

Phylum *Cnidaria* (*Coelenterata*)



The "simplest" of the complex animals . . .

Types of *Cnidarians*



*Sea
Anemone*



Sea Coral



Jellyfish



Hydras

Simple Facts - Simple Creatures

- The term "Coelenterata" signifies the presence of a single internal cavity or a hollow gut called coelenteron, or gastrovascular cavity, combining functions of both digestive and body cavities.
- The term "Cnidaria" indicates the presence of stinging cells (*Gr.*, *knide* = nittle or stinging cells)
- Coelenterates are multicellular organisms
- They have tissue-grade of organization
- The body is radially symmetrical. Radial symmetry is the symmetry of a wheel
- All the members of this phylum are aquatic
- They are solitary or colonial
- The body wall is diploblastic. It is made up of two layers of cells, namely the ectoderm and the endoderm w

Two types of individuals occur in the life cycle. They are polyps and medusa

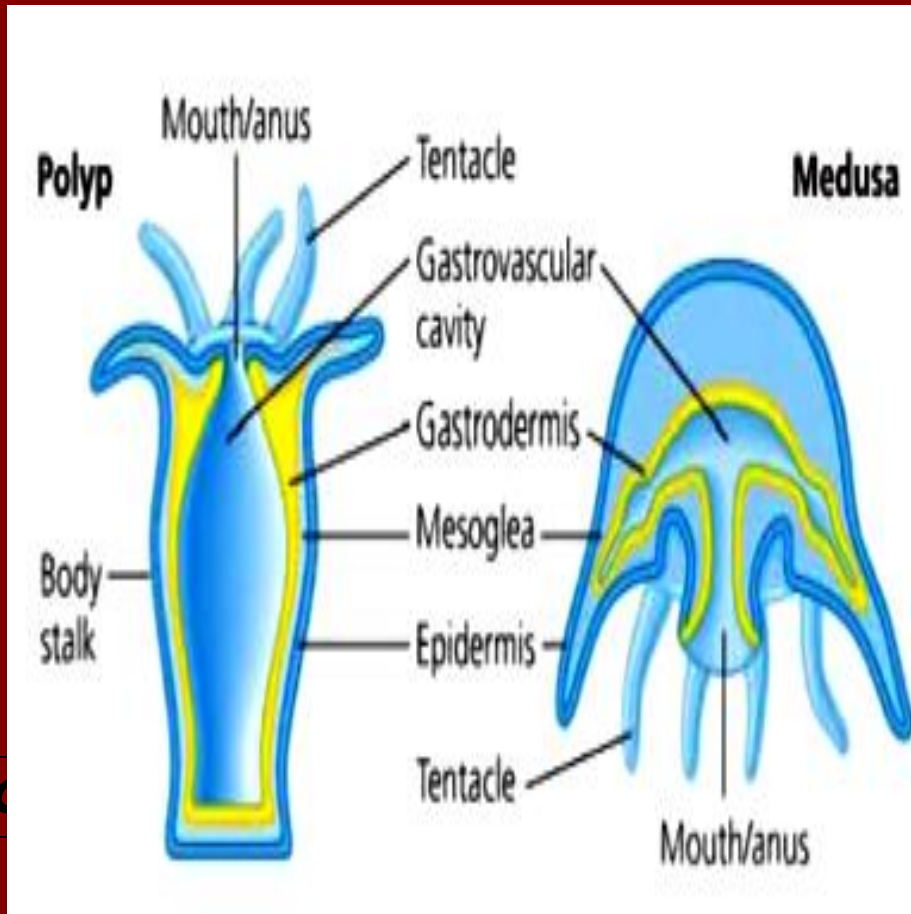
