

BASUDEV GODABARI DEGREE COLLEGE, KESAIBAHAL,  
DEPARTMENT OF ZOOLOGY  
SELF STUDY MODULE

MODULE DETAILS –

**.CLASS-1<sup>ST</sup> SEMESTER**

**.SUBJECTNAME- ZOOLOGY**

**.PAPER NAME-NON- CHORDATES 1-PROTISTA**

**TO PSEUDOCOELOMATES**

UNIT-2-- STRUCTURE-

CNIDARIA & CTENOPHORA

.POLYMORPHISM IN CNIDARIA

.GENERAL CHARACTER & EVOLUTIONARY SIGNIFICANCE OF CTENOPHORA

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- Occurrence in the same species of more than one type of individual, which differ in form and function is known as Polymorphism. Polymorphism denotes division of labor among the zooids of the individual.

- Polymorphism is one of the characteristic features of Coelenterate animals.
- In coelenterata or in hydrozoa which may be single or colonial, here occur two main types of individuals or zooids-Polyp and medusae.

- **ORIGIN OF POLYMORPHISM**

- There are many theories to explain the origin of polymorphism in coelenterates.



**Poly-organ theory:** This theory was proposed by Huxley (1859), Eschscholtz (1829), E. Metschnikoff (1874) and Muller (1871).

- According to this theory, a polymorphic colony is supposed to be a single medusoid zooid; its various components are regarded to be the modified organs of this medusoid zooid. The various parts of the zooid, i.e., manubrium, tentacles, umbrella, etc., multiply independently from one another and they have assumed different forms to perform different functions.
- **Poly-person theory:** This theory was first proposed by Leuckart (1851), Vogt (1848), Gegenbaur (1854), Kolliker (1853), Claus (1863) and later strongly

supported by E. Haeckel (1888), Balfour (1885) and Sedgewick (1888).

- According to this theory colony is not a single individual but various parts of the colony are modified individuals which have changed their structure due to division of labour. They have all modified from the primitive zoid which was a polyp.
- **Medusa theory:**
- This theory was proposed by Haeckel (1888) as a compromise between the above theories. The theory says that the siphonophores formed from gastrula was a medusoid individual, from which zooids

or persons appeared by budding from the subumbrella.

