

Life Chapter 12

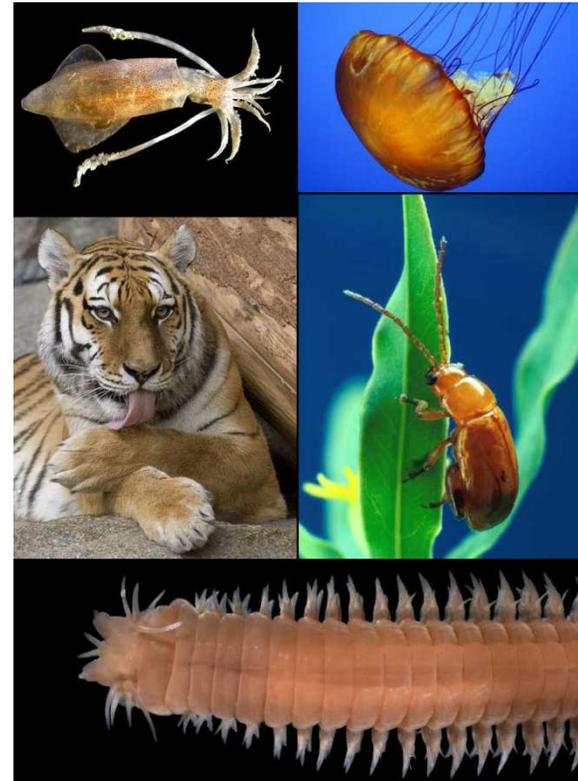
Part 1

Phyla

Porifera & Cnidaria

Kingdom: Animalia

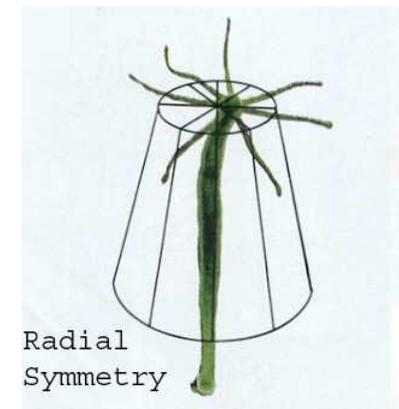
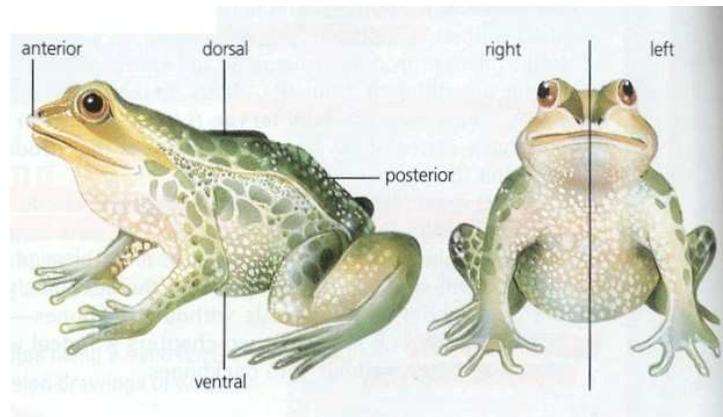
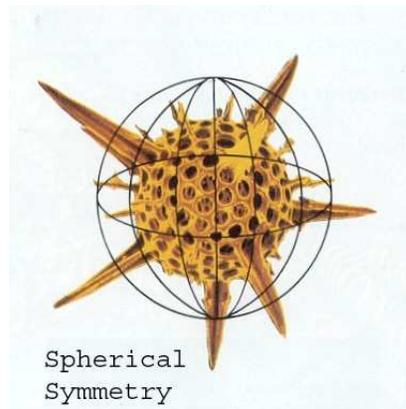
- AKA: Kingdom – **Metazoa**
 - Multicellular eukaryotic heterotrophs
 - Doesn't contain the Prokaryotes (bacteria & blue-green algae), protists, Fungi or Plants
 - Cells lack a rigid cell wall
 - Most (except sponges) ingest food & digest it in an internal cavity
 - Most (except sponges) are composed of cells organized into tissues & organs
 - 2 main Groups
 - **Invertebrates** – those w/out a backbone
 - **Vertebrates** – those w/ a backbone



