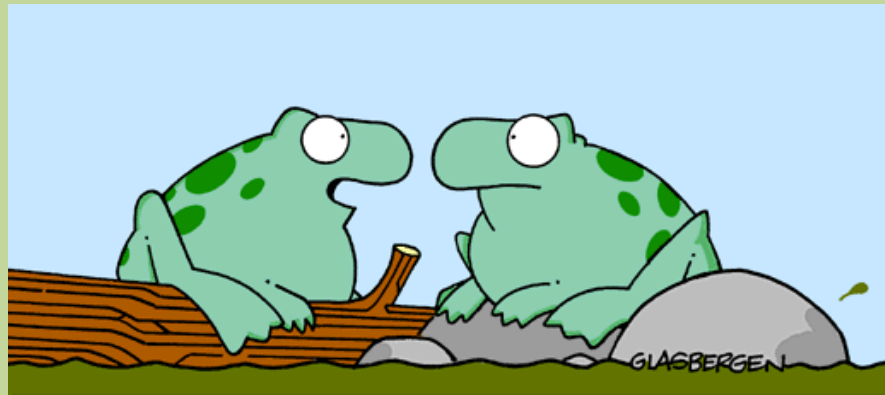


# General Biology II

## Lab Practical 2 Presentation



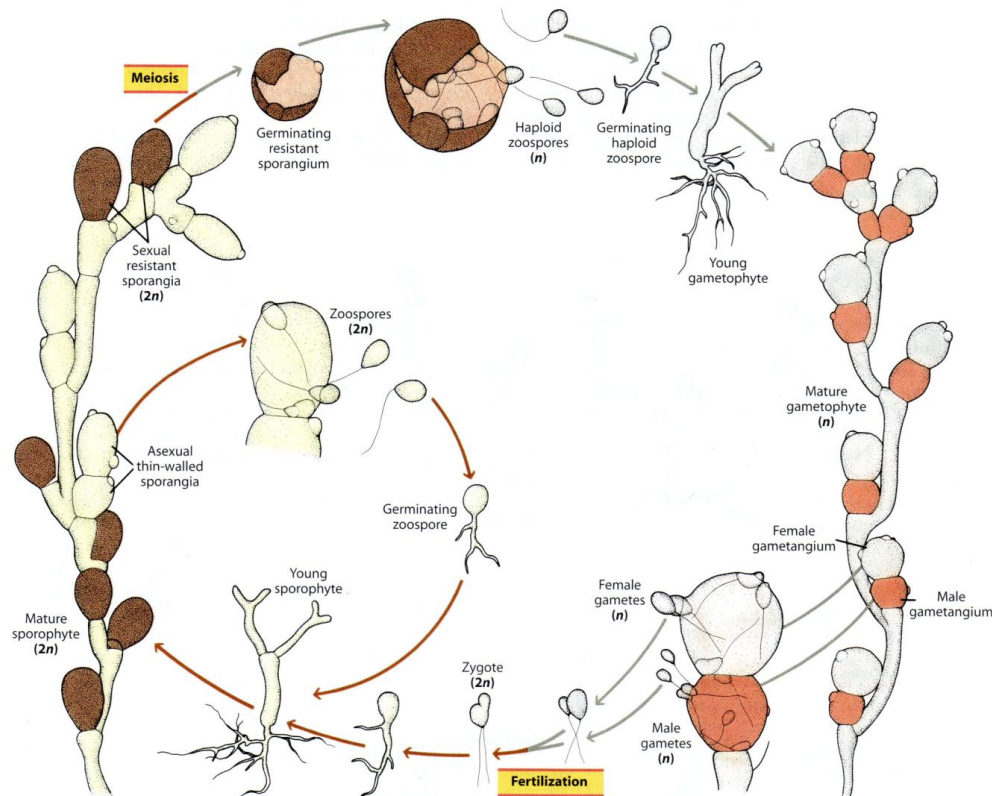
**"Looks aren't everything. It's what's inside you that really matters. A biology teacher told me that."**

## Animals and Fungi

# Kingdom Fungi

- Fungi are
  - Heterotrophic
  - Sessile
  - Sexual or Asexual Reproduction
  - Haploid
- Parts of a Fungus
  - Hyphae
  - Mycelium
  - Spores
  - Spore-Producing structures (zygosporangium, basidiosporangium, etc)
  - Cell Wall composed of chitin