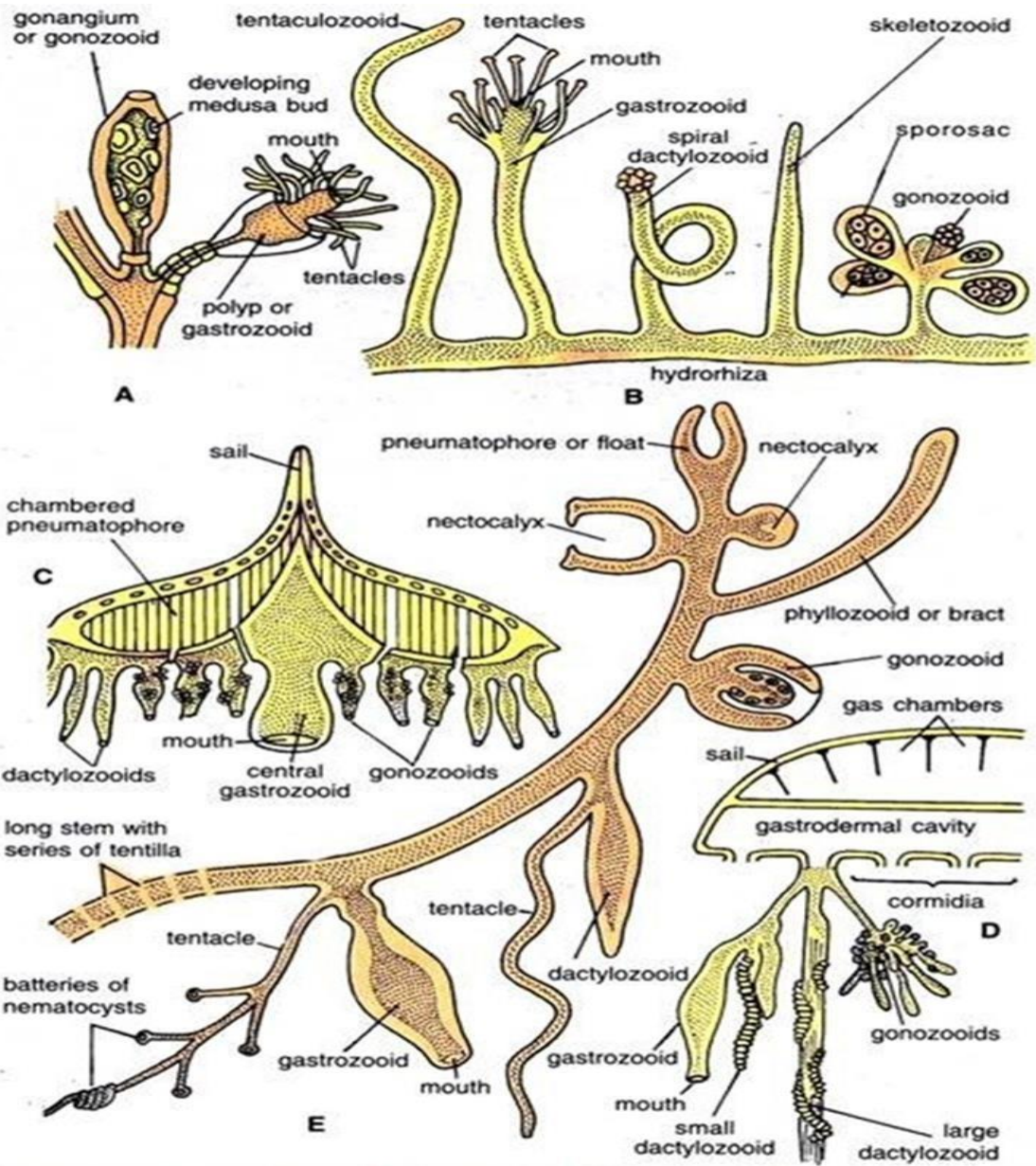


- **Polymorphism** (Gr., poly = many; morphe = form) is the occurrence of several different types of individuals or zooids in a single species during its life cycle or as members of the colony, the members perform different functions so that there is a division of labour amongst the members.

- Coelenterata are noted for their polymorphism, but the various types are reducible to either a polypoid or medusoid type. The polyp and medusa occur in a

number of morphological variations. However, polymorphism may be defined as the representation of a single organism by more than one kind of individuals or zooids which differ in their form and function.

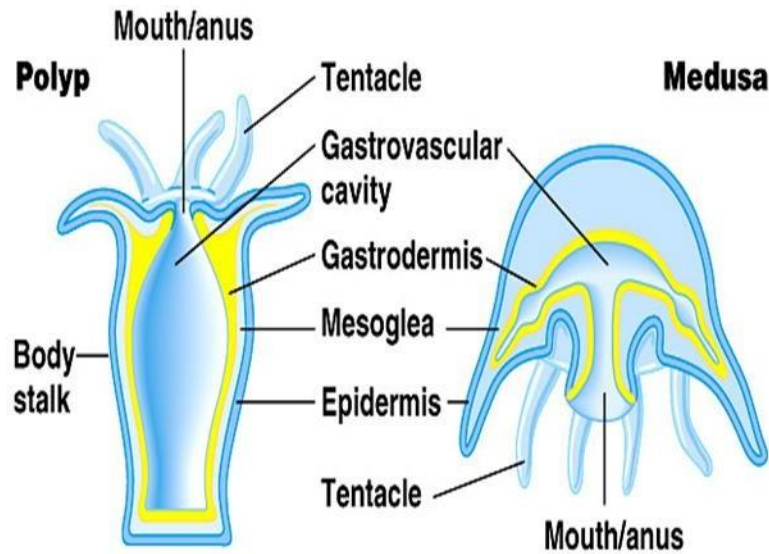
- **2. Trimorphic:** Besides gastrozooids and gonozooids they also possess a third type individuals the dactylozooids.



2.

Polymorphic colonies of Hydrozoa. A—*Obelia* ; B—*Hydractinia* ; C—*Verrucaria* ; D—*Physalia* showing a single cormidium; E—Generalised calycophora Siphonophora showing a single cormidium.





● (a) Sea anemone: a polyp

(b) Jelly: a medusa

**Polyp:** A

polyp has a tubular body with a mouth surrounded by tentacles at one end. Other end is blind and usually attached by a pedal disc to the substratum.