Cell → Tissue → Organ → Organ System → Organism

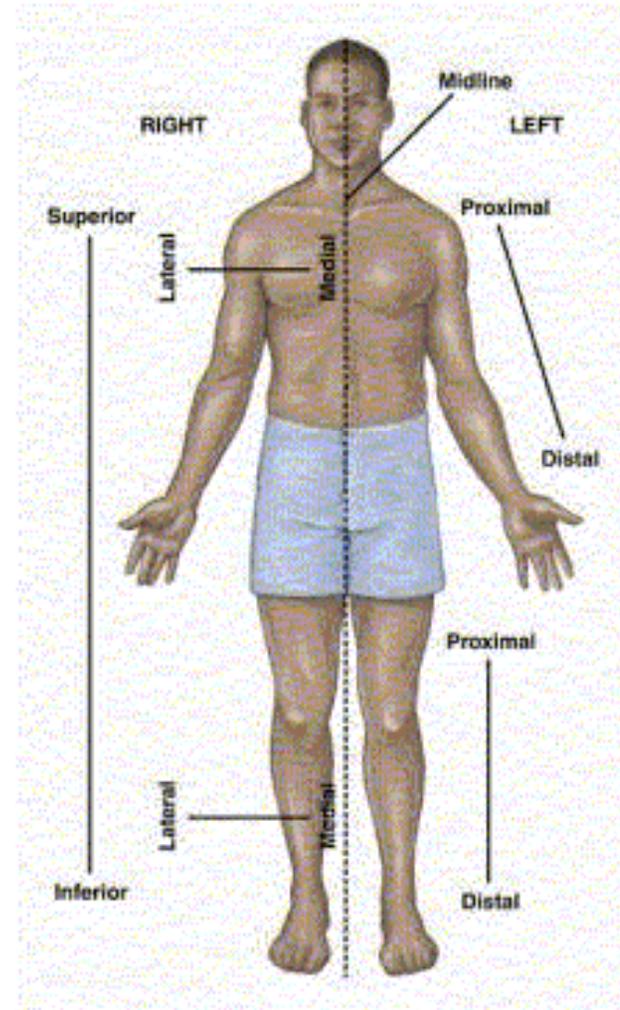
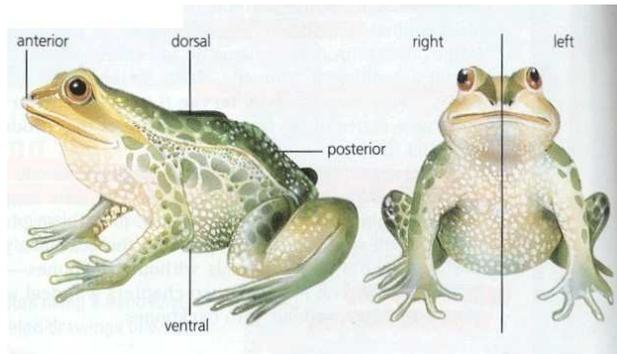
Anatomical Terminology

- Symmetry – a body pattern of similarity
 - 1. **Spherical Symmetry**: Example- Volvox; animal can be bisected thru any plane that passes thru the center point of the critter. Most primitive of symmetrical types
 - 2. **Radial Symmetry**: Example – sea anemone, starfish, sea urchins jellyfish; animal can be bisected w/ equal halves when plane cuts thru a central line. 2nd most primitive symmetry
 - 3. **Bilateral Symmetry**: Examples- Planarians, vertebrates; only one plane will bisect the critter into two relatively equal halves. Plane must go thru a central plane for symmetry to occur. Most advanced



Anatomical positions

- 1. Dorsal / Ventral
- 2. Anterior / posterior
- 3. Lateral / Medial
- 4. Proximal / Distal
- 5. Right / Left
- 6. Cranial / Caudal



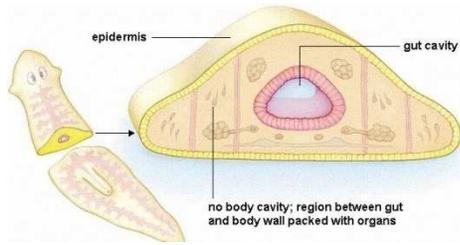
Seven Essential Life Functions

- 1. **Feeding** – a way used to gather food
- 2. **Respiration** – a way need to obtain oxygen from environment and remove carbon dioxide from the organism
- 3. **Internal transport** – (circulation) need to move nutrients and wastes to all cells of the organism
- 4. **Excretion** – need a way to remove the nitrogenous cellular wastes products
- 5. **Respond** to the environment – Nervous System - a way to sense & gather information from the environment
- 6. **Reproduction** – a way to generate off spring
- 7. **Movement** – most are able to move from place to place or at least move their surrounding to or through them.

