

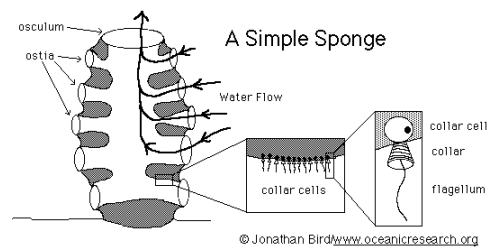
## Section 26.1 - Sponges

# Chapter 26 Sponges, Cnidarians, Flatworms and Roundworms

Biology II  
Mrs. Michaelsen

### I. What is a Sponge?

- A. Asymmetrical aquatic animals.
- B. Sponges are pore bearers
  - 1. Phylum Porifera
  - 2. 5000 species – 100 found in freshwater.
  - 3. Sessile organisms.
  - 4. Gather food by filter feeding.



## Variety of Sponges



### • What Purpose Do They Serve?

- Provide shelter for other organisms.
- Important part of diet for snails, starfish and fish.
- Humans have used sponges for cleansing.
- Some chemicals used in medical field.

### C. Cell Organization in Sponges

1. Multicellular
2. Cells are organized to perform different functions, but do *not* have tissues like other animals.
3. and hypothesized that they evolved from colonial, flagellated protists like *Volvox*.

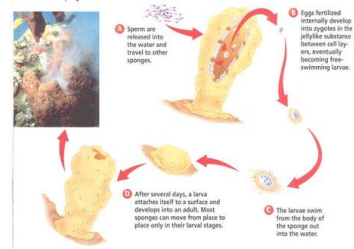
### D. Reproduction in Sponges

1. Reproduce sexually and asexually.
2. Asexually by buds. May fall and float away or stay attached and form colony.

3. Most reproduce sexually.
4. Most are hermaphrodites – individual animal that can produce both eggs and sperm.
  - a. Increases likelihood of fertilization.
5. Fertilization can be external or internal.
  - a. Few have external – eggs and sperm are released into water and fertilization occurs outside.
  - b. Most have internal – eggs remain inside body and sperm are carried to eggs.
    - i. Collar cells collect sperm and transfer to amoebocytes.
    - ii. Amoebocytes transport sperm to eggs.
    - iii. Result is free swimming larvae.

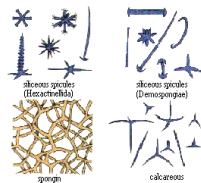


**This barrel sponge is spawning.**



### E. Support and Defense in Sponges

1. Soft-bodied invertebrates.
2. Some have sharp spicules located between cell layers.
3. Made of glasslike material or calcium carbonate.
4. Others have internal skeleton – silica or spongin.
5. Some contain toxins.



**In this photograph, the pumping action of a sponge is illustrated. A non-toxic yellow dye has been squirted around the base of a purple tube sponge in the Caribbean. Shortly thereafter, the dye is pumped out through the osculum at the top of the sponge.**



**Some sponges grow quite large. This barrel sponge is nearly large enough for the diver to climb right inside! Other barrel sponges get even bigger than this.**

## Section 26.2

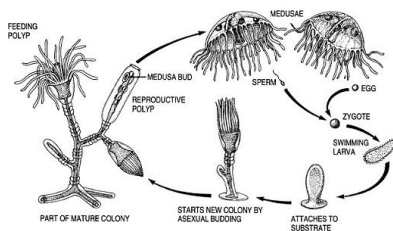


### I. What is a Cnidarian?

- A. Group of marine invertebrates
- B. 9000 species of jellyfishes, corals, sea anemones, and hydras.
- C. Cnidarians have Radial Symmetry
  - 1. Body is made up of two cell layers derived from the ectoderm and endoderm of the embryo.
    - a. Ectoderm develops into protective layer.
    - b. Endoderm is internal and mostly digestion.
  - 2. Cell layers are organized into separate tissues with specific functions.

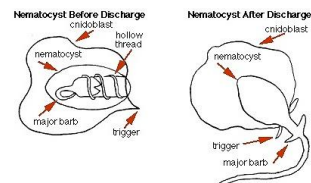
### 3. Display Two Body Forms

- a. Each body form occurs at different times.
- b. Polyp: Stage with a tube shaped body and mouth surrounded by tentacles (sessile).
- c. Medusa: Stage with a body shaped like an umbrella with tentacles hanging downward (free swimming).

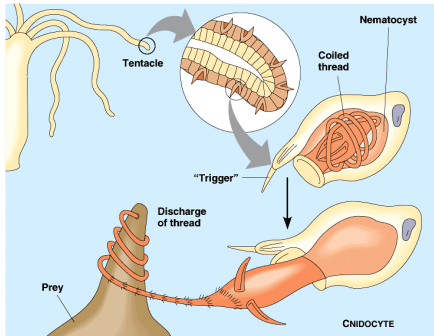


### D. Digestion in Cnidarians

- 1. Capture or poison prey with nematocysts:
  - a. Capsule that contains a coiled, threadlike tube.
  - b. Tube may be sticky or barbed and contain toxic substances.
  - c. Discharged like toy popguns in response to touch or chemicals in environment.



