

## **Cnidaria = Coelenterata**

### **General attribute:**

1. Radial symmetry.
2. Diploblast (two germ layers during development ectoderm and endoderm).
3. Adult body with an outer cellular layer (epidermis or ectodermis) and an inner cellular layer (gastrodermis) with a non-cellular – layer (Mesoglea = Jelly) like material in between.
4. Some specialized tissues present.
5. Possess unique stinging or adhesive structures (Cnidae).
6. Simple nerve net forms a nervous system.
7. In the Cnidarian groups that have alternation of generations. There are two forms, polyp and medusa, which alternate successively where the polyp reproduce asexually to form a large number of medusa, each medusa reproduce sexually by the union of eggs and sperms to form zygote. The zygote grows into larva, which fix itself to a substrate and finally form a new polyp.

**Note:** Polyp and medusa are two life cycle stages of the Cnidaria phylum, alternating in some species, while other Cnidaria species exist as either polyp or medusa, Polyp are sessile which present as tubular shape while medusa are mobile have a bell shape

### **Classification of Cnidaria**

#### **Phylum: Cnidaria**

1. Class: Hydrozoa ..... *Hydra*
  - Most are marine a few are freshwater.
  - Individuals usually small and inconspicuous.
  - Polyp is dominant stage, some completely lack medusa.
  - Medusa when present has velum around margin.
  - Most are colonial – small plant like appearance.
  - Most have polymorphism with alternation generation.

2. Class: Scyphozoa .....*Aurellia*
  - Most of larger Jellyfish belong to this group.
  - Medusa without velum, cells in Mesoglea.
  - All of them are marine.
  - Polyp stage reduced or completely absent.
  - thick jelly layer (Mesoglea).
3. Class: Anthozoa .....*Favia*
  - Flower animals, all are marine.
  - Polyp only, no medusa stage.
  - Many cells in mesoglea.
  - Some are solitary, most are colonial.
  - Most secret skeleton of calcium carbonate or protein.

### ***Hydra***

Phylum: Coelenterata

Class: Hydrozoa

Order: Hydroida

Family: Anthomedusae

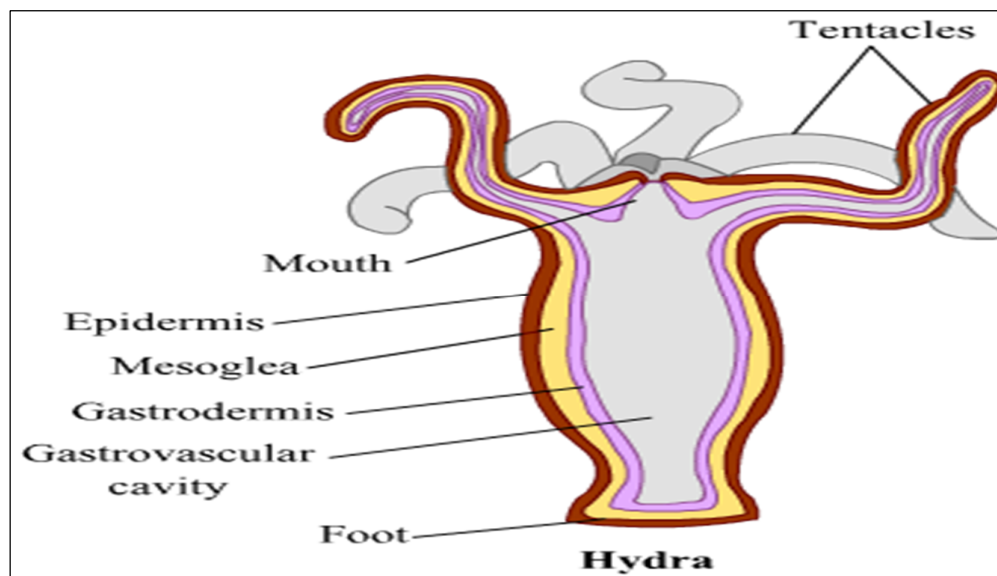
Genus: *Hydra*

#### **General characteristic of *Hydra***

1. Small multicellular, has tubular body up to 10 mm.
2. Radial symmetry.
3. They can found in most unpolluted freshwater ponds, lakes and streams in the temperature and tropical regions.
4. Contain in foot region basal disc, gland cells in the basal disc secret a sticky fluid that accounts for its adhesive properties.
5. Mouth found in free end of the body surrounded by (1-12) thin mobile tentacles, each tentacle or Cnida (plural Cnidae) clothed with highly

specialized stinging cells (Cnidocytes) contain specialized structures called (Nematocytes).