Body Cavity : Coelum

- Pronounced “seal –um”
- The space between an animals outer covering (epidermis or ectoderm) and the lining of the gut or digestive tract (endoderm)
- Animals divided into 3 types
 - **Acoelomate:** “no coelum” include the flatworms – most primitive
 - **Pseudocoelomate:** “false coelum” – roundworms
 - **Coelomate:** “true coelum” present – annelids, all vertebrates and most bilaterally symmetrical animals

Body Cavity : Coelum



Acoelomate

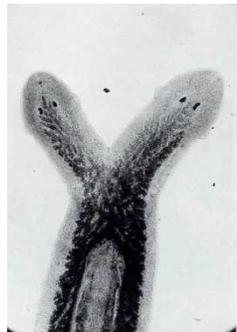
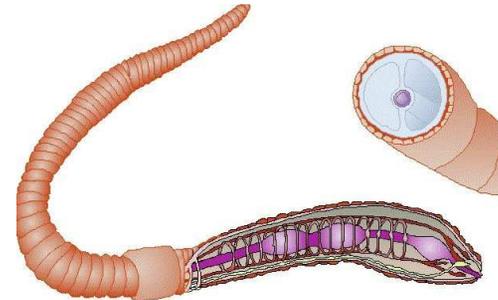
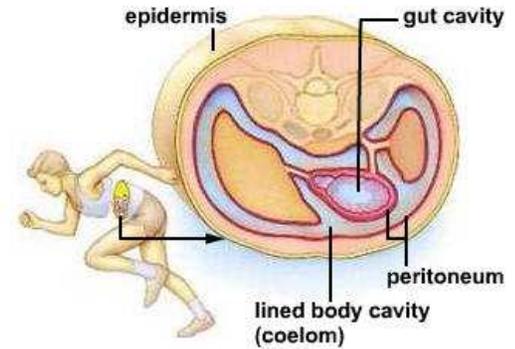
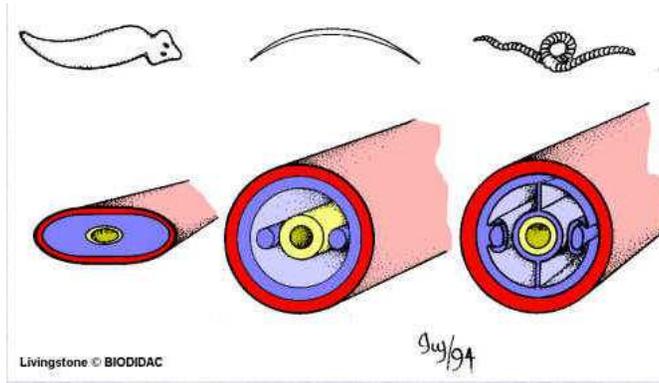
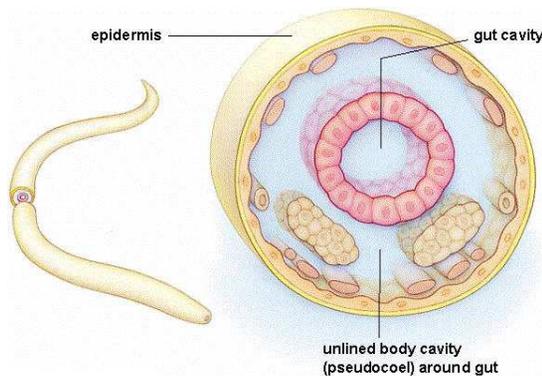