# Chytridiomycota

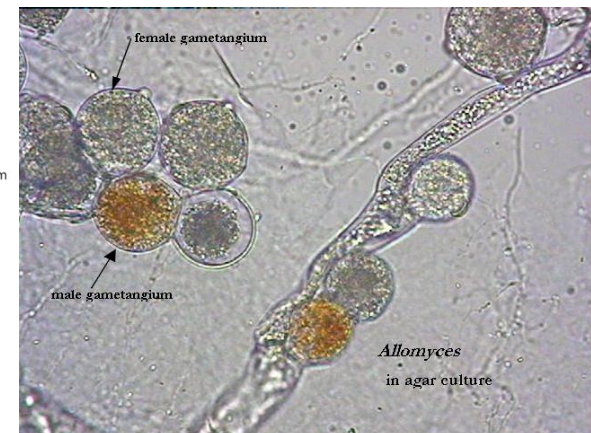


## Chytridiomycetes

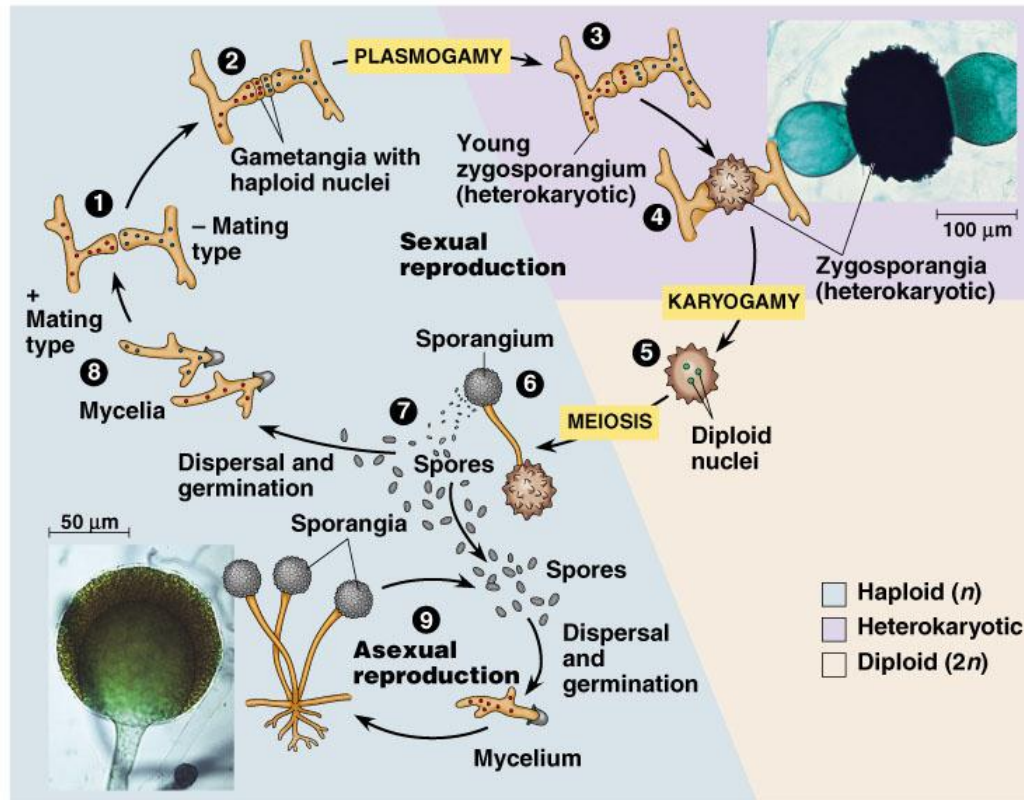
Unicellular Molds

Sexual and Asexual  
Reproduction

Zoospores



