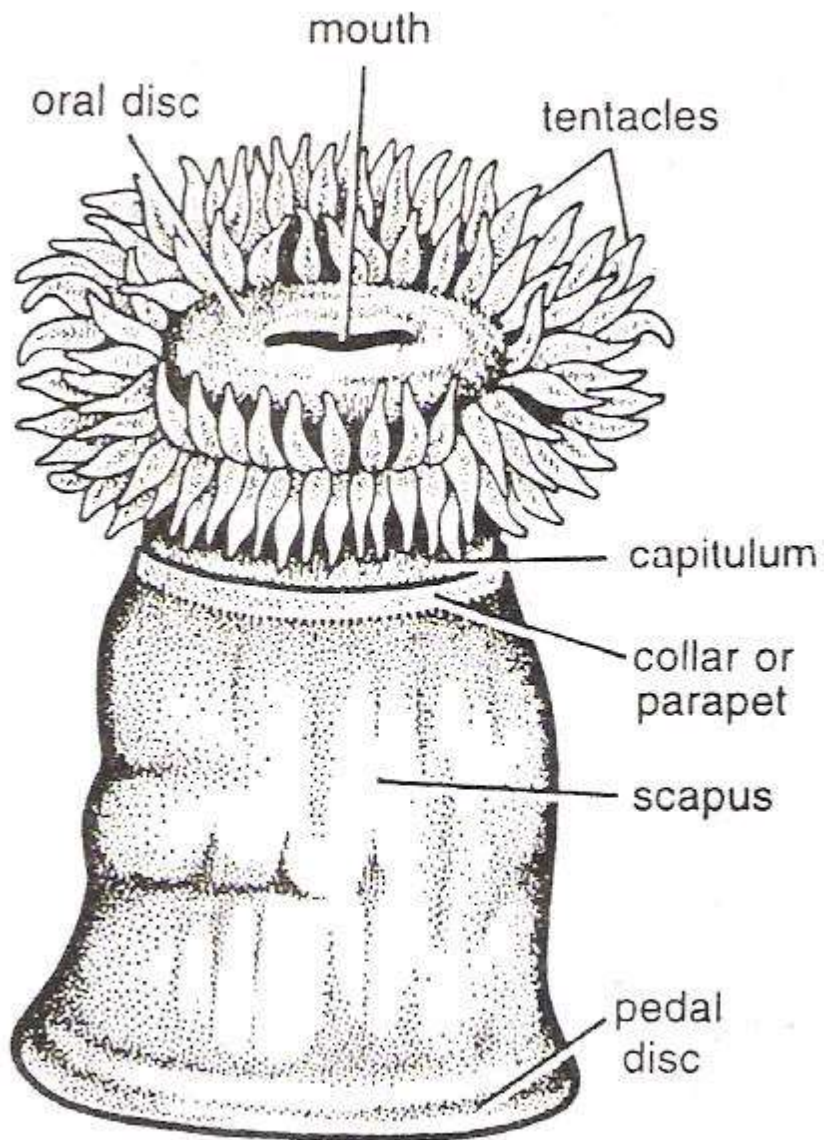
C) SEA ANEMONE

Classification

1. Phylum: Coelenterata (Multicellular; tissue grade; diploblastic and acoelomate.)
2. Class: Anthozoa (Exclusively marine and polypoid, medusoid stage absent; hexamerous, octomerous or polymerous; stomodaeum with one or more siphonoglyphs; gastrovascular cavity divided by complete or incomplete mesenteries.
3. Subclass...Hexacorallia (Polyps bear numerous tentacles and mesenteries arranged in the multiple of five and six but never eight; siphonoglyphs; polyps usually monomorphic.)
4. Order: Actiniaria (Body cylindrical divided into oral disc, column and base, aboral end with a pedal disc; tentacles and mesenteries numerous and often arranged in the multiple of six; siphonoglyph one or more, skeleton absent.
5. Genus.....: *Metridium*.