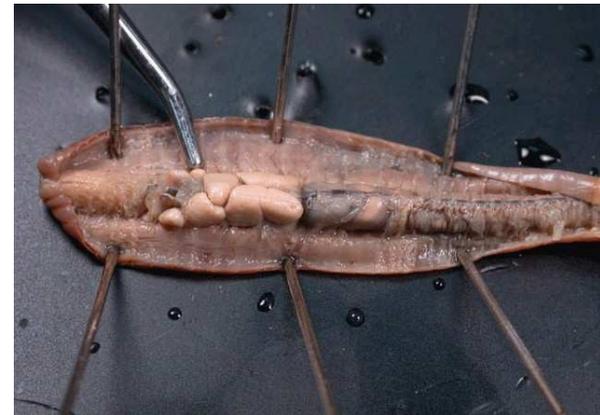
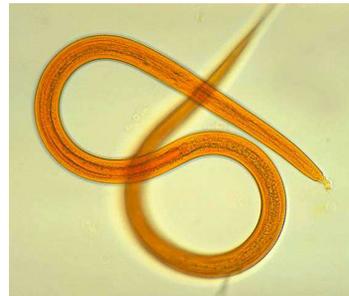
Fig. 58e Two-headed planaria w.m. x40. Same organism as in Fig. 57c when mounted on a slide.



Coelomate



Pseudocoelomate



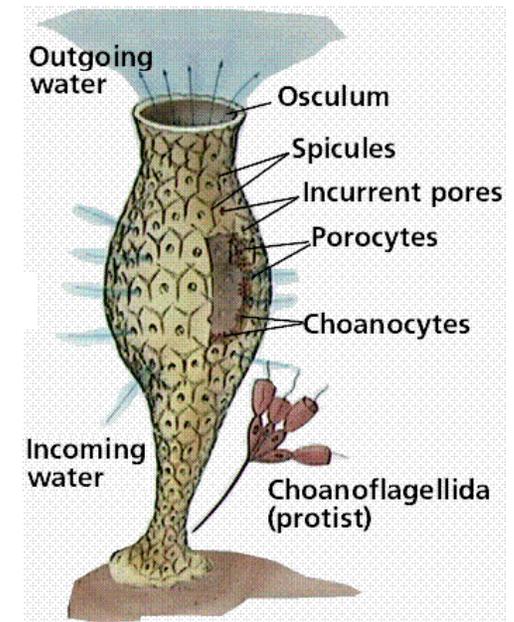
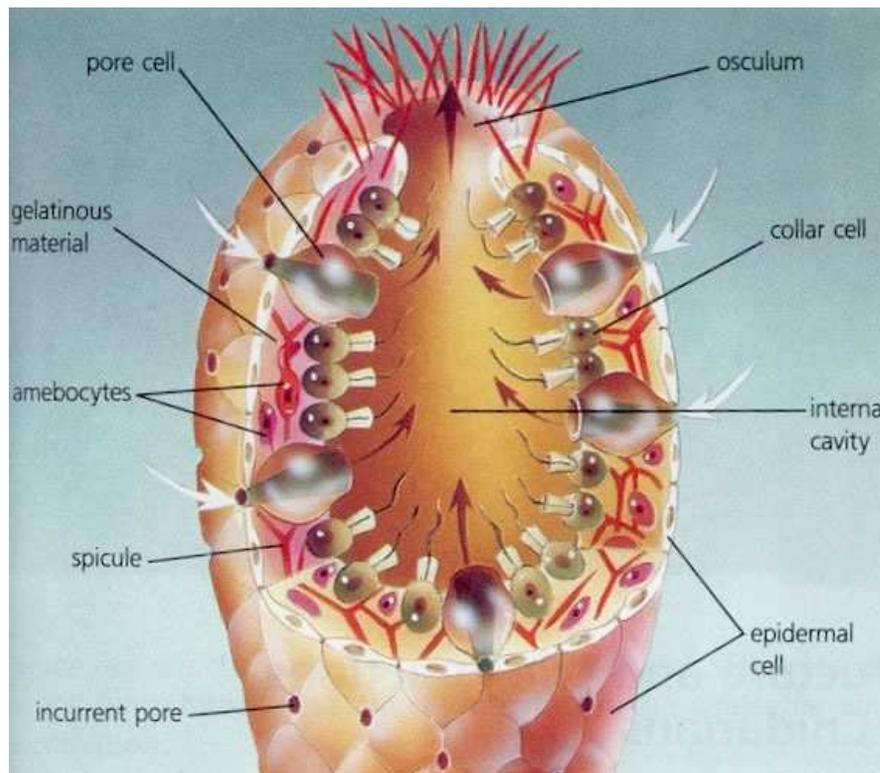
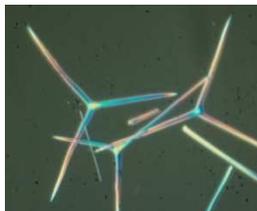
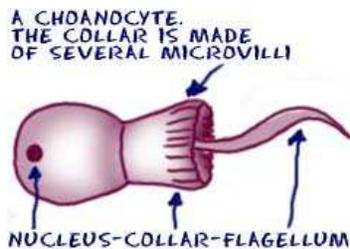
Phylum Porifera - Sponges