# Zygomycota



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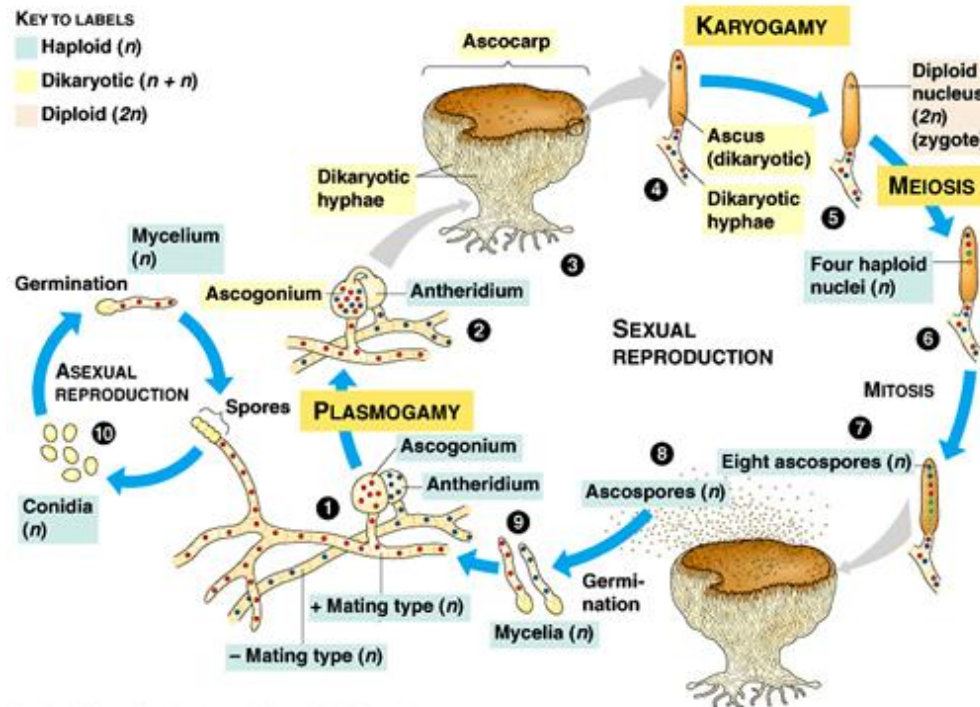
**Zygomycetes - Bread Molds**

Zygomycetes Have  
 Sporangia  
 Hyphae  
 Zygosporangia  
 Mycelia  
 Sexual and Asexual  
 Reproduction