Salient features

1. *Metridium* is commonly known as sea anemone.
 2. Body is short, cylindrical and radially symmetrical, divisible into three distinct regions, pedal disc, column and oral disc.
 3. Pedal disc is muscular broad base or foot by which it is attached to the substratum.
 4. Column is differentiated into two portions a distal thin-walled short capitulum and a proximal thick-walled scapus by a groove and collar.
 5. The wall of the scapus is perforated by small openings called cinclides.
 6. Oral disc is lobed and flat having a slit-like mouth in the centre which is surrounded by numerous short, hollow marginal tentacles arranged in a number of circles.
 7. Mouth leads into a short gullet which finally opens into the gastrovascular cavity. Gullet or stomodaeum is provided usually with one or two siphonoglyphs. Gastrovascular cavity is divided into compartments usually by six pairs of mesenteries.
 8. Sexes are separate. Gonads are borne on the mesenteries.
 9. Asexual reproduction by fragmentation and budding.
 10. Habit and habitat: *Metridium* is a large sessile, brightly coloured, solitary, flower-like form. It is a marine form, found attached to the rocks, piles of wharves and solid objects from tide pools to a depth of 90 fathoms.
- Distribution: *Metridium* is found on the Atlantic coast, New Jersey to Labrador, Pacific coast and Europe



Sea anemone

7. TUBIPORA

Classification

Phylum...Coelenterata

1. Diploblastic body-wall.
2. Coelenteron present.
3. Nematocyst present.

Class...Anthozoa

1. Only polyps present.
2. Sedentary and colonial.
3. Enteron divided by mesenteries

Order...Stolonifera

1. Polyps arise from creeping stolons.

Genus...*Tubipora*

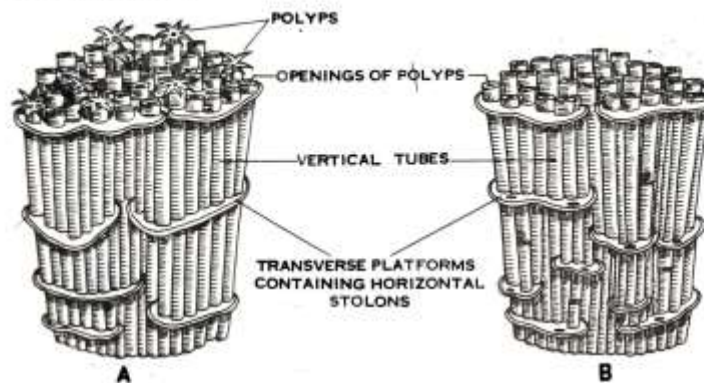


Fig. 4.36. *Tubipora*. (A) a portion of living colony. (B) skeleton.

Distribution

Found on corals in waters of Atlantic, Pacific and Indian Oceans.

Habits and Habitat

Tubipora is a marine, colonial polypoid coelenterate.

Comments

1. Popularly known as organ pipe coral.
2. The body consists of vertically arranged **parallel tubes** connected by transverse platforms and fused spicules.
3. The characteristic **red colour** of the tubes is due to iron salts.

4. The **skeleton** is internal, consists of spicules, it is covered by the ectoderm in living state.
5. The tubes contain **polyps** in the living condition which are **green** in colour.

6. Mesogleal spicules are perfectly fused to form the tubes for the polyps.
7. Reproduction is by budding.

8. GORGONIA

Classification

Phylum....Coelenterata

Class....Anthozoa

Order....Gorgonacea

Genus...*Gorgonia*.

1. Diploblastic body-wall.
 2. Coelenteron present.
 3. Nematocyst present.
1. Only polyps present.
 2. Sedentary and colonial.
 3. Coelenteron divided by mesenteries.
1. Horny corals.

Distribution

Commonly found in West Indies and South Atlantic Ocean.

Habits and Habitat

Gorgonia is marine, colonial and sedentary, found attached to rocks and stones in shallow waters of tropical and sub-tropical seas.

Comments

1. It is popularly known as 'Sea fan'.
2. Forms **submarine gardens** in tropical water.
3. The body is in the form of tree-like colony of yellowish-red tinge.
4. The base of the colony expands, forming a **holdfast** for attachment to the substratum.
5. The polyps or **anthocoela** emerge from branches and possess 8 pinnate tentacles, mouth, **gastrovascular cavity** and 8 filamentous **mesenteries**.
6. The skeleton is made up of **gorgonian spinules**.
7. The dried skeleton of the animal has **ornamental value**.
8. It has great power of regeneration

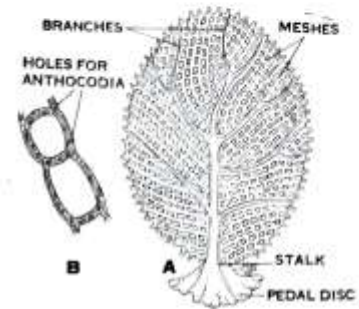


Fig. 4.37. *Gorgonia*. (A) entire colony. (B) a portion of colony (magnified).