- Two general body forms exhibited

- POLYP

- » Sessile
- » Cylindrical body
- » Ring of tentacles on oral surface

- MEDUSA

- » Flattened, mouth-down version of polyp
- » Free-swimming



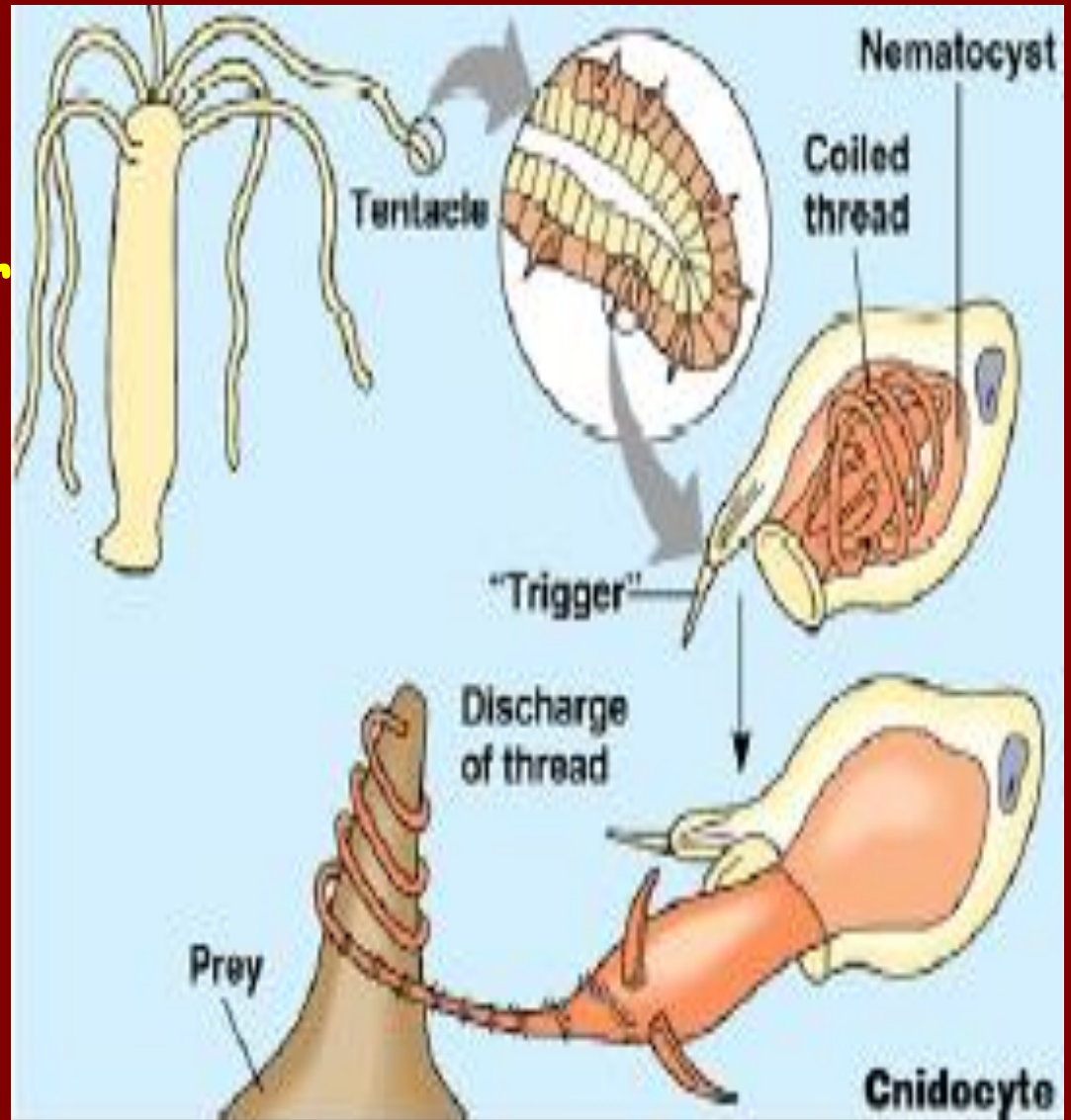
Med

Simple Facts - Simple Creatures

- Nematocysts or stinging cells are present
- Coelom is absent. Hence coelenterates are acoelomate animals
- A gastrovascular cavity or coelenteron is present. It can be compared to the gut of higher animals.
- Mouth is present; but anus is absent
- All cnidarians are carnivores
- Tentacles capture and push food into mouth
- Tentacles are armed with stinging cells
- ***Cnidoblasts / cnidocytes*** : Contain stinging capsules called *nematocysts*. They are, microscopic stinging structures that are present in the tentacles. Their primary use is to capture and paralyze prey such as fishes and marine animals.

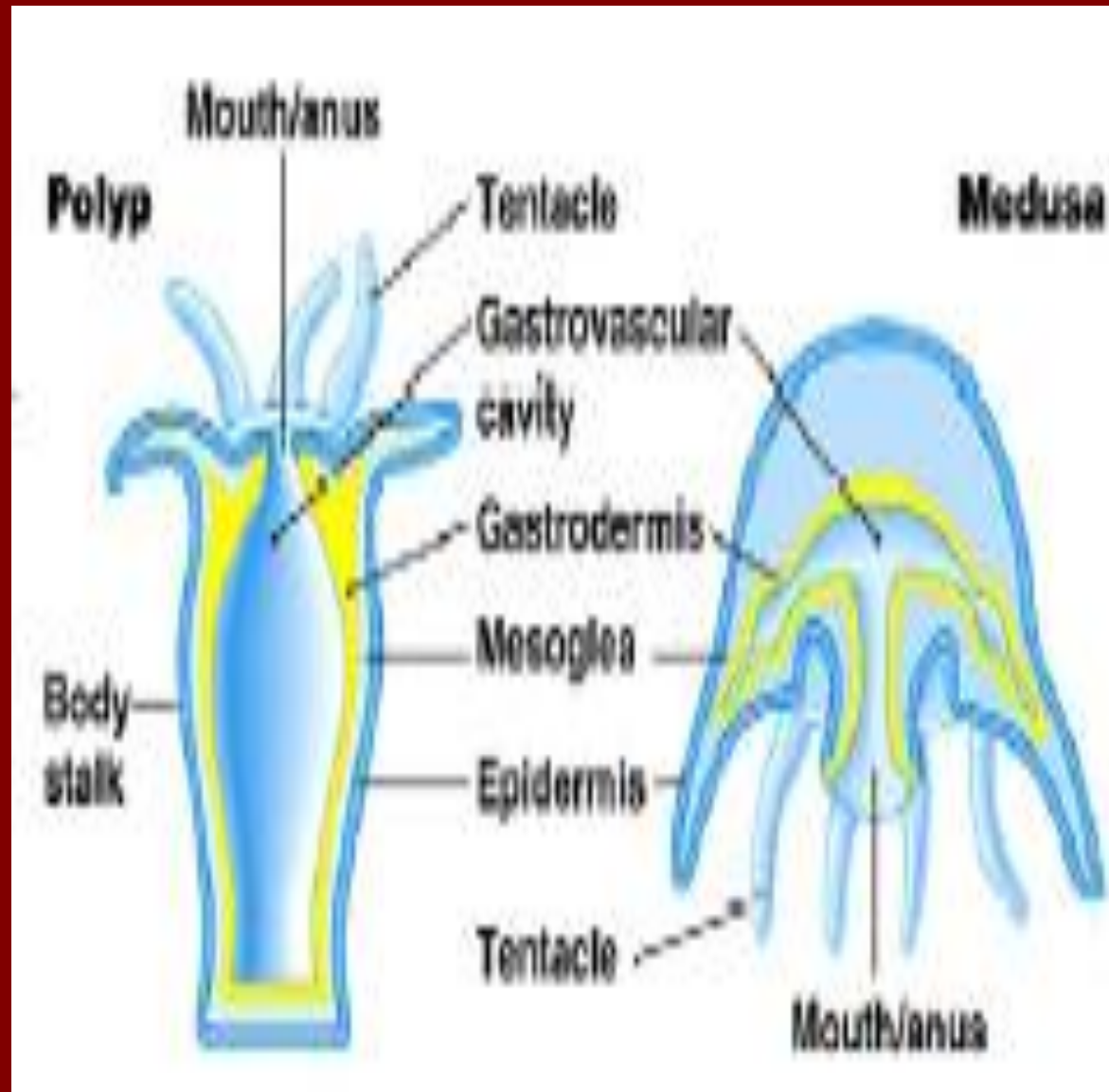
How does the stinging cell work??