# Ascomycota



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## Ascomycetes – Sac Fungi

### Ascomycetes Have

- Hyphae
- Mycelium
- Antheridium
- Ascogonium
- Ascocarp
- Ascus
- Ascospores

# Basidiomycota

## Basidiomycetes – Club Fungi

### Basidiomycetes Have

Hyphae

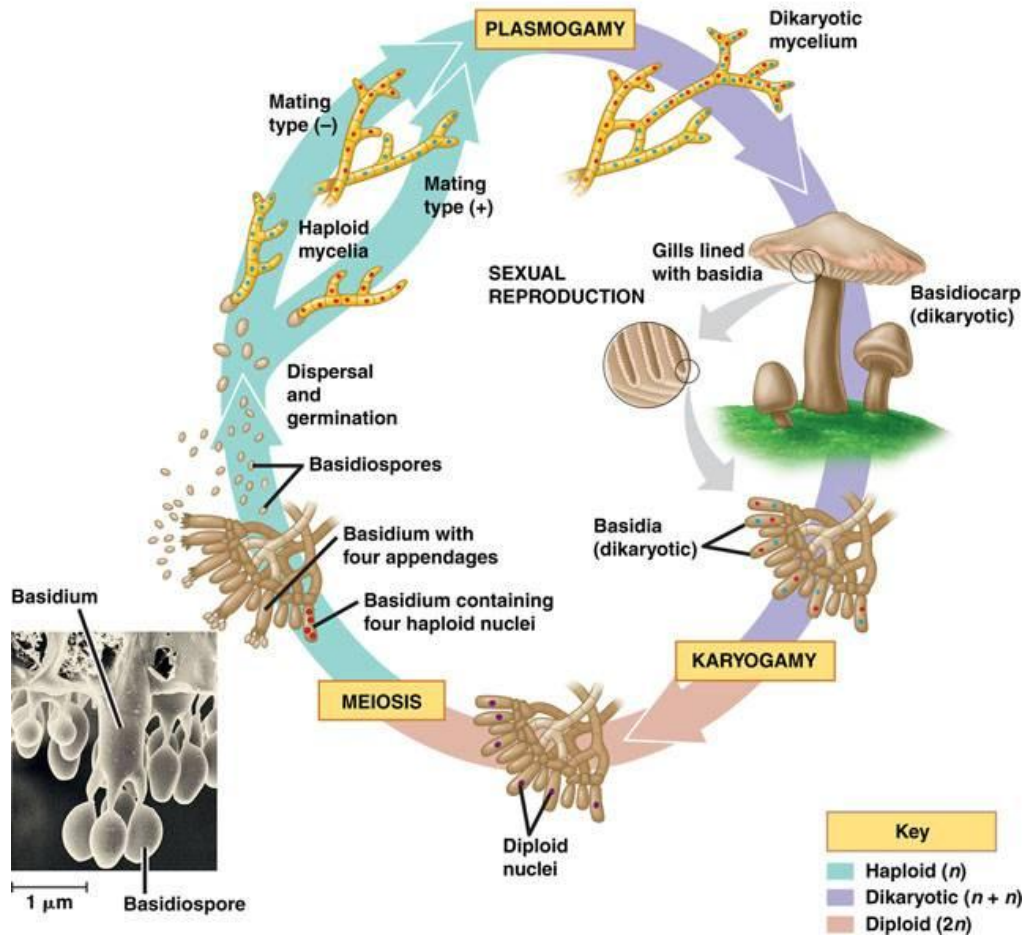
Mycelia

Mushrooms

Gills

Basidia

Basidiospores



# Fungi Imperfecta

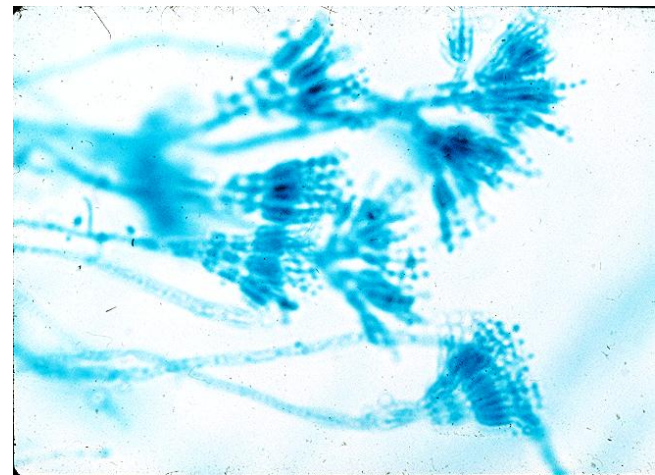


## Fungi Imperfecta

### Asexual Reproduction

### Example: Penicillin

Note: All Fungi have been moved to other Phylums due to all fungi being found to do sexual reproduction.



