ANIMAL

KINGDOM 02

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MBC – Mridul Bhaiya Classes

B.Sc 1st NOTES

ZOOLOGY NOTES

PART - 02

GENERAL CHARACTERISTICS AND CLASSIFICATION OF COELENTERATA AND PLATYHELMINTHES

TYPE STUDY – OBELIA AND FASCIOLA

- ✓ Detailed notes
- ✓ PYQs with answers
- ✓ Graphics included

Zoology is the division of biology that deals with the animal kingdom. It is the scientific study related to the entire species of the animal kingdom.

UNIT – 02 (SEMESTER 1ST)

TOPICS TO BE COVERED

A. General Characteristics and Classification of Phylum Coelenterata (Upto Class) Coelenterata – Type study : Obelia

B. General Characteristics and Classification of Phylum Platyhelminthes (Upto Class) Platyhelminthes – Type study : Fasciola

UNIT-02

GENERAL CHARACTERISTIC AND CLASSIFICATION OF PHYLUM COELENTERATA (CNIDARIA)

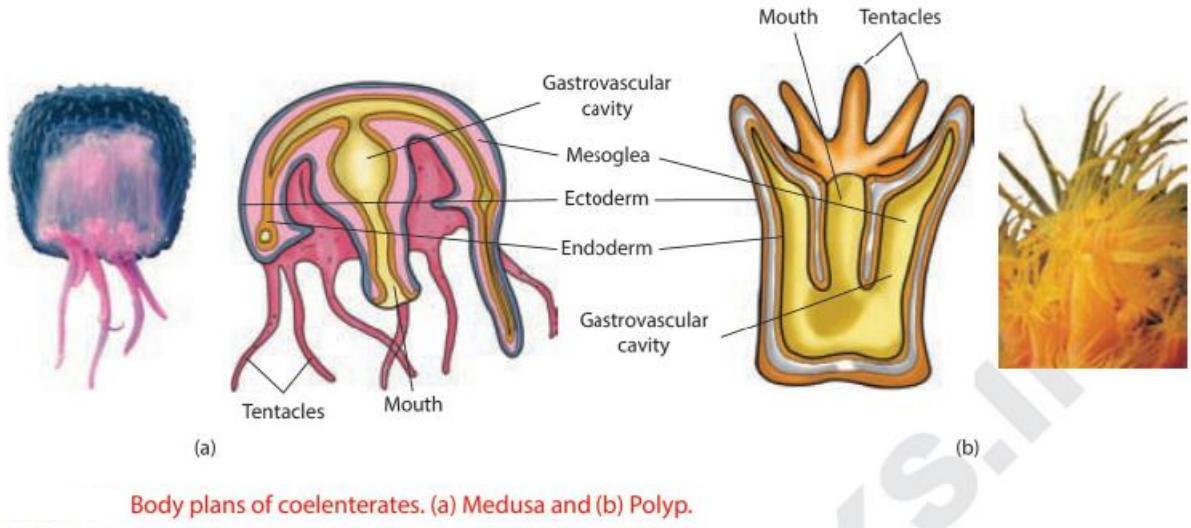
TYPE STUDY - OBELIA

[Greek Keilos(coel) = Hollow + enteron = intestine/cavity]

General Characteristics

1. **Habitat :** All animals are aquatic. Mostly marine except some species are found in fresh water.
2. They are solitary, colonial, sedentary or free swimming animals.
3. **Body Plan :** The member of this exhibit two main structures (i.e **Diamorphic**). The cylindrical shape is known as **Polyp** and disc shaped round structure known as **Medusa.**
4. **Symmetry :** Animals are radially or biradially symmetrical.
5. **Body Organisation :** Tissue grade organisation.
6. **Germ layer and Body :** Body wall **diploblastic**. Outer layer is **ectoderm** and inner layer is **endoderm** or **gastroderm**. Non-cellular, gelatin layer **Mesoglea** is present.
7. Hollow cavity enclosed by body wall is known as **Colenteron.**
8. The anterior conical part of body is known as **Hypostome** where **Mouth** is present.
9. Muscular system is of *Epithelio* and *Endothelio* muscle cells.
10. Mouth is often encircled by short and slender tentacles in which stinging cells the **Nematocysts** are present.
11. **Nervous system :** It consists of **nerve net**. Sensory cells are **Statocysts** (sense gravity) and **ocelli** (sense light)**.**
12. **Digestion :** Intracellular as well as Extracellular.