- **Invertebrate, Most have Radial Symmetry some w/ no symmetry,**
- Most primitive of invertebrates
- All are aquatic, most are marine
- No specialized tissue or organs, essential life functions performed at the cell level
- Filter feeders that sift microscopic particles from the water
- Structure and Function



Porifera - Anatomy

- 1. **Central Cavity**: Area enclosed by the body wall of the sponge
- 2. **Osculum**: Large dorsal hole where water leaves the sponge 's central cavity
- 3. **Porocytes** AKA: **Pore cells**: Specialized cells in the body wall through which water enters
- 4. **Pores**: one of thousands of openings in the body wall allowing water to enter the central cavity
- 5. **Epidermal cells**: outer cell layer on the surface of the sponge
- 6. **Spicule**: Structural "skeletal" support usually made of silica or calcium
- 7. **Amebocyte**: specialized cells that manufacture the spicules
- 8. **Choanocyte** AKA: **Collar cells**: cells facing the inside w/ flagella that create water current and traps food



Porifera-Form and Function

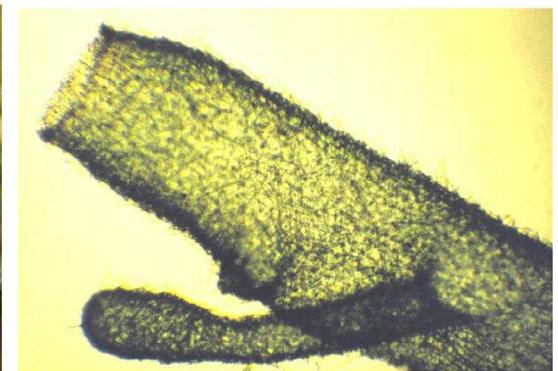
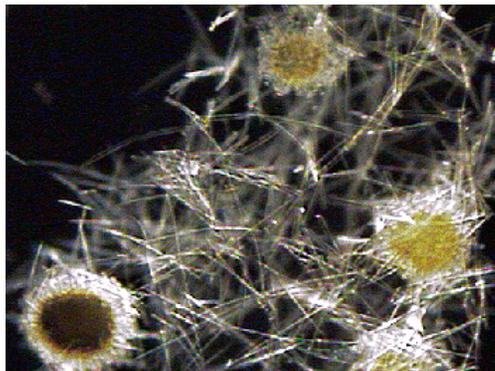
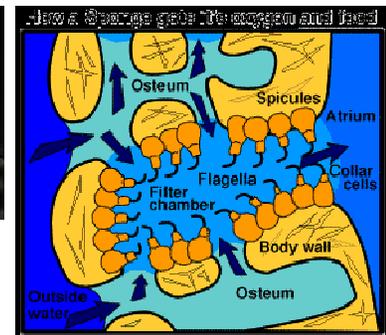
- **Feeding:** filter feeders that sift particles of food from the water that passes into the central cavity. The food is trapped by the collar cells.
- **Internal Transport** (the system that carries nutrients & wastes through the body): The water being pulled through the sponge acts as the transport system.
- **Excretion** – Cellular wastes are also carried away by the water movement and leaves through the osculum
- **Respiration** – Again, the water passing past the sponge cells allow for O₂ and CO₂ to be absorbed and discharged respectively.
- **Reproduction:**

– a. Sexual w/ egg and sperm:

- i. **Hermaphroditic** – produces both male & female gametes
- ii. Eggs produced and held in central cavity.
- iii. Sperm produced by different sponge and pass thru the pores to fertilize.
- iv. Larvae passed into water current and become plankton

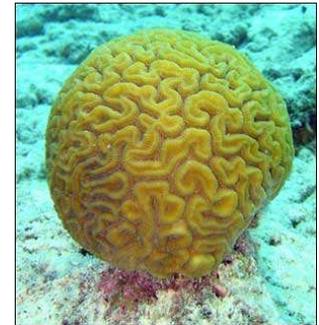
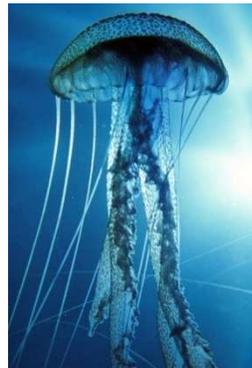
Asexual forming

- i. **Gemmules:** clumps of amebocytes covered by spicules endure poor environmental conditions
- ii. **Budding:** small new growth breaking off creating genetically identical offspring



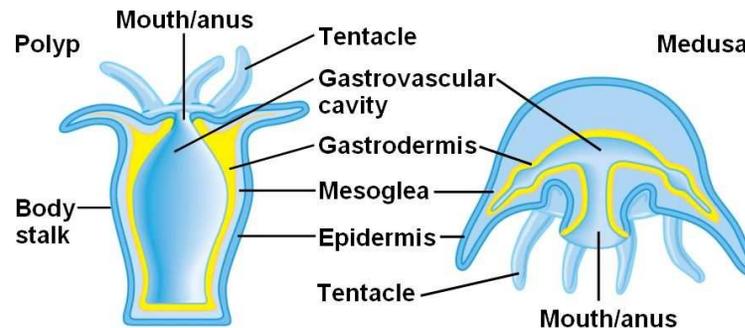
Phylum Cnidaria:

- AKA Coelenterate: Jellyfish, hydra, sea anemone & corals
- A. Aquatic, Invertebrate, Soft bodied critters w/ sting cells (nematocysts) on tentacles surrounding a mouth
- B. Radial symmetry
- C. First example of specialized cells and tissue
- D. All are aquatic



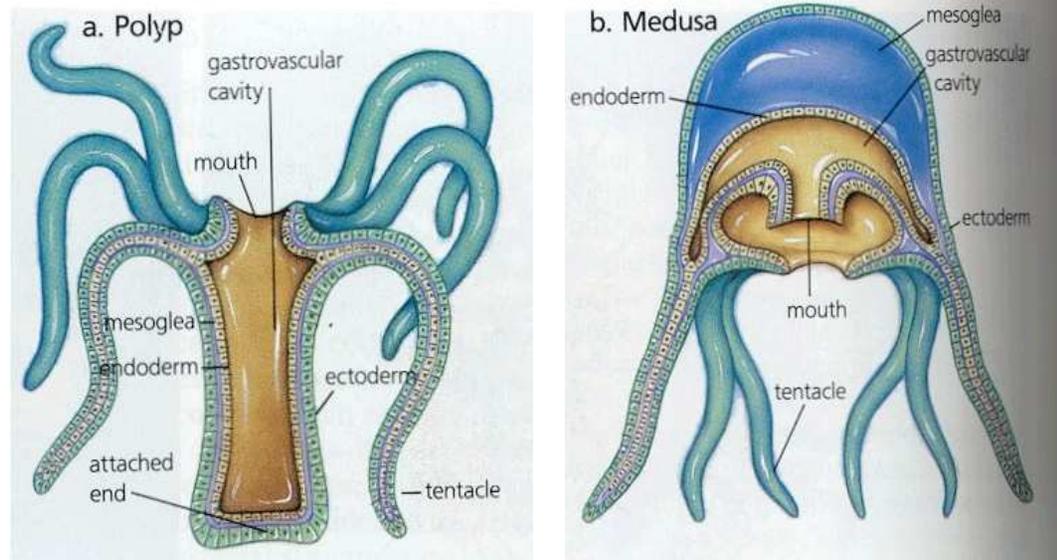
Cnidaria – Body Shapes

- 1. **Polyp**: Hydra, sea anemones and corals – sessile “flower-like”(sedentary, doesn’t move around much)
- 2. **Medusa**: jellyfish, Man-of-War, free swimming, planktonic, motile bell-shaped



