Malkapur P.D.

• unit - II
• B.Sc. I yr
Sem I

Phylum - Cnidaria (Coelenterates)

General characters

1) Cnidaria or coelenterates are multicellular organisms.
2) They have tissue - grade of organization.
3) The body is radially symmetrical.
4) All the members of this phylum are aquatic.
5) They are solitary or colonical.
6) The body wall is diploblastic. It is made of only two layers of cells, namely ectoderm and the endoderm with a non cellular layer in between them called mesogloea.
7) Coelom is absent; hence coelenterates are acoelomate animals.
8) A gastrovascular cavity or coelenteron is present. It can be compared to the gut of higher animals.
9) Mouth is present, but anus is absent.
10) Digestion is extracellular as well as intracellular.
11) Respiratory, excretory and circulatory systems are absent.
12) Nervous system is diffuse - type, formed of nerve - nets.
13) Reproduction is by asexual and sexual method.
14) Development is indirect as there are one or two larval forms present.

15) life history has alternation of generations.
16) Two types of individuals occur in life cycle. They are polyps & medusa.

Examples → Hydra, obelia, sea anemone, corals etc

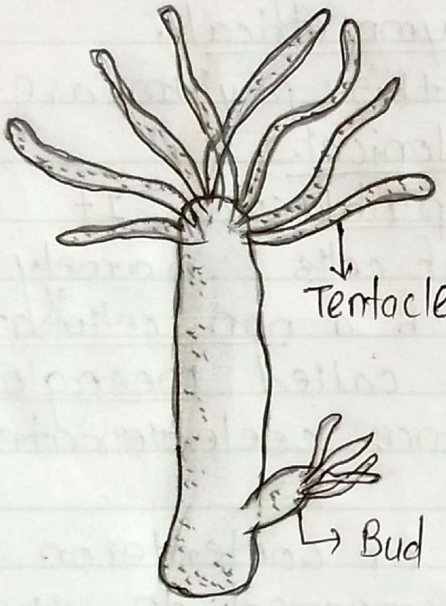

Fig. Hydra

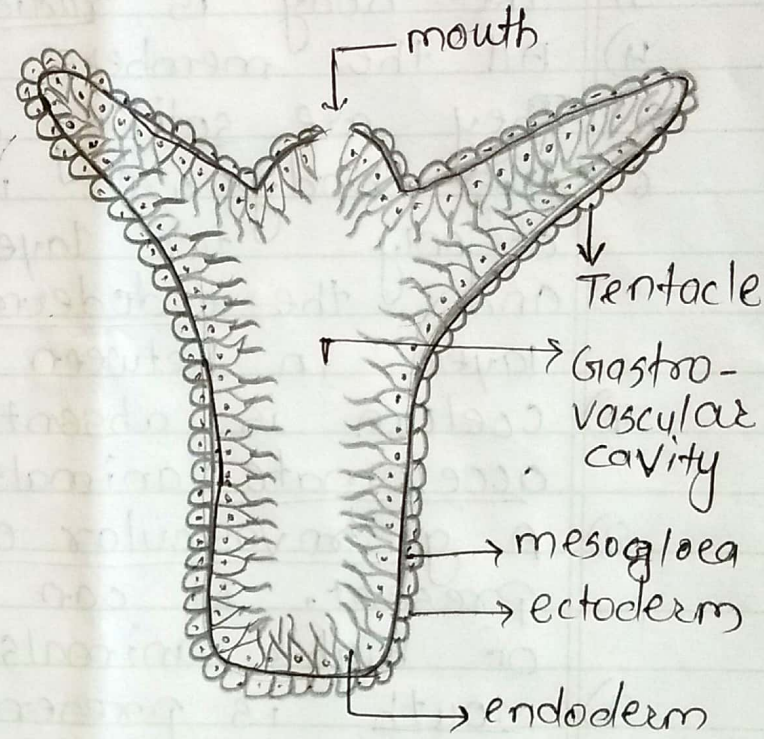

Fig. vertical section of Hydra

Classification of coelenterates

Cnidaria are radially symmetrical animals with a diploblastic body wall, & a gastrovascular cavity. This phylum include Hydra, obelia, Jelly fishes, corals, etc.

Phylum cnidaria or coelenterates divided into three classes, namely -

1) Hydrozoa
2) Scyphozoa
3) Anthozoa.