13. **Respiration :** It takes place by simple diffusion as respiratory organ are absent.
14. **Excretion :** By simple diffusion, excretory organs are absent.
15. **Circulation :** absent
16. **Reproduction :** Both Asexual and Sexual. Asexual by budding and segmentation. Sexual by gametes.
17. They possess a good power of **regeneration.**
18. Development of **Planula larva.**
19. Life cycle exhibits **alternation of generation** or **metagenesis.**



Body plans of coelenterates. (a) Medusa and (b) Polyp.

Classification

Phylum – **COELENTERATA/CNIDARIA**

- **HYDROZOA**
- **SCYPHOZOA**
- **ANTHOZOA (ACTIZOA)**

Class – 1. Hydrozoa

[**Gr** : Hydra = water, zoa = animals]

Characters

1. Mostly marine, some are found in fresh water.
2. Mostly are colonial and sedentary, but some are free swimming.
3. Mostly are polymorphic.
4. Gastrovascular cavity is simple and nonseptate.
5. Mesoglea is non-cellular and gelatinous.
6. Asexual polyp and sexual medusa alternate with each other.

7. Medusa stage is umbrella shaped.
8. Gonads ectodermal is origin.

Class – 2. Scyphozoa or Syphozoa

[**Gr** : skyphos = cup + zoa = animals]

Characters

1. Large true jelly fishes are included in this class.
2. All the animals are marine and solitary.
3. Majority of animals are pelagic medusa, which develops directly from the eggs or develops from Hydroid stage.
4. Polyp stage is absent or underdeveloped.
5. Absence of velum in the medusa.
6. Mesoglea is thick, gelatinous and cellular.
7. Gonads develops from interstitial cells of endodermal canal.
8. Absence of perisarc.
9. Absence of tentacles
10. Development is indirect.
11. Planula larva metamorphosed into Scyphistoma larva.
12. Presence of Metamorphosis.

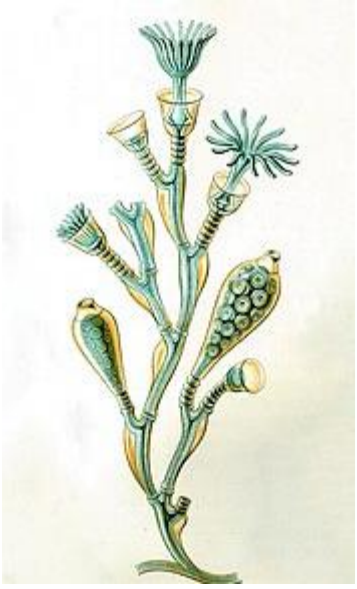
Class – 3. Anthozoa or Actinozoa

[**Gr** : anthos = flower + zoa = animals]

Characters

1. Animals are marine, solitary and colonial. They are found attached to some objects.
2. Only polypoid or hydroid are persent.
3. Mesoglea in form of fibrous connective tissue.
4. Body of the animal is cylindrical and biradially symmetrical
5. Mouth opens into intestine through stomodaeum or gullet.
6. Muscular system is highly developed.
7. Nematocysts are found.
8. Skeleton is ectodermal, secrete $CaCO_3$ which is called as coral.
9. Fertilization is external. Larva is planula.