# Kingdom Animalia

- Animals are
  - Heterotrophic
  - Motile
  - Diploid
  - Sexual Reproduction

# Phylum Porifera



## **Phylum Porifera – Sponges**

### Poriferans Have

Asymmetry

Begin as larvae

Below tissue level of organization

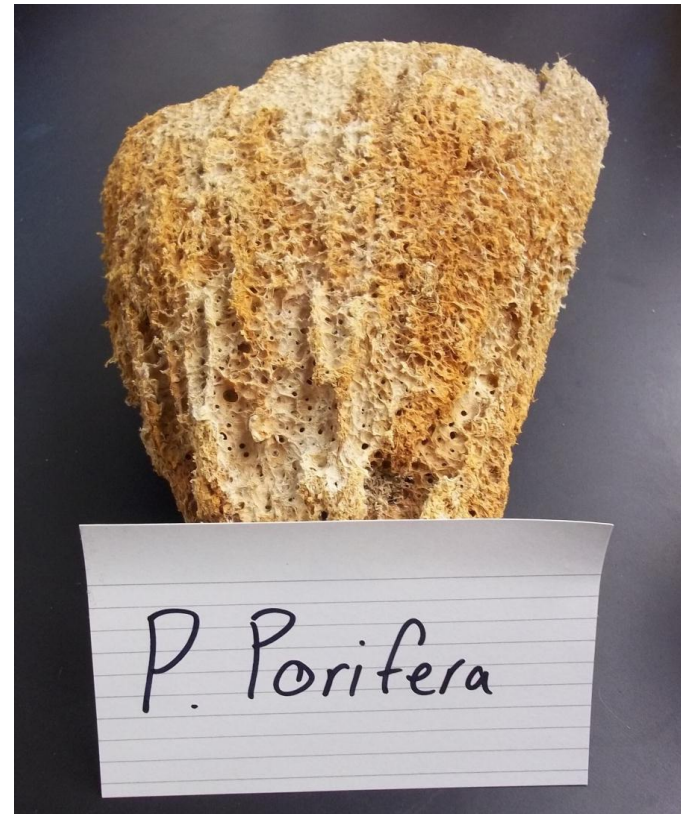
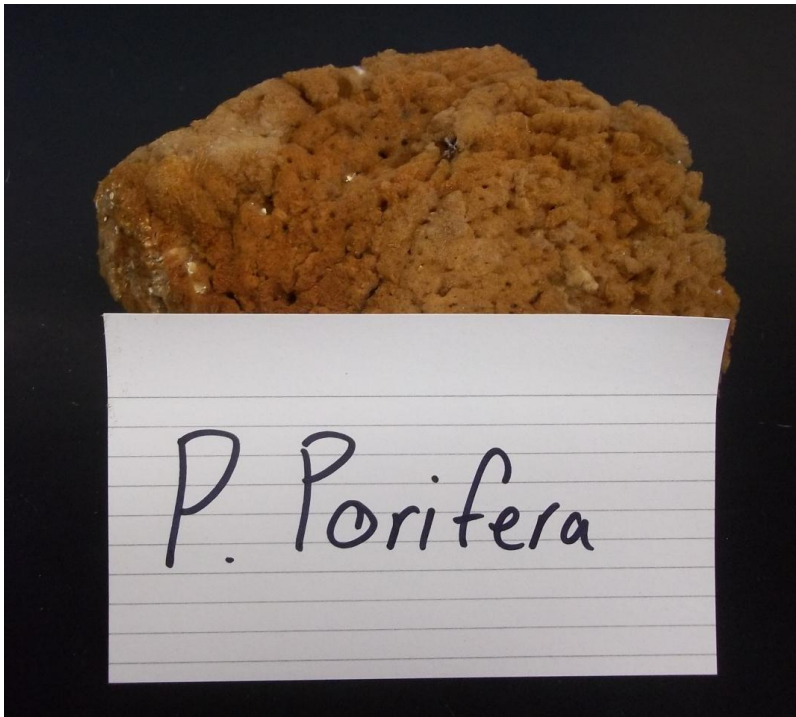
Collar Cells – bring in nutrients

