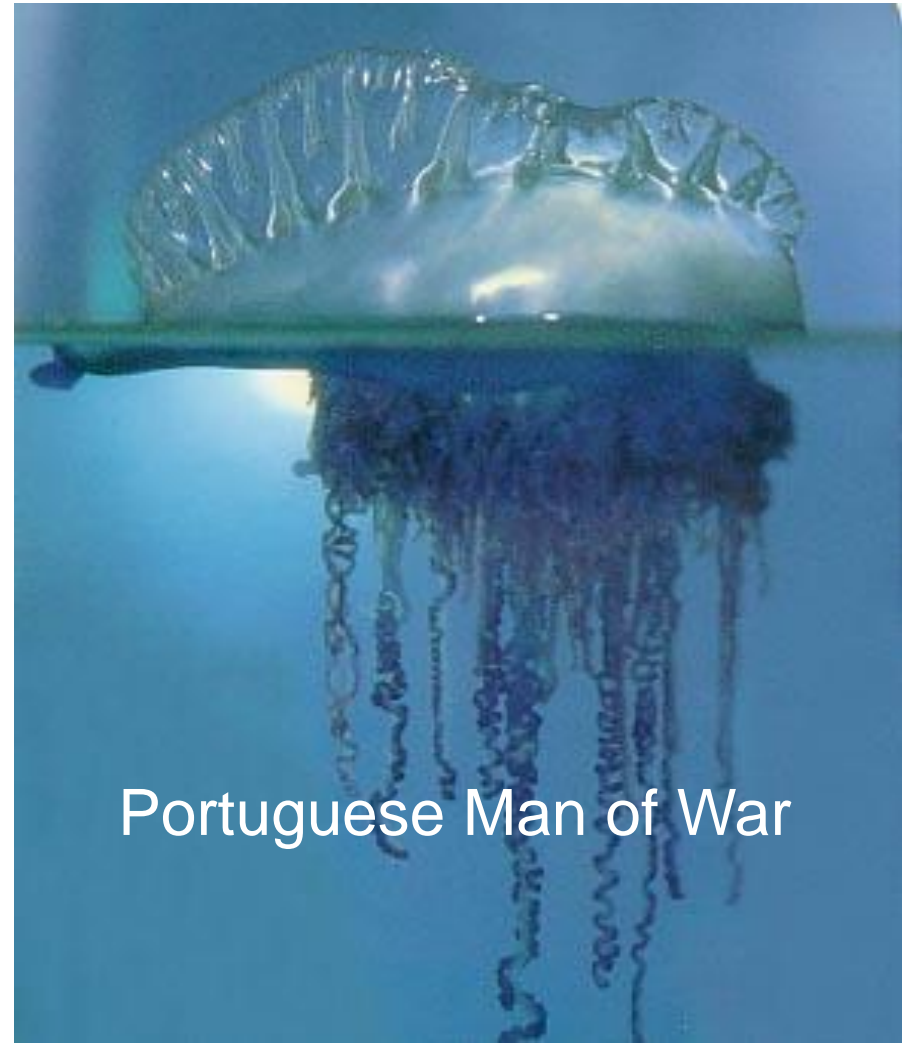




Characteristics of Animals

- Heterotrophic- depend on others for food
- Digest their food
- Move
- Multicellular
- Eukaryotic

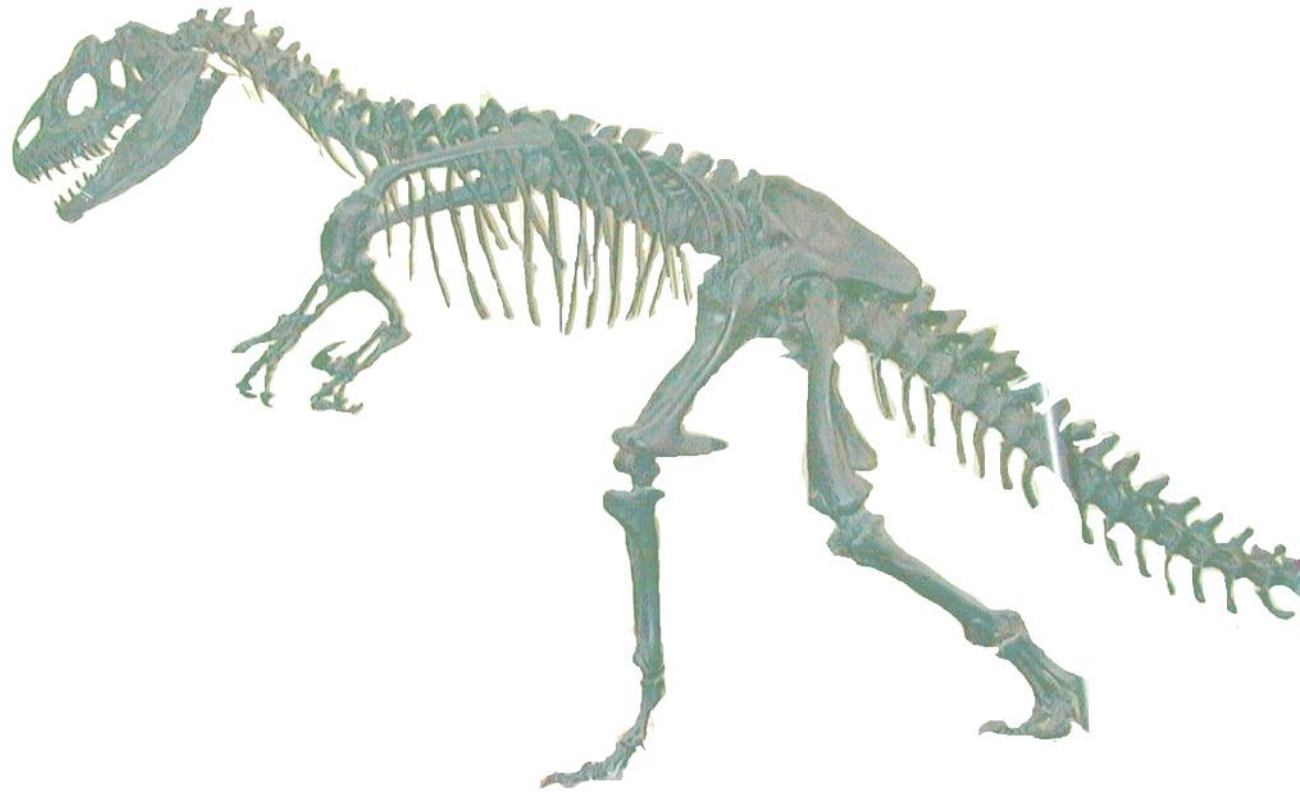
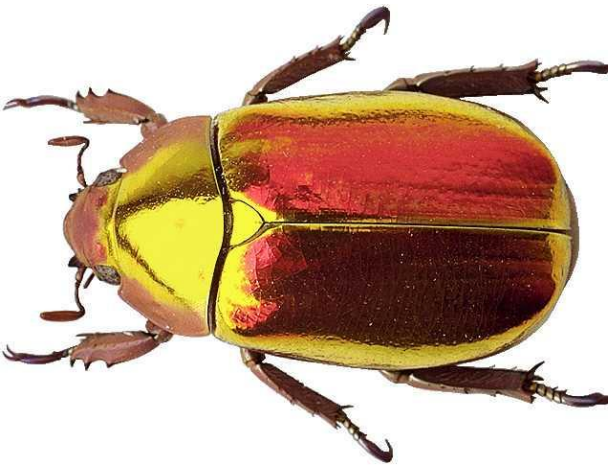
*Give five characteristics of animals.**



Portuguese Man of War

Animal Classification

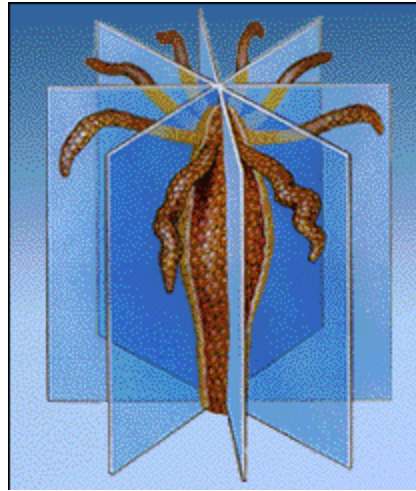
- Vertebrate
- Invertebrate



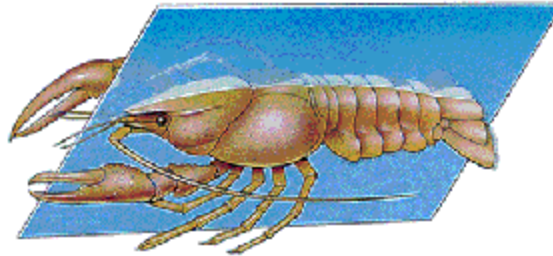
*Animals are classified into two main groups. What are they?**

Symmetry

- Radial
- Bilateral
- Asymmetry



Radial Symmetry



Bilateral Symmetry

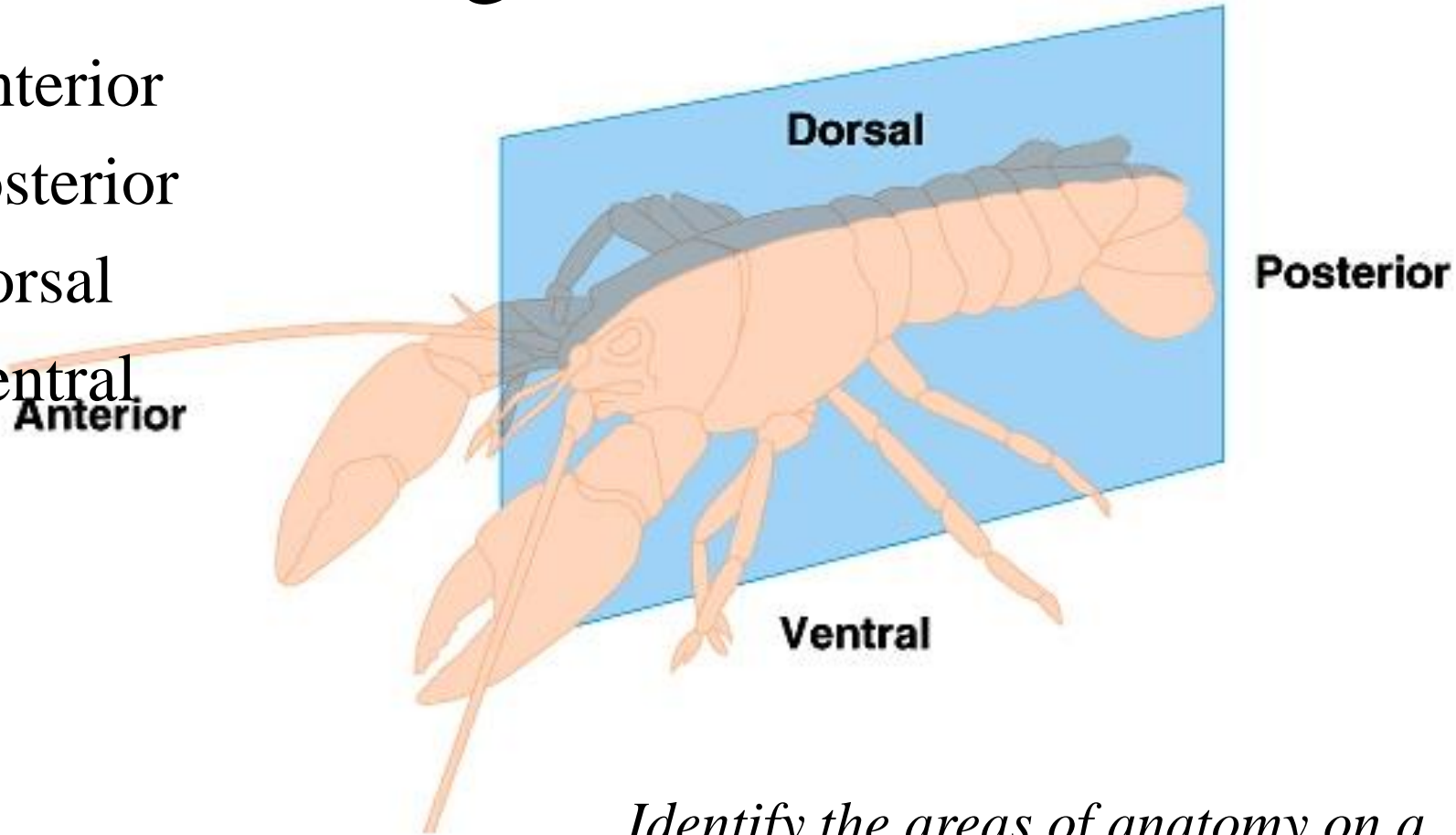


Asymmetry

*Identify the symmetry of different organisms.**

Areas on bilaterally symmetrical organisms

- Anterior
- Posterior
- Dorsal
- Ventral

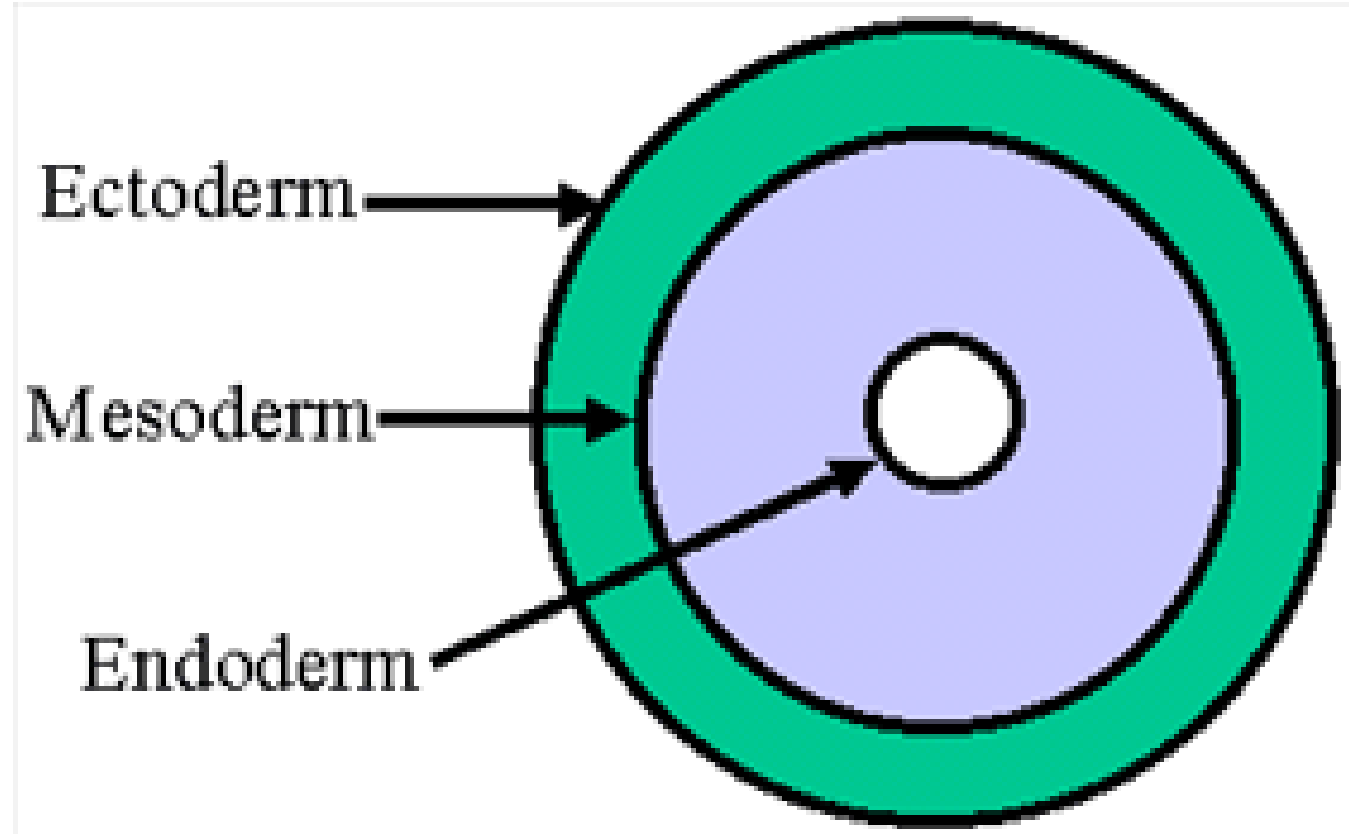


(b) Bilateral symmetry

*Identify the areas of anatomy on a bilaterally symmetrical organism.**

Embryo layers of development

- Ectoderm
- Endoderm
- mesoderm



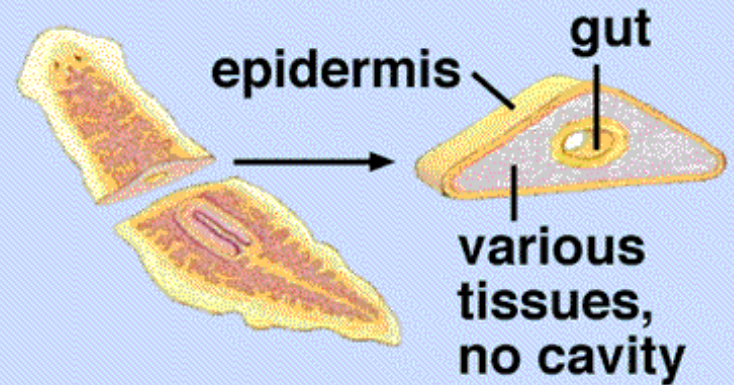
*What are the three layers of developmental tissue?**

Body Cavities

- Acoelomem
- Pseudocoelomem
- Coelomem

What are the three types of body cavities and what does that mean?