TYPE STUDY : OBELIA



CLASSIFICATION :

Phylum – Coelenterata

Class – Hydrozoa

Order – Hydroida

Genus – *Obelia*

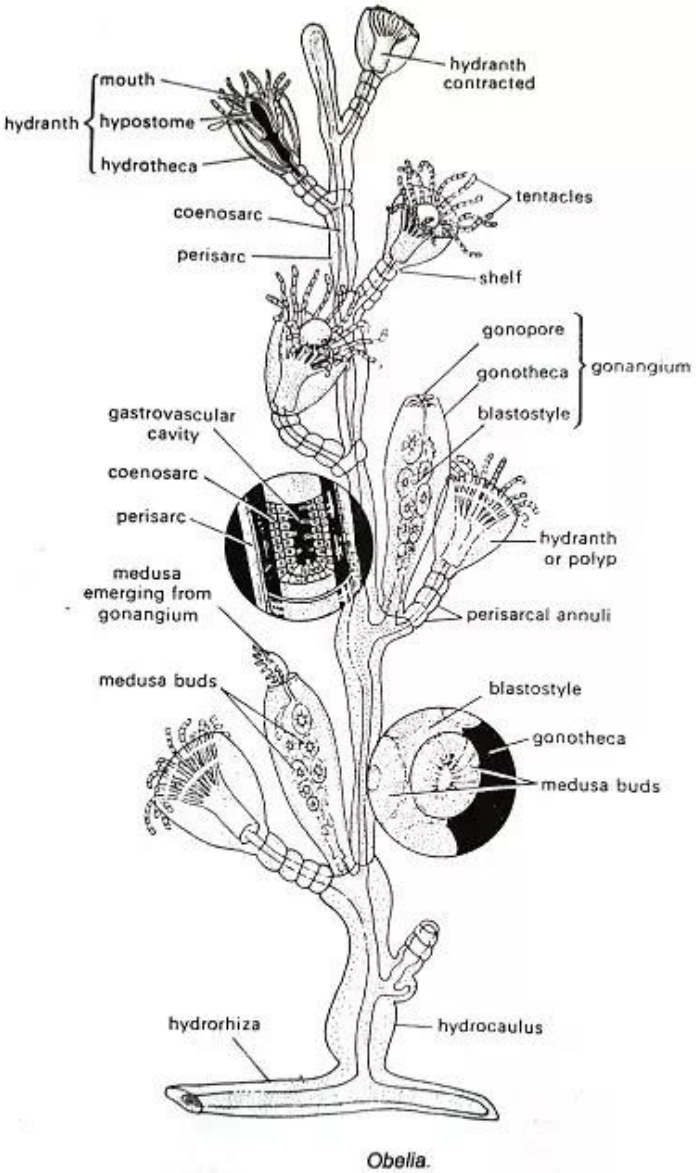
Species - *geniculata*

HABIT AND HABITAT :

- Obelia is sedentary, marine, colonial and hydroid animal.
- It is found attached with rocks, stones, sea weeds etc in shallow water of sea and cosmopolitan in distribution.
- Found upto the depth of 250 feet. It is commonly known as **"Sea fur"**
- It occurs as sexual and asexual forms.
- Its asexual form is a branched hydroid colony found attached with rocks, stones, aquatic weeds in the seawater.
- Its sexual form is Medusa which is umbrella shaped and free floating.

HYDROID COLONY

- Colony of the Obelia is soft, delicate, semitransparent, white and light brown colour.
- A hollow main stem **Hydrorhiza** is present in horizontal part, lie parallel to substratum.
- Many vertical branches arises from the hydrorhiza are known as **hydrocauli**.
- From each hydrocaulus arises branches in alternate manner, which



Obelia.