- The tentacle is stimulated
 - Pressure on "trigger"
- Nematocyst is discharged
 - Thread uncoils
 - Entangles prey
- Some species produce toxins
 - Injects toxin into prey, paralyzing it!



Body Structure

- Basic body plan of ALL cnidarians
 - Sac with a central digestive compartment (*GVC*)
 - Single opening serving as both mouth and anus
 - Ring of tentacles on oral surface



Classification of Phylum Cnidaria/Coelenterata

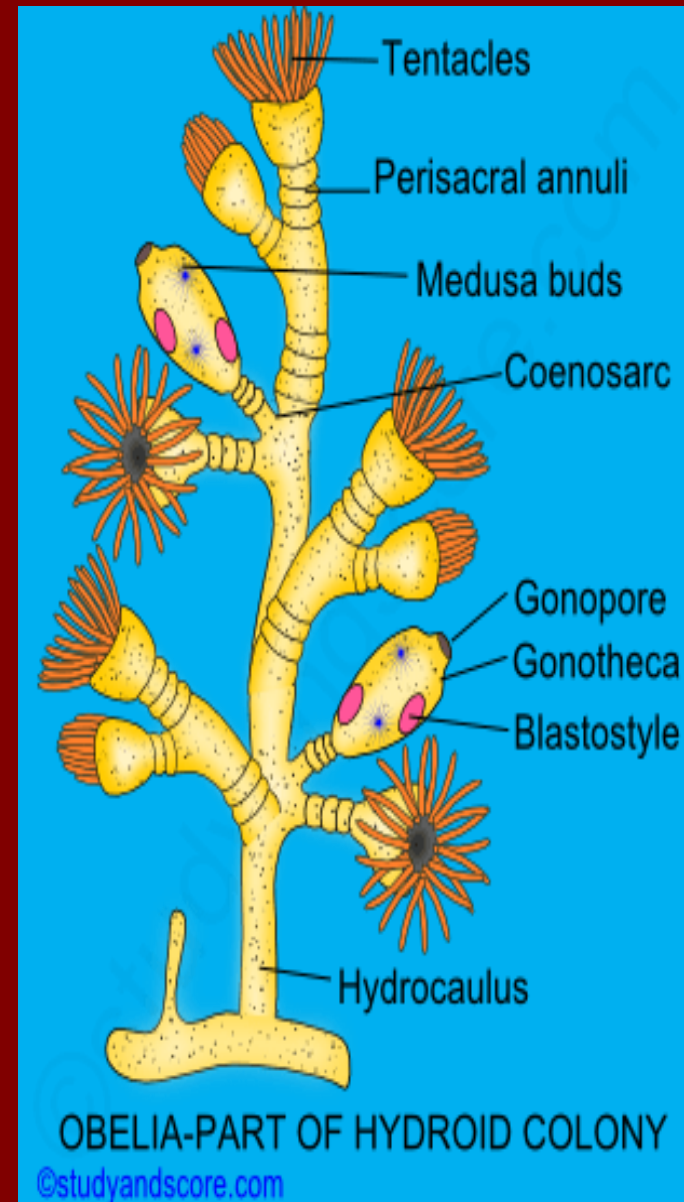
- The phylum coelenterate is divided into three classes on the basis of development of zooids: (A zooid or zoöid is a single animal that is part of a colonial animal)

Class1: Hydrozoa

- (Hydra; water; zoon: animal)
- Habitat: mostly marine, few are fresh water
- Habit: some are solitary and some are colonial
- Asexual Polyps is dominant form
- Medusa possess true velum
- Mesogloea is simple and acellular
- Examples: *Hydra*, *Obelia*, *Physalia physalis* (portuguese man of war), *Tubularia*

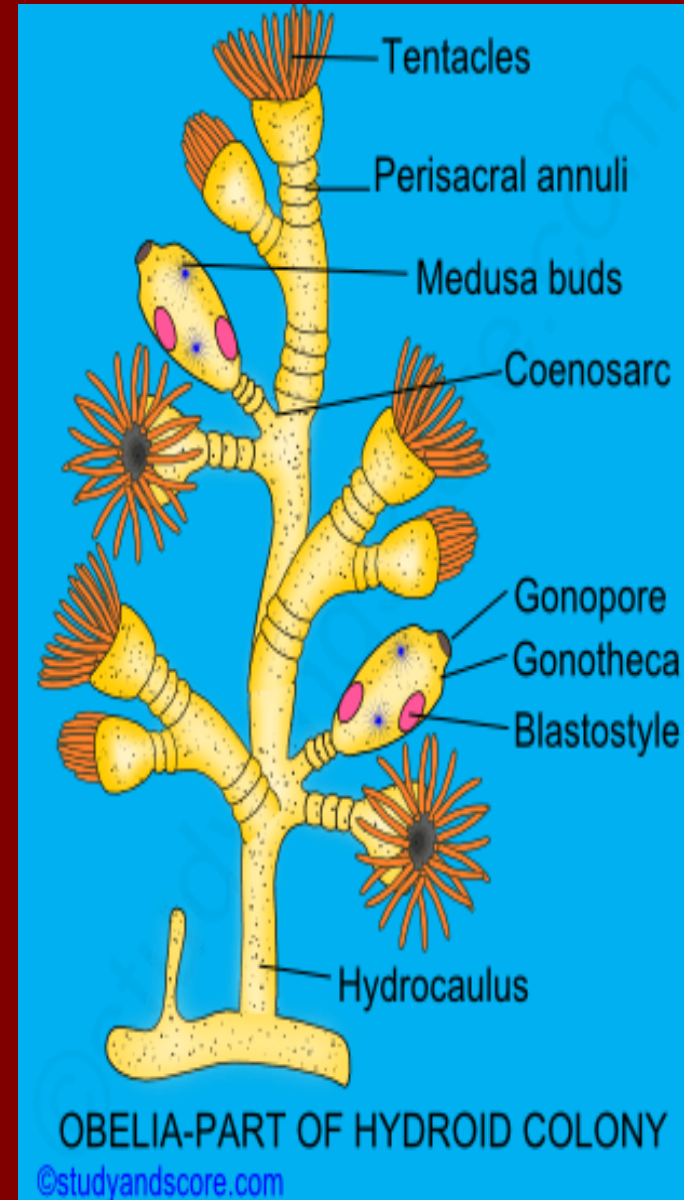
Obelia

- Genus of hydrozoa with a colonial form
- Commonly known as 'sea fur' - forming a whitish or light brown plant like fur in the sea
- Obelia is sedentary, marine colonial form found attached on the surface of sea weeds, molluscan shells, rocks and wooden piles in shallow water up to 80 metres in depth
- Life history shows alternation of generations and development through planula larva.