- **Medusa:** A medusae has a bowl or umbrella shaped body with marginal tentacles and centrally located mouth or manubrium.
- **Patterns of polymorphism:**
- Degree of polymorphism varies greatly in different groups of hydrozoas.
- **Dimorphic:** Simplest and commonest pattern of polymorphism is exhibited by many hydrozoan colonies like Obelia, Tubularia etc.,
  - They have two types of individuals or zooid namely:
- Gastrozooids or hydranths are connected for feeding

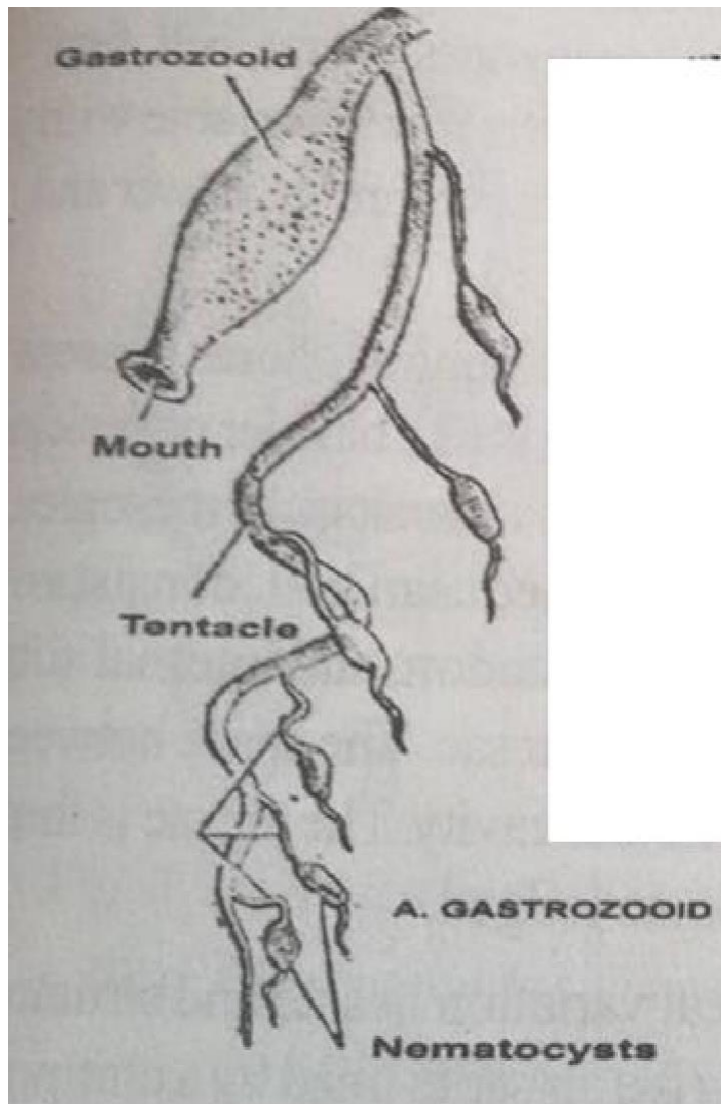
- Gonozooids or blastostyles with asexual budding forming sexual medusae or gonophores.
  - This phenomenon is termed as dimorphism.
- . Trimorphic: Besides gastrozooids and gonozooids they also possess a third type individuals the dactylozooids.
- 3. Polymorphic: Animals having more than three types of individuals are called polymorphic. some what greater degree of polymorphism is found in the encrusting colony of Hydractinia with five types of polyps each performing a specialized function.

- Gastrozooids - feeding
- Dactylozooids - protection.
- Tentaculozooids - Sensory cells
- Skeletozooids - Spiny projections of chitin
- Gonozooids - Reproductive individuals.

○ POLYPOID ZOOIDS ARE:

- Gastro zooids
- Dactylo zooids
- Gono zooids
- Gastrozooids:
- The nutritive polyps are called gastro-zooids.

- They alone take up nutrition in the colony.
- A mouth is present at the tip of the hypostome. Near the base of a gastrozoid usually a single, long and contractile tentacle arises. It shows batteries of nematocysts. Lateral branches are present called tentilla.
- Gastrozooids catch the prey and digest it. The digested food is thrown into the coenosarcial canal.



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- In Pennatula the gastrozooids modified in to nectocalyx which are like buds on the body and helps in driving the water.
  - In Renella nectocalyx are in bunches some times called as pseudonectocalyx.

- In *Millipora* many gastropores protrude out from the polyp. Each polyp with 4-6 tentacles and cnidoblast buds.