## Nematocyst Discharged



- d. Once captured by nematocysts prey is brought to mouth by tentacles.
- e. Prey is taken to gastrovascular cavity where digestion takes place.

### E. Oxygen Enters Cells Directly

1. Oxygen dissolved in water diffuses directly to body cells.

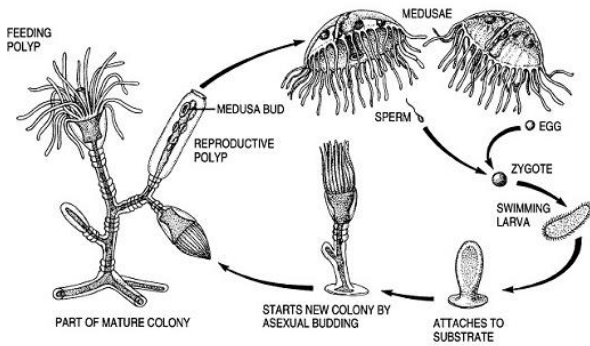
### F. Nervous Regulation in Cnidarians

1. Simple system – Nerve net: Conducts impulses from all parts of the body.

### G. Reproduction in Cnidarians

1. Sexual and asexual.
2. Sexual occurs in one part of life cycle – usually medusa stage.
3. Asexual can occur in medusa or polyp.
4. Cnidarians that remain in polyp stage (hydras, corals, sea anemones) can reproduce sexually as polyps.
  - a. Known as budding.
5. Most common reproduction:
  - a. Sexual stage – medusa alternates with asexual phase – polyp.
  - b. Male medusae release sperm and female medusae release eggs into water where fertilization occurs.
  - c. Zygote develops into embryo and then into larva.
  - d. Free swimming larva settles and grows into polyp, which, in turn, reproduces asexually to form new medusae.
  - e. These two stages then alternate.

## Section 26.2 - Cnidarians



## II. Diversity of Cnidarians



### A. Most Hydrozoans Form Colonies

1. Two groups – hydroids (hydra) and siphonophores (Portuguese man-of-war).
2. Most hydroids consist of polyp colonies formed by budding.
3. Siphonophores include floating colonies that drift about at ocean surface and some free swimming medusae.
4. Have open gastrovascular cavity with no divisions.



Pink-Hearted Hydroids *Tubularia* spp.

### Portuguese Man-of-War Primarily found in tropical waters



### Accident Provoked by Man-of-War

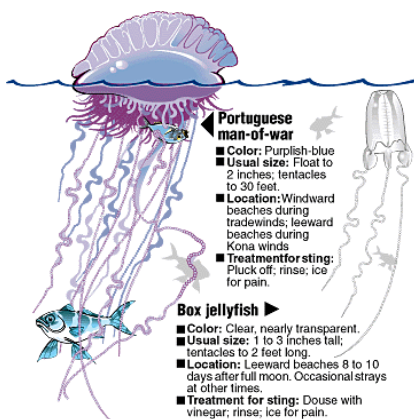


B. Scyphozoans are Jellyfishes

1. Some transparent, others pink, blue, orange.
2. Medusa stage dominant.
3. Contraction of medusa causes movement.
4. Sting is painful.
5. Found everywhere in oceans – tropical to arctic.
6. Gastrovascular cavity has four divisions.



## Jellyfishes



C. Most Anthozoans Build Coral Reefs

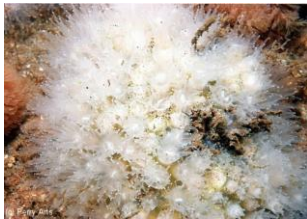
1. Exhibit only polyp form.
2. All have many divisions in gastrovascular cavity.
3. Sea anemones live as individuals in all climates.
4. Corals live in colonies of polyps in warm ocean waters.
  - a. Secrete cuplike calcium carbonate shelters around their soft bodies for protection.
  - b. Makes beautiful coral reefs that take centuries to build.



Group of fairly young, skinny Frilled Anemones. Very young ones have only a single whorl of tentacles, so these would be "teenagers."



A burrowing anemone - probably *Cerianthus borealis*. Note the two rows of tentacles.