12. FUNGIA

Classification

Phylum...Coelenterata

1. Diploblastic body-wall.
2. Coelenteron present.
3. Nematocyst present.

Class....Anthozoa

1. Only polyps present.
2. Sedentary and colonial.
3. Coelenteron divided by mesenteries.

Order....Madreporaria

1. Stony corals.
2. Skeleton calcareous.

Genus....*Fungia*

Distribution

Found in warm seas, usually in Gulf of California.

Habits and Habitat

It is a large, solitary and marine coral.

Comments

1. It is popularly known as 'Mushroom coral'.
2. Solitary, grows upto the size of 25 cms.
3. It is **discoidal**, mushroom-shaped with upper convex surface and lower concave surface.
4. The discoidal **corallite** contains numerous **septa** connected together by a calcareous rod known as **synapticula**.
5. A single, large polyp is present in the living condition.
6. **Siphonoglyph** is absent.
7. **Planula larva** metamorphoses into an adult.
8. Asexual reproduction by **budding**.
9. It originated in tertiary period and is living till now with little change.

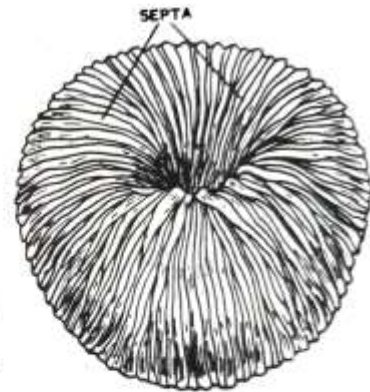


Fig. 4.42. *Fungia*.

6. Study of adult *Fasciola hepatica*, *Taenia solium* and their life cycles (Slides/microphotographs)

FASCIOLA

Classification

1. **Phylum**.....: Platyhelminthes (Acoelomate; organ grade and flatworms.)

2. **Class**.....: Trematoda (Ecto or endoparasitic; body wall without epidermis and well developed suckers present.)

3. **Order**.....: Digenea (Endoparasitic; mostly with two suckers without hooks.)

5. **Genus**.....: *Fasciola*

6. **Species**....: *hepatica*.

Salient features

1. *Fasciola* (Fig. 14) is commonly known as liver fluke.

2. Body is leaf-like, dorso-ventrally flattened measures 25-30 mm in length and 4-5 mm in breadth.
3. Anterior end is small and conical, while the posterior end is large more rounded in front than behind.
4. An oral sucker is situated apically and a larger highly muscular ventral sucker (acetabulum) is located a little posterior to the oral sucker.
5. Mouth is situated at the anterior end and is surrounded by the oral sucker.
6. Digestive system is simple; pharynx is muscular, oesophagus short and branched and diverticulated intestine.
7. Between the oral and ventral sucker is a median genital pore through which eggs pass to the exterior.
8. Excretory pore lies at the extreme posterior end of the body.
9. Hermaphroditic. Male system consists of testes, vasa deferentia, seminal vesicle, ejaculatory duct and penis, while "female system comprises ovary, uterus and vitelline glands.
10. Life-cycle is complicated includes an intermediate host, *Lymnaea*, a mollusc.
11. Liver-fluke causes a disease known as liver rot.
12. Habit and habitat: *Fasciola hepatica* is found as an endoparasite in the bile ducts of liver of sheep.
13. Distribution: *Fasciola hepatica* is cosmopolitan in distribution throughout sheep-raising areas. In U.S.A. and India it is endemic.