Class 1 - Hydrozoa

Hydrozoa includes Hydra-like coelenterates. This group exibits two types of zooids, namely Polyps and medusa.

Silent features of Hydrozoa :-

1) They are aquatic, living in the freshwater or sea water.
2) They are solitary or colonial.
3) They are sessile and free swimming
4) They exhibit radial symmetry.
5) Body wall consist of outer ectoderm and an inner endoderm separated by a non-cellular gelatinous mesogloea.

6) They exhibit polymorphism. There are two main types of zooids, the polyp and medusa.
7) cleavage is holoblastic.
8) Development is indirect with planula larva.
9) Many hydroza exhibit alternation of generation.

Examplex of Hydrozoa -

- Hydra, pennaria, Physalia, Tubularia, obelia, etc.

★ Class 2. Scyphozoa

1) Scyphozoa include large jelly fishes or true medusae.
2) They are exclusively marine.
3) Medusae are large, bell or umbrella-shaped and without true velum. They are free swimming or attached by an aboral stalk.
4) Marginal sence organs are tentaculocysts.
5) Polypoid generation is absent or represented by small polyp.
6) Gastrovascular system present it may or maynot be divided into four inter-radial pockects by septa.
7) Mesogloea is usually cellular.
8) Gonads are endodermal and the sex cells are discharged into the stomach.

examples - Lucernaria, Aurelia, Cassiopea, etc.

Class 3. Anthozoa

1) These are solitary or colonial exclusively marine cnidarians.
2) They are exclusively polypoid. Medusoid stage is altogether absent.
3) Gastrovascular cavity is divided into compartments by complete or incomplete septa or mesenteries.
4) Mesoglea contains fibrous connective tissue and amoeboid cells.
5) Skeleton is either external or internal. Exoskeleton is formed from calcium carbonate which often ~~from~~ form massive corals.
6) Nervous system is in the form of typical nerve net without a concentrated central nervous system.
7) Gonads are endodermal & they develop in the mesenteries.
8) Fertilization is external.

examples –

Tubipora, Heliopora, Adamsia, corallium, etc.

★ Polymorphosim in Hydrozoa

Occurrence of more than one type of individuals, which differ in form or structure and function in same species is known as polymorphosim.

- In hydrozoa (or coelenterates), which may be single or colonial, there occur two main types of individuals or zooids — polyps and medusa.