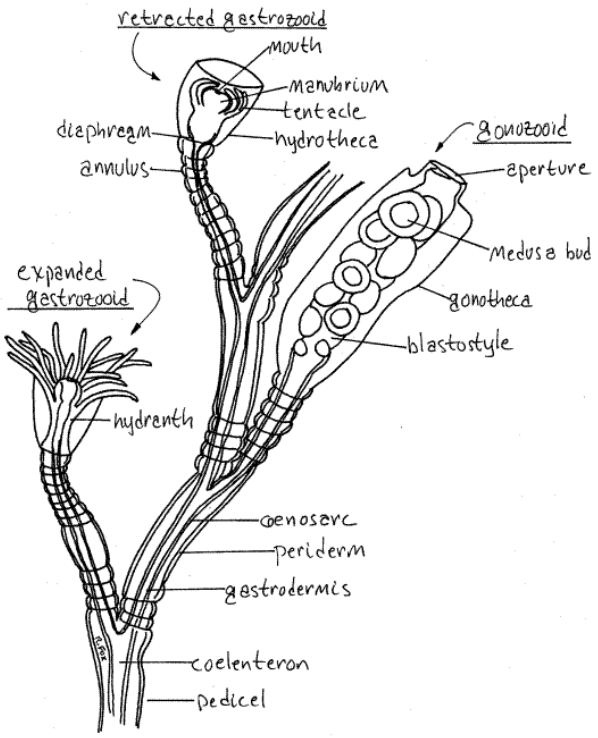
sometime gives branches of third grade which bears a **zooid** at its free end, which is known as **Polyp** or **hydranth**.

- At the base of each zooid ring like structure is present.
- In all the branches and in zooids a tubular like region is present, it is known as **Coenosarc**.
- Around the Coenosarc a cuticularised **Perisarc** is present.

(1) Perisarc : Perisarc is a tough, transparent and light yellow or brown coloured covering of a cuticle which forms exoskeleton.

(2) Cenosarc : made up of ectoderm, endoderm and, mesoglea. In between these layers a gastrovascular cavity is present.

(3) Zooid : Three type of zooids are present in Obelia colony hence is called **trimorphic colony.**



→ Nutritive Zooid – Polyp or Hydranth.
→ Reproductive Zooid – Blastostyle
→ Sexual Zooid – Medusa

Polyp or Hydranth :

It is nutritive zooids (**Gastric zooid**) situated at the free end of hydrocali and its branches.

They are yellow coloured hollow cylindrical with conical elevation opened at both the ends.

The narrow base is attatched with cenosarc and its distal end is called conical manubrium or **Hypostome**.

The apex of the hypostome bears a terminal aperture called the **mouth**.

Somewhat 30 tentacles (solid, long and filiform) are present around the mouth.

Mouth opens into the middle cavity of the hydranth the **Gastro-vascular cavity** or **Coelenteron.**

The perisarc surrounding the hydranth, dilates and forms a loose vase shaped covering known as **Hydrotheca.**

These are nutritive zooids of the obelia colony. It is carnivorous and feed on the microorganism found in water. Tentacles transfer the prey or food into the mouth from where the food enters into coelenteron.

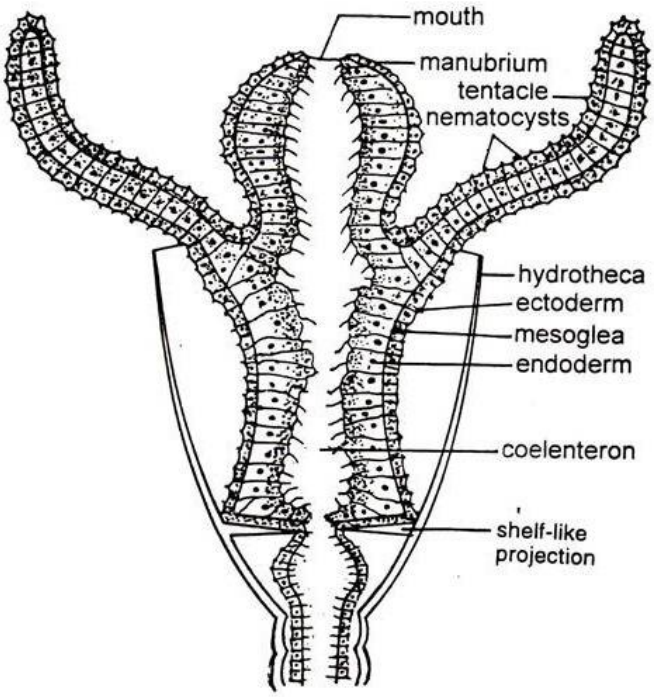


Fig : V.S of polyp or hydranth

Blastostyle :

The cylindrical zooids found in the axil between the hydrocaulus and hydranth in the proximal region of the colony known as **Gonozooid or Blastostyle**.