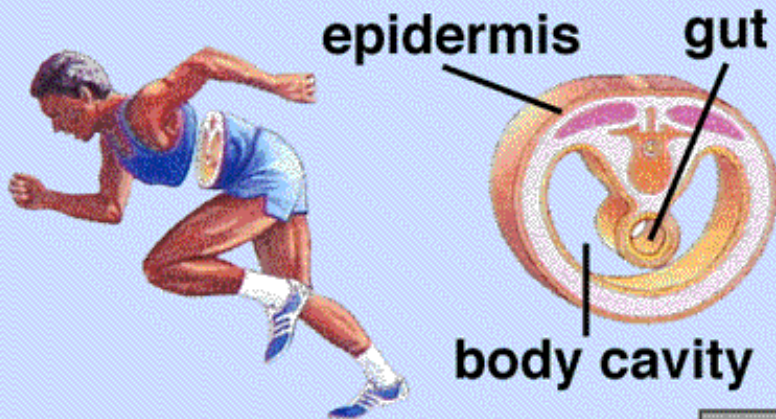
Body Cavity Types: Acoelomate



1 of 3

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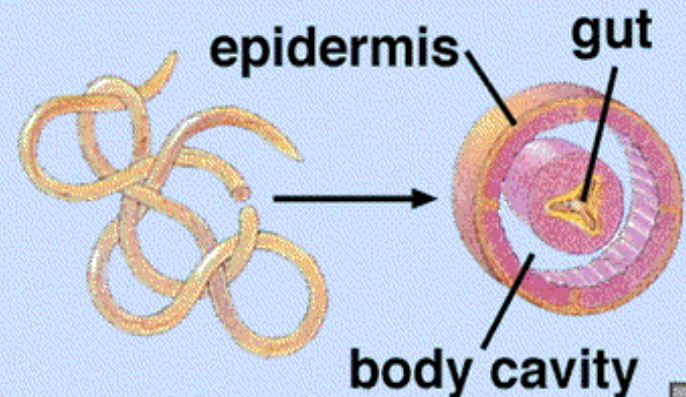
Body Cavity Types: Coelomate



3 of 3

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Body Cavity Types: Pseudocoelomate



2 of 3

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Sponges & Cnidarians



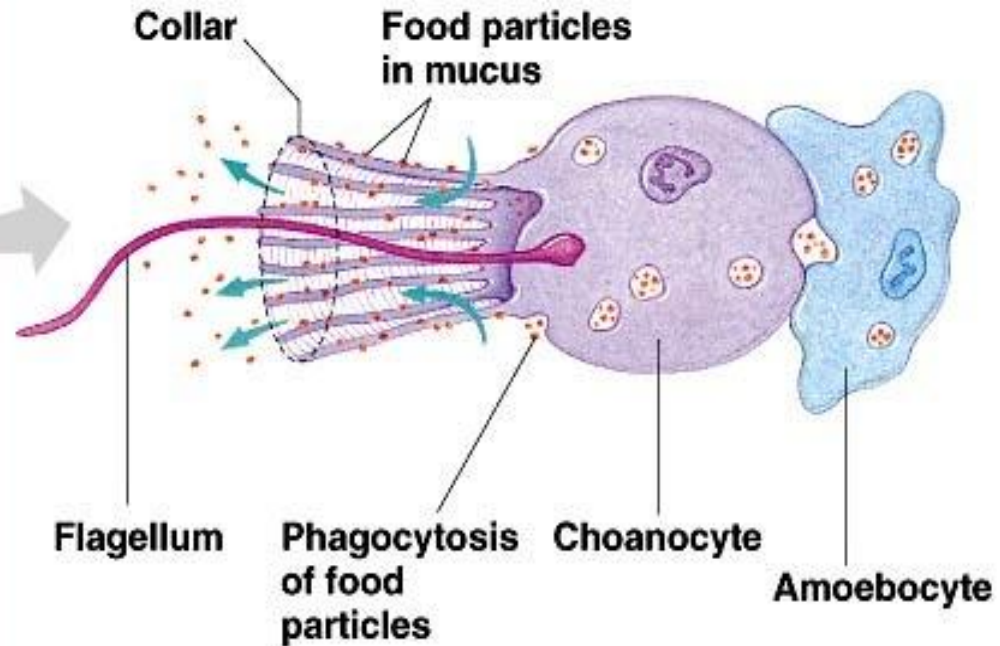
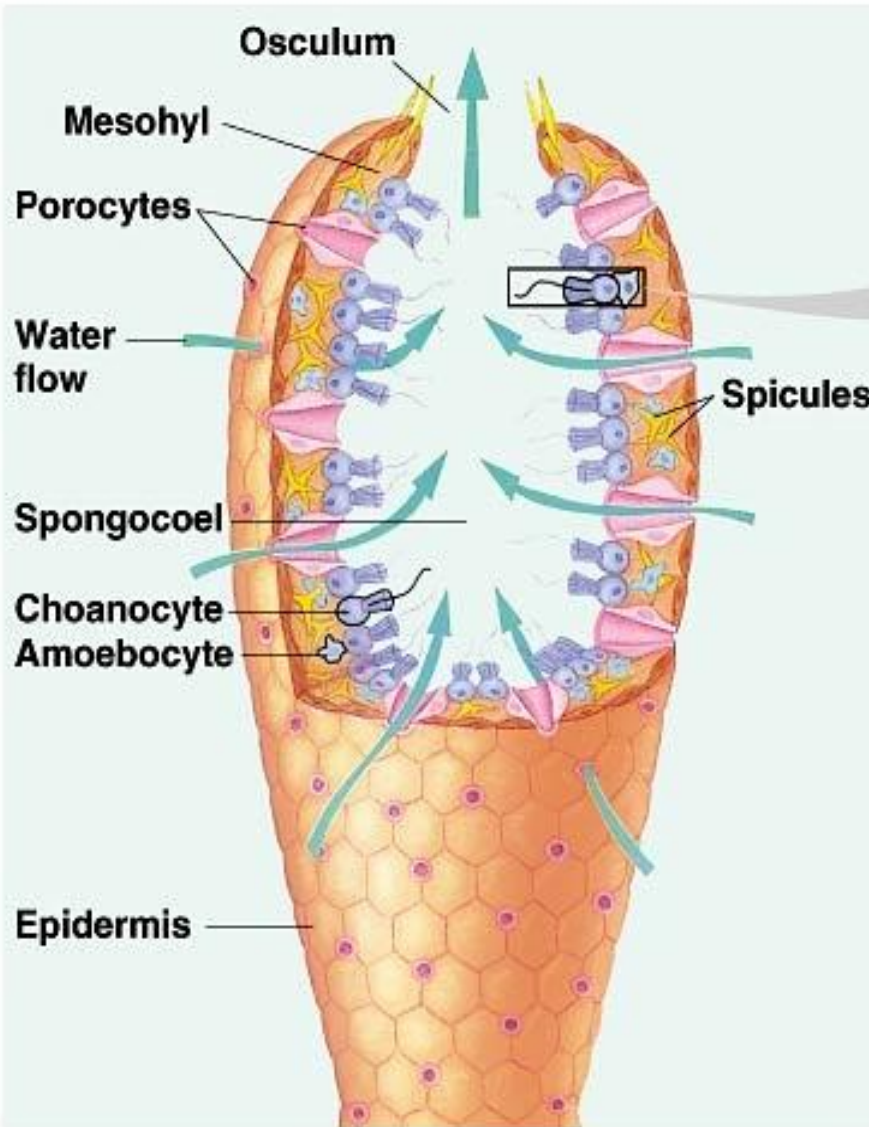
Sponges

- **In the phylum Porifera**
- **Characteristics**
 - Aquatic filter feeders
 - Most are asymmetrical
 - Adult form is sessile (doesn't move)
 - Have no tissues, organs, or organ systems or nervous system
 - Obtaining food
 - Feeds on plankton by filter feeding
 - Uses flagella to move water
 - Collars on collar cells trap plankton

*What phylum are sponges?**



Basic Body Plan



Reproduction

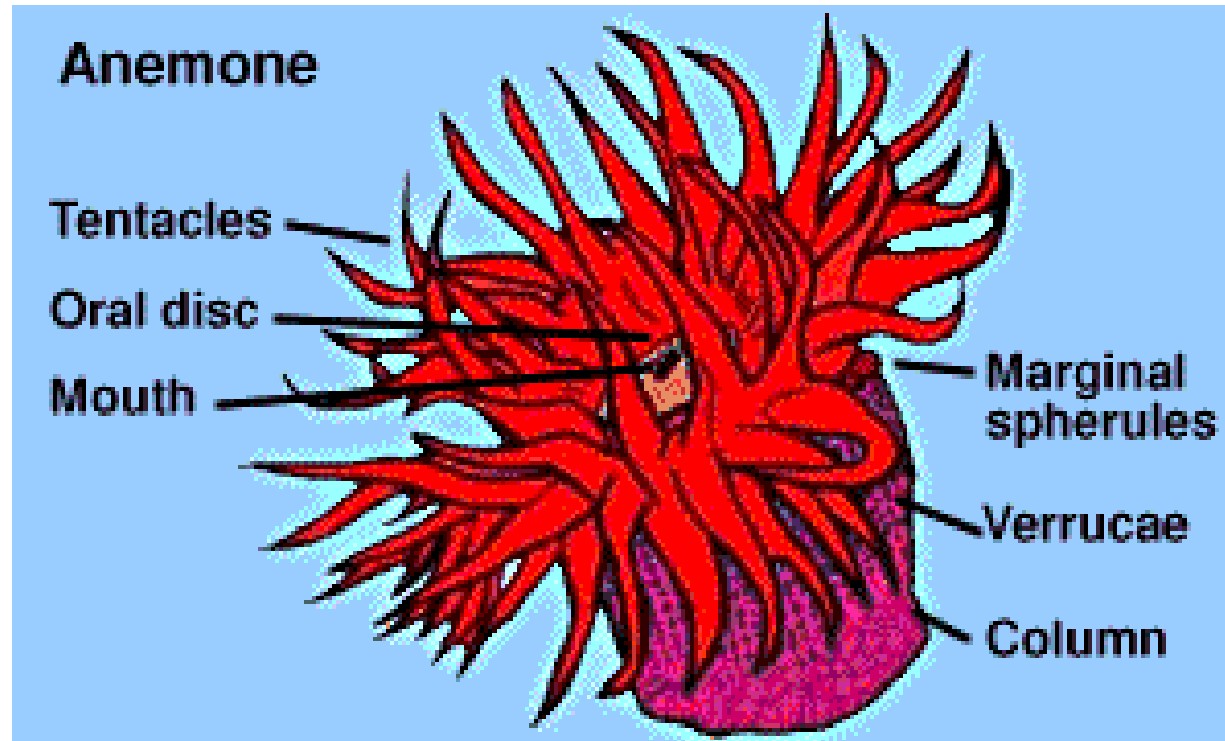
- Asexual
 - Budding, fragmentation and regeneration
- Sexual
 - Hermaphrodites
 - Have both male and female parts
 - Fertilization takes place in water
 - Larvae swims to area to start new sponge



Cnidarians

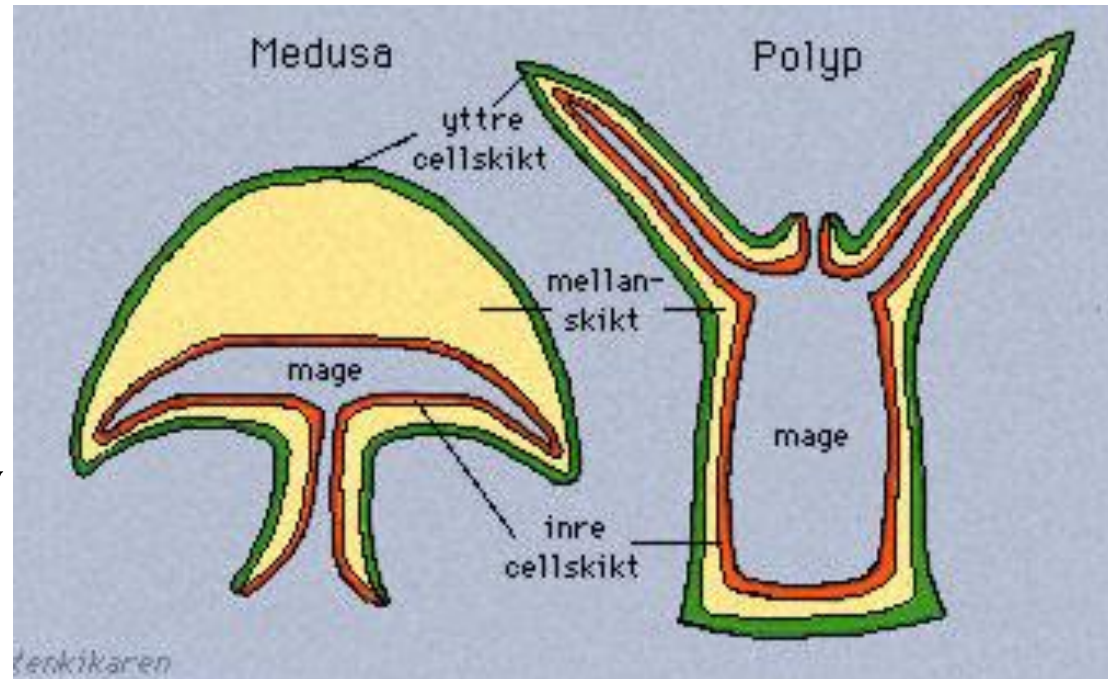
Characteristics

- Aquatic
- All have stinging cells
- Radial symmetry
- Have two cell layers (tissues)
 - Endoderm
 - Ectoderm
- Have a body cavity
- Have tentacles
- Aquatic



Two body plans

- Polyp is the sessile stage (doesn't move)
- Medusa
 - Many cnidarians have both stages
- Reproduction
 - Asexual – Polyps reproduce asexually by budding
Medusa can produce sexually and asexually
 - Sexually
 - Egg and sperm
 - Larvae stage
 - Polyp stage
 - Medusa



This group includes hydra, jellyfish, obelia, man of war, and coral







Flat worms and Round worms



Tapeworm



Flatworms are in the phylum
Platyhelminthes

characteristics

- **bilateral symmetry**
- **soft flattened body**
- **3 tissue layers**
- **Incomplete digestive system**
- **definite organs**
- **nervous tissue**
- **many are parasites but some are free living**

Planarians

- Free living
- Hermaphrodites
- Can reproduce asexually by dividing and regeneration