Obelia

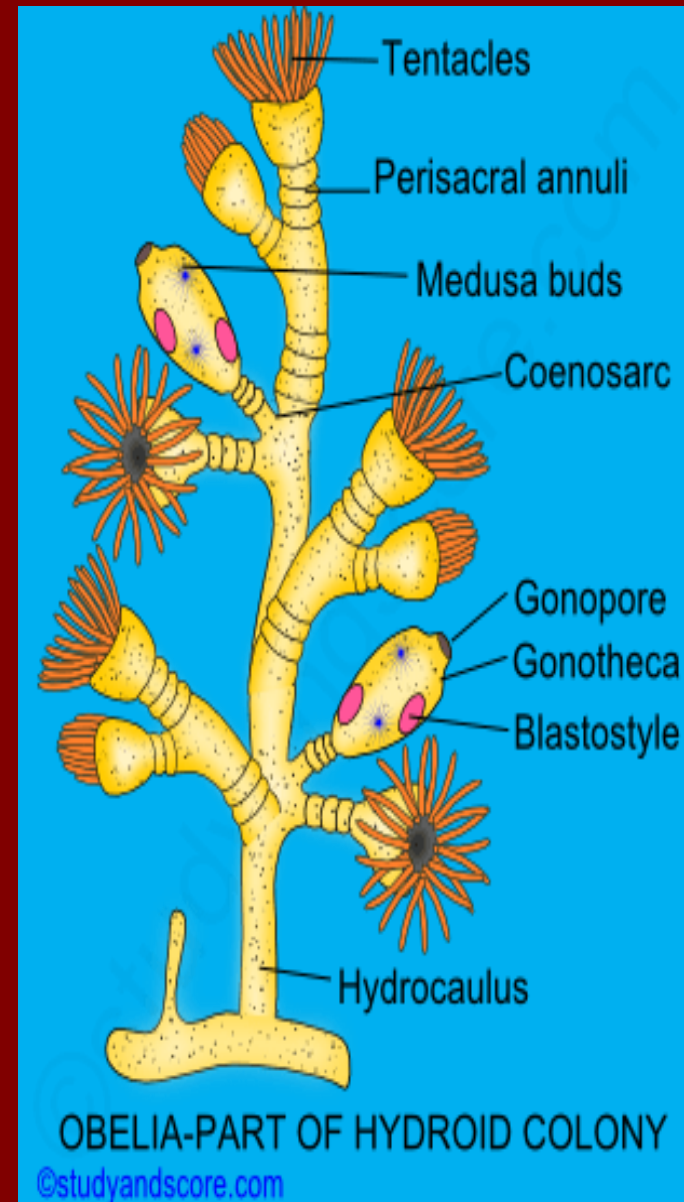
- Each colony of Obelia consists of a horizontal thread-like root called hydrorhiza which is attached to a weed or any substratum. From hydrorhiza arises a vertical branching stem about 2.5 cm long which is known as a hydrocaulus. The hydrorhiza and hydrocaulus are hollow tubes of hydrozoa with a colonial form
- The hydrocaulus bears zooids or polyps on either side in a cymose formation. At the growing ends of the main branches are immature club-shaped polyps. Each polyp has a stem and a terminal head called a



Obelia

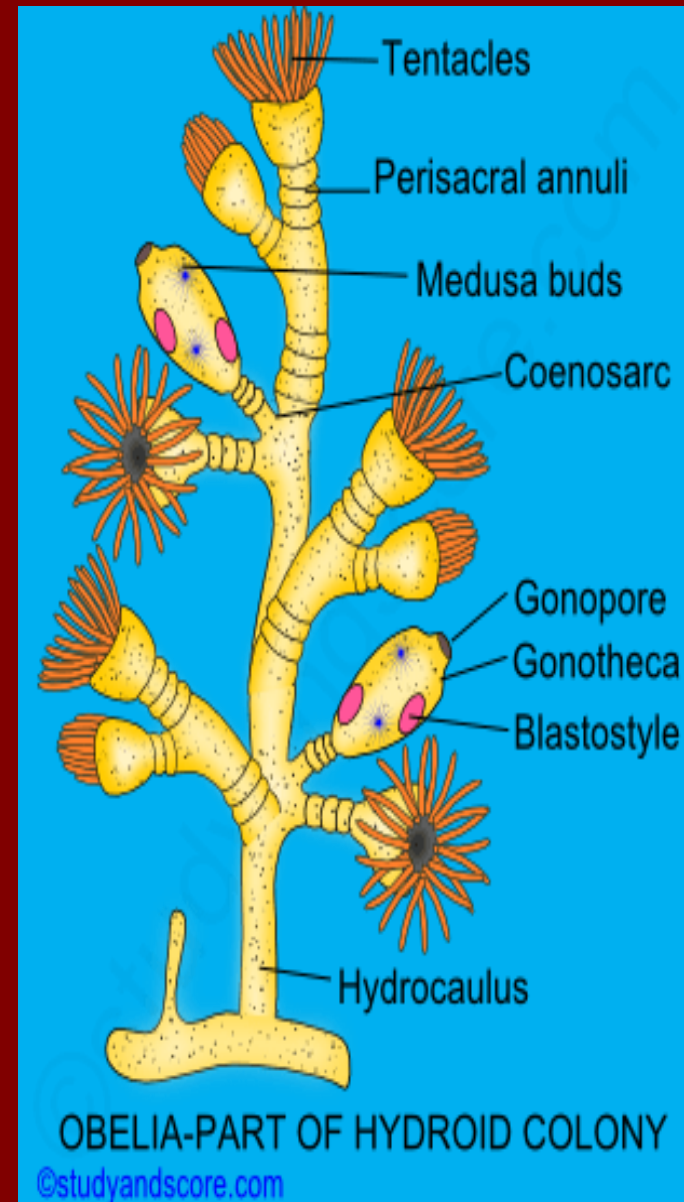
hydranth. The hydranths are feeding polyps, they feed by capturing minute animals and larvae.