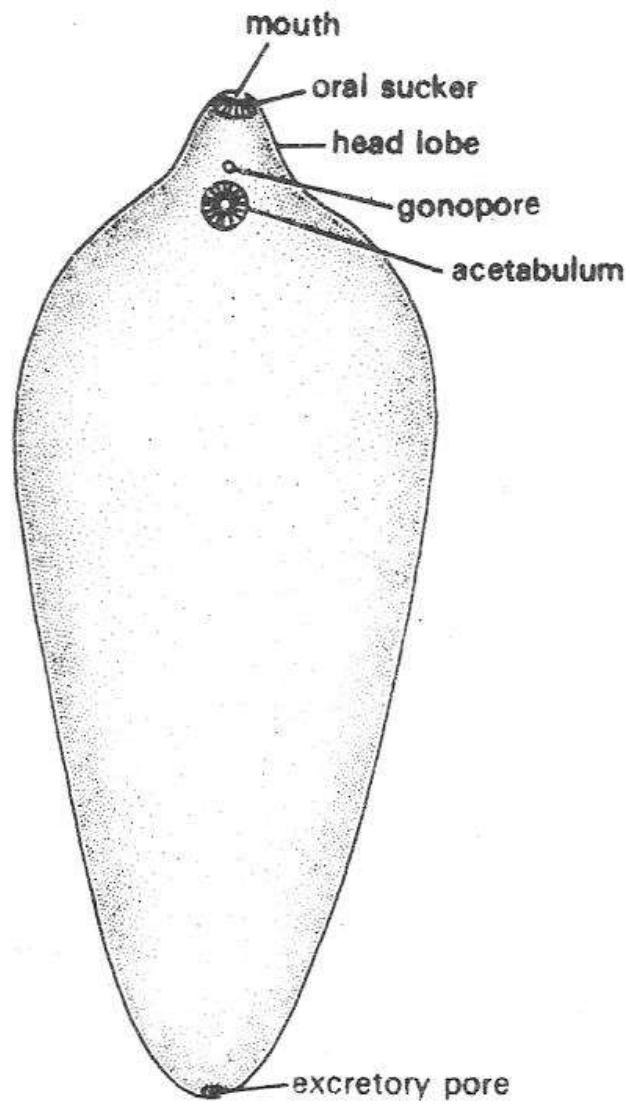


Fig: Fasciola

TAENIA (TAPEWORM)

Classification

1. Phylum.....: Platyhelminthes (Acoelomate; organ grade and flatworms.)
2. Class.....: Cestoda (Endoparasitic in the intestines of vertebrates, Body divided into few to many segments (Proglottids); Anterior end with hooks and suckers.)
3. Subclass.....: Eucestoda (Body elongated and ribbon-like, Anterior end bears an extended scolex, each proglottid with more than one set of reproductive organ.
4. Order.....: Taenioidea (Endoparasitic in the intestines of birds and mammals; scolex with four suckers often with an apical rostellum armed with hooks; yolk gland single and compact.
5. Genus.....: *Taenia*
6. Species.....: *solium*

Salient features

1. *Taenia* (Fig. 15) is commonly known as tapeworm.
2. Body consists of scolex or head, neck and strobila or body segments.
3. Scolex is smaller than the head of a pin, about 1 mm in diameter. It is the organ of attachment, bears four suckers and a rostellum which has a double circlet of hooks about 28 to 32 in number.
4. Behind the scolex is a thin unsegmented neck.
5. Strobila or body consists of large number of segments about 800 or more in number. Each segment is termed a proglottid.
6. Each proglottid contains a set of male and female reproductive organs, a part of excretory and nervous system and a lateral genital opening.
7. Life-cycle is complicated involves an intermediate host, pig.
8. The intermediate host of *Taenia solium* is pig in which infective cysticercus larva or the bladder worm is found encysted.
9. Pig is infected by bladder worm after eating contaminated human faeces. Man in turn gets infection by consuming mealy pork.
10. Habit and habitat: *Taenia solium* is commonly found in the intestine of man in places where pork is eaten as food.
11. Distribution: *Taenia solium* is cosmopolitan in distribution.

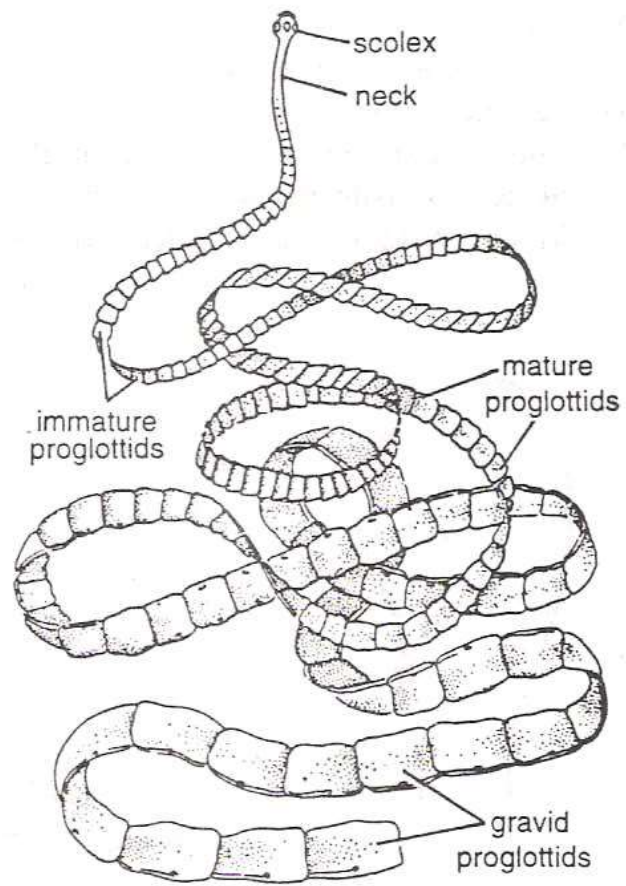


Fig: *Taenia*.