6. The nervous system of *Hydra* is a nerve net which is structurally simple compared to mammalian nervous system, and there are sensitive nerve cells located in the body wall and tentacles.
7. Respiratory and Excretion occur by diffusion everywhere through the epidermis.
8. *Hydra* undergoes morphallaxis (tissue regeneration) when injured or served.



### **Motion in *Hydra***

1. looping

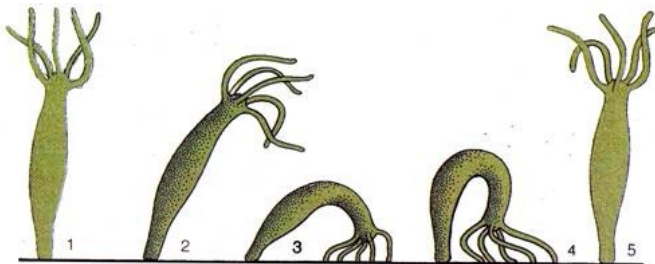


Fig. 31.15. *Hydra* showing looping movements.

2. Somersaulting

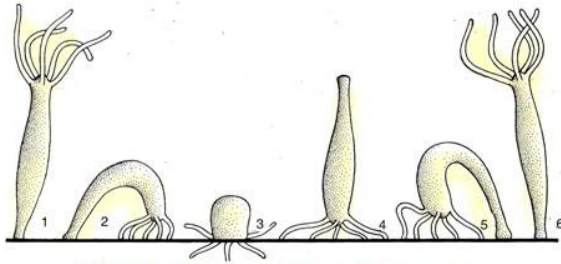


Fig. 31.16. Hydra showing somersaulting movements.

3. Gliding

4. Cuttlefish – like movement

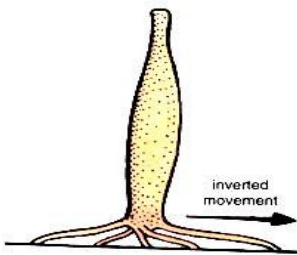


Fig. 31.17. Hydra showing cuttle-fish-like movements.

5. Floating

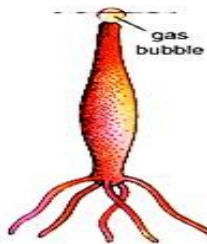


Fig. 31.18. Hydra showing floating.

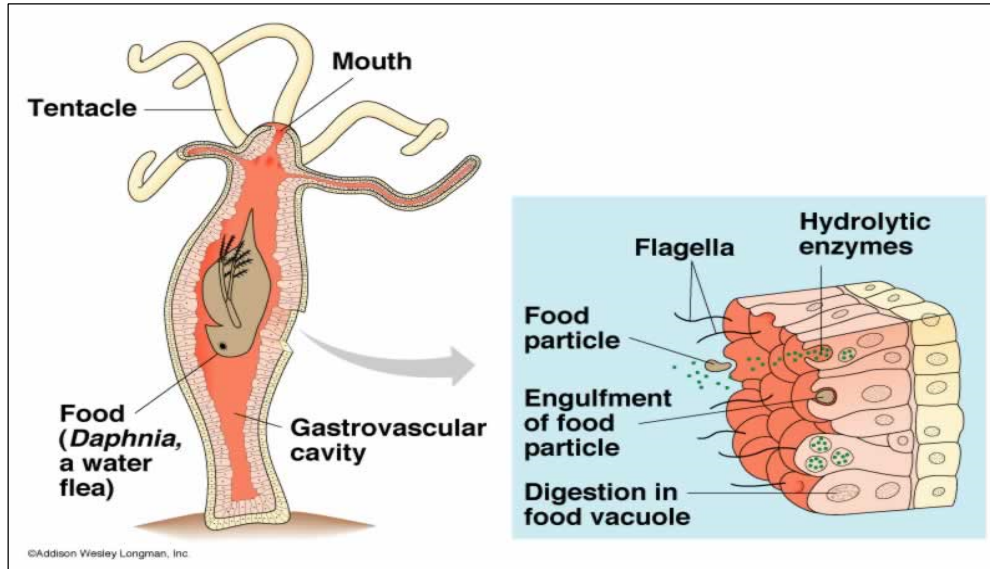
6. Measuring worm

7. Swimming

8. Climbing

## Feeding of *Hydra*:

*Hydra* mainly feed on small aquatic invertebrates such as *Daphnia* and *Cyclops*. When feeding, *Hydra* extend their tentacles, despite their simple construction the tentacles of *Hydra* are extra ordinarily extensible and can be four to five times the length of the body, within two minute, the tentacles will have surrounded the prey and moved it into the opened mouth aperture. then, the prey will have been enclosed within the body cavity and digestion will have started *Hydra* is able to stretch its body wall considerably in order to digest prey more than twice its size. After that the remains of the prey will be discharged by contraction through the mouth aperture.