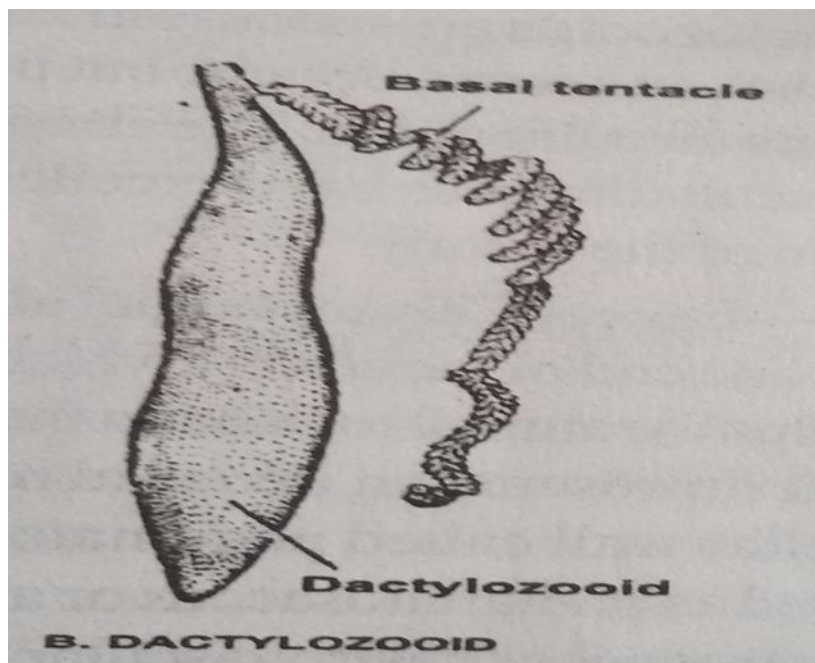


- **Millipore**

- **Dactylo zooids:**

- They are called Palpons, feelers or tasters.
- They resemble the gastrozooids.
- They do not show mouth. Their basal tentacle is un branched.
- In *Physalia*, the tentacle is very long.

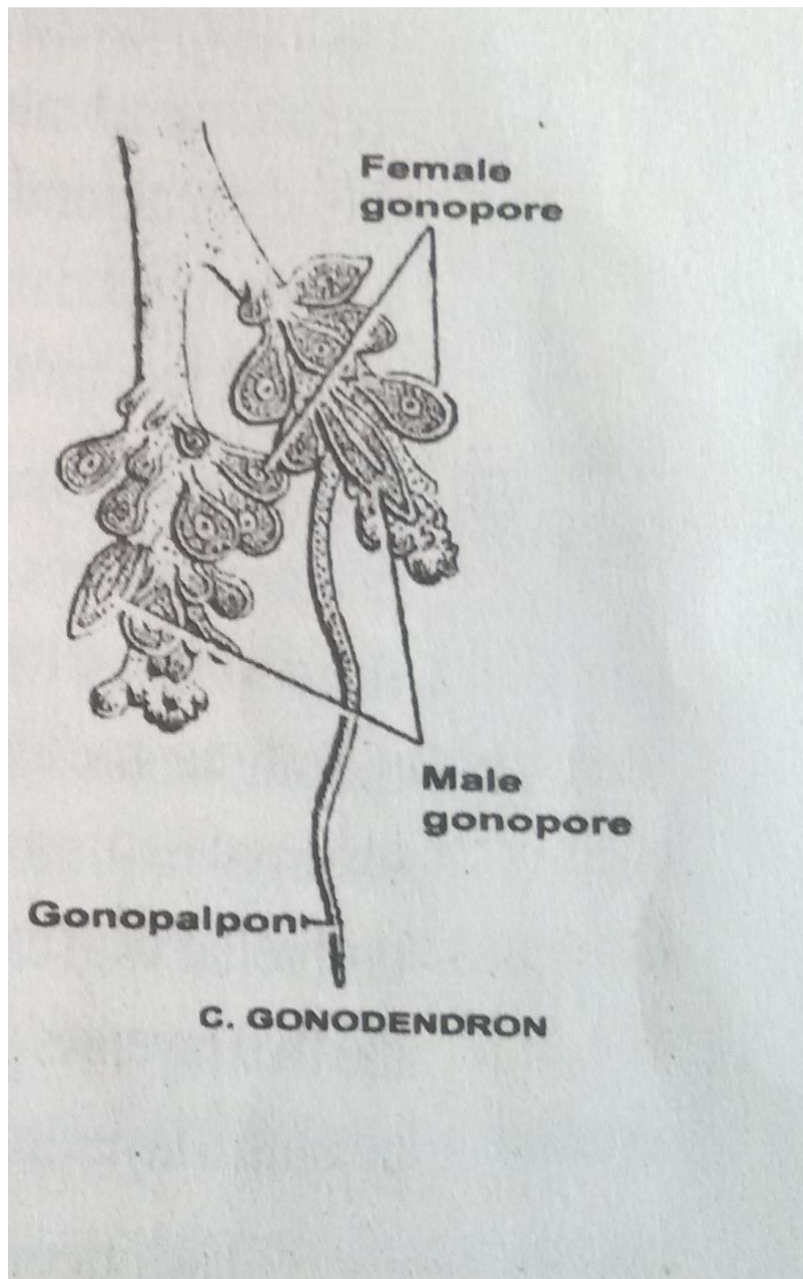
- In velella and Porpita the margin of the colony bears long and hollow tentacles.
- These zooids are protective in function.
- They bear batteries of nematocysts.