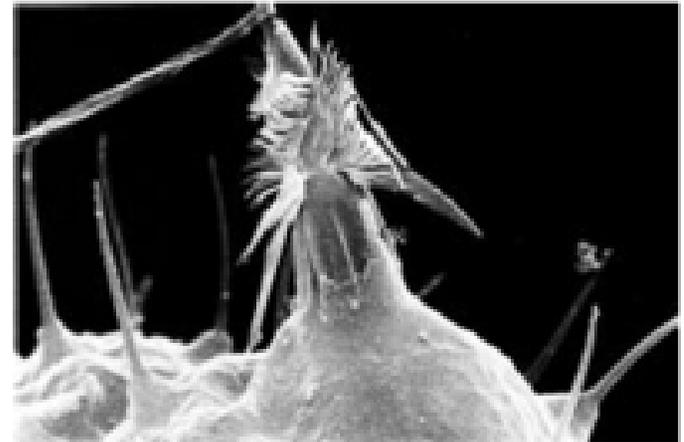
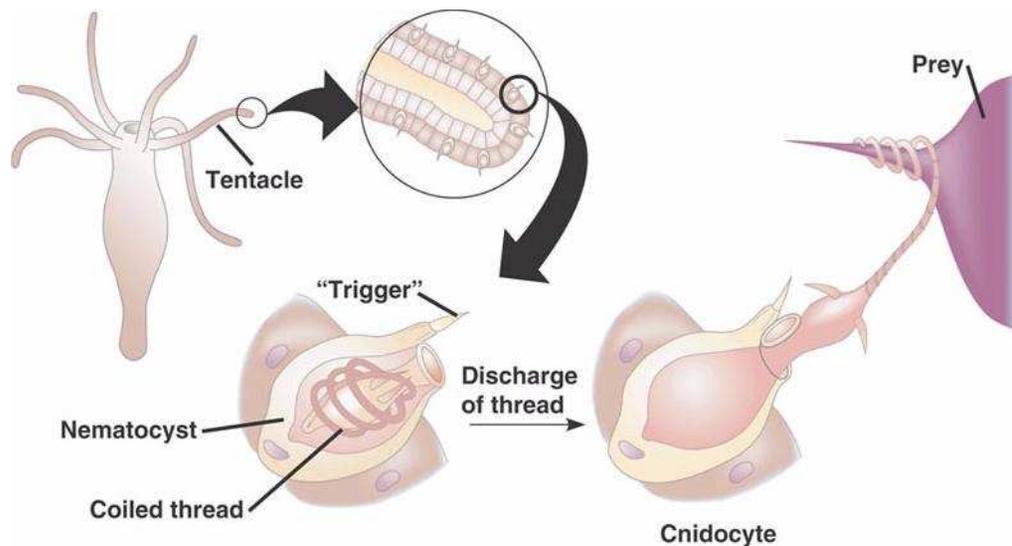
Cnidaria: Structure and Function

- **Tentacle:** finger-like projections that contain the nematocysts and bring prey item to the mouth
- **Mouth:** opening into which prey items enter gastrovascular cavity and since there is no anus, waste products leave through this opening also.
- **Gastrovascular Cavity:** GVC “stomach”: prey items digested here
- Body wall w/ three layers:
 - a. **Ectoderm:** Epidermis
 - b. **Mesoglea:** mesoderm - middle jelly-like layer
 - c. **Endoderm:** Gastroderm: secretes digestive enzymes into the gastrovascular cavity
- **Basal disk:** Sticky base that attaches to the substrate and holds the polyp in place



