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Dr. R. K. Dawale
Associate Professor,
Department of Zoology,
D. B. F. Dayanand College of Arts and Science, Solapur
rkdawale@dayanandsolapur.org

ZOOLOGY	PAPER No.: I (Animal Diversity- I)
	MODULE No. 1 (Polymorphism in Hydrozoa)

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1. Learning Outcomes:

In this module,

- You shall learn about the information regarding the concept of Polymorphism in Hydrozoa.
- You shall learn about morphology, classification of members of phylum Cnidaria.
- You shall learn about habit and habitat, types Polymorphism in different members of coelenterates.
- You can see how the Cnidarians shows polygon theory.

2. INTRODUCTION:

The phenomenon of polymorphism is mainly seen in the class Hydrozoa. Coelenterates have two basic zooids, polyp and medusa. All other types of zooids are modifications of these two types of zooids. Coelenterates are known for their polymorphism and various types of polypoid and medusoid forms are seen in them.

The occurrence of more than one type of structurally and functionally different individuals within a population is called polymorphism. It is one of the characteristic features of coelenterate, the class Hydrozoan of phylum Coelenterate includes a large number of colonial species that contain more than one form of individuals which are called zooids. The phenomenon of polymorphism is mainly seen in the class Hydrozoan. Coelenterates have two basic zooids, polyp and medusa. All other types of zooids are modifications of these two types of zooids. Polymorphism: The phenomenon of occurrence of an individual in two or more distinct morphological and functional forms.

Meaning of polymorphism: Occurrence in the same species of more than one type of individuals, which differ in form and function, is known as polymorphism (Gr., Polyps- many or several + Morpheform). This ensures an efficient division of lab or between the several individuals.

Polymorphism may be defined as the “phenomenon of existence of different physiological and morphological forms represented by an extensive range of variation within a single species”.

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

3. Polymorphic form in Coelenterate:

Coelenterates are known for their polymorphism and various types of polypoid and medusoid forms are seen in them. Both these polyp and medusa occur in a morphological variation. Some of the polypoid zooids are