- **Gonozooids:**
- The reproductive zooids
- They have no mouth.



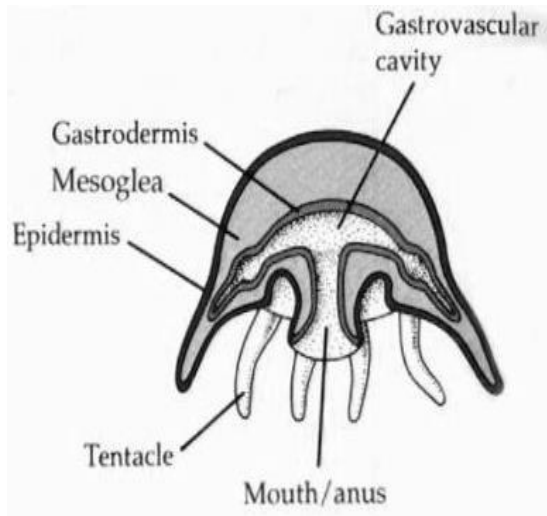
- In Physalia the gonozooid shows branched stalk, bearing clusters of gonophores (gonopalpon).
- Gonozooids produce medusae called gonophores.
- In Porpita and Velella dactylozooids are treated as gonodactylozooids.



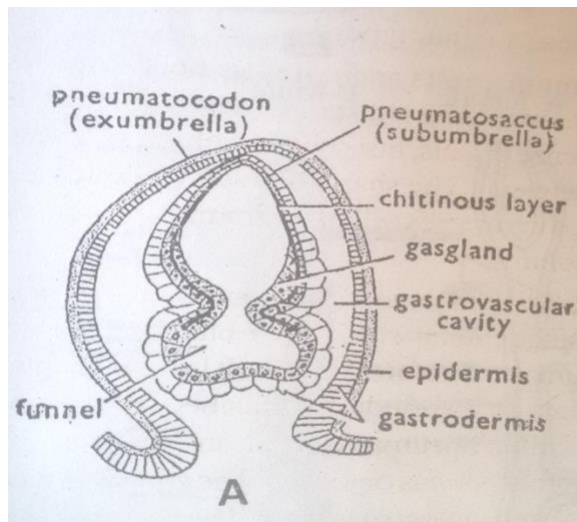
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- **MEDUSOID FORMS:**
- Pneumatophores:
- Nectopore or Nectocalyx or swimming zooid:

- Bracts:
  - Gonophores:
  - **Pneumatophores:** It functions as a float. It is an inverted medusan bell. The walls are two layered and highly muscular. The epidermal lining becomes glandular to form a gas gland. The gas gland secretes gas into the air-sac.
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- 1)The pneumatophore is small in Halistemma.
  - 2)The pneumatophore is very large in Physalia.

- 3) It is disc-shaped in porpita.



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- In Agalma the air sac is lined by a chitinous layer secreted by the Epidermis which is also forms a funnel shaped tricher or funnel. The epidermis forme two layers and the gas gland secretes the gas.



- . **Nectopore or Nectocalyx or swimming zooid:** Nectocalyces or nectophores are bell-shaped medusoids with a velum, radial canals and circular canal, they have no mouth, manubrium, tentacles or sense organs, A nectocalyx is muscular and brings about locomotion of the colony by swimming. It is also referred to as nectophore or nectozooid.



- **Nectocalyx**
- **3.Bracts:** They are also known as hydrophyllia. They are leaf like, helmet shaped.
- They serve to cover and protect other zooids of the colony.