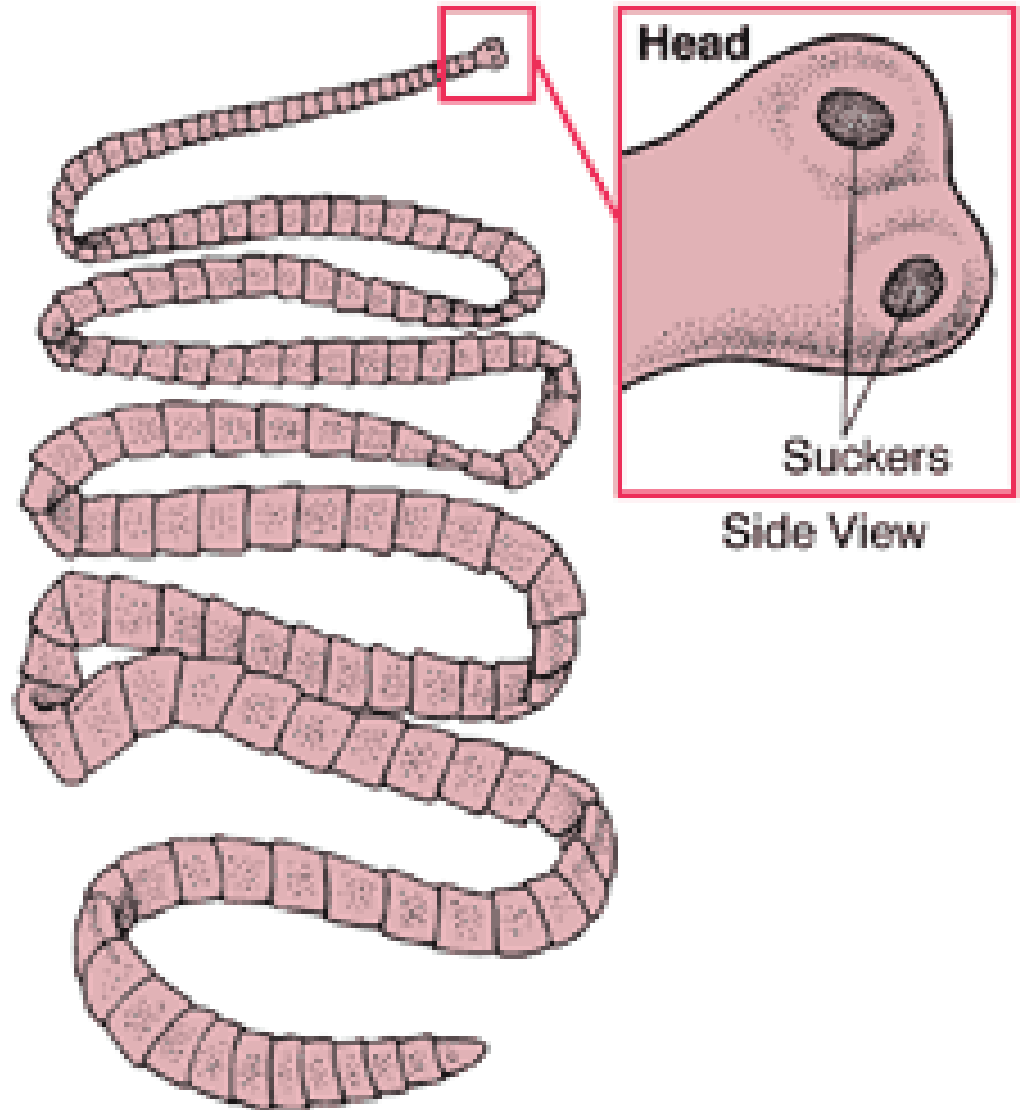
www.planarians.org

Dugesia dorotocephala



Tape Worms

- Parasitic
- Hermaphrodites



Round worms

Phylum nematoda

- **Characteristic**
 - **Complete digestive system**
 - **3 tissue layers**
 - **organs present**



Types of Roundworms

- Ascaris – round and pin worms common human parasites
 - Trichinella
 - Hook worms
 - Heart worms
 - Filarial worms
 - Many in Large intestine
 - 64% of worlds population
 - 30% of children in US
 - 16% of the adults in the US



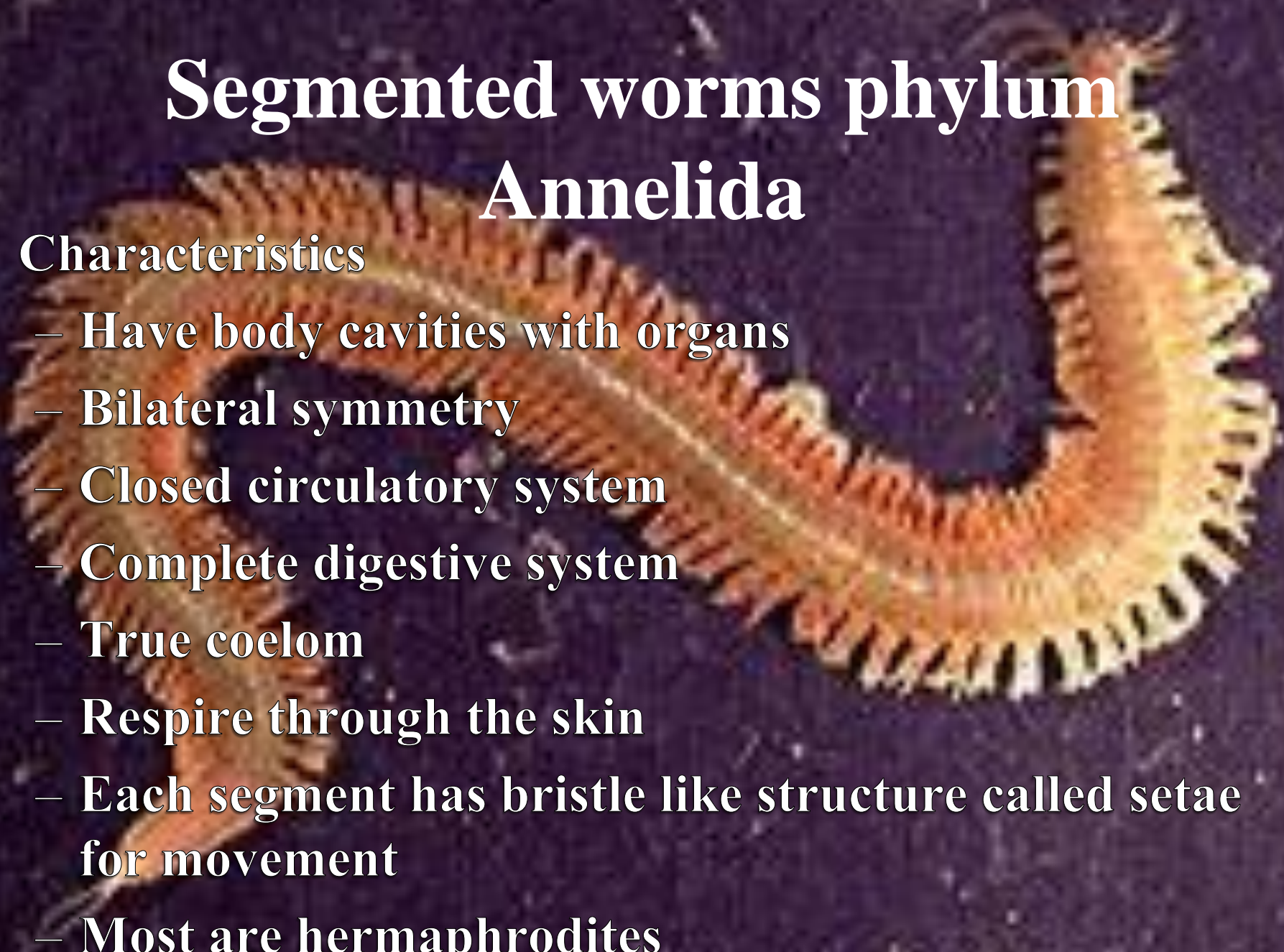
Quiz

1. Animals are divided into two groups.
What are the two groups?
2. What are the three types of symmetry?
3. What are the three developmental layers of complex organisms?
4. What is the difference between coelom, acoelom and psuedocoelom?

Segmented worms phylum

Annelida

- **Characteristics**
 - Have body cavities with organs
 - Bilateral symmetry
 - Closed circulatory system
 - Complete digestive system
 - True coelom
 - Breathe through the skin
 - Each segment has bristle like structure called setae for movement
 - Most are hermaphrodites



General structure of the earth worm

- **Systems**

- **Digestive**

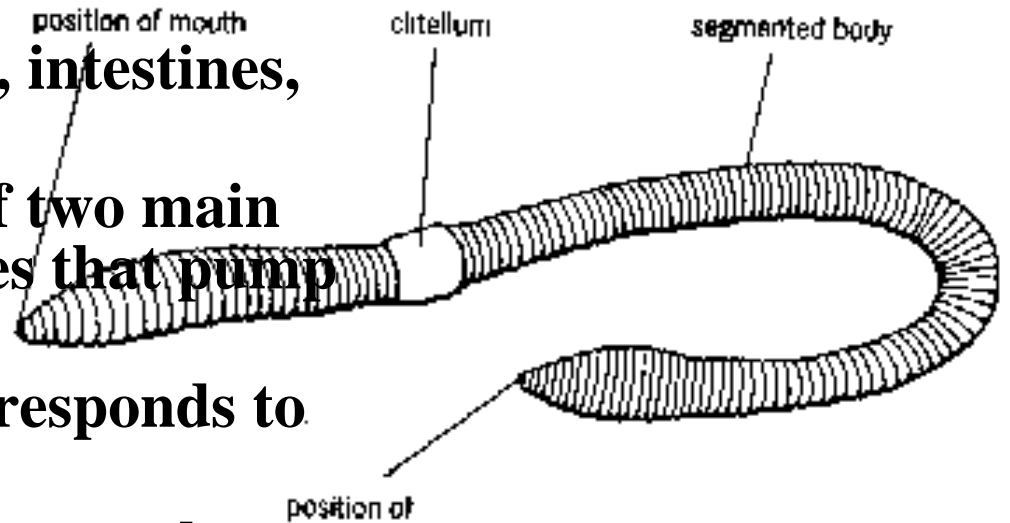
- **Mouth, crop, gizzard, intestines, anus**

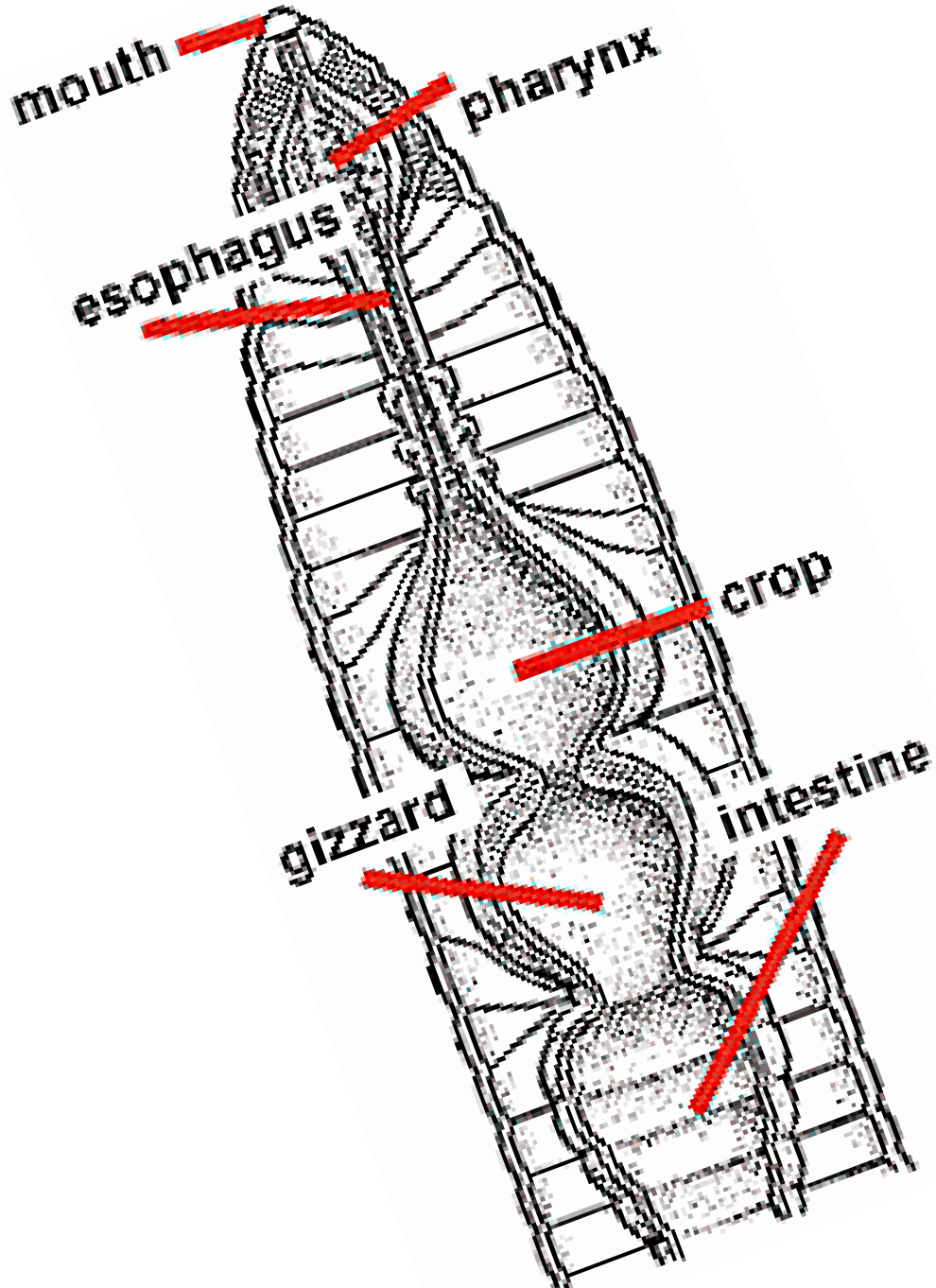
- **Circulatory system of two main vessels, 5 aortic arches that pump blood**

- **Nervous system that responds to the environment**

- **Respiratory system that exchanges oxygen and carbon dioxide through the skin**

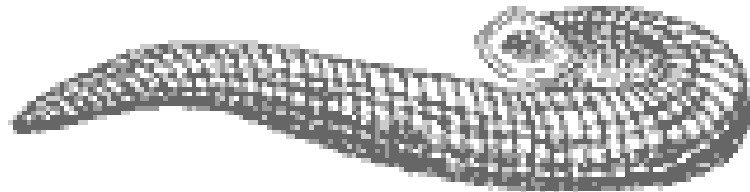
- **Reproductive system (hermaphrodite)**





Leeches

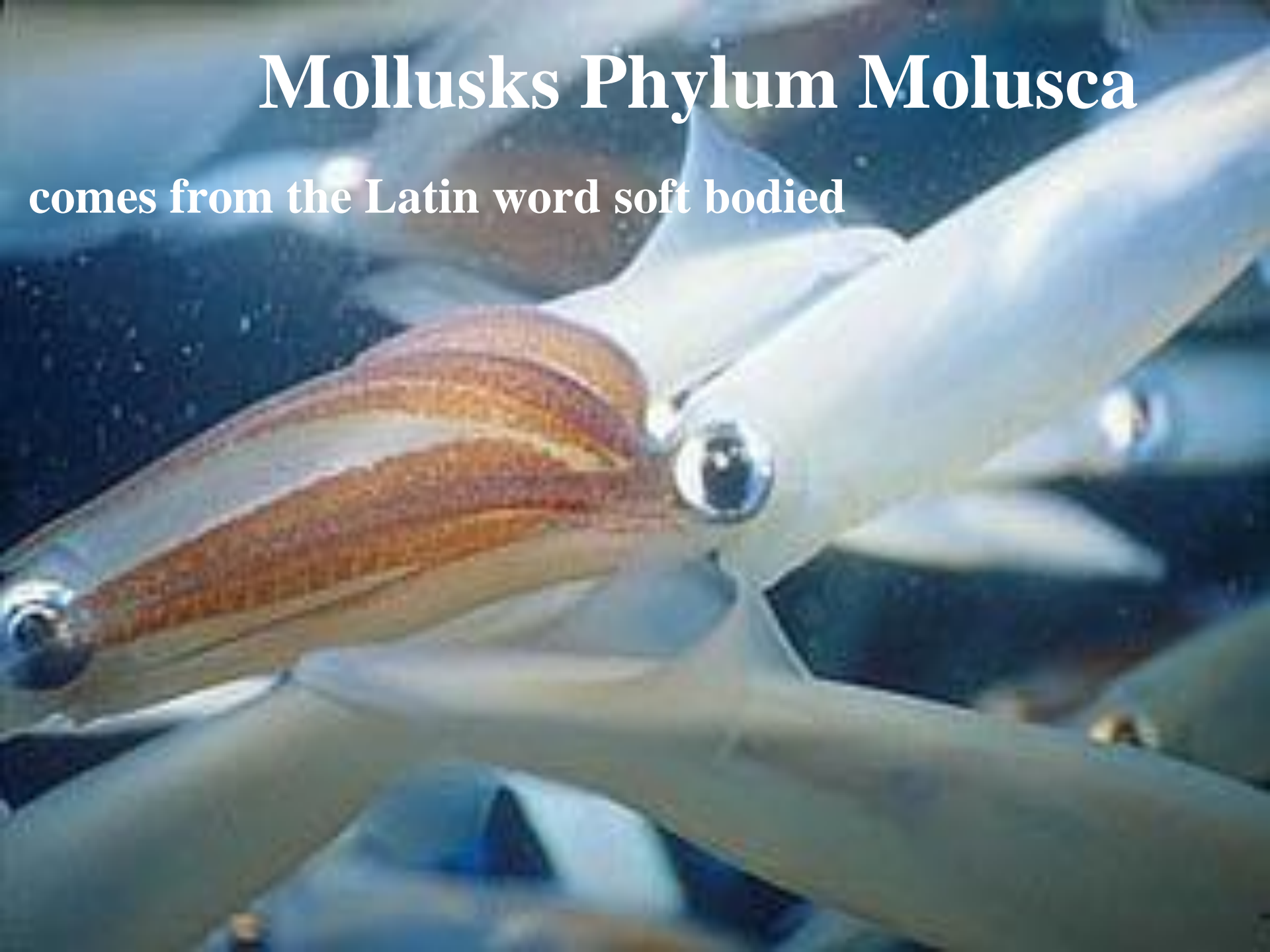
- Don't have setae
- Feed blood from other organisms
Saliva contains anti clotting chemical