Features of Blastosyle :

- Shape : narrow tubular structure, the distal end is closed,
- Body wall is double layered
- In middle hollow gastrovascular cavity is present.
- They Small and in the primary stage and never opens to outside.
- Absense of tentacles and mouth and it never feeds.
- It is covered by a loose transparent, vase like covering of perisarc known as **gonotheca.**

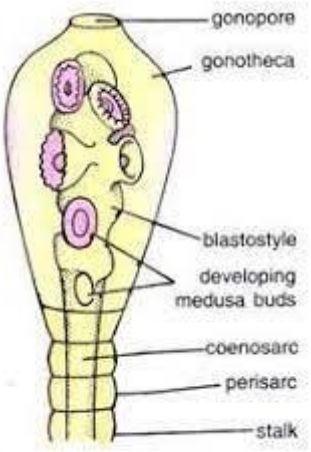


Fig. 32.3. *Obelia*. A gonangium.

In Blastostyle small saucer shaped sexual bodies are formed by budding known sa **medusae.**

Blastostyle with medusa together with the gonotheca is known as **Gonangium.**

Medusa or Sexual Zooids :

They are formed by budding from the axis of the blastostyles. Their development takes place from the coenosarc of the blastostyle as a hollow cavity. Medusa swims freely on the surface water.

Features of Medusa :

- Each medusa is bell or saucer shaped
- When fully formed it breaks free and emerges from the mouth of the gonotheca.
- Its outer surface is convex (exumbrellar surface) and inner surface is concave (umbrellar surface)
- In the centre of sub-umbrellar surface hangs a small hollow structure called as **Manubrium**, which opens to the outiside by a four sided **mouth.**
- The mouth leads into an enteric cavity or gastric cavity in the manubrium.
- Projecting from the middle of the radial canals are four gonads, since sexes are separate they are either four testes or four ovaries.
- The gonads mature after the medusae escape from the gonotheca.

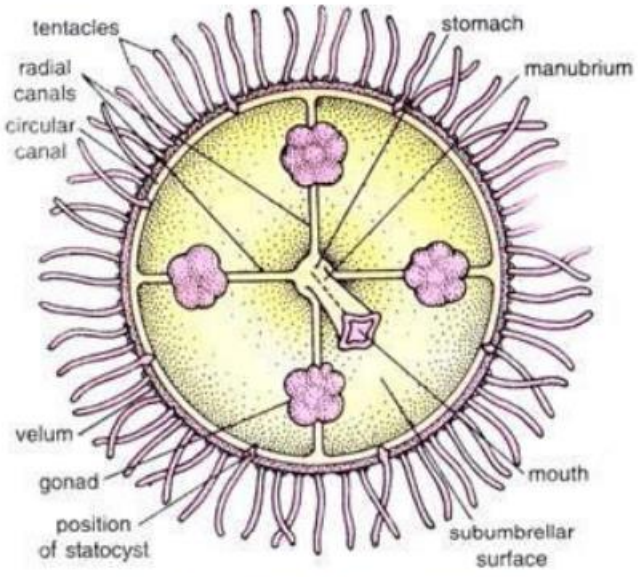


Fig. 32.4. *Obelia*. Medusa in oral view.

REPRODUCTION IN OBELIA

Obelia colony never reproduces sexually but it is found both in sexual and asexual forms.

Its asexual form is branched hydroid colony, and its sexual form is Medusa.

ASEXUAL REPRODUCTION

In a favourable environmental conditions by the process of budding Obelia reproduces asexually. In this process :