7. Study of adult *Ascaris lumbricoides* and its life stages (slides/micro-photographs)
Ascaris lumbricoides

PHYLUM: ASCHELMINTHES

1. ASCARIS

Classification

1. Phylum.....: Aschelminthes (Pseudocoelomate, unsegmented, unisexual nematodes.)
2. Class.....: Nematoda (Round worms, alimentary canal straight.)
3. Order.....: Ascarioidea (Buccal capsule absent, mouth with three lips.)
5. Genus.....: *Ascaris*
6. Species...: *lumbricoides*.

Salient features

1. *Ascaris* is commonly known as round worm. It causes ascariasis in man especially in children.
2. Body is elongated and cylindrical and shows sexual dimorphism with separate male and female individuals. Males measure 15-30 cm in length and female 20-35 cm.
3. Tail end of male ventrally curved containing cloacal aperture, through which two equal isopicules project. Tail end of female bluntly pointed. However, anterior ends exhibit same structures in both male and female.
4. Mouth situated at the anterior extremity is guarded by one dorsal and two subventral lips.
5. Amphids are found in sub-ventral lips. Excretory pore lies at a distance of 2 mm from anterior end.
6. Two lateral, one mid-dorsal and one mid-ventral longitudinal chords extent from anterior to posterior end.
7. No intermediate host in life history. Infection occurs by eating raw and uncooked vegetables.
8. Pathogenesis: Causes haemorrhage, haemoptysis, insomnia, iappendicitis, peritonitis, tumour, ulcer, diarrhoea, eosinophilia and death. *Ascaris* infection also causes disturbances in the nucleic acid, sugar, protein and fat metabolism of the host.
9. Prevention: infection can be avoided by not eating raw and uncooked vegetables especially grown on human night soil fertilizer. Contaminated water should not be taken.
10. Identification: Since the animal has an unsegmented cylindrical body hence it is *Ascaris*.
11. Habit and habitat: Found in intestine of man and pig. Two specimens are called as *Ascaris lumbricoides* variety *humanis* (found in man) and *A. lumbricoides* variety *sum* (found in pig).

Both forms are morphologically identical but two different physiological strains. Infective eggs from man's *Ascaris* will not develop into the pig and vice-versa.

12. Distribution : One of the most common nematodes found in all parts of the world especially in India, China, Philippines, Korea and Pacific Islands.

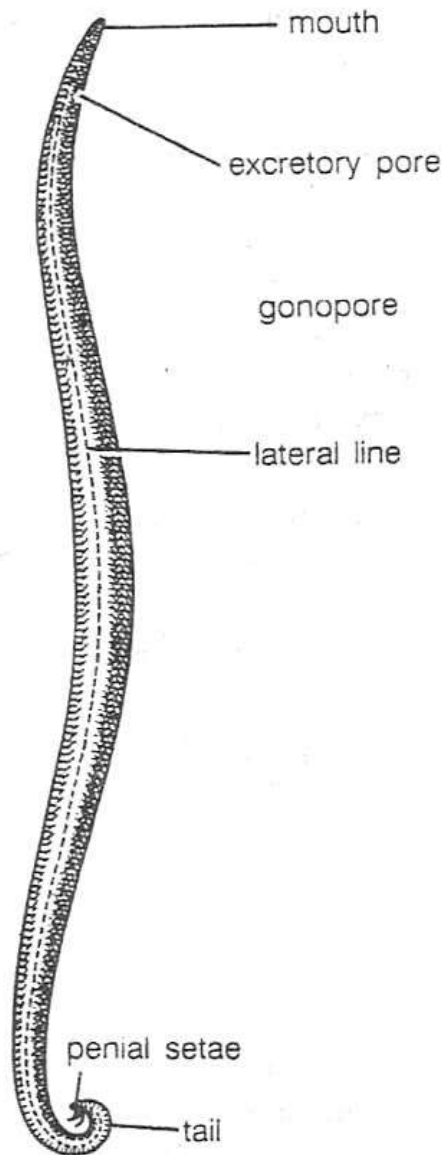


Fig: Ascaris.