- Marine worms - polychaetes

Mollusks Phylum Mollusca

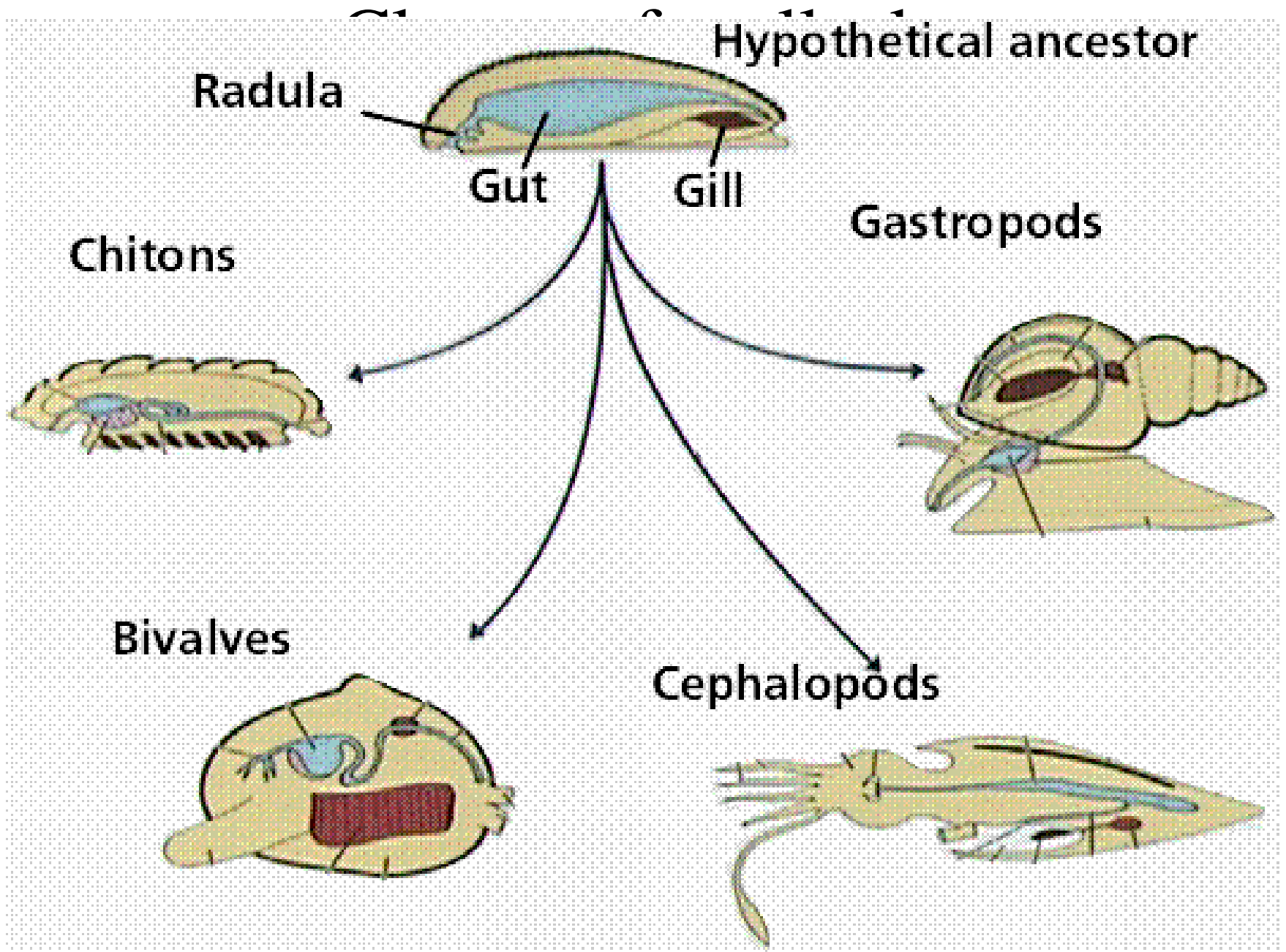
comes from the Latin word soft bodied



Characteristics of Mollusks

- **Soft Bodied**
- **Bilateral symmetry**
- **True coelom**
- **Nervous system**
- **Mantle - thin layer of tissue that secretes a shell**
- **Gills - water to organism CO_2 , O_2 exchangers**
- **Visceral mass – contains body organs**
- **Muscular foot - means of movement**
- **Open Circulatory system**
- **Classified by movement (Kind of foot) or shell**





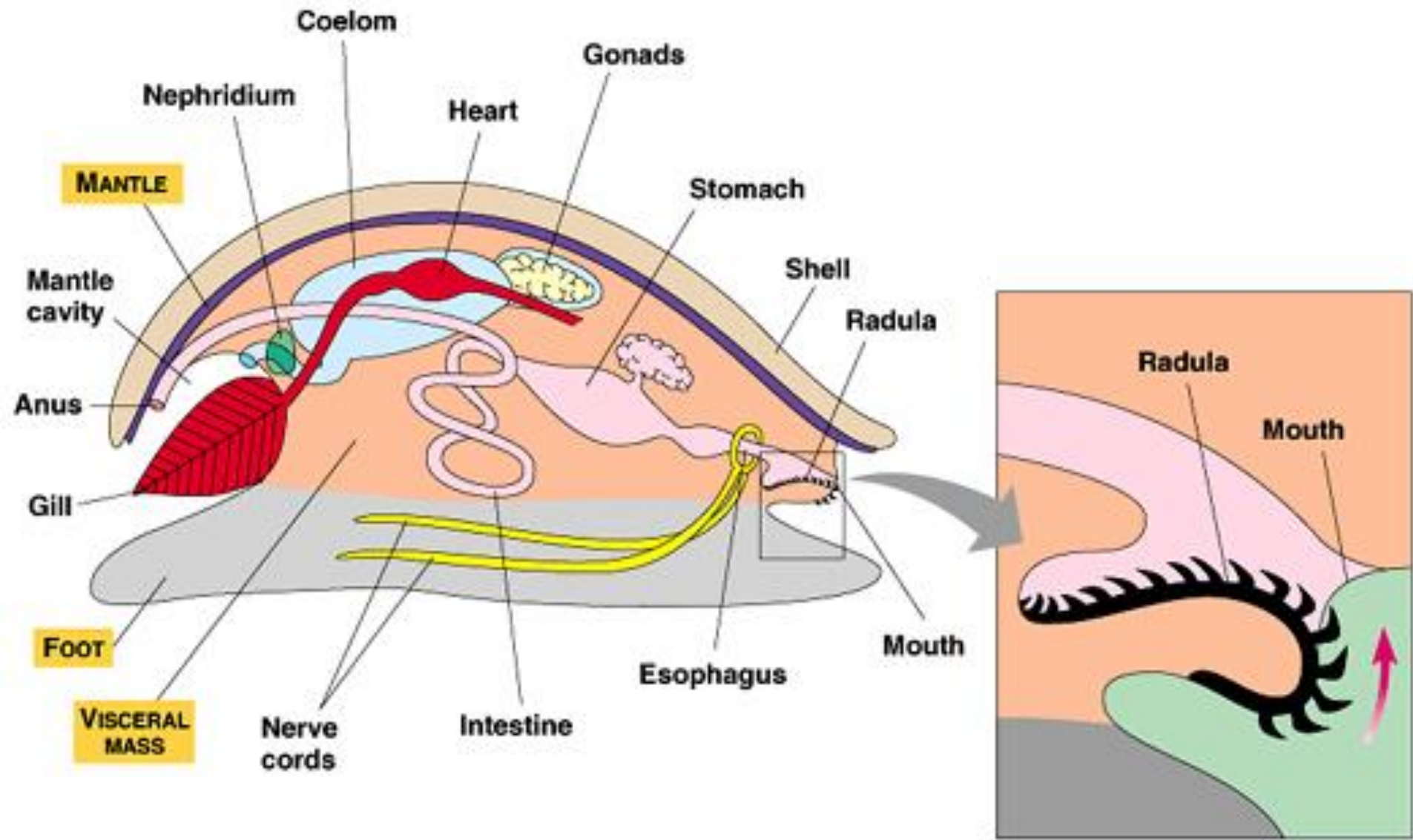
Gastropods

- **Gastro means stomach and pod means foot**
- **Includes snails, slugs, abalones, whelks, conches, sea slugs**
- **All have single shells and or move on stomach by mucus**
- **All have a radula for scraping algae and other food**





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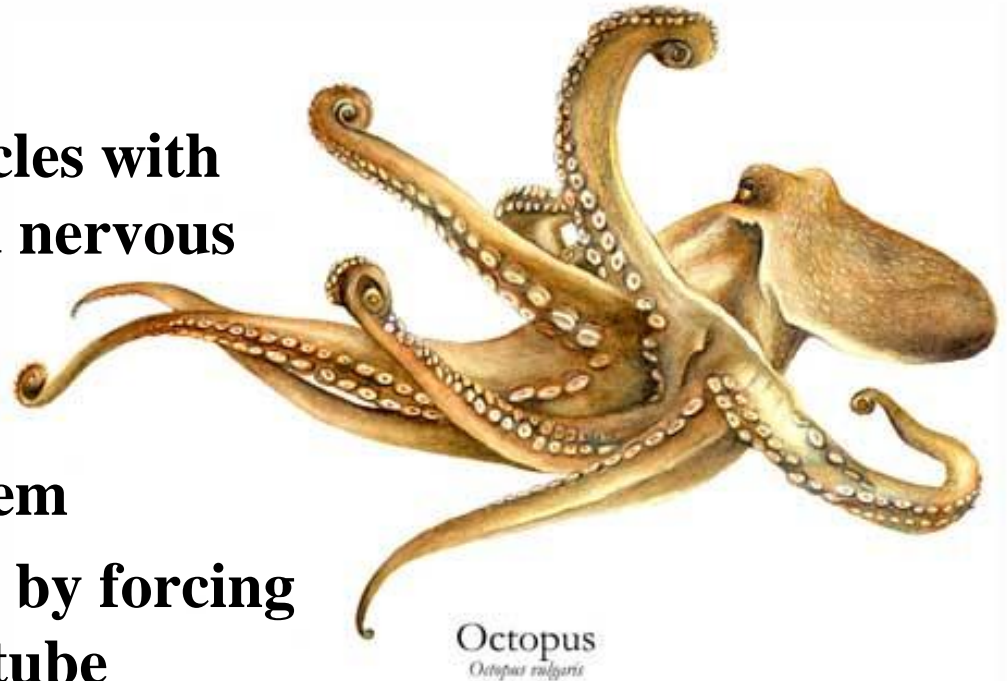
Bivalves

- Means two shells
- Includes clams, oysters, scallops and
- Mussels
- Filter feeders
- Two part shell
- Move by opening and closing shell



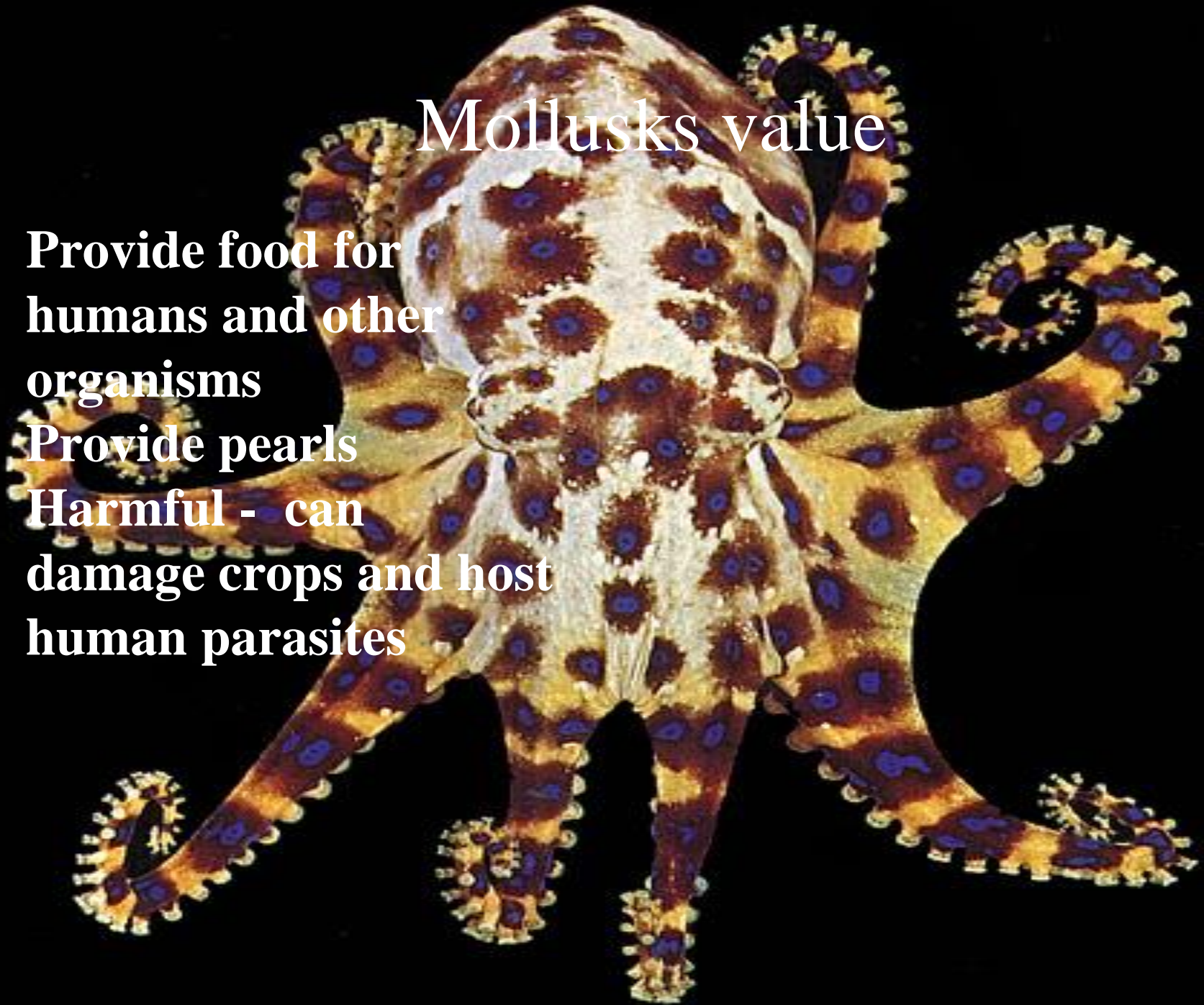
Cephalopods

- **Means head foot**
- **Well developed head**
- **Foot divided into tentacles with suckers, well developed nervous system**
- **Large eyes**
- **Closed circulatory system**
- **Move by jet propulsion by forcing water out their siphon tube**



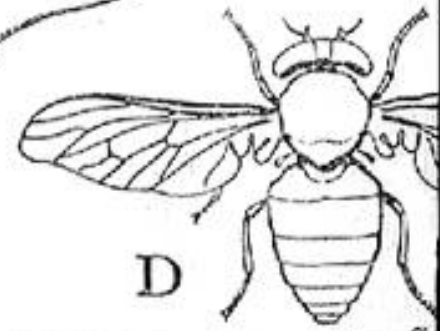
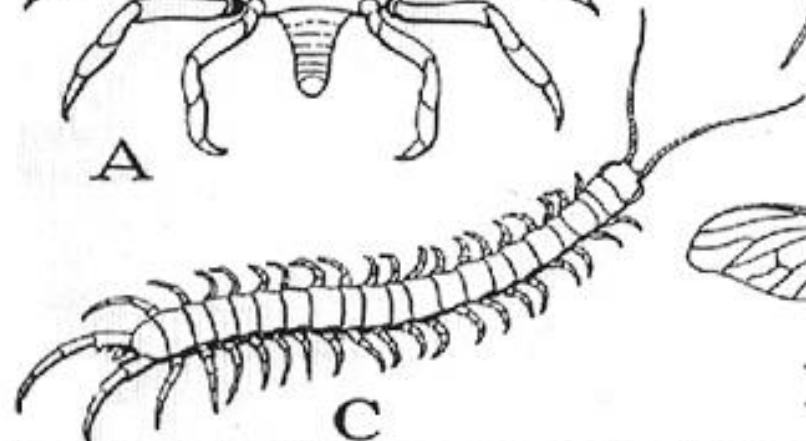
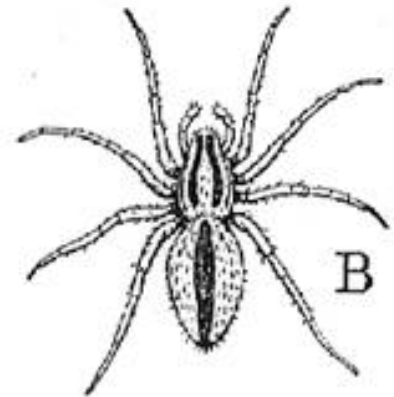
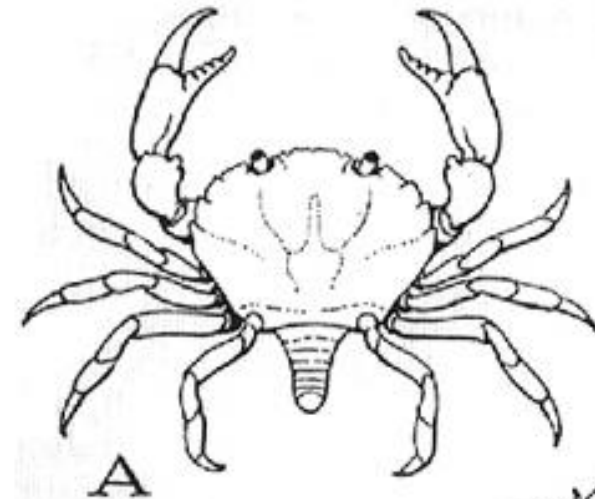
Mollusks value