- **fig-Bract**

- **Gonophores:** Bearing gonads, male gonads produce sperm and female gonad produce ova

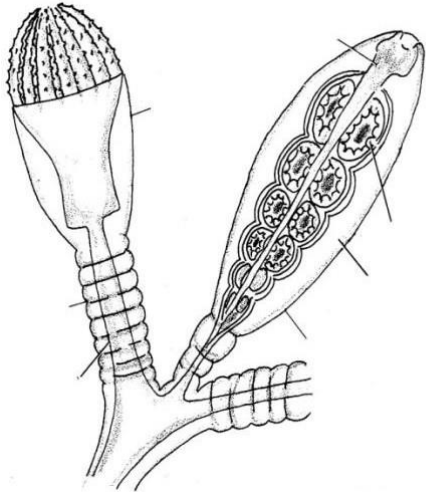
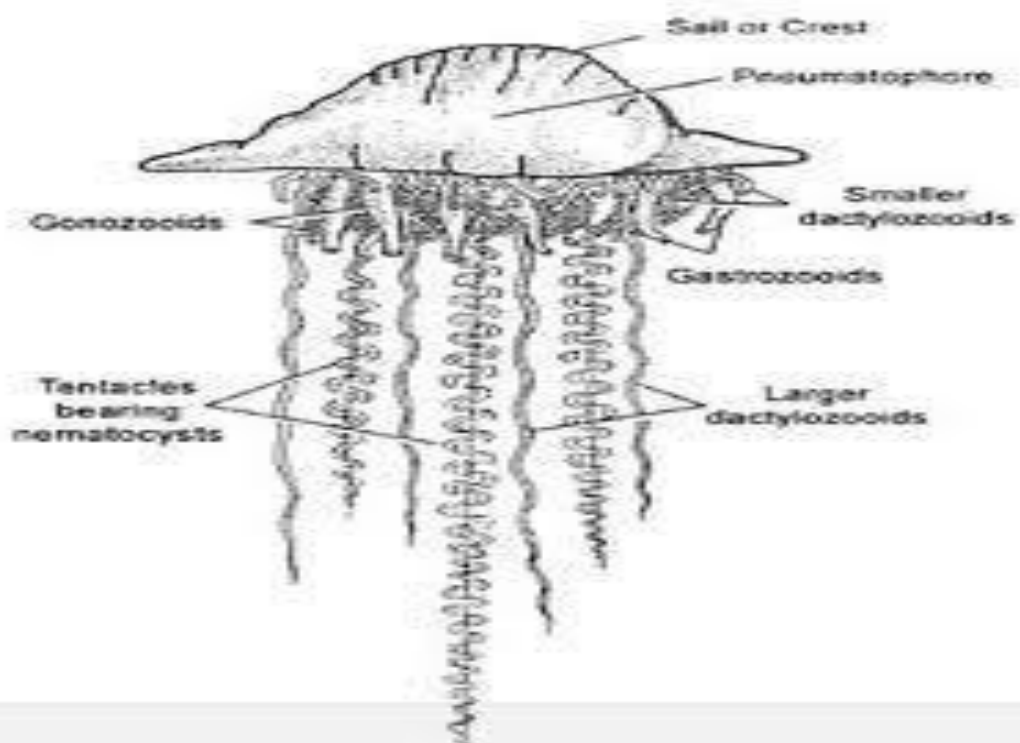
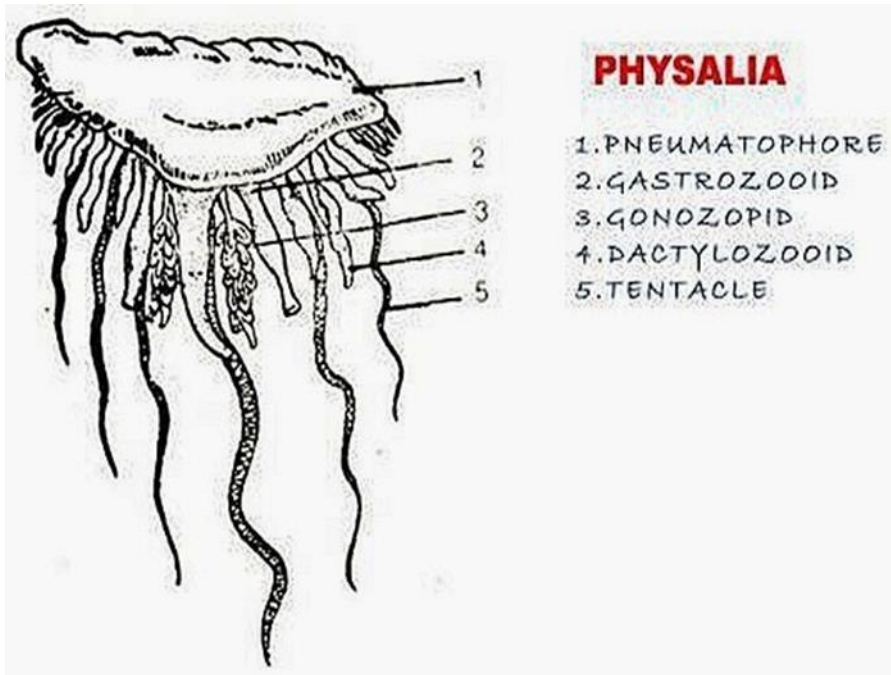