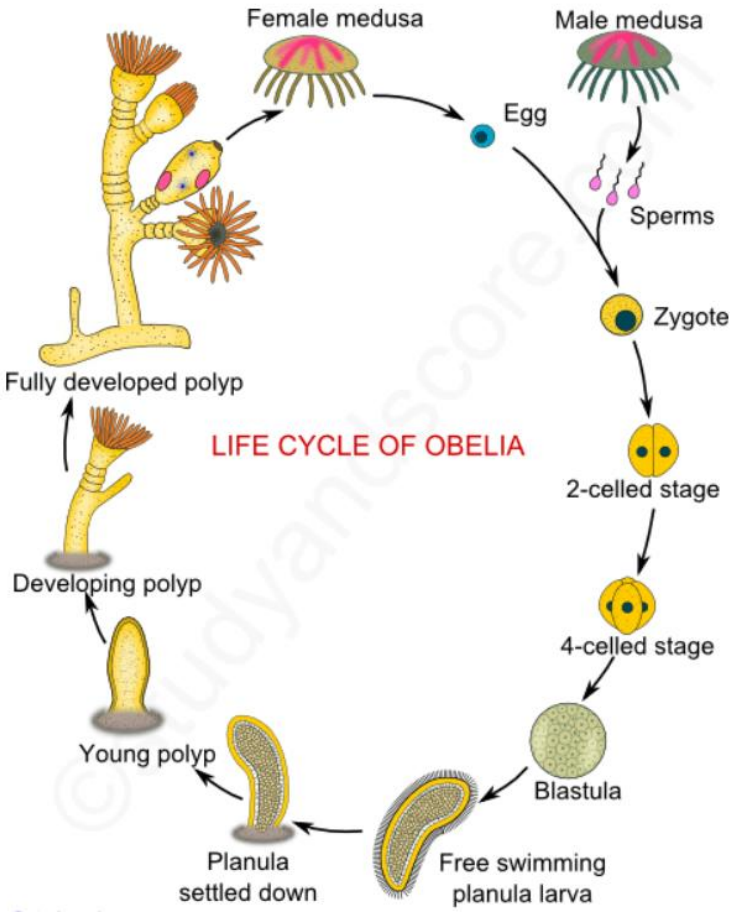
1. The Hydrorhiza of the obelia colony give rise rise to new vertical stem or Hydrocauli which increases the number of organisms by budding.
2. Blastostyle are specialized reproductive zooids which forms medusa by budding.

SEXUAL REPRODUCTION

On the axis of the hydranth by budding Blastostyle is formed. This indicates the asexual reproduction.

At the apex of Blastostyle by budding many small umbrella type structures – **Medusa** are formed. It is a sexual zooid. In each medusa gonads are present in four groups, all are similar either **testes** or **ovary**. Medusa is an **unisexual** zooids.

Gonads : Gonads are situated on sub-umbrella surface per radial canals. When gonads mature, the gonads rupture and sperm and ova are discharged outside into sea water.



Fertilization : Sperms enter the female medusa along with water current and fertilize the ovum.

Development :

- Segmentation or cleavage in zygote is **Holoblastic** and **complete**, zygote changes into solid ball known as **Morula**.
- After sometime a hollow cavity **Blastocoel** develops in it. The stage of embryo is called as Blastula and its cells are called Blastomeres.
- By division of internal blastomeres new cells are formed filling the blastocoel completely. This way embryo changes into **Sterio-gastrula**.
- When gastrula develops further in length, cilia are formed which makes embryo free floating **Planula Larva**. Its anterior end is broader than posterios part.
- Planula larva settles down, metamorphosis takes place in it and larva looks like Polyp. This stage is known as **Hydrula** stage.
- Gradually it develops into **Hydrorhiza.** From which vertical adult branches develops forming Obelia colony.