- **Provide food for humans and other organisms**
- Provide pearls**
- Harmful - can damage crops and host human parasites**



Arthropods

- Phylum arthropoda
- Name means jointed foot
- Largest phylum



Arthropods Characteristics

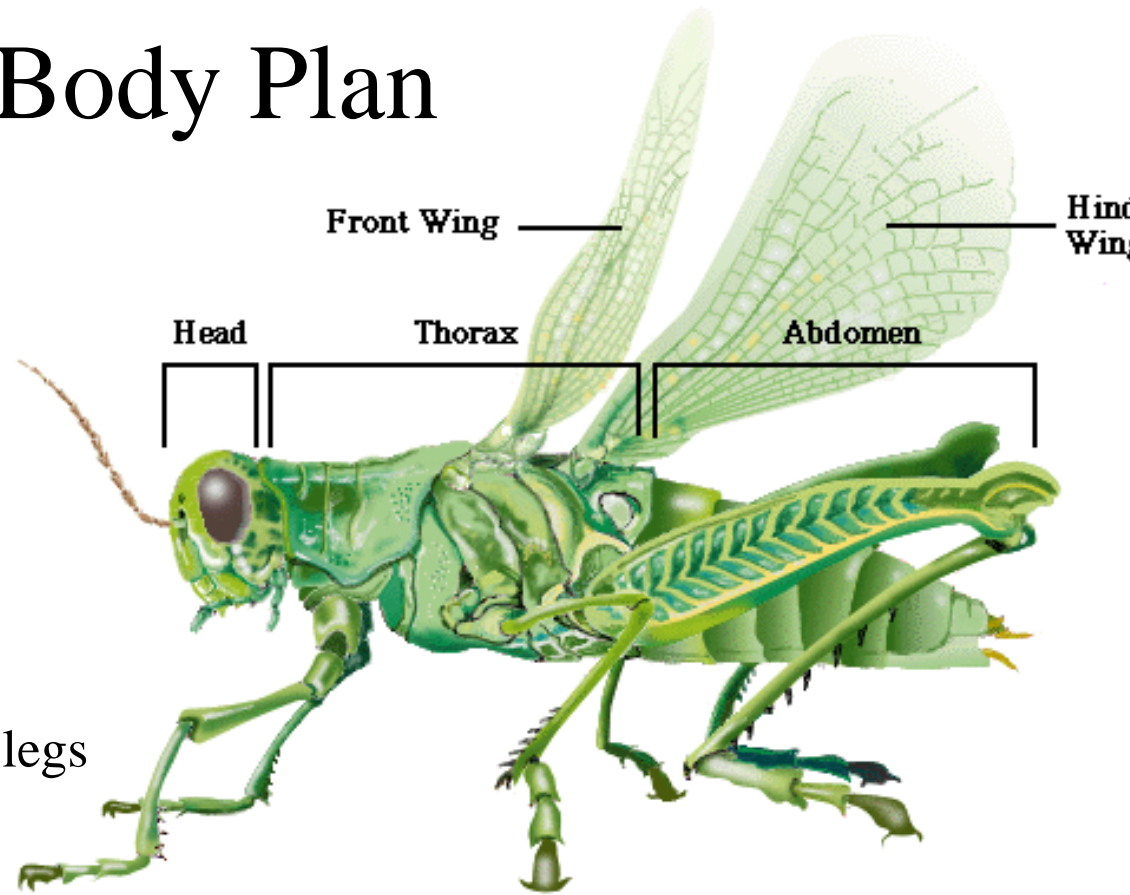
- Have segmented bodies
- True coelom
- Open circulatory system
- Have appendages
- Have body cavity and an open circulatory system
- Complete digestive system
- Nervous system with brain
- Exoskeletons made from chitin
- Organism molts exoskeleton when it grows

Class insecta



Insect Body Plan

- Head
 - Antennae
 - Eyes
 - Mouth
- Thorax
 - Three pairs of jointed legs
 - 1 or 2 pair of wings
- Abdomen
 - Segmented with spiracles for breathing
 - Reproductive structures
 - Reproduction - separate sexes and female lays eggs



Insect Metamorphosis



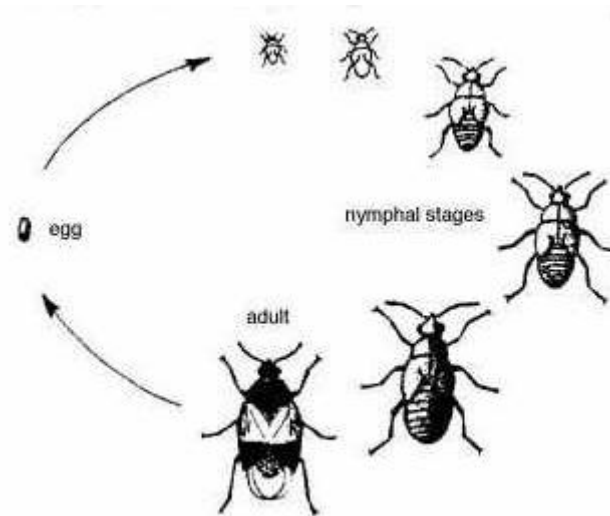
- Changes that a species goes through becoming an adult

- Complete

- Egg
- Larvae
- Pupa
- Adult

- Incomplete

- Egg
- Nymph
- Adult



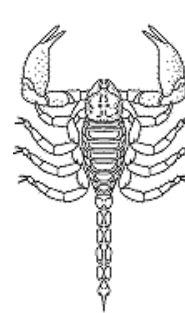
Arachnids

- class arachnida

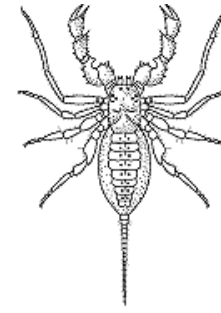
- Characteristics

- 2 body regions
 - Cephalothorax
 - Abdomen
- 4 pairs of legs
- Spiracles and book lungs

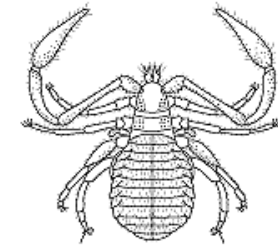
- Includes ticks, mites, scorpions, spiders, tarantulas, harvestman



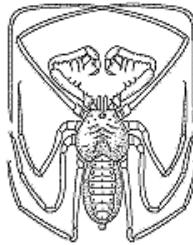
Scorpiones



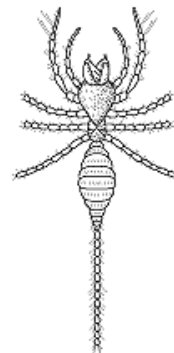
Uropygi



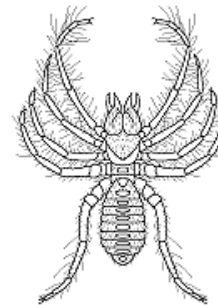
Pseudoscorpiones



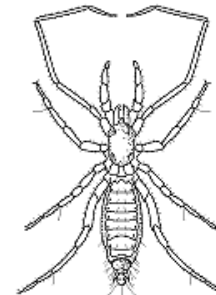
Amblypygi



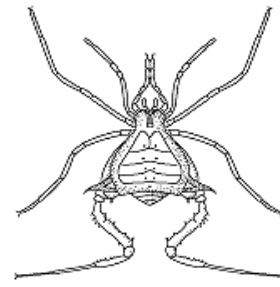
Palpigradi



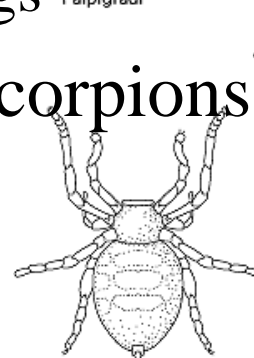
Solpugida



Schizomida



Opiliones



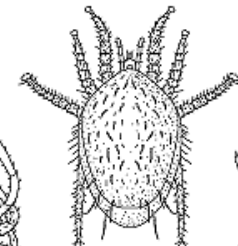
Ricinulei



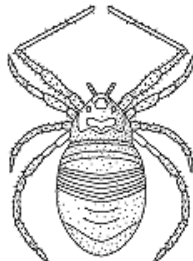
Acariformes



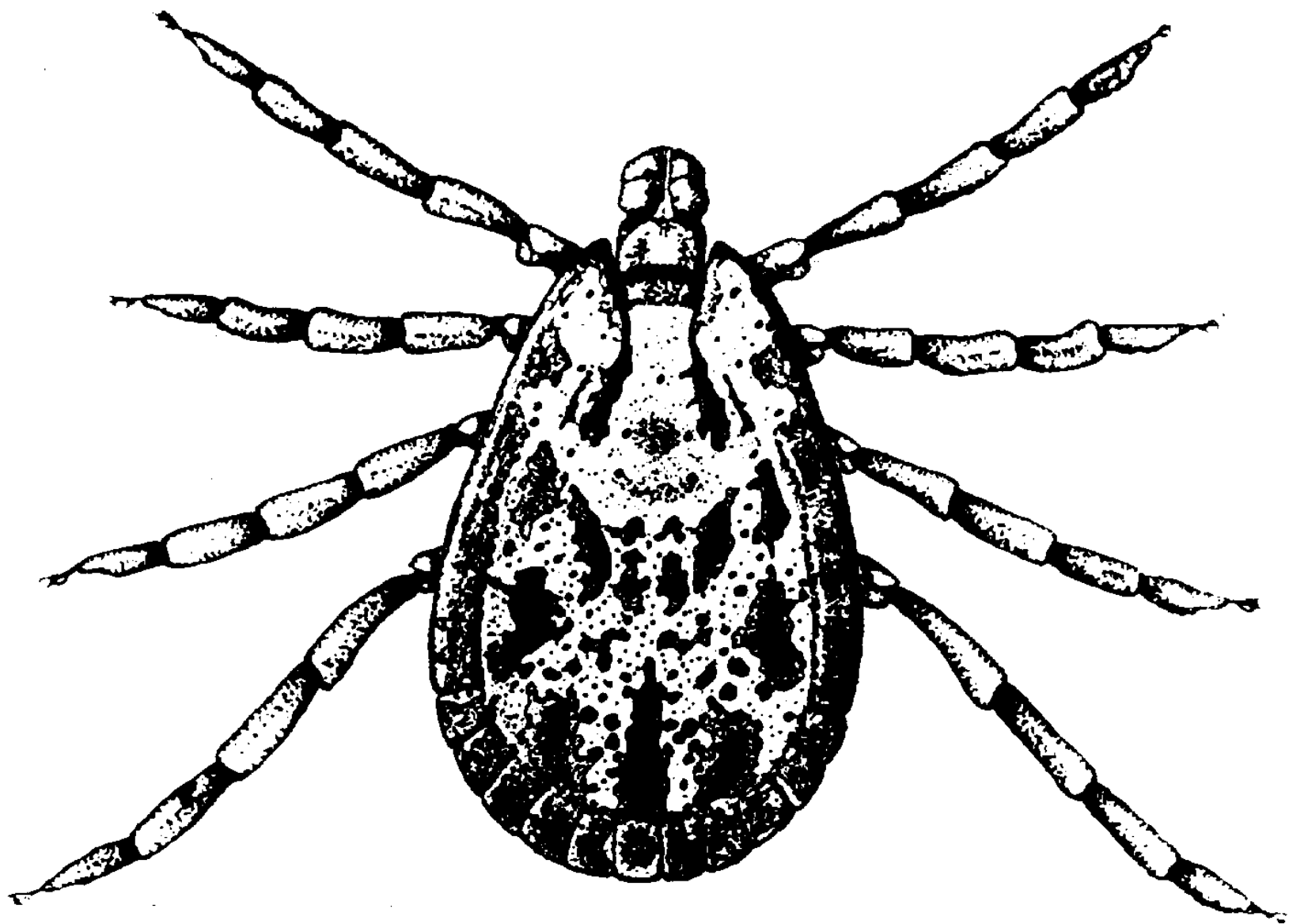
Araneae



Parasitiformes



Notostigmata

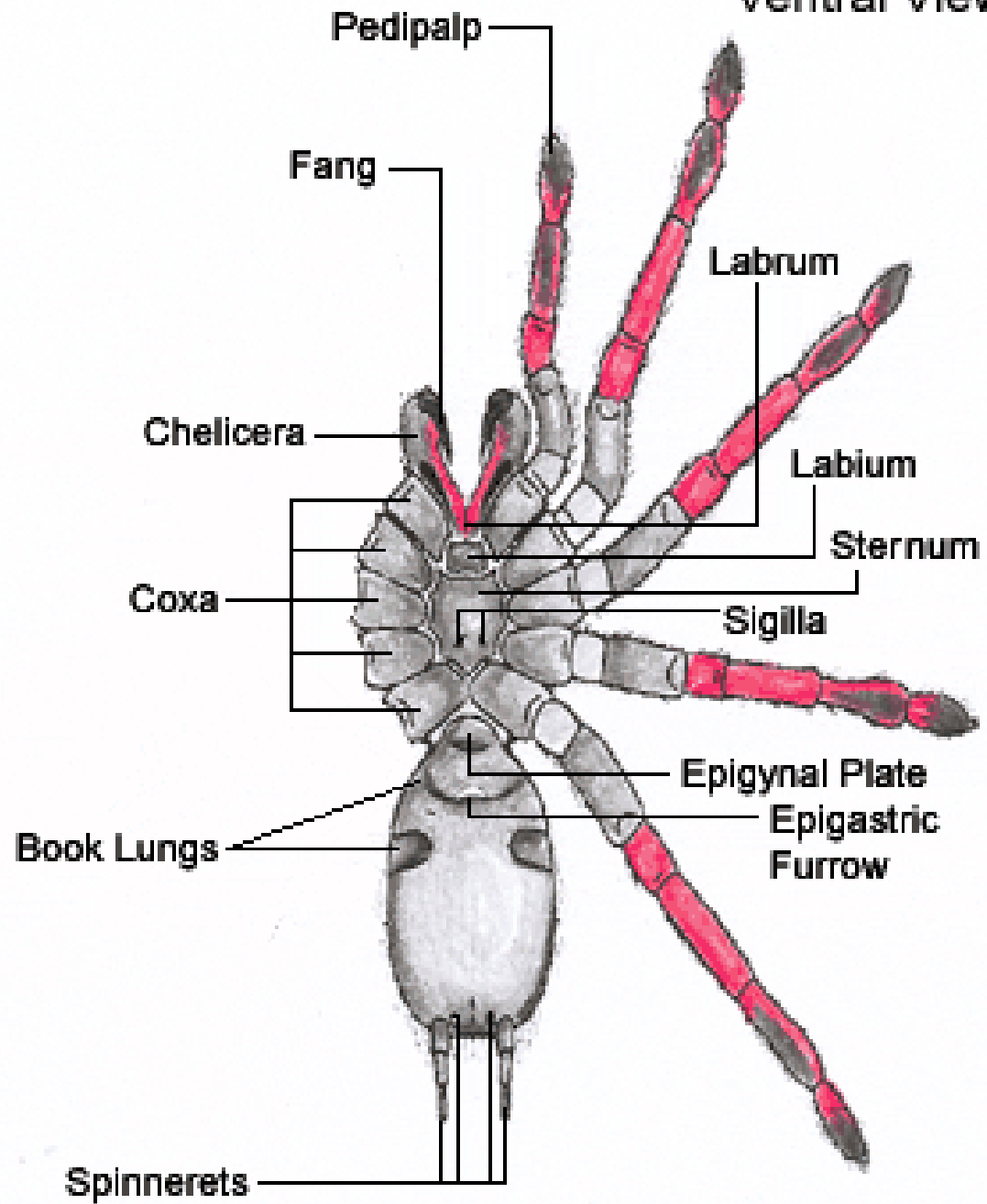




A spider that
eats other
spiders . . .