Fig-Gonophore

- **Notable polymorphic colonies:**
- Hydrozoans exhibit remarked development of Polymorphism. Some of them are Physalia, Halistemma, Porpita
- Physalia: Is commonly called as Portuguese man of war. This is a free floating pelagic colonial form.

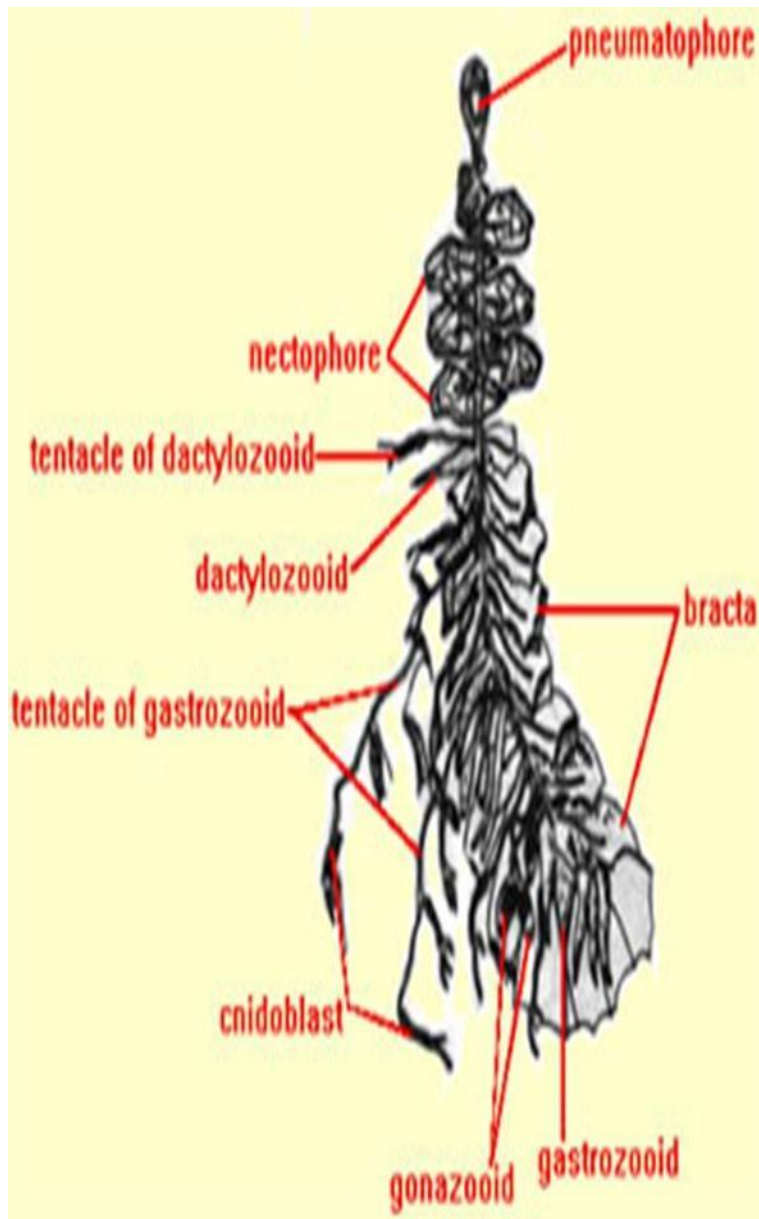
- The medusa is modified into a big pneumatophore or float which floats above the water. The underside of the float has cormidia. Each cormidium consists of a small dactyl zooid with a long slender tentacle, a large dactylozooid with an enormous nematocyst bearing fishing tentacles.
- A branched gonozooid with male and female gonophores is present.





- Halistemma: This is a floating form with long, thin peduncle

- (with nodes) having different zooid. Pneumatophore is at first anterior end of peduncle and helps the animal float on the surface of the water. The bottom of the float has asymmetric medusa, which are called nectocalyces which help in locomotion.
- Each nectocalyces is with nodes and bell shaped. Manubrium is absent.