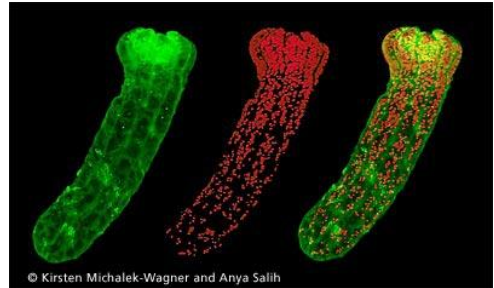
Northern Star Coral with polyps extended



Northern Star Coral with polyps withdrawn



5. Coral polyp extends tentacles to feed.
6. Coral reefs are in shallow, nutrient poor waters but they thrive because of a symbiotic relationship with zooxanthellae, photosynthetic protists.
7. The zooxanthellae supply oxygen and food to the corals and use carbon dioxide and wastes produced by the corals.
8. Protists responsible for bright colors.



This picture taken through a microscope shows a soft coral polyp. Green shows the polyp tissue, while red represents the zooxanthellae

### III. Origins of Sponges and Cnidarians

- A. Earliest fossil evidence for sponges is from 700 million years ago.
- B. Cnidarians date to about 630 million years ago.
- C. Scientists consider cnidarians to have evolved from protists.

### Section 26.3 - Flatworms



## I. What is a Flatworm?

1. Least complex worm.
2. Belong to Phylum Platyhelminthes.
3. Acoelomates with thin, solid bodies.
4. Parasitic tapeworms (class Cestoda) and flukes (class Trematoda) are most well known.
5. We will study planarians (class Turbellaria).
6. Over 14,500 species of flatworms.

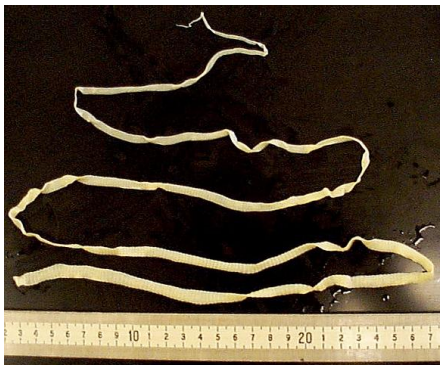


Planarian



London Scientific Films/Oxford Scientific Films

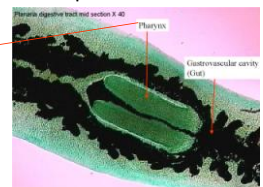
Fluke



Tapeworm

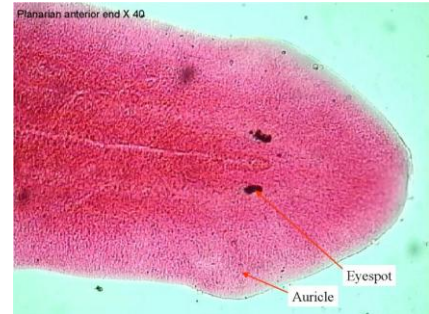
### A. Feeding and Digestion in Planarians

1. Feeds on dead or slow moving organisms.
2. Extends tube like pharynx out of mouth.
3. Enzymes released by pharynx begin digestion outside body.
4. Food is sucked into gastrovascular cavity where particles are broken up.

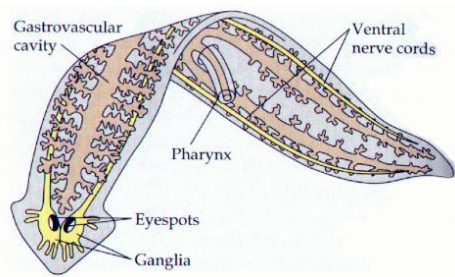


## B. Nervous Control in Planarians

1. Some have nerve net others have beginnings of CNS.
2. Planarian has two nerve cords that run length of body.
3. Also have sensory pits that detect chemicals and movement.
4. Eye spots that detect light and dark.
5. Ganglion on head communicate with body to respond to stimuli with muscles.



From faculty.clintoncc.suny.edu/.../img039.jpg

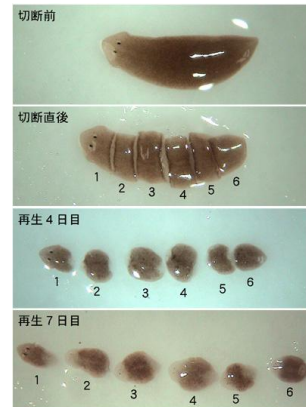


science.northern.edu/.../images/planariad.jpg

## C. Reproduction in Planarians

1. Hermaphrodites.
2. During sexual reproduction planarians exchange sperm, which travel along special tubes to reach eggs.
3. Fertilization is internal and zygotes are released in capsules into water.
4. These hatch into tiny planarians.

5. Asexual reproduction occurs through regeneration: Replacement or regrowth of body parts.
6. If cut in half, one end will grow new head and other will grow new tail.