Ventral View



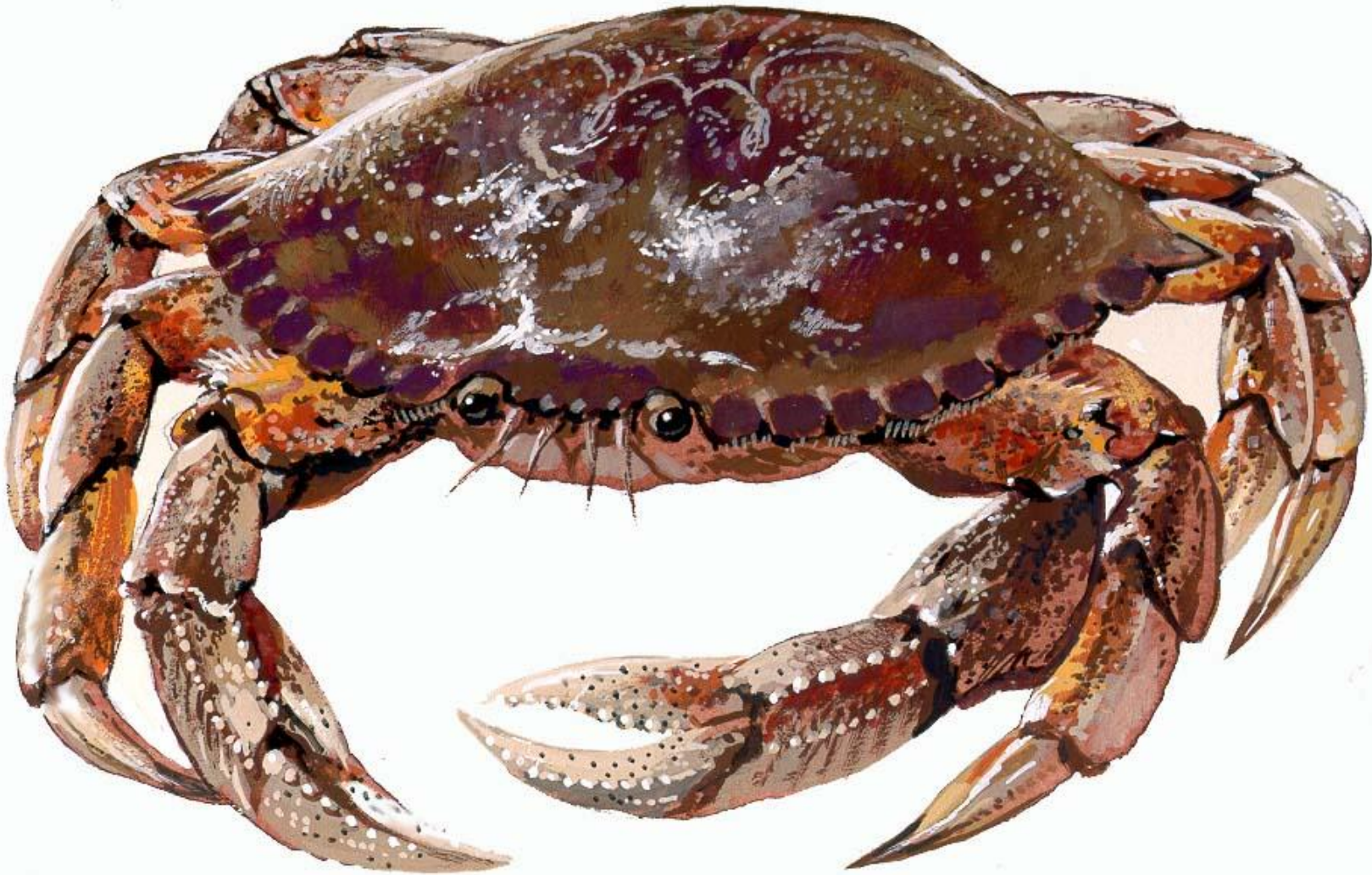
Centipedes and Millipedes

- Centipedes are predacious
- Millipedes are herbivorous
- Centipedes have 1 pair of legs /segment
Millipedes have 2 pair of legs /segment



Crustaceans

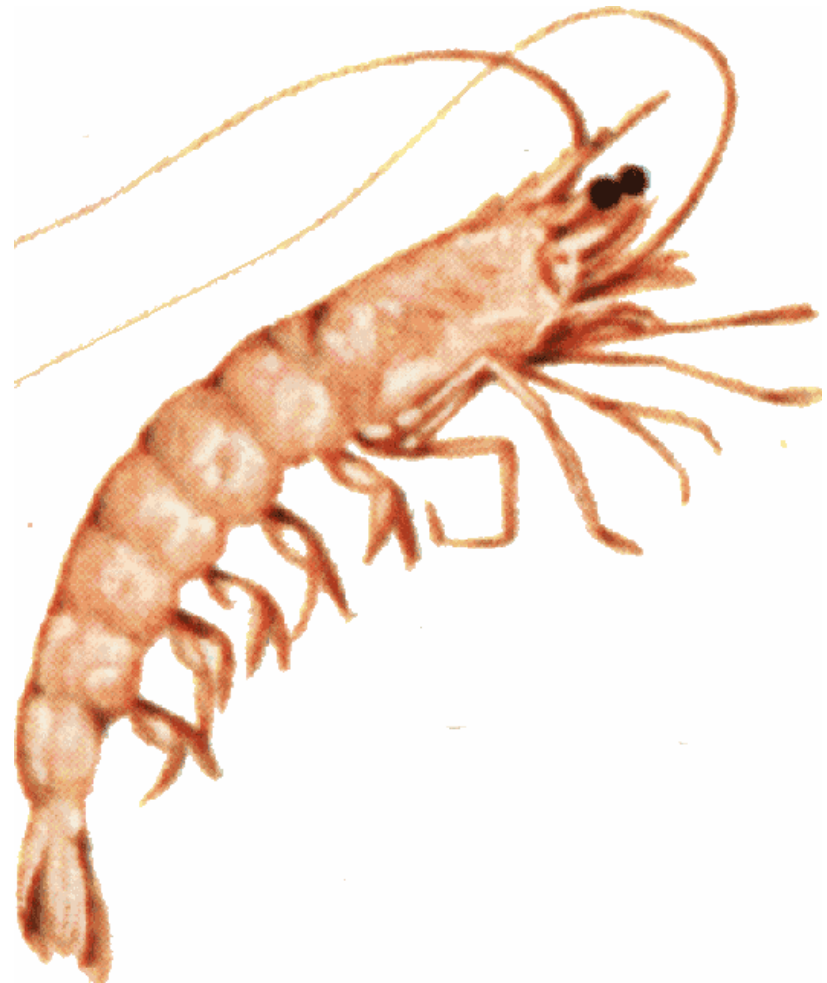
- **Class crustacea**



Characteristics

- **Jaws called mandibles – crush food**
 - **1 and 2 antennae**
 - **Have 1,2 or 3 body segments**
 - **5 pairs of legs**
 - **The first pair of many have claws to catch and hold food**
 - **2cnd pair – 5th used for moving**
 - **Some have five pair of appendages on abdomen called swimmeret's**
 - **For movement, reproduction and water over gills**
 - **Can regenerate appendages**
- Examples include lobster, crab crayfish, shrimp, and pill bugs**



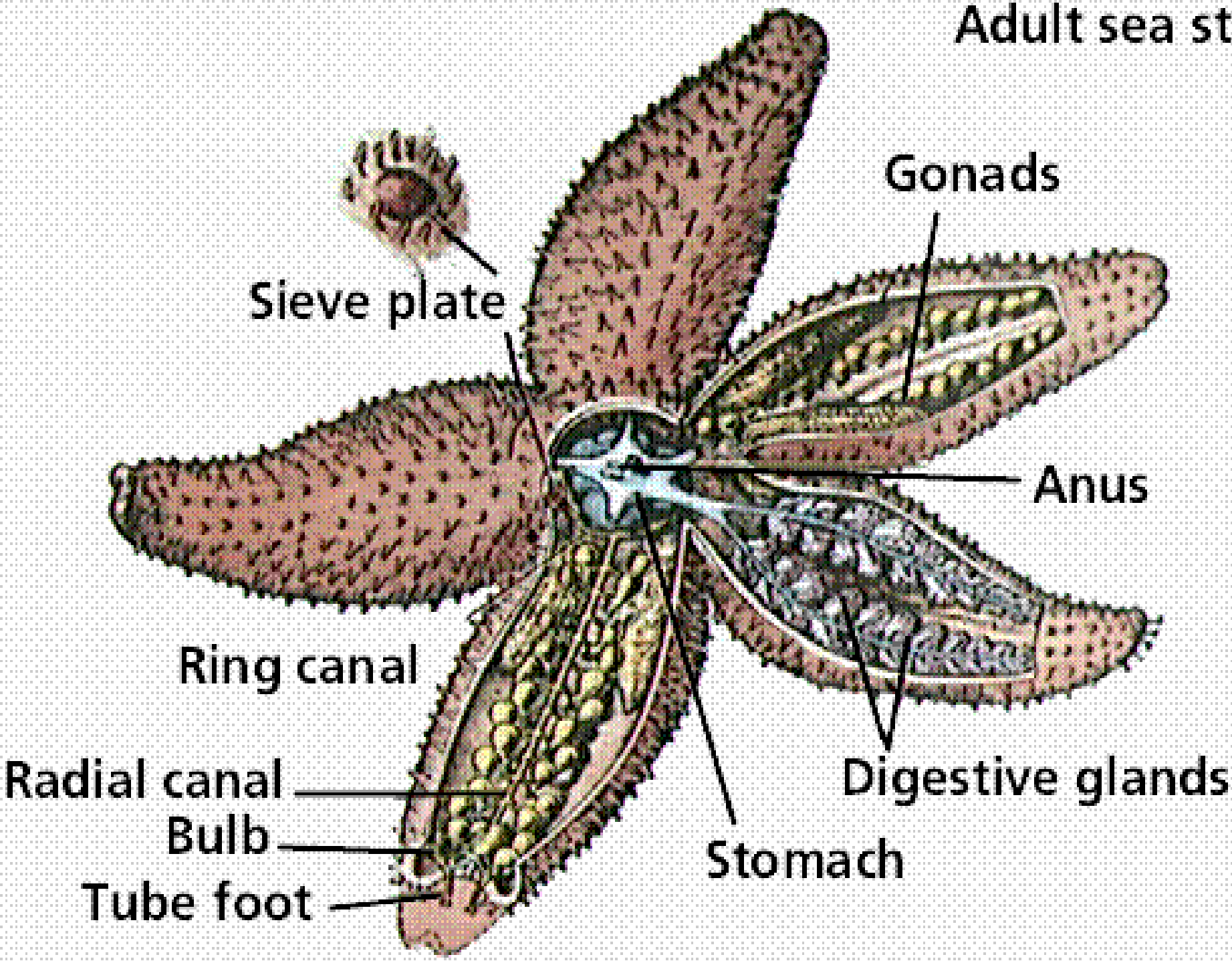


Echinoderms Phylum Echinodermata

- **Spiny skinned animals**
- **Characteristics**
- **Marine bottom dwellers**
- **Internal skeleton of Calcium Carbonate plates covered by a spiny skin**
- **Have a water vascular system**
- **Tube feet**
- **Ring canal**
- **Do not have a complete digestive system**

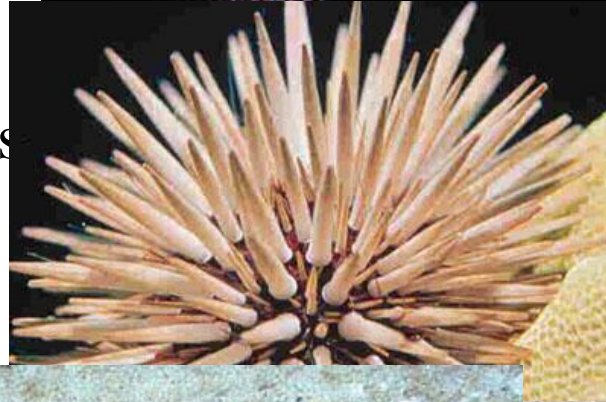


Adult sea star



Echinoderm classification

- Sea stars – 5 or more arms around a central point
- Brittle stars - move more quickly and break off parts as defense
- Sea Urchins and sand dollars
- Sea cucumbers

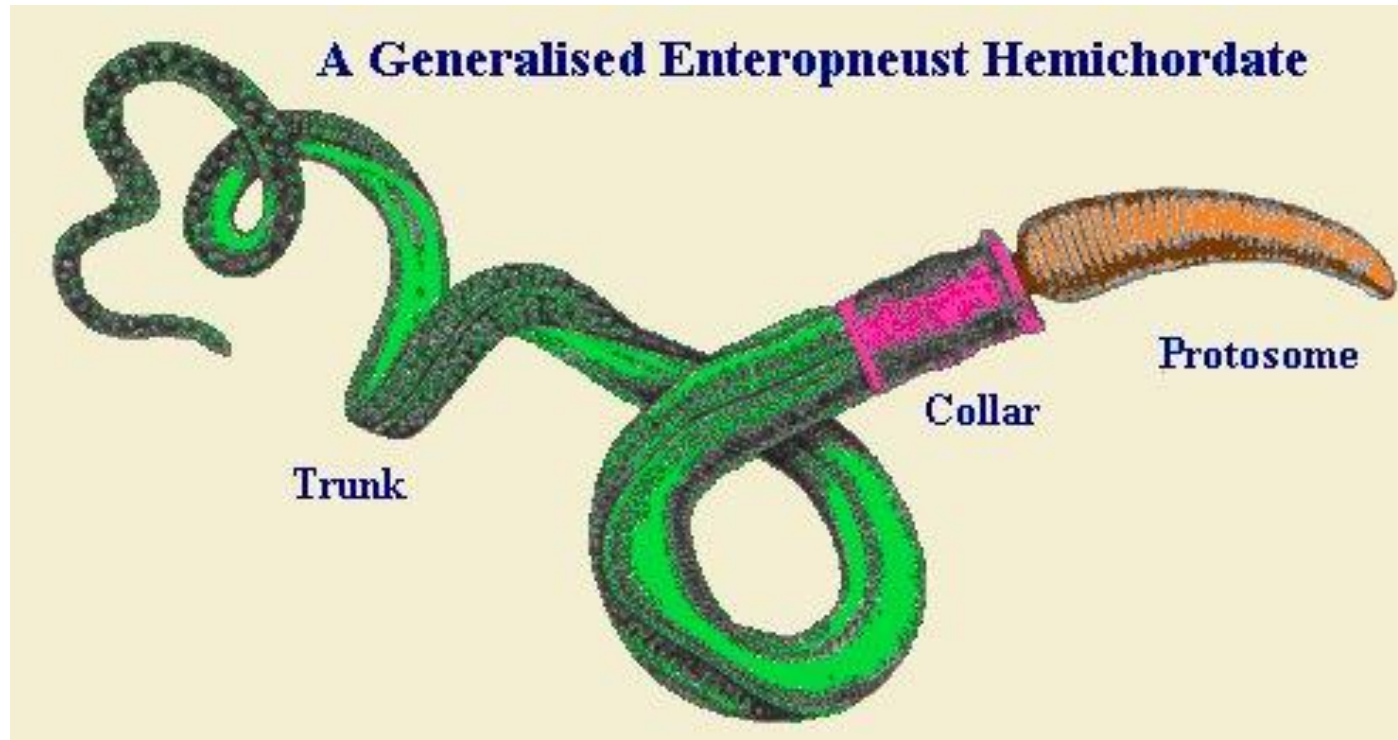


Quiz

1. Name and explain the two body forms of many cnidarians.
2. What organisms are included in the cnidaria group?
3. What organisms are included in the phylum Platyhelminthes?
4. What characteristic do round worms have that flat worms, cnidarians, and porifera did not have?
5. Give two distinguishing characteristics of the annelids that make them different than nematods, flat worms, cnidarians and porifera.
6. What are the three main classes of mollusks and give an example of each.
7. What does the word arthropoda mean?
8. Give three of the five classes of arthropods given in your notes and give and
9. What are three examples of the phylum echinodermata.