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- **Porpita:** It has medusoid disc like large pneumatophore and chitinous shell with many concentric gas chambers. On the ventral-central region is a single large gastrozoid which is surrounded by

clusters of small gonozooids which bear sexual medusae. On the edge of its tentacle like dactylozooids armed with nematocysts.

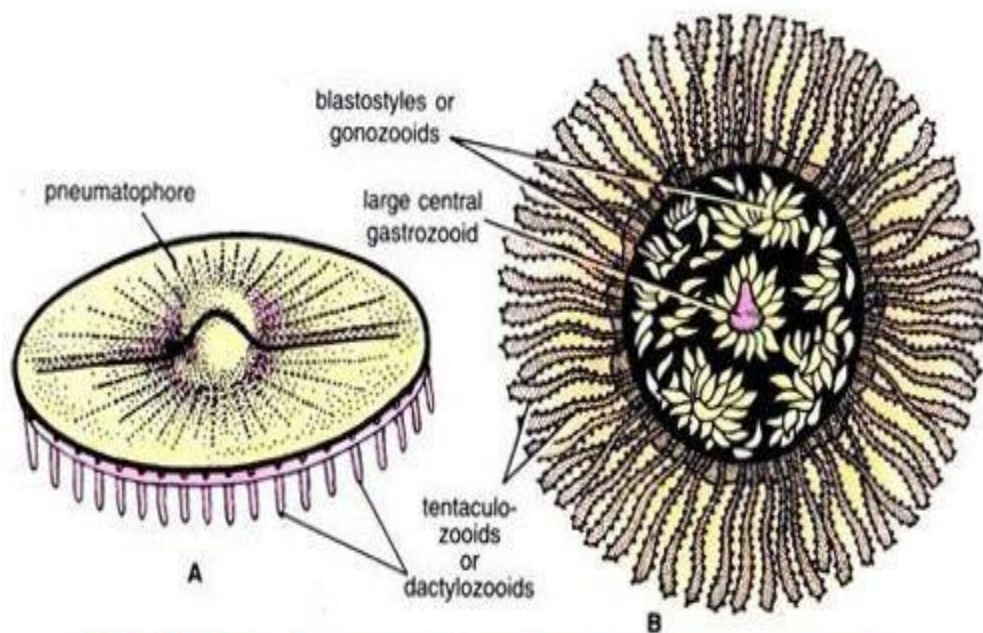
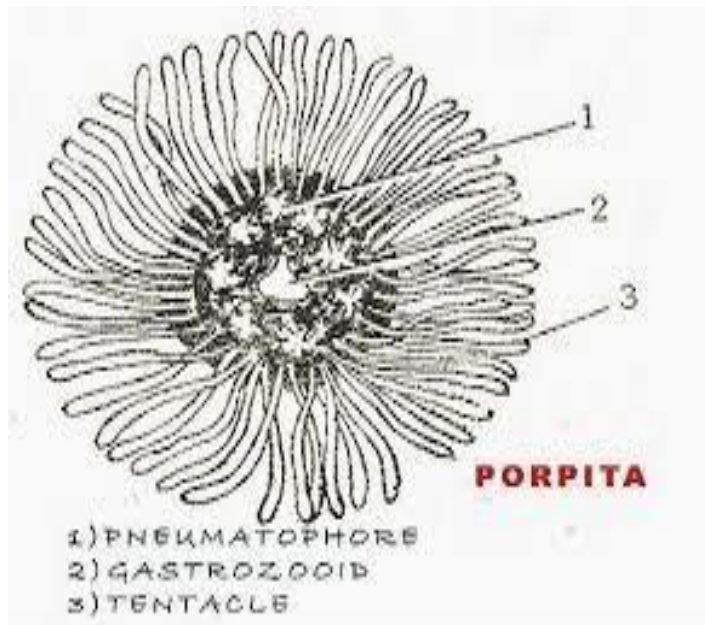


Fig. 35.6. *Porpita*. A—Colony in dorsal view; B—Colony in ventral view.

- **SIGNIFICANCE OF POLYMORPHISM:**
- The phenomenon of polymorphism is essentially one of division of labour in which specific functions are assigned to different individuals. Thus, polyps are modified for feeding, protection and asexual reproduction, while medusae are concerned with sexual reproduction. This distribution of functions among diversified individuals and their subsequent modifications in coelenterates may have resulted from their initial simple organization and lack of organ specialization. Polymorphism gave the colonies competitive edge in protection

and food gathering and eventual survival.  
polymorphism: colonies of some species  
have morphologically differing  
individuals each specialized for certain  
roles e.g. feeding, reproduction & defense  
etc.

THANK YOU.