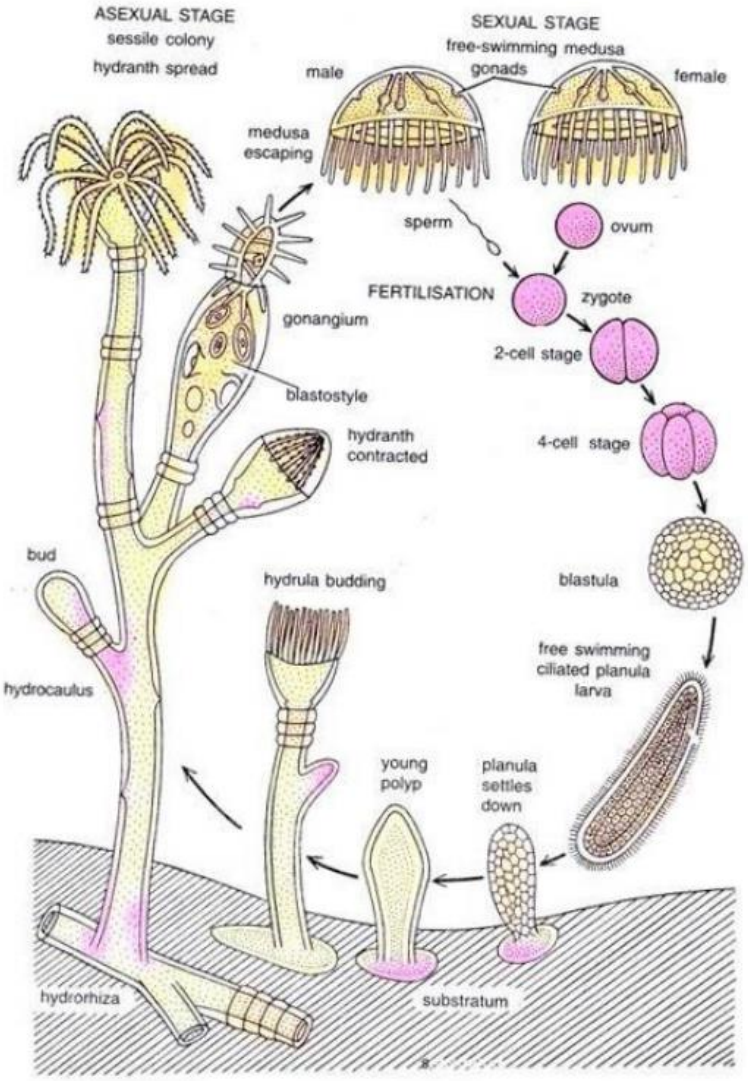
Alternation of Generation and Metagenesis

In some animals, its life cycle is a diploid/digenetic. Asexual phase and Haploid sexual phase regularly alternate with each other. It is known as **Alternation of generation**.

The process of alternation of diploid polyp and medusa is known as **Metagenesis**.

The life history may be represented as

Male and Female gametes → zygote → Planula larva → Hydrula → Colony → Sexual medusae → Gametes → Zygote and so on



COMPARISION OF POLYP AND MEDUSA

POLYP	MEDUSA
1. *They are sedentary*	1. *They are free floating*
2. *They are attached to the vertical branches of the colony*	2. *It develops as a lateral bud on the blastostyle*
3. *They are hollow, conical vase shaped*	3. *They are bell or saucer shaped*
4. *Velum absent*	4. *Velum present*
5. *Absence of sense organs*	5. *Sense organ as statocyst is present*
6. *Absence of gonads*	6. *Gonads are present in between the radial canals*
7. *It is a nutritive zooid and represents the asexual stage of colony.*	7. *It is an sexual zooid, which represents the sexual stage of colony.*

SIMILARITIES BETWEEN POLYP AND MEDUSA

1. In both the body wall is diploblastic.
2. Body of both shows biradial symmetry.
3. Mouth is homologous in both cases.
4. The stomach, radial and circular canals of medusa are similar to gastric cavity of polyp.
5. Polyp and medusa both are carnivourous.

GENERAL CHARACTERISTIC AND CLASSIFICATION OF PHYLUM PLATYHELMINTHES (CNIDARIA)

TYPE STUDY - FASIOLA

[Greek Platy = flat, helminthes = Worm]