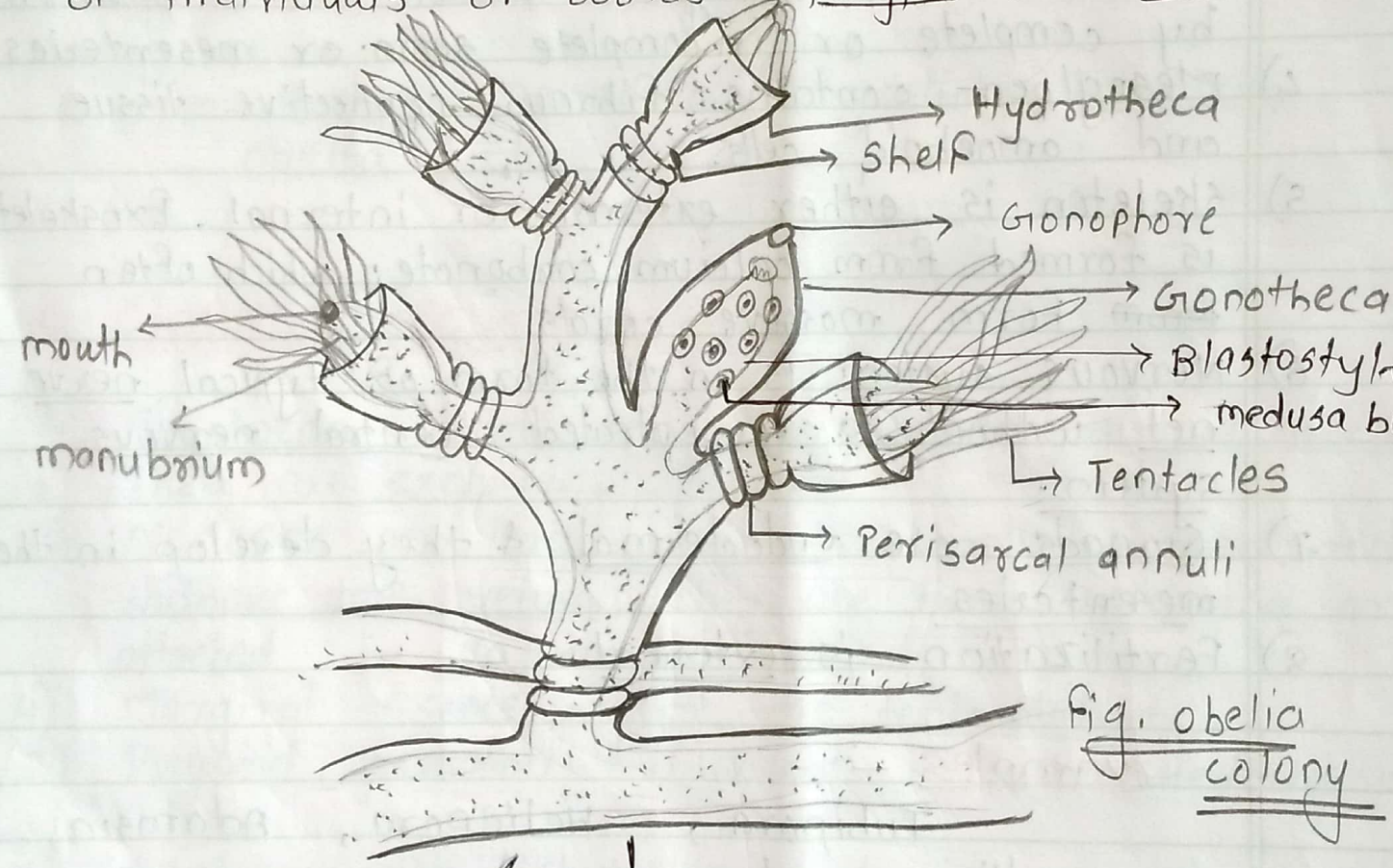

fig. obelia colony

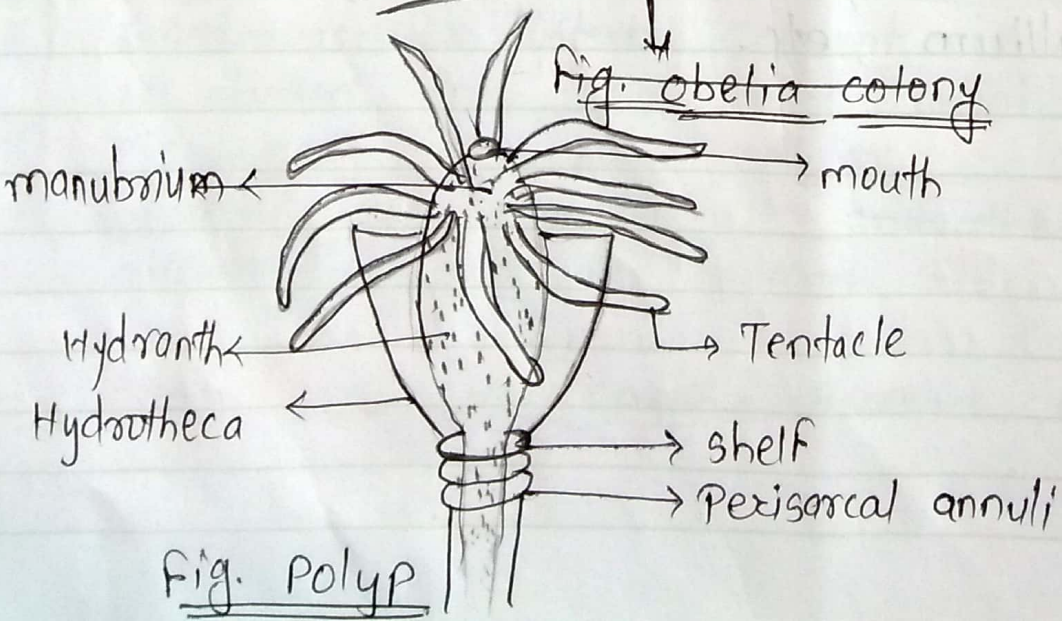

fig. Polyp

Polyps

- Polyps are nutritive zooids of obelia colony.
- They are present on the lateral branches.
- They are cylindrical sac-like zooids.
- They are also called hydranths because they resembles like Hydra.
- The proximal end of the polyp is continuous with the hydrocaulus.
- The distal end of the polyp has a conical elevation called manubrium or hypostome.
- The manubrium bears an opening called mouth in the centre and surrounded by a circlet of about 30 tentacles.
- The polyp has a wide cavity inside called as gastrovascular cavity or coelenteron.
- One end of the cavity opens to the outside by the mouth and the other end gets connected with the coenosarcal canal.
- The body wall is diploblastic. It is made up of an outer ectoderm, an inner endoderm and a middle mesogloea.
- The perisarc, located around the polyp, dilates to form a funnel like structure called hydrotheca.
- When disturbed the body and tentacles of the polyp can be retracted into the hydrotheca. Thus the hydrotheca protects the polyp.
- The base of hydrotheca is produced into a ring-like structure called shelf.

- The polyp rests on the shelf.
- The perisarc bears a few circular constrictions at the base of hydrotheca. These contrictions are called Perisarcal annuli. They function as shock absorbers and prevent the breakage of zooids from the colony when the colony is swayed by the water current.
- Polyps are nutritive in function. They capture and digest food for the entire body.