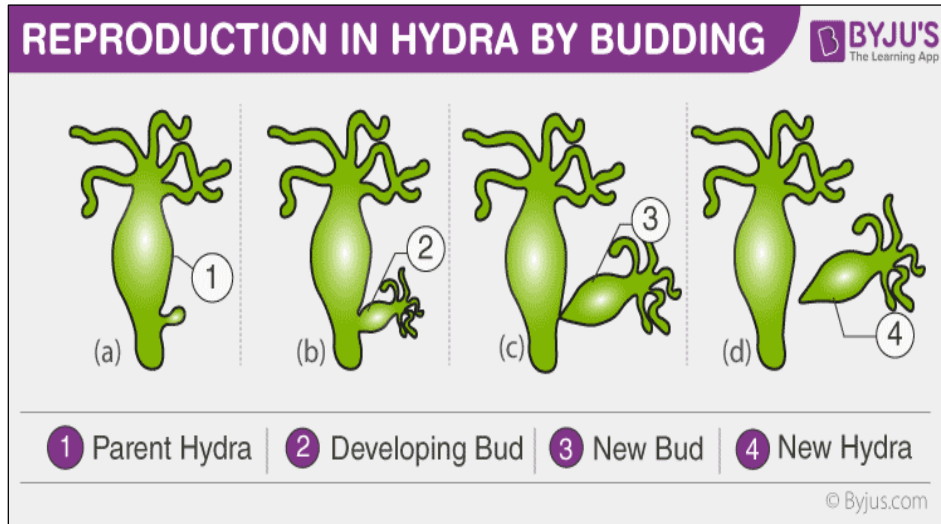


## Reproduction of *Hydra*

When food plentiful and conditions good, *Hydra* produce asexually by producing buds in the body wall, new bud can form every two days. When conditions are harsh, often before winter or in poor feeding conditions, sexual reproduction occurs in some *Hydra* swellings in the body wall develop into either a simple ovary or testes.

The testes release free swimming gametes into the water and these can fertilize the egg in the ovary of another individual. The fertilized eggs secrete a

tough outer coating and fall to the bottom of the lake or pond to a wait better conditions.



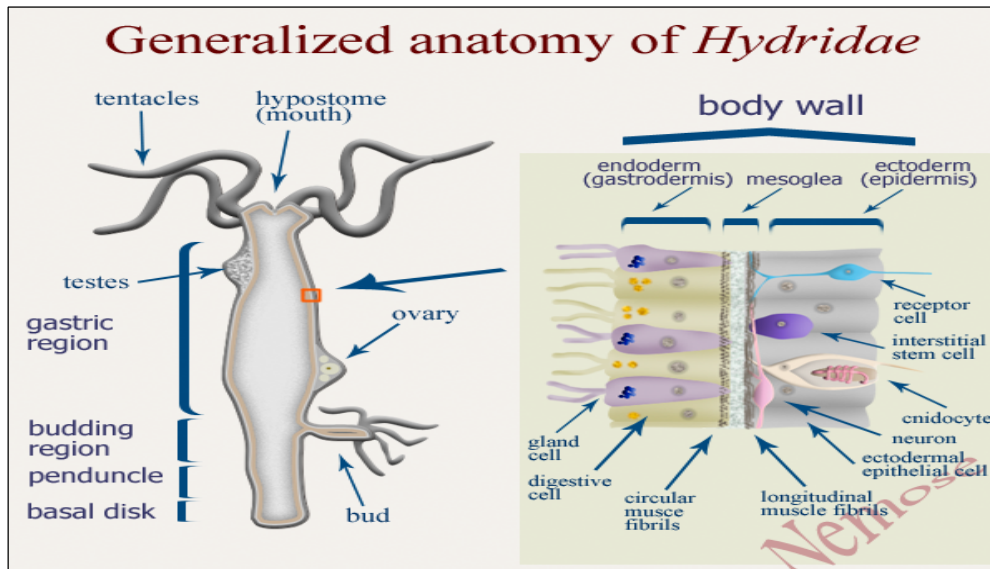
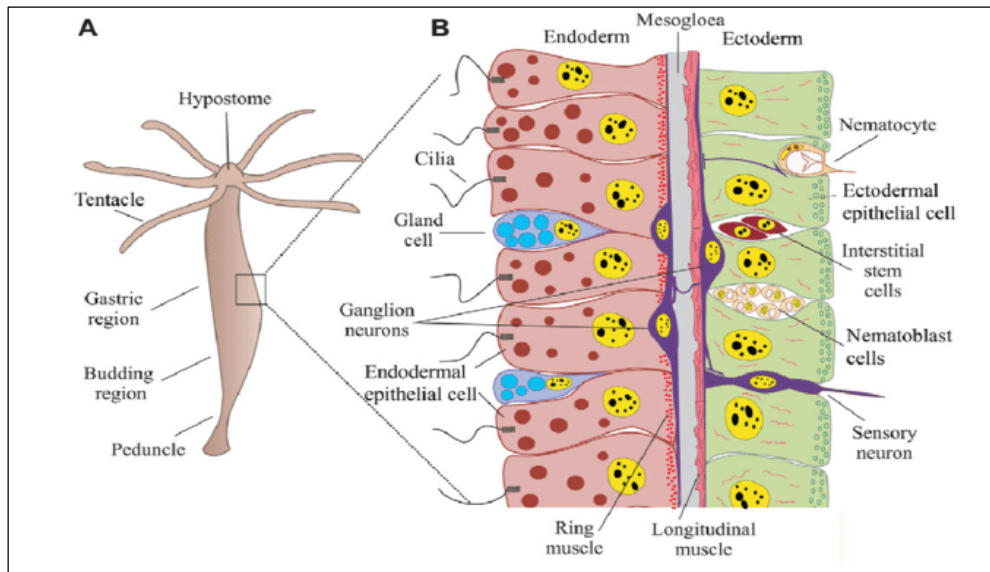
### **Types of cells in *Hydra*:**