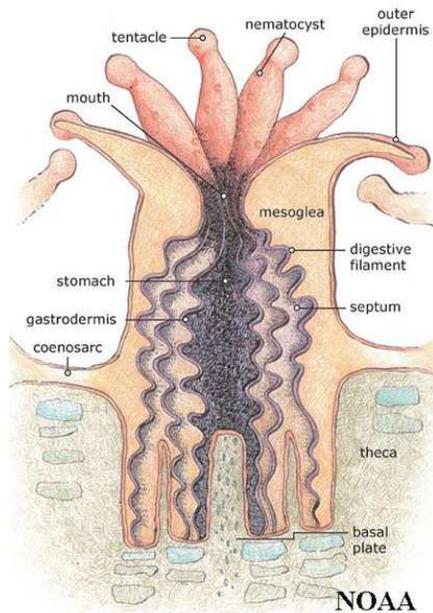
Nematocyst – specialized stinging cell

Specialized stinging structures located on the tentacles. Dart-like structures that are triggered by touch and inject poison to kill prey items



Cnidaria - Physiology

- **Digestion:** incomplete digestive system- only one in and out orifice
- **Internal Transport:** no specialized tissue, organism thin enough for diffusion to move substances between the GVC and the rest of the organism
- **Excretion:** no specialized tissue, organism thin enough for diffusion to be enough
- **Respiration:** no specialized tissue organism thin enough for diffusion to be enough
- **Nervous System:** Primitive network of nerves, no true “Brain” or central nervous system

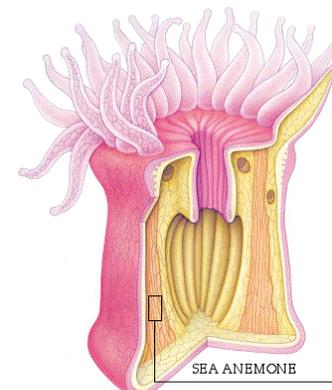


Sea Anemone vs. Crab

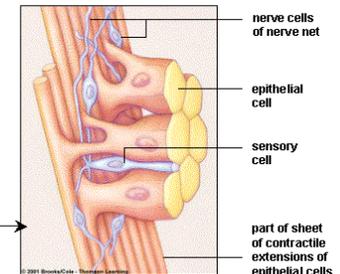


Sea Anemone vs. a Finger

Nerve Net



- Diffuse mesh of nerve cells that take part in simple reflex pathways
- Nerve cells interact with sensory and contractile cells



Cnidaria - Reproduction

- 1. Asexual: reproduces by **budding**, producing a genetically identical individual
- 2. Sexual:
 - a. Hermaphroditic
 - b. Sperm produced in testis
 - c. Eggs produced in ovaries
 - d. Fertilized eggs are zygotes and are released into the water becoming planktonic

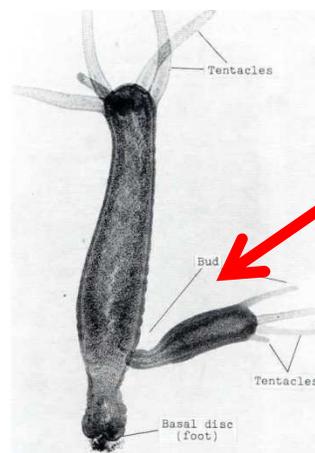
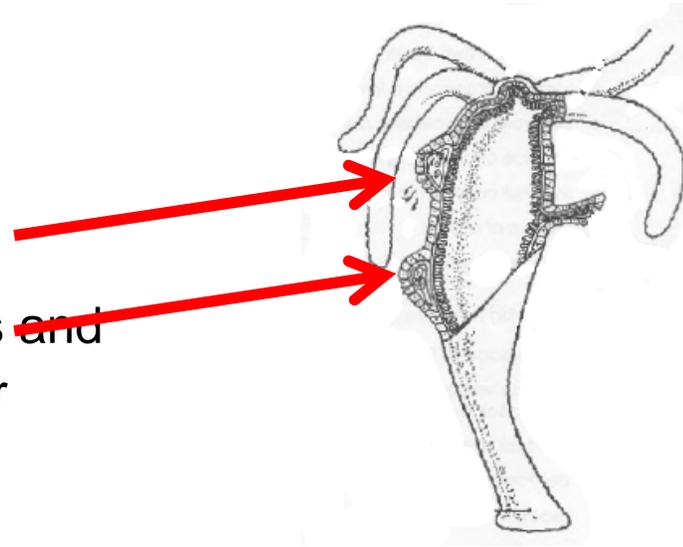


Fig. 53a Hydra with bud w.m. x40.

Bud

The End !!

The Worms are in part 2!!