★ Figures of medusa

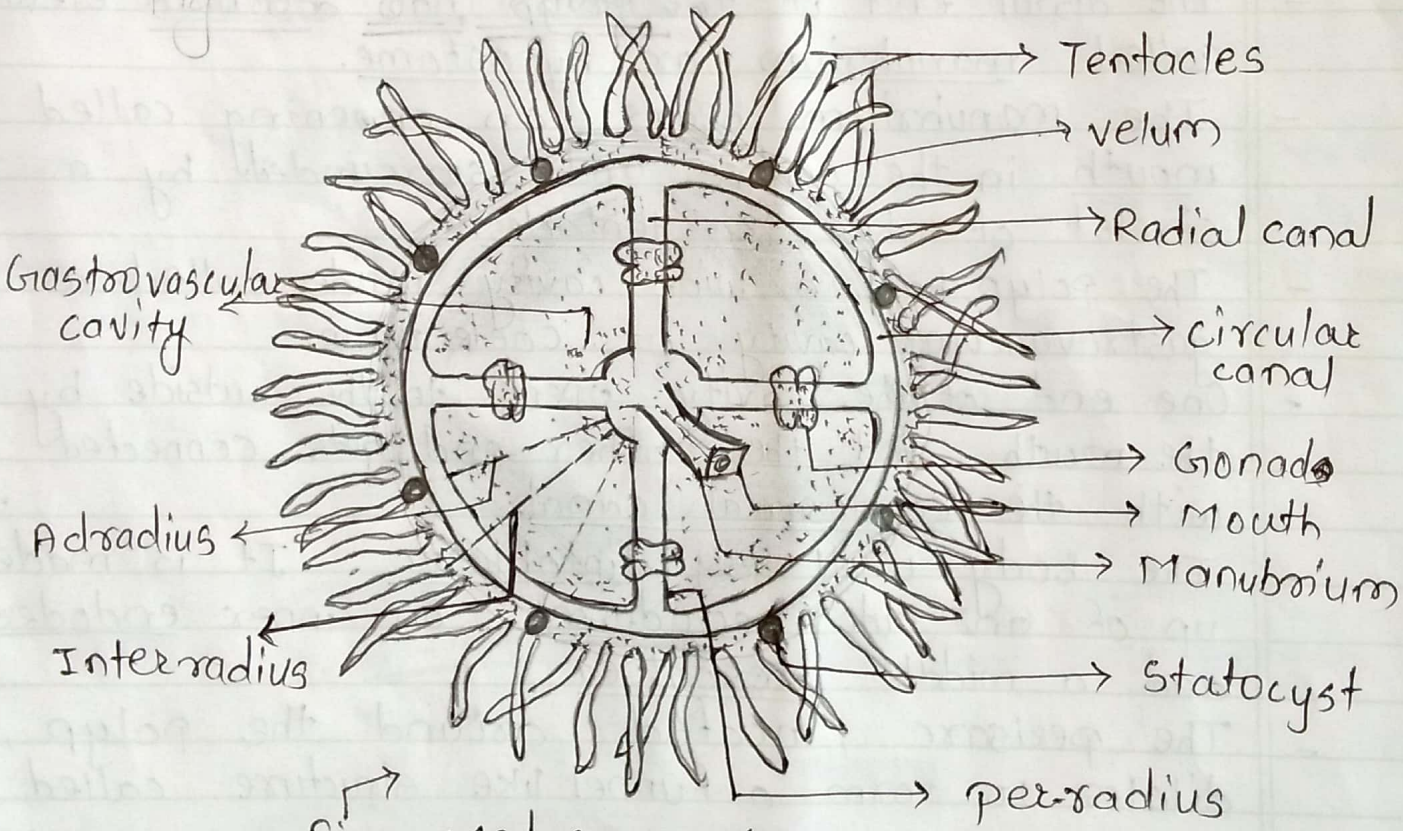

Fig. Medusa : Sub-umbrellar side

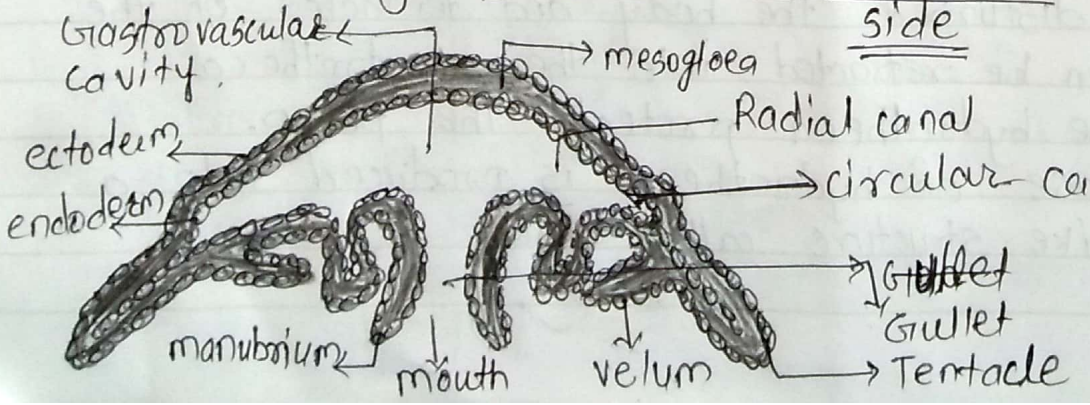

Fig. Medusa (vertical section)

Medusa

- The medusa is the sexual zooid of the obelia colony.
- It is formed from blastostyle by budding.
- A single blastostyle can produce several medusa.
- They fully formed medusae detach from the blastostyle and escape through gonopore.
- A medusa is in the form of a tiny umbrella floating in the water.
- It is about 7 mm in diameter.
- One side of the medusa is convex and is called ex-umbrella.
- The other side of medusa is concave and is called sub-umbrella.
- A small, short handle-like structur hangs from the centre of the sub-umbrella. This is called manubrium.
- The manubrium bears a four-sided opening called mouth at its free end.
- The mouth leads into a cavity called gullet present inside the manubrium.
- The gullet leads into a sac-like structure called stomach or gastrovascular cavity.
- The stomach leads into four canals called radial canals.
- The radial canals open into a circular canal present at the margin of the medusa.
- The margin of the umbrella bears numerous solid tentacles.
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- The edge of the umbrella is turned inwards as a fold called velum.
- The medusa has a well developed radial symmetry.
- The four radial canals represent the four radii called per-radii.
- The imaginary line bisecting the angle between any two per-radii is called inter-radius. The line bisecting the angle between a per-radius and an inter-radius is called an adradius.
- The body wall is diploblastic & formed of ectoderm, endoderm & the mesogloea. The mesogloea form a very thick layer in the medusa.
- It is carnivorous and it exhibits extracellular as well as intracellular digestion.
- The medusa has eight statocysts. They are located in the margin, one at the base of each adradial tentacle. Each statocyst has a large sac filled with fluid.
- statocysts are sensory organs and they maintain equilibrium and muscular co-ordination
- The medusa swims freely on the surface of water with manubrium hanging down. swimming is brought about by contraction of muscles. It also swims with the body tilted and the manubrium pointing upwards.
- Medusa is a sexual zooid containing gonads.
- Sexes are separate.
- Each medusa contains 4 gonads, testes or ovaries. The gonads are located on the radial canals. The gametes are released by the rupture of gonads.