[http://www.cdb.nken.go.jp/erb/Breeding\\_Diary\\_folder/Breeding\\_Diary/explain/images/Regeneration1.jpg](http://www.cdb.nken.go.jp/erb/Breeding_Diary_folder/Breeding_Diary/explain/images/Regeneration1.jpg)

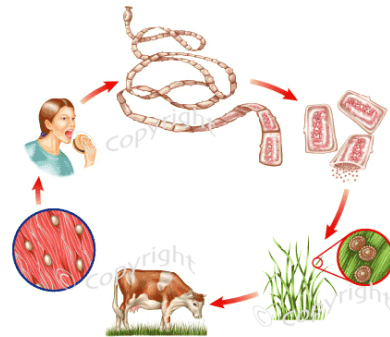
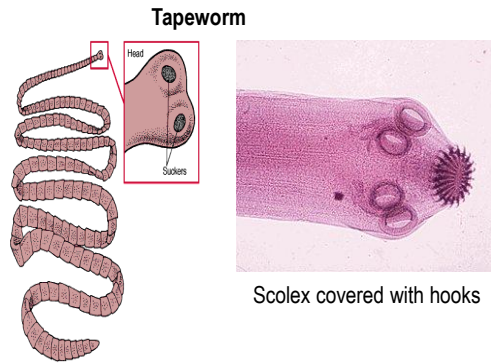
#### D. Feeding and Digestion in Parasitic Flatworms

1. Organism lives in or on another organism and depends on organism for food.
2. Have mouthparts with hooks to keep attached.
3. Do not have complex nervous or muscular tissue (no need for this).

## II. Diversity of Flatworms

### A. Tapeworm Bodies Have Sections

1. Some can grow more than 10 meters long.
2. Body is made up of head and repeating sections called proglottids.
3. Proglottid: Detachable section of a tapeworm that contains muscles, nerves, flame cells, and male and female reproductive organs.
4. Each proglottid could have up to 100,000 eggs and a worm could have 2000 proglottids.



## B. The Life Cycle of a Fluke

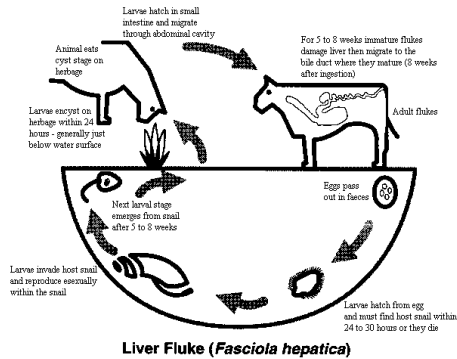
1. Fluke invades the internal organs of vertebrates and embeds in organ to feed on cells, blood and other fluids.
2. Blood flukes of genus *Schistosoma* cause the disease schistosomiasis.
3. Common in rice growing countries.
4. Snails are secondary host.

Sheep liver fluke (*Fasciola hepatica*) stained



From faculty.clintoncc.suny.edu/.../img039.jpg

## Section 26.4 - Roundworms



### I. What is a Roundworm?

- A. Belong to Phylum Nematoda
- B. More than 12,000 species known.
- C. Most free-living, but many parasitic.
- D. Tapered from both ends, have thick outer covering to prevent being digested.
- E. Lack circular muscles and move in a thrashing fashion.
- F. Have a pseudocoelom and two body openings.

### II. Diversity of Roundworms

- A. Roundworm Parasites Invade Humans Through a Variety of Methods
  1. *Ascaris* mainly infects children who swallow eggs.
  2. Eggs hatch in intestines move to bloodstream and then to lungs, where they are coughed up and swallowed again.

## Ascaris



[www.nematodes.org/pictures/ascaris.jpg](http://www.nematodes.org/pictures/ascaris.jpg)

3. Hookworms infect people who walk on contaminated soil with bare feet.
4. Become weak and tired from blood loss.



Hookworm on the lining of the intestine

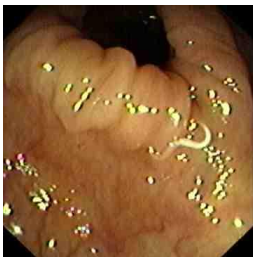
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Site of hookworm infestation

[www.marvistavet.com/assets/images/foot\\_infect...](http://www.marvistavet.com/assets/images/foot_infect...)

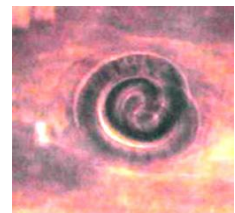
5. Pinworms invade intestinal tract.
6. Females lay eggs near anus, and reinfestation is common because of itching.



<http://www.emedicine.com/med/images/18381.jpg>



7. *Trichinella* cause trichinosis.
8. Enter body in undercooked pork.
9. Embed in muscle tissue.
10. Microscopic and killed when meat is cooked thoroughly.



**Trichinella**

**B. Roundworm parasites of Other Organisms**

1. Can also kill pine trees, cereal crops, and food plants.
2. Very attracted to plant roots.