1. Gastrozooids

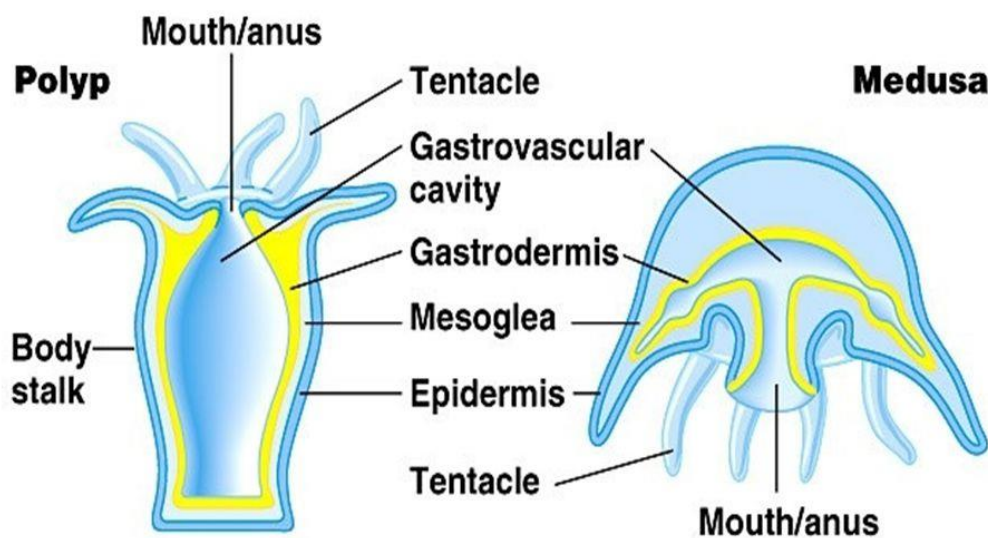
2. Dactylozooids

3. Gonozooids

Some medusoid forms are

1. Pneumatophores
2. Nectophore
3. Bracts
4. Gonophore

Polymorphism in Cnidaria



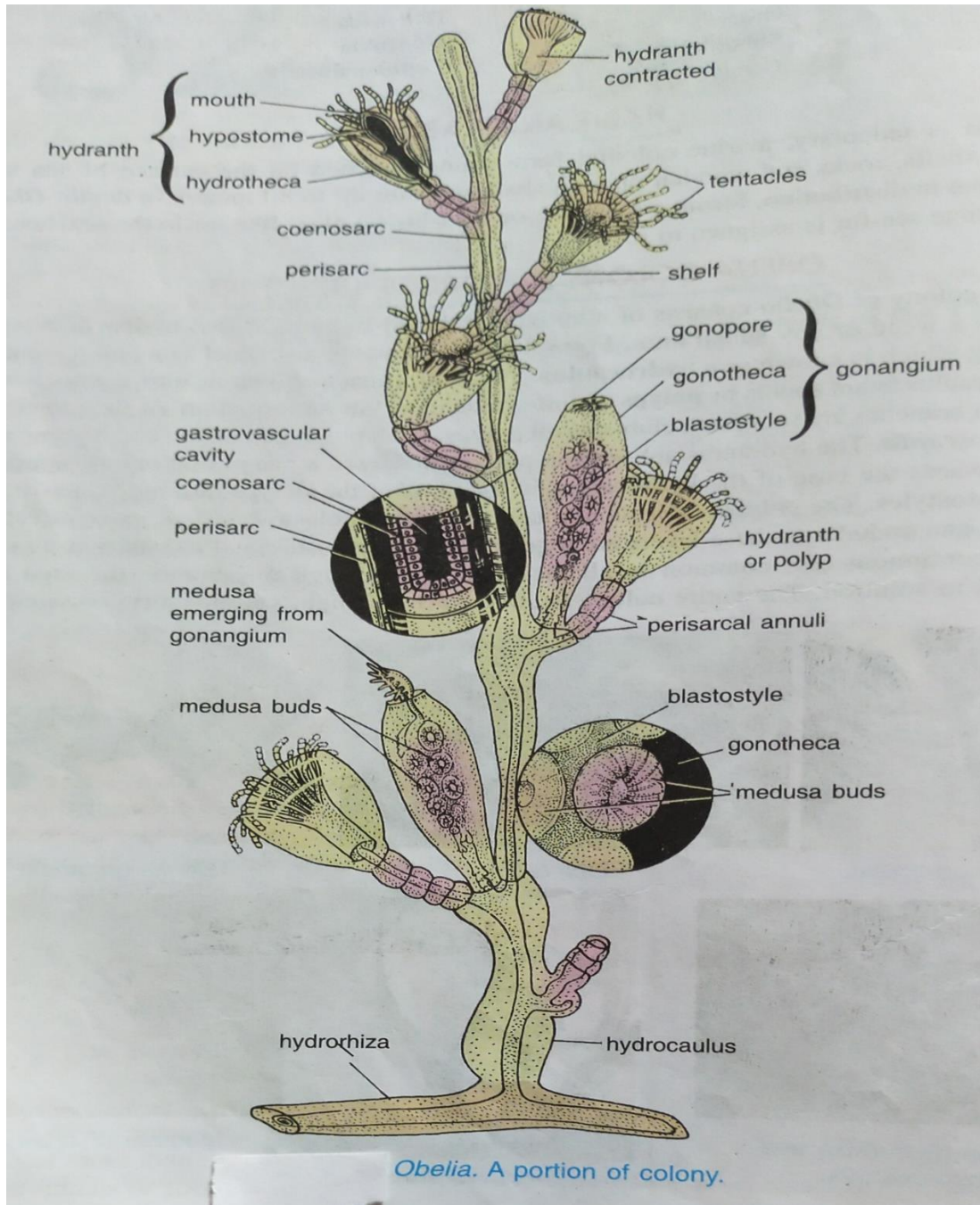
Coelenterates which may be single or colonial, they exist in two forms- polyps and medusa