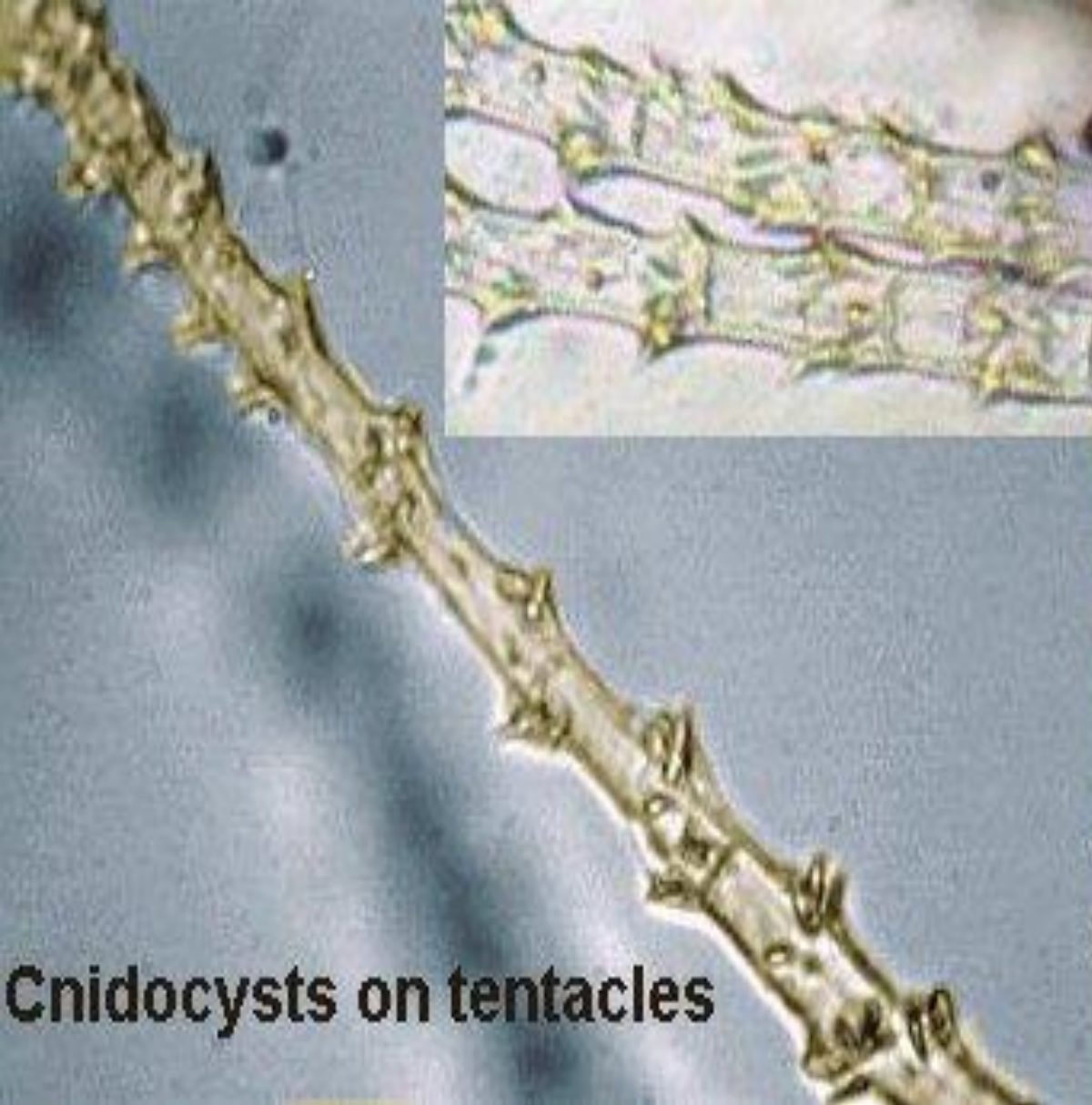
- Each branch bears three types of zooids - the polyp, the medusae and the blastostyles, thus making it polymorphic.
- The polyp has a vase-like or bell-like body enclosed in a cup-like hydrotheca. At its distal end lies distinct a raised area - the hypostome with an apical mouth surrounded with tentacles. It is the organ of feeding.