General Characteristics

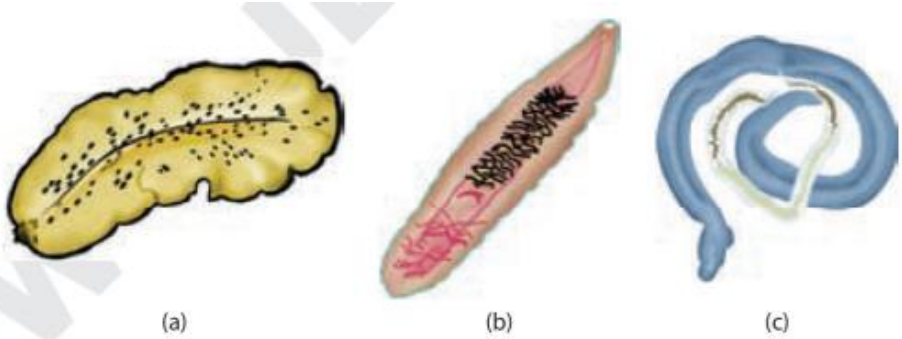


Figure 1.13 Flatworms. (a) A free-living marine flatworm. (b) The human liver fluke (*Clonorchis sinensis*). (c) An intestinal tapeworm (*Taenia solium*)

1) **Level of organisation** : Organ and Organ System level of Organisation
2) **Symmetry** : Bilateral Symmetry
3) **Germ Layer** : Triploblastic organisation.
4) **Body** :
   a) Body is generally flat and body is soft, segmented but this segmentation is not true
   b) Adhesive organs in the form of **Suckers** and **Hooks** are present.
   c) Epidermis is soft and multinucleate, generally a covering of cuticle is found on it and in some animal it is ciliated and in other it is absent.
   d) Absence of exo and endoskeleton.
5) **Coelom** : Coelom is absent or Acoelomates.
6) **Digestion** : The digestive system is incomplete.
7) **Circulation** : Circulatory system is absent.
8) **Respiration** : Respiratory system is absent. It takes place through diffusion from body surface.
9) **Excretion** : A network of fine tubules containing specialised bulb-like cells called flame cells (protonephridia) help in excretion and osmoregulation.
10) **Neural system and Sensory cells** : Nervous system and sense organ are feebly developed.

11) **Reproduction** :

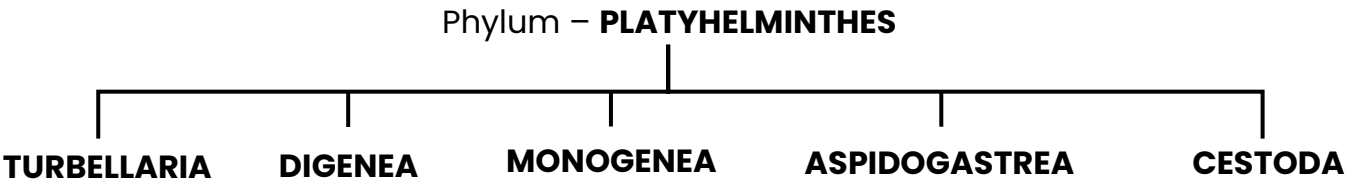
a.) Animals are hermophrodite

b.) Fertilisation is internal. Development either without larva or with larval stage.

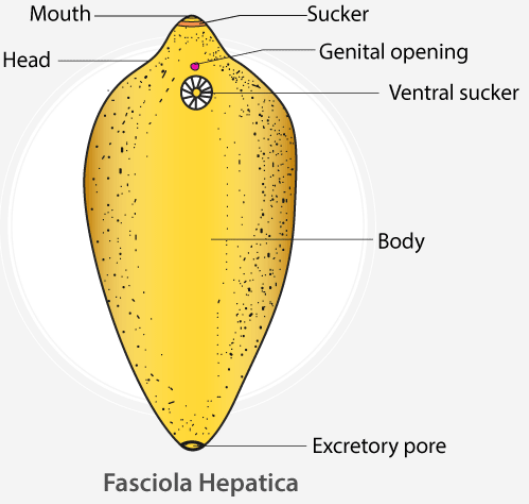
c.) Life cycle is complicated or completed in many hosts.

12) Some animals of this phylum are free living and occur in water.

Classification



TYPE STUDY : FASCIOLA (LIVER FLUKE)



Fasciola Hepatica

CLASSIFICATION :

Phylum – Platyhelminthes

Class – Digenea

Genus – *Fasciola*

Species – *hepatica*

HABIT AND HABITAT :

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