1. Polyp:

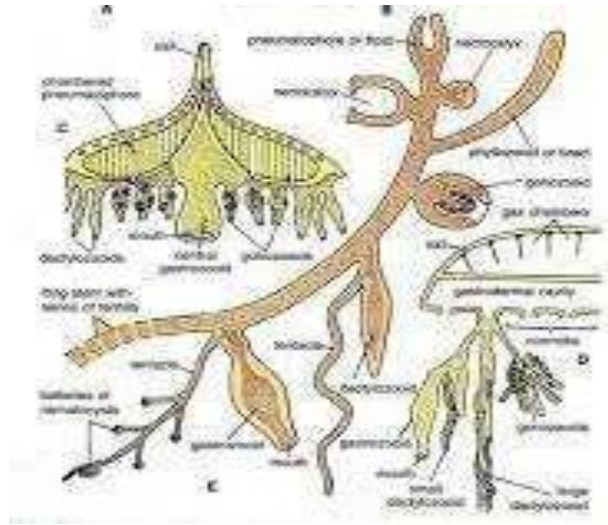
- In Hydrozoa, polyps have a tubular body with a mouth surrounded by tentacles at one end. Another end is blind and usually attached to pedal disc to the substratum.
- Polyps are generally sessile
- They reproduce asexually

2. Medusa:

- In Hydrozoa, medusa has a bowl or umbrella shaped body with marginal tentacles and mouth centrally located on a projection called manubrium of the lower concave surface.
- Medusas are generally motile
- They reproduce sexually



4. Patterns of polymorphism in Hydrozoa:



Degree of polymorphism varies greatly in different group of Hydrozoa.

1. Dimorphic:

- It is simplest and commonest pattern of polymorphism
- They have only two types of zooids (gastrozooids and gonozooids) and the phenomenon is known as dimorphism.
- Gastrozooids are concerned with feeding.
- Gonozooids related to reproduction.
- Exhibits by many Hydrozoan colonies.
- Examples: Obelia, Tubularia

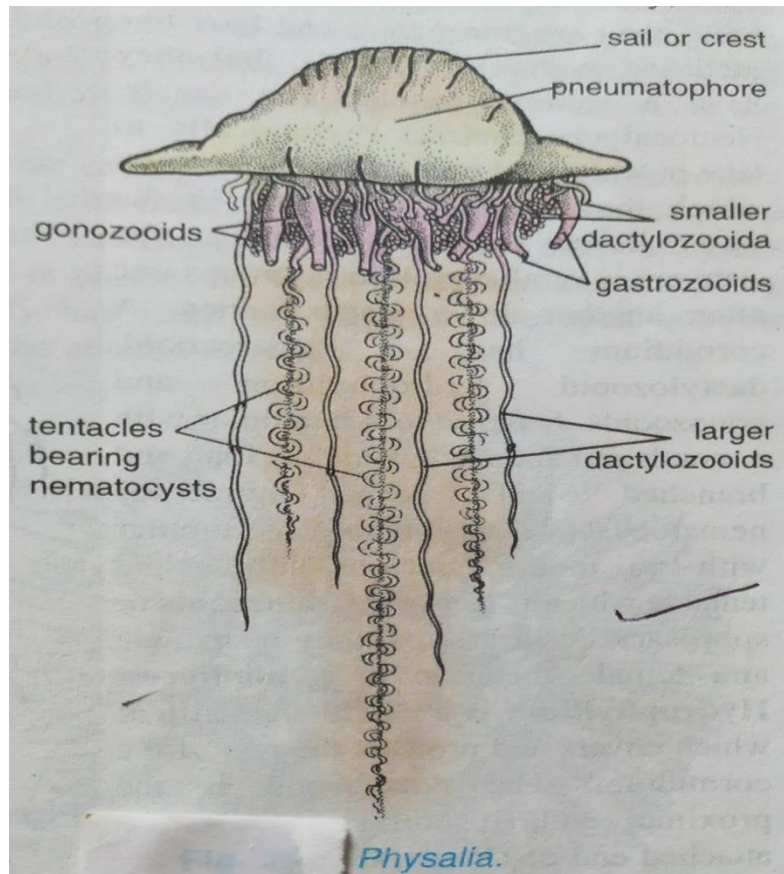
2. Trimorphic:

- They have three types of zooids- gastrozooids, gonozooids and dactylozooids.
- Gastrozooids is responsible for feeding and asexual reproduction
- Similarly, gonozooids is responsible for sexual reproduction
- Dactylzooids is functionally non-feeding form and is responsible for defence.

3. Polymorphic:

- Some coelenterate has more than three forms called polymorphism
- In Hydractinian, five polymorphic form or zooids exists- gastrozooids, spiral dactylzooids, tentaculozooids, skeletozooids and gonozooids.
- Gastrozooids: responsible for feeding
- Spiral dactylzooids: responsible for protection
- Tentaculozooids: responsible for sensory impulse

- Skeletozooids: responsible for spiny projections
- Gonozooids: responsible for sexual reproduction
- Hydrozoan exhibit remarkable development of polymorphism. Some of them are Physalia, Helistemma, Porpita.



5. ORIGIN OF POLYMORPHISM:

- There are many theories to explain the origin of polymorphism in coelenterates.
- **Polyorgan theory:** This theory was proposed by Huxley (1859), Eschscholtz (1829), E. Metschnikoff (1874) and Muller (1871), according to which individuals of a colony are actually organs of a medusoid individual, which have multiplied and migrated from their primitive positions to the current evolved positions.
- **Polyperson 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 zooid which was a polyp.

- **Medusoid theory:** This theory was proposed by Haeckel (1888) as a compromise between the above theories. The theory says that the siphonophore larva formed from gastrula was a medusoid individual, from which zooids or persons appeared by budding from the subumbrella.

6. 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.

7. Summary:

Polymorphism is a phenomenon of division of labour which different functions to different individuals of the polymorphic form, rather than to the parts or organs of one individual or zooid. All members of the colony whether polyploids or medusoid are formed from the coenosarc. In hydra, polyp produces both sexually and asexually this condition is also seen in Anthozoa. Life cycle remains very simple that is it may be represented as – polyp-egg-polyp. In cases of polyps reproduce asexually to give rise to medusoid form (gonophores) which reproduces sexually to form polyp. Thus, life cycle becomes complicated and may be represented as polyp-medusa-egg-planula-polyp. Therefore, also called alternation of generations.

Video: <https://drive.google.com/file/d/1QXSMP70jf0vSJpOozjK8nqGWQHCxhacP/view?usp=sharing>

Assignment: [https://docs.google.com/forms/d/e/1FAIpQLSd-WvVkdPJyWBUxt2k8YmKwnAqqu1Bkm5xnKBfhCiKLUycAA/viewform?usp=sf link](https://docs.google.com/forms/d/e/1FAIpQLSd-WvVkdPJyWBUxt2k8YmKwnAqqu1Bkm5xnKBfhCiKLUycAA/viewform?usp=sf_link)

Know more:

Suggested readings, web links:

1. E.I. Jordan & P.S. Verma (2009): Invertebrates Zoology
2. Dhami Dhami: Text book of Invertebrates Zoology
3. R.L.Kotpal : Invertebrates Zoology
4. S.N.Prasad : Text book of Non chordates Zoology
5. <https://www.onlinebiologynotes.com/polymorphism-in-coelenterata/>

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