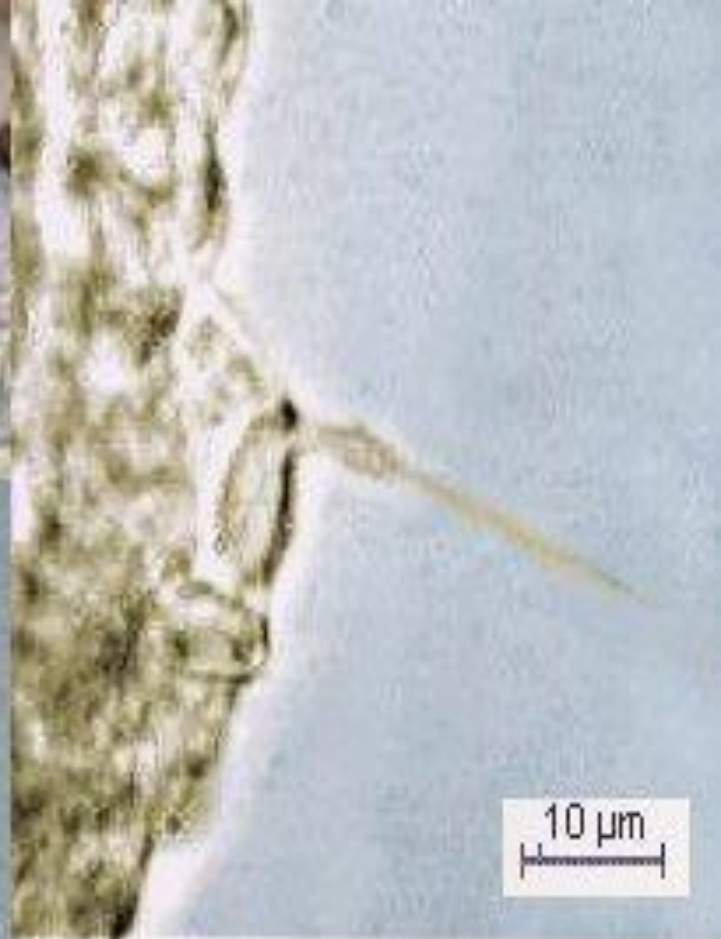
Obelia

- The medusae are saucer-shaped zooids and are produced in blastostyles.
- The blastostyles or gonozooids are club shaped and are devoid of mouth or tentacles. They are enclosed in gonotheca.
- Gonads are borne on medusae.





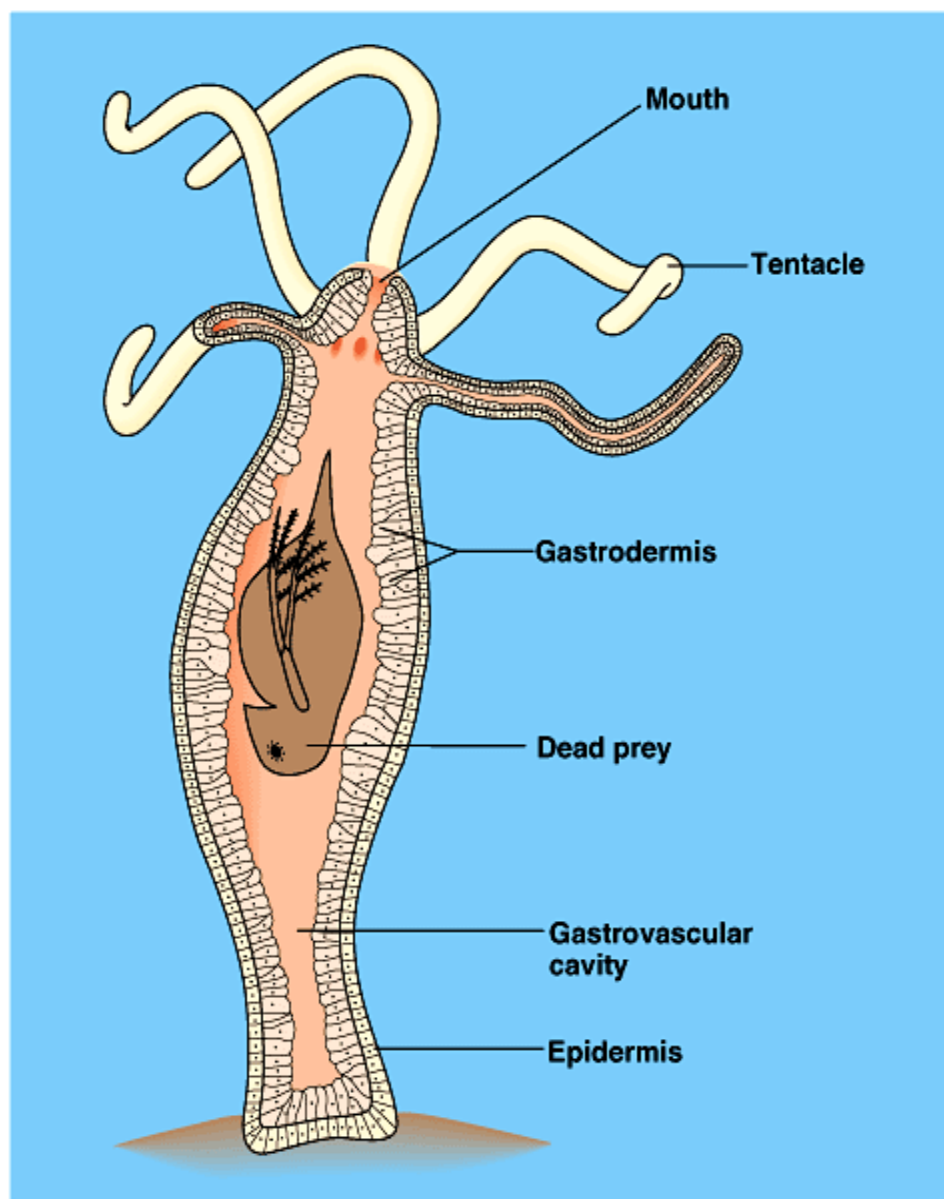
Cnidocysts on tentacles



Discharged cnidocyst

Cnidocytes cover the length of tentacles

Caught ya'!! ... (now what?!?)