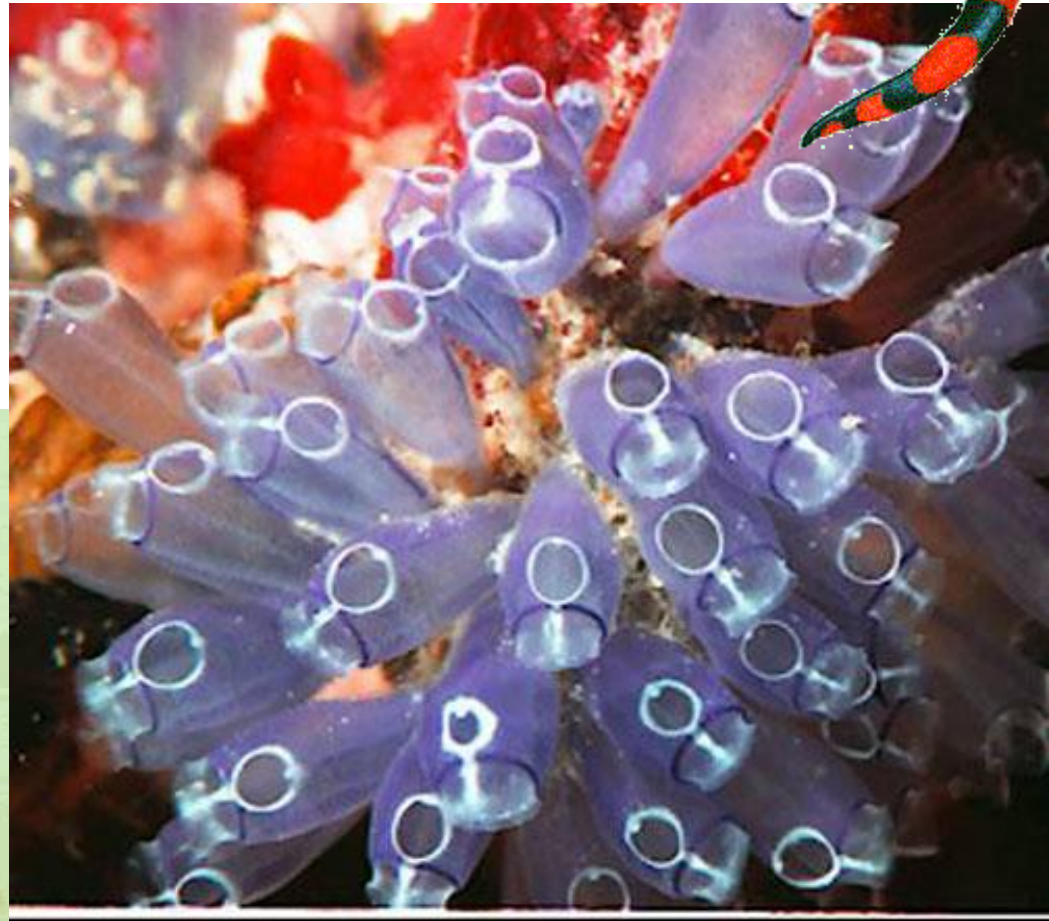
Hemichordates

- Characteristics
 - Dorsal Nerve cord different than chordate
 - Gill slits or pouches sometime in life
 - Notochord

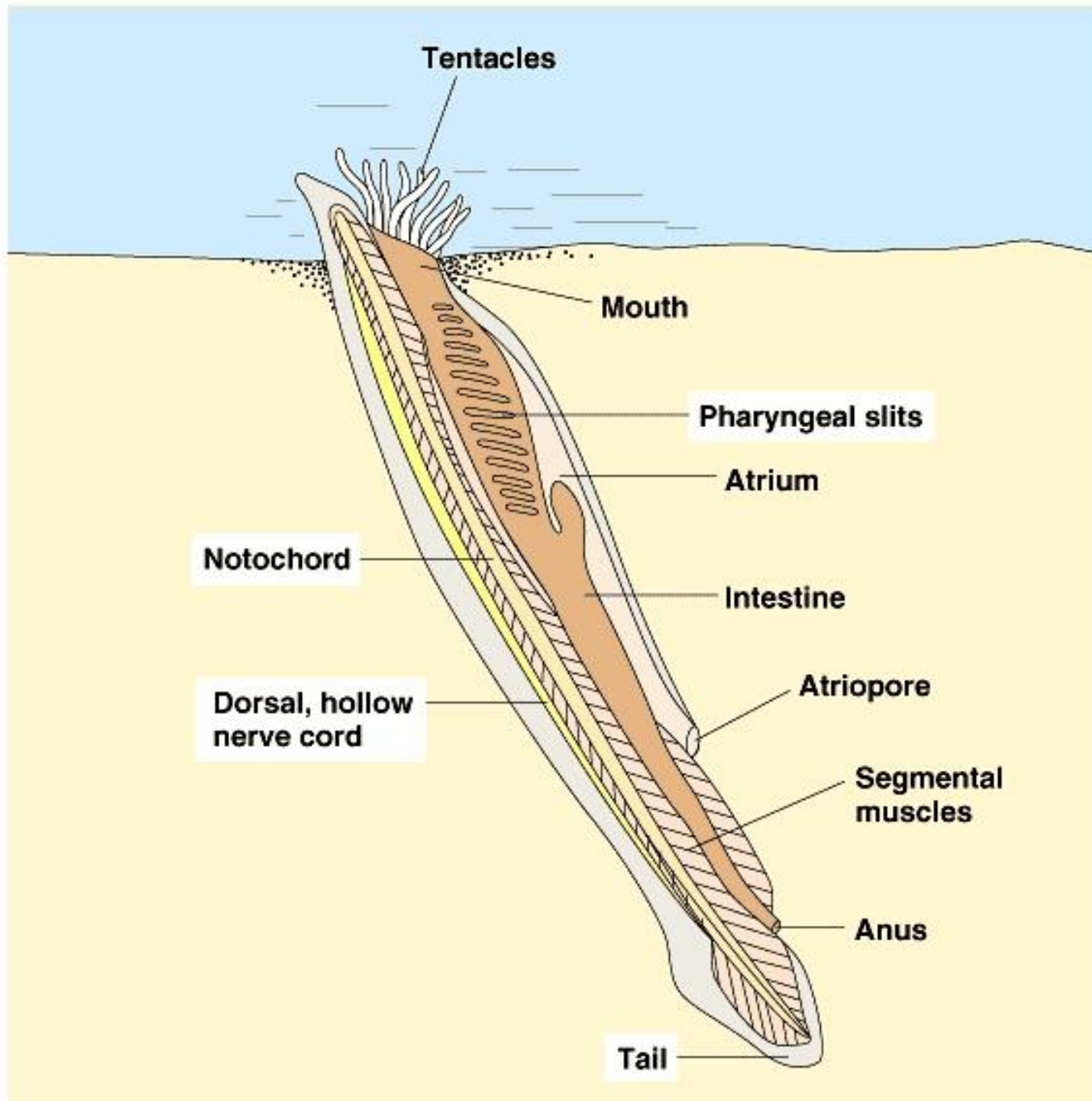


Chordates

- **Phylum Chordata**
- **Three subphyla**
 - **Vertebrates**
 - **Tunicates**
 - **Lancelets**

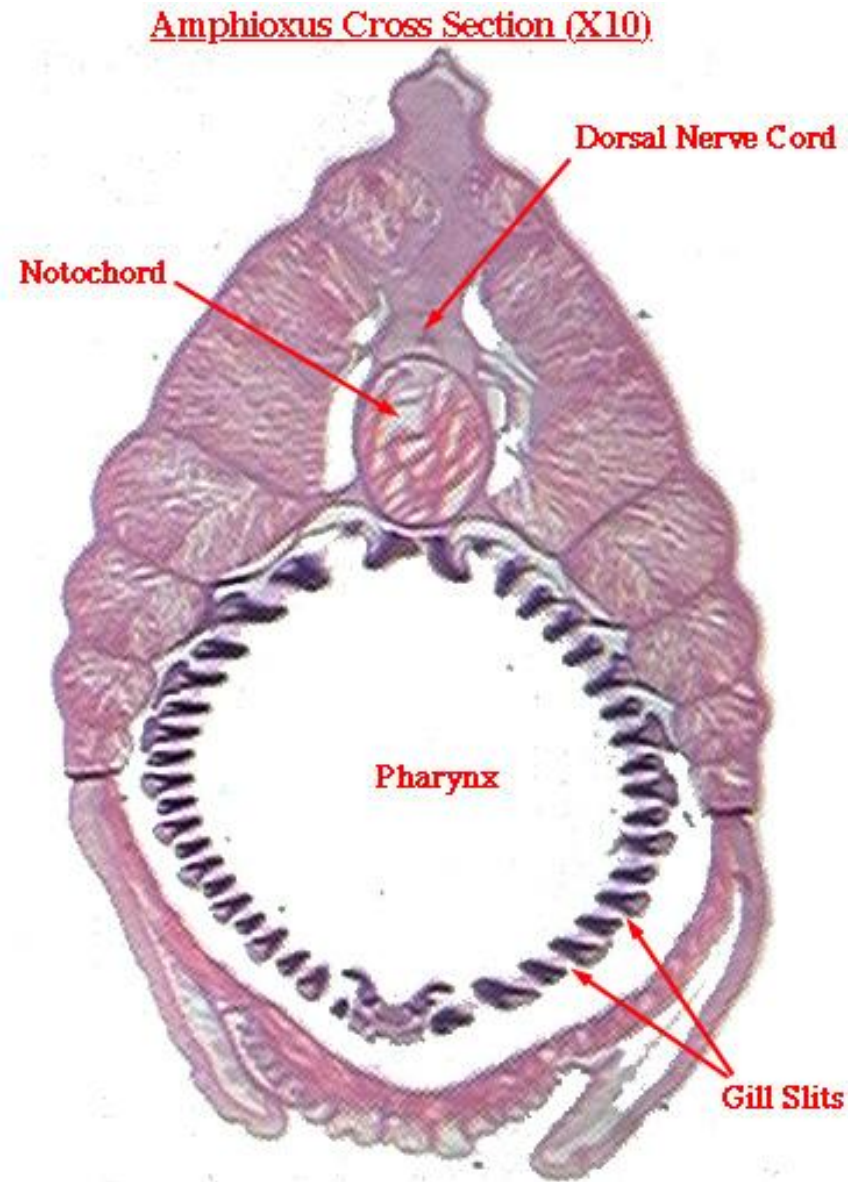


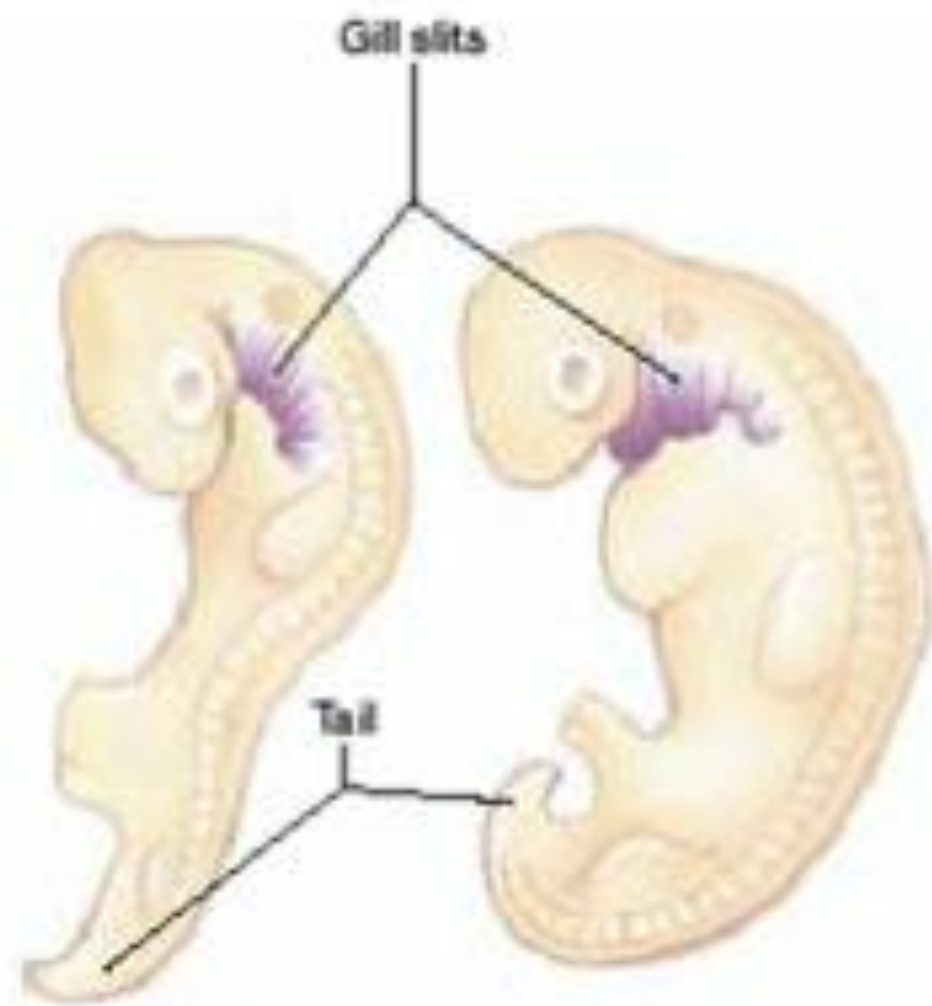
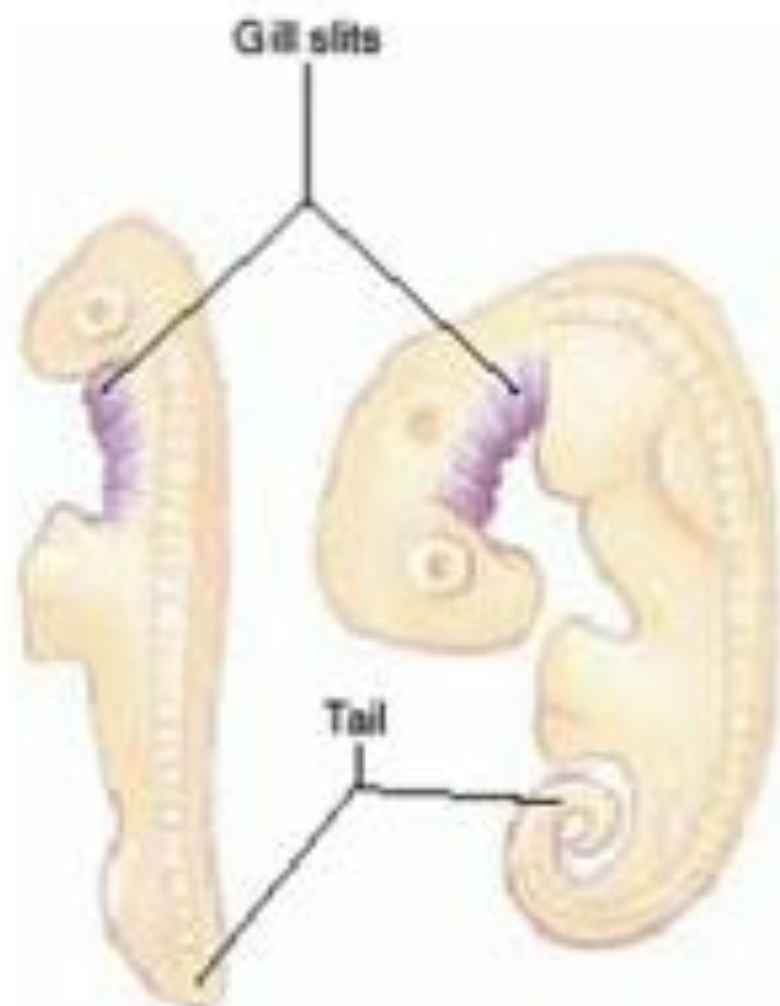




Three characteristics of chordates

- **Notochord** (develops into a backbone in vertebrates)
- **Dorsal hollow nerve cord** (develops into a spinal cord in vertebrates)
- **Gill slits**





Fish

Reptile

Bird

Human

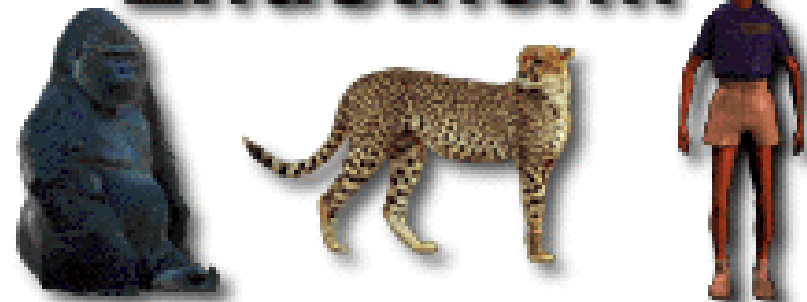
Vertebrates

- **Two main groups**
 - **Ectotherms** – Get heat from outside
 - **Endotherms** – Have a constant internal body temperature

Ectotherm



Endotherm



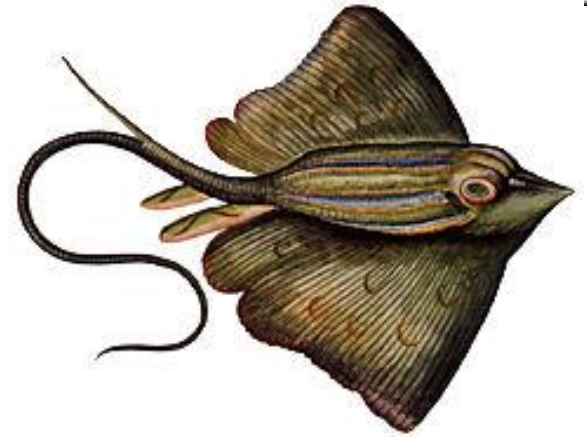
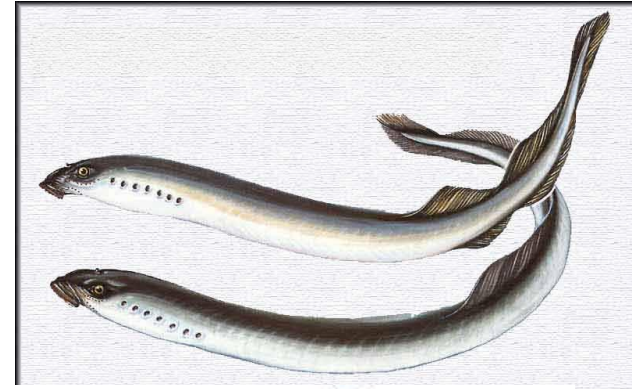
Fish