#### **A. Epidermis layer**

1. Epithelio – muscular cells.
2. Sensory cells.
3. Nerve cells.
4. Interstitial cells.
5. Cnidocytes.
6. Germ cells.
7. Gland cells.

#### **B. Endodermis layer (Gastrodermis layer)**

1. Epithelio – muscular cells (Digestive cells).
2. Interstitial cells.
3. Sensory cells.
4. Nerve cells.
5. Gland cells.



## Cnidocyte

The cnidocyte is a rounded or oval-shaped cell. The nucleus of the cnidocyte is conspicuous. It lies on the basal side of the cell. A pyriform sac, which is filled with a toxin known as **hypnotoxin**, is present inside the cnidocyte. The hypnotoxin is a mixture of proteins and phenols. The outer end of the sac is invaginated into a tubular filament coiled inside the sac itself. The base of the tubular filament is swollen to form a butt. The butt carries three spines known as barbs. The lid that covers the sac is known as **operculum**. The discharge of the tubular filament is triggered by a hair-like process called **cnidocil**.

The restraining thread known as lasso and the contractile muscle fibrils at the base of the cnidocyte prevent the throwing out of the nematocyst from the cell.

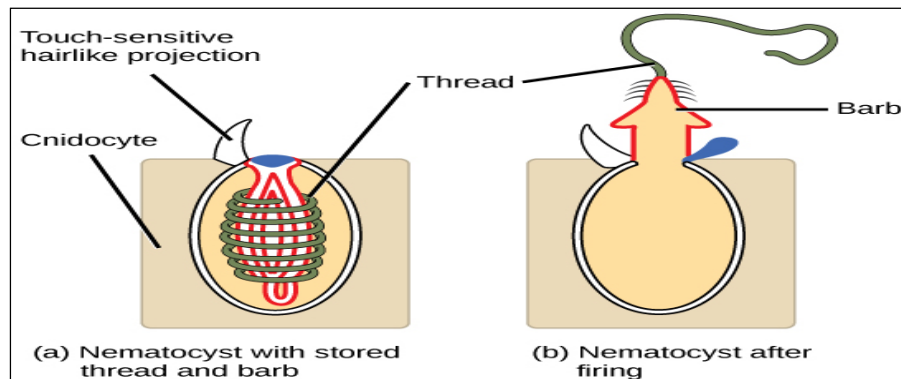
### Types of Cnidae

Over 30 types of Cnidae are found in different Cnidarians, they can be divided into following groups:

1. Penetrant: a harpoon – like structure used to penetrate, referred to as Nematocysts.
2. Glutinant: a sticky surface used to stick to prey, referred to as Ptychocysts and found on burrowing (tube) anemones, which help create the tube in which the animal lives.
3. Volvent: a lasso – like string that is fired at prey and wraps around a cellular projection on the prey, referred to as Spirocysts.

### Note:

Depending on species one or several types can appear simultaneously on the organism.



### Difference Between Cnidocyte and Nematocyst:

**Cnidocyte:** Cnidocyte refers to a specialized cell, containing cnidocyst, which is involved in capturing the prey in cnidarians.

**Nematocyst:** Nematocyst refers to an organelle inside the cnidocyte, consisting of an ejectable thread that causes a sting.