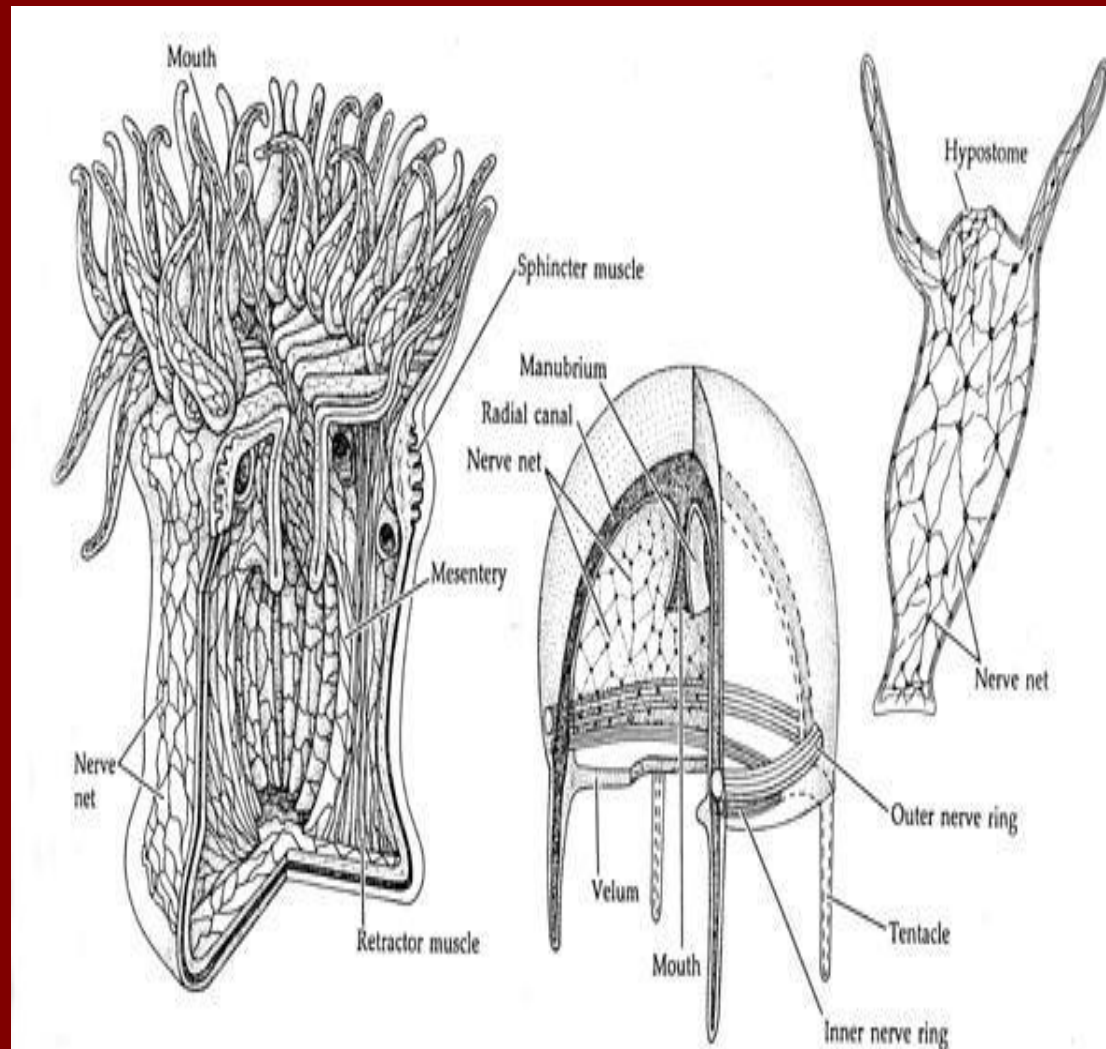


- Food is forced into the *GVC*
- **Extracellular digestion begins**
 - Enzymes secreted into *GVC*
- **Intracellular digestion completes process**
 - Partially digested food engulfed by endoderm cells

I'm Feelin' it!

(Can Cnidarians feel their prey?)

- First true nerve cells in *K. Anamalia*
 - **Nerve net** sends impulses in all directions
 - Cells of epidermis and gastrodermis arranged into contractile fibers
- **Do not have a brain to receive information!**