- **Characteristics**
 - Ectotherms
 - gills,
 - fins,
 - external fertilization,
 - 2 Chambered heart,
 - scales



Three classes of fish

- Agnatha – Jawless fish, examples are lamprey and hagfish
- Chondrichthyes – Cartilage fish, examples are shark, rays and skates
- Osteichthyes – bony fish (largest class of fish)



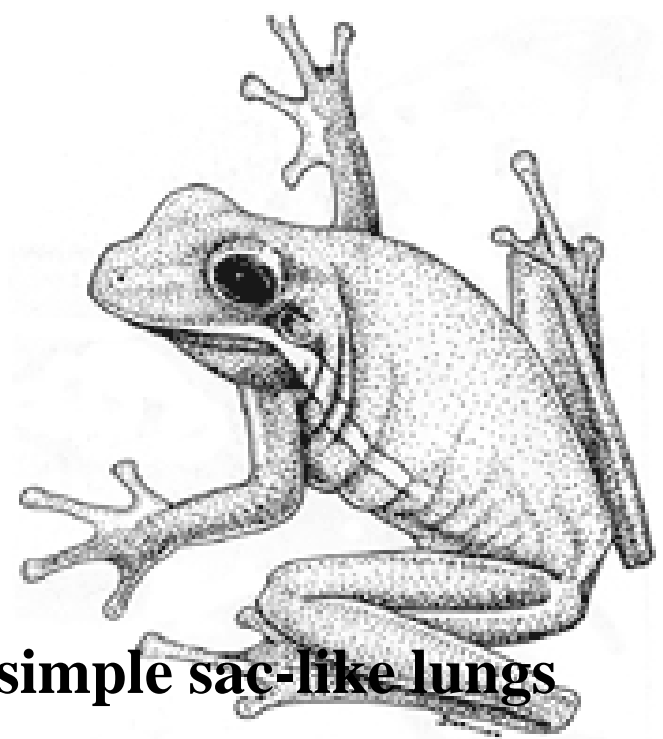
Three groups of bony fish

- **Lobe finned fish**
- **Lung fish (have both gills and lungs)**
- **Ray finned fish**



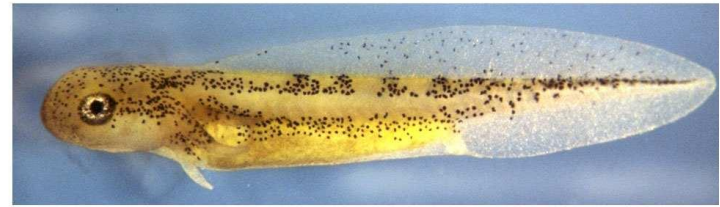
Amphibians

- **(Means double life)**
- **Characteristics**
 - **Moist skin without scales**
 - **Exchange gases through skin or simple sac-like lungs**
 - **Skeleton made of bone**
 - **Three chambered heart**
 - **Lay eggs in water**
 - **Go through metamorphosis**
 - **Ectotherms**
- **Hibernate**
- **Estivate – Slow their system during a dry hot period**



Amphibians

- Includes, Frogs, toads, salamanders, and newts
- External fertilization
- Amphibians on the decline p. 414



A. t. tigrinum

Photo by David Snyder



larvae Tiger Salamander









Gina Mikel

www.scientificillustrator.com



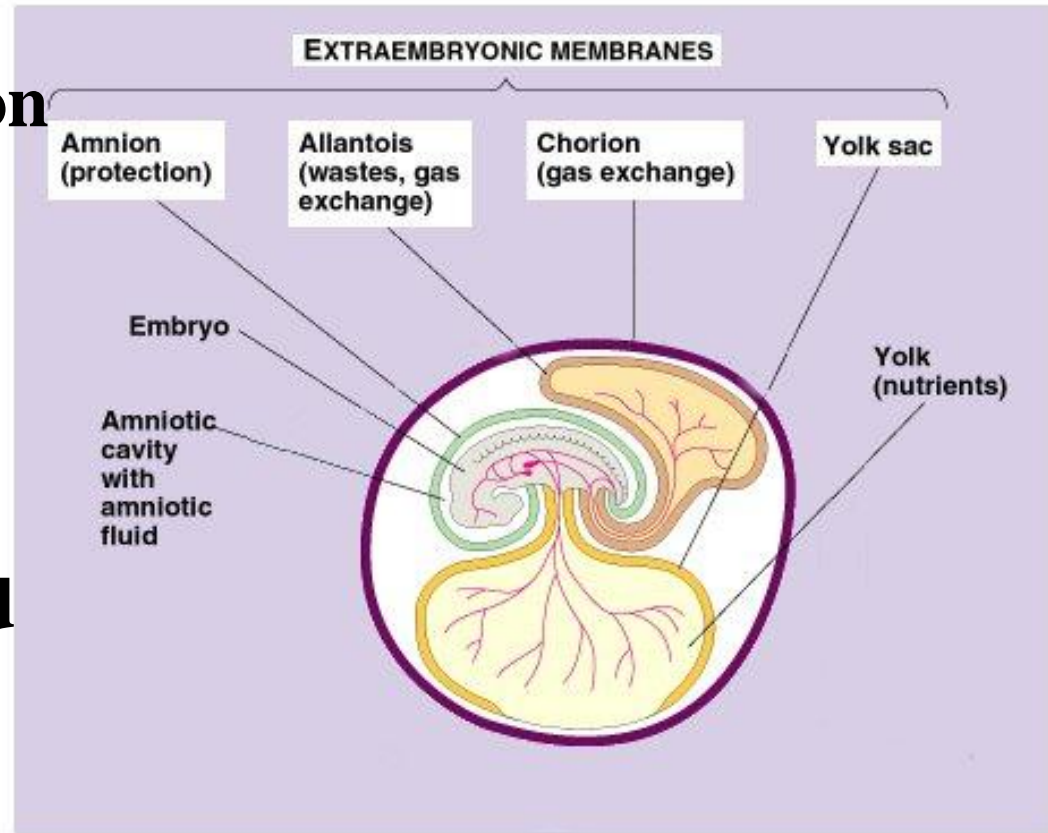
Reptiles

- **Characteristics**
 - **Ectotherms**
 - **Scales**
 - **Breathe through lungs**
 - **Three chambered heart**
 - **Internal fertilization**
 - **Lay eggs on land that have a leathery shell**



Amniotic egg

- Membranes form cushion and protection
- Large food supply (yolk)
- Pores that allow gas exchange
- Hatch fully developed



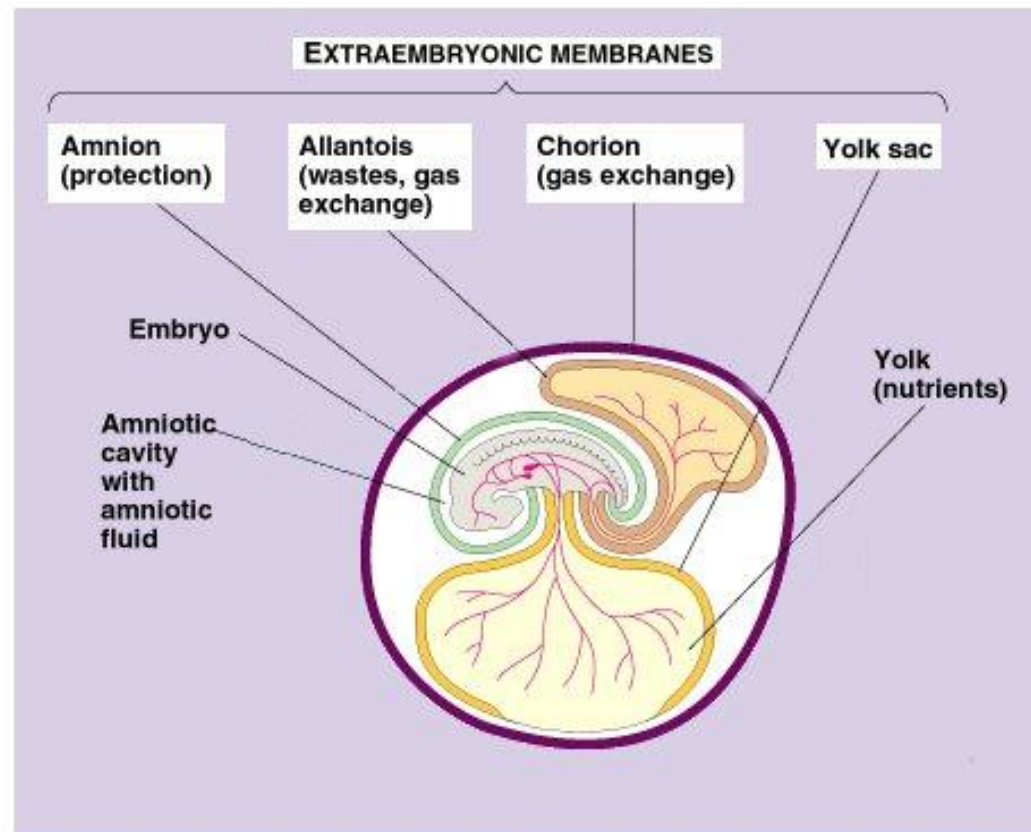
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Reptiles

- **Group includes: Lizards, snakes, turtles, crocodiles, alligators, and dinosaurs**
- **Three orders of reptiles exist today**
 - **Turtles: Hard shelled**
 - **Crocodiles and alligators (Crocodilia)**
 - **Lizards and Snakes – Largest group of reptiles**
 - **Lizards**
 - **Movable eyelids**
 - **External ears,**
 - **Usually legs with toes claws and feet**
 - **Snakes –**
 - **No legs**
 - **No eyelids**
 - **No external ears**
 - **Jaw bone that can detach**















Photo by: Jerry L. Gingerich



Rat Snake



Birds & Mammals



Birds 9,000 species

Characteristics

1. endotherm
2. Feathers and scales
3. Lay eggs
4. Incubate eggs
5. All have wings
6. Back legs with toes and claws



Bird eggs an nests

- Like reptiles except there is a hard shell
- Lay eggs in a nest and incubate eggs 0
 - Called clutch
 - Incubation period varies



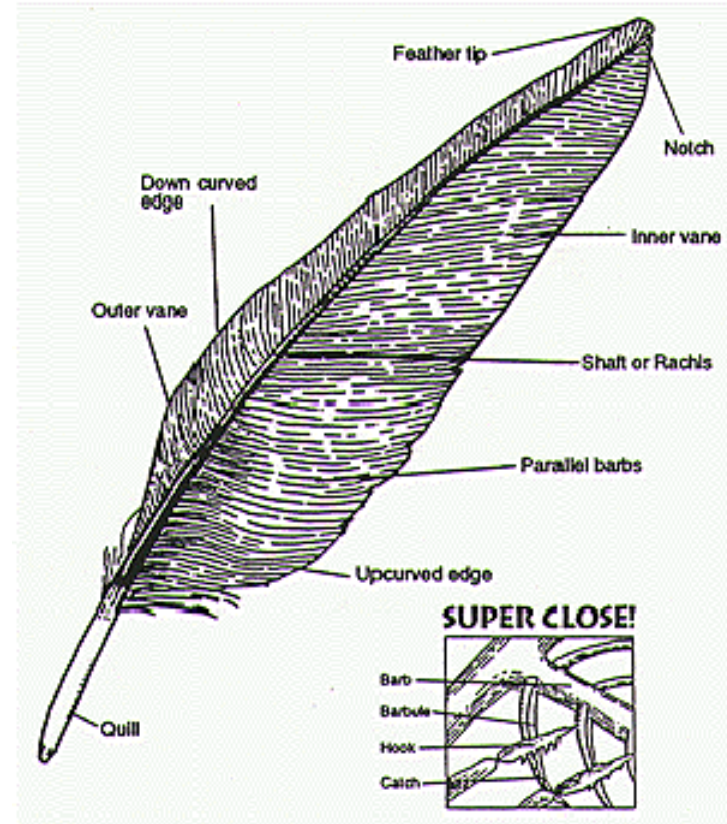
Flight

1. Hollow bones
2. Keen eyesight
3. high energy
4. breast bone for muscle attachment
5. no bladder
6. wings that provide thrust and lift



Feathers

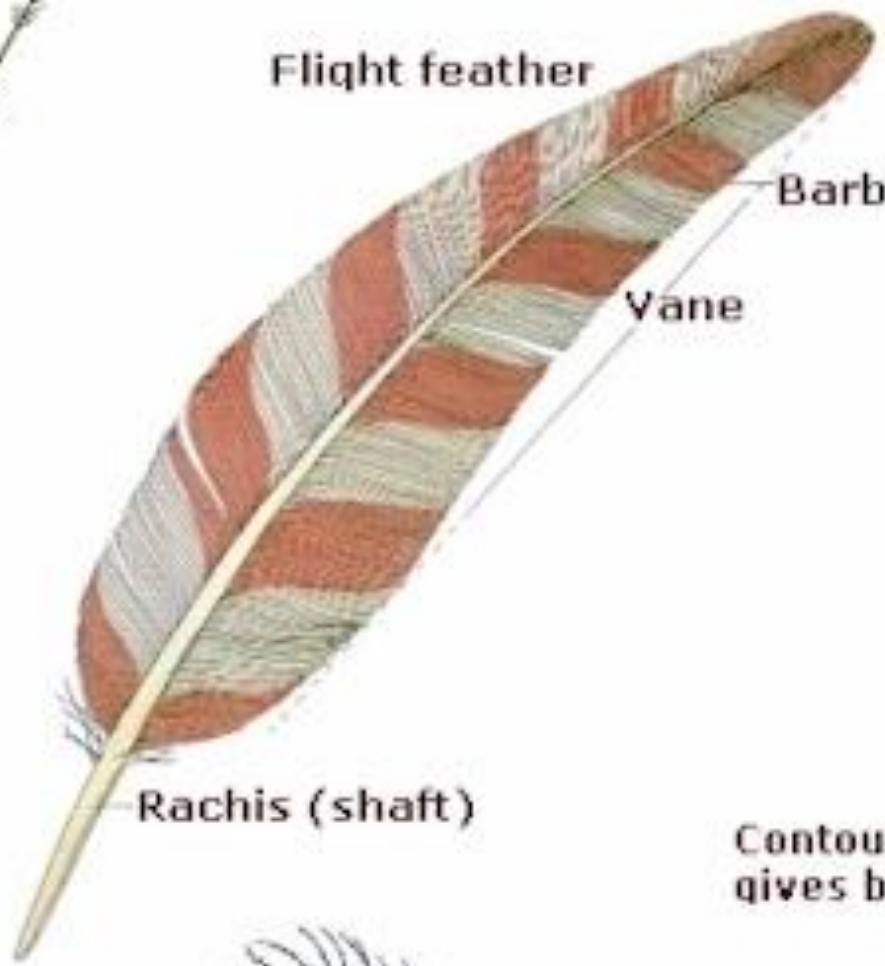
- Contour are used for warmth
 - Birds preen feathers to oil and repair
- Feathers are used for flight
- Down feathers separations





Filoplumes:
grow around
flight and
tail feathers
and act as
direction
sensors

Flight feather



Barb

Vane

Rachis (shaft)



Contour feather:
gives birds its shape



Nestling down:
lines nest
for warmth



Permanent down:
provides insulation

Mammals





Characteristics

- 1. Endotherms**
- 2. fur feed young milk from mammary gland**
- 3. provide care for young**
- 4. Teeth**
- 5. complex body systems**
- 6. reproduce sexually**
- 7. give birth to their young**

Classification of Mammals



monotremes

- lay eggs
- nurse by licking
- example: duck billed platypus and spiny anteater



Marsupials (the pouched mammals)

- a. Give birth to tiny undeveloped offspring
- b. Crawl to and develop in pouch
- c. Examples: kangaroo, koala, wallaby and opossums



Placental

Embryo develops in the uterus

1) Developmental period is called gestation

2) Embryo is attached to mother by placenta and umbilical cord

3) Great diversity among placentals

Quiz

1. What are the two main groups of vertebrates? Hint: (it has to do with body temperature)

a.

b.

2. What are the three classes of fish? Give an example of each.

Class

Example

a.

b.

c.

3. Describe a typical amphibian.

4. What adaptations do reptiles have that allow them to live on land?

5. Give three characteristics of the class aves.

a.

b.

c.

6. Give three characteristics of mammals that distinguish them from other animals.

a.

b.

c.

7. Mammals are divided into three main groups according to development. What are they?

a.

b.

c.