Reproduction in Cnidarians

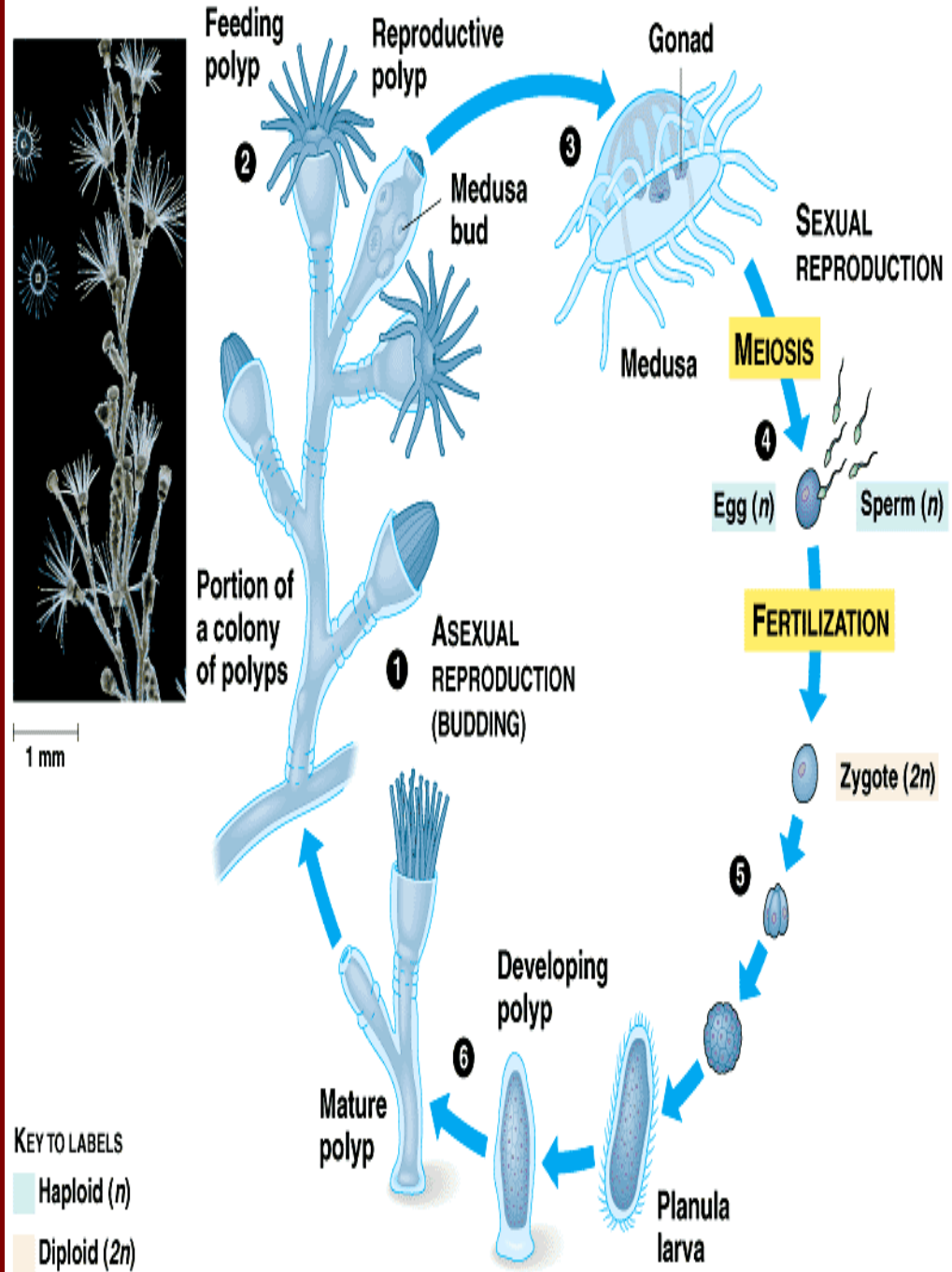


Budding in Hydra

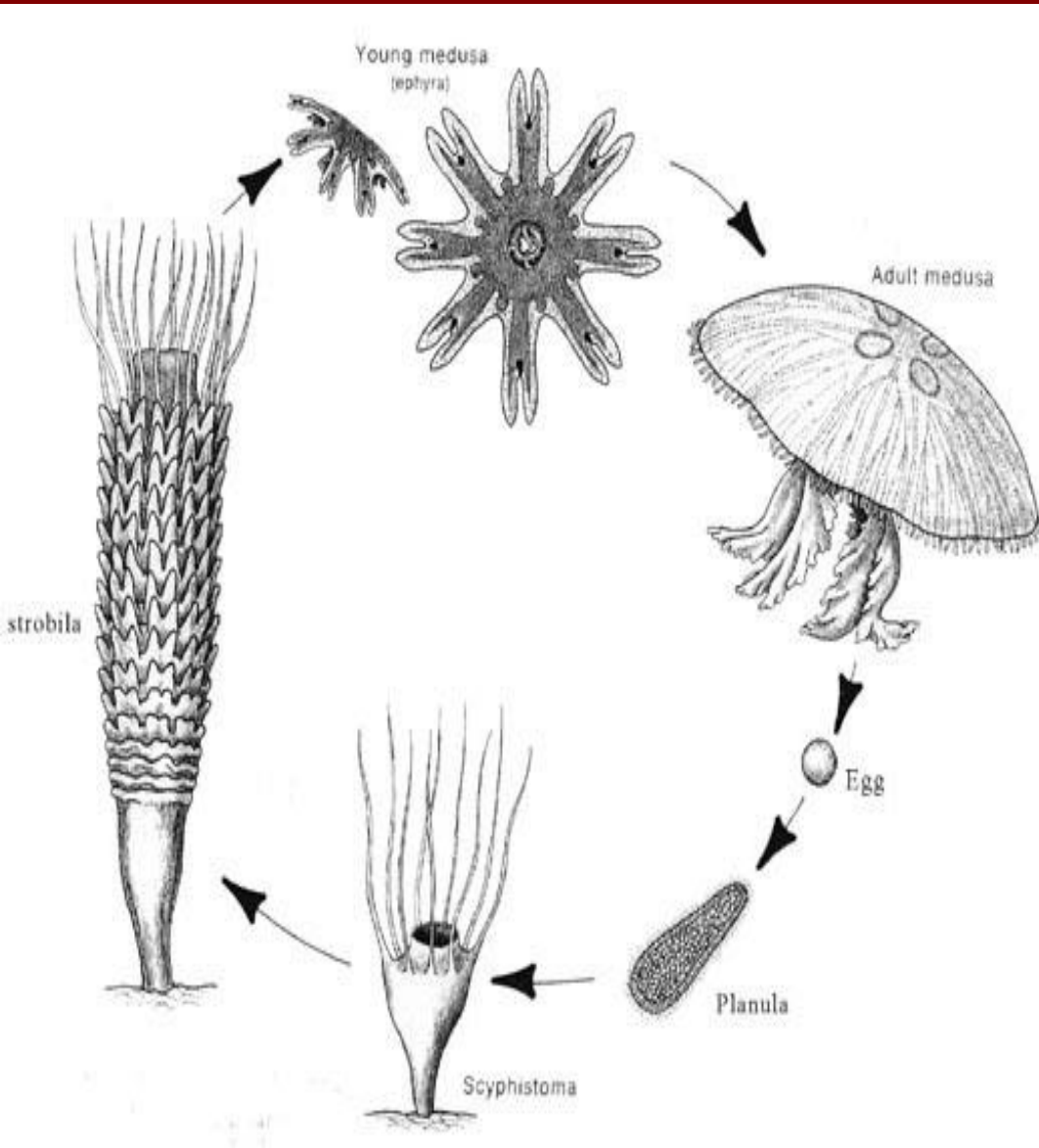
- Varies among forms
 - Hydras, anemones and corals
 - exist only in polyp form
 - Asexual reproduction (*conditions good*)
 - » Budding
 - Sexual reproduction (*conditions unfavorable*)
 - » Zygotes remain dormant until conditions improve

- Some colonial polyp forms have a medusa phase in their life cycle

- Specialized reproductive polyps produce tiny medusas by asexual budding
- Sexual reproduction by medusas produce ciliated larva
 - » *planula*
- Planula settles and develops into new polyp



What about jellyfish?!?



Medusa and polyp stages

- Separate sexes produce gametes
- Fertilization occurs in GVC of female
- Planula develops and is free-swimming
- Planula settles, develops into polyp
- Polyp produces new medusas by budding

**Fig. 32-8, PG 690*



The cnidarians may be a relatively small group comprising the Animal Kingdom, but they play a major role in any marine habitat.