Amoebocytes – distribute nutrients, make spicules

Spicules – calcium carbonate or silica spikes in the extracellular matrix

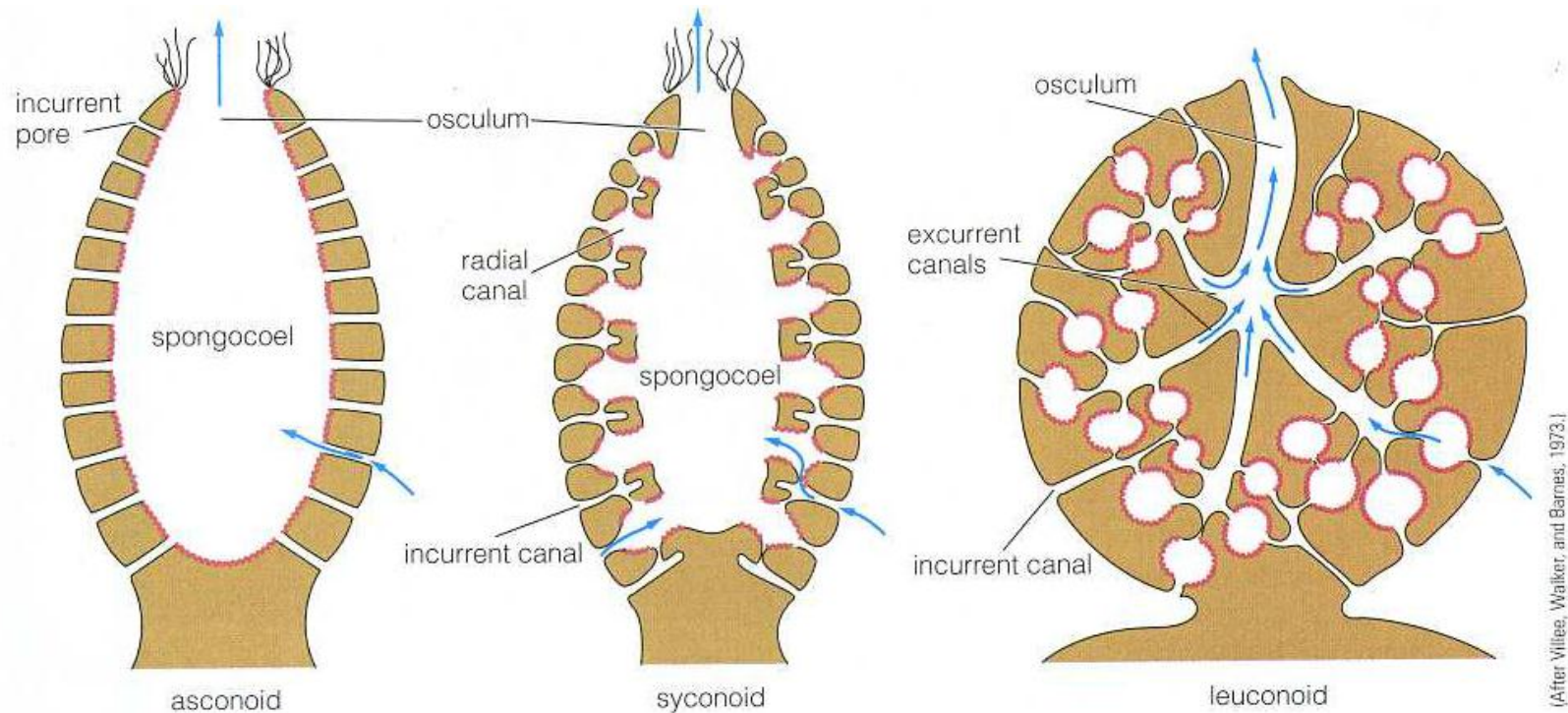


# Phylum Porifera



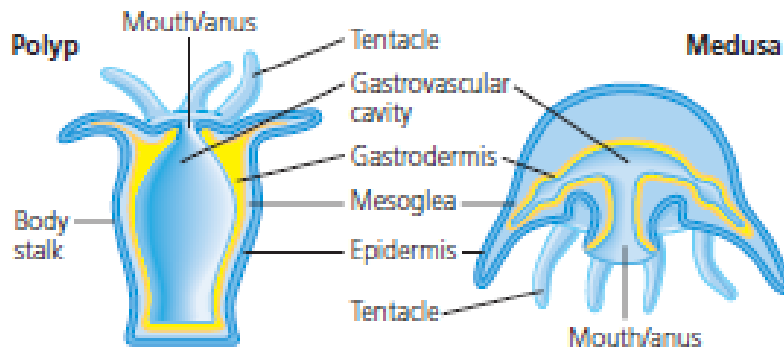


# Phylum Porifera



**Figure 26-4** Three body plans of sponges. The blue arrows indicate the direction of water flow. Pink areas are lined by collar cells.

# Phylum Cnidaria



▲ **Figure 33.5 Polyp and medusa forms of cnidarians.** The body wall of a cnidarian has two layers of cells: an outer layer of epidermis (darker blue; derived from ectoderm) and an inner layer of gastrodermis (yellow; derived from endoderm). Digestion begins in the gastrovascular cavity and is completed inside food vacuoles in the gastrodermal cells. Flagella on the gastrodermal cells keep the contents of the gastrovascular cavity agitated and help distribute nutrients. Sandwiched between the epidermis and gastrodermis is a gelatinous layer, the mesoglea.

Cnidarians have

Radial Symmetry

Begin as Polyps, Adults are medusa

Some have only a polyp or a medusa stage

Ectoderm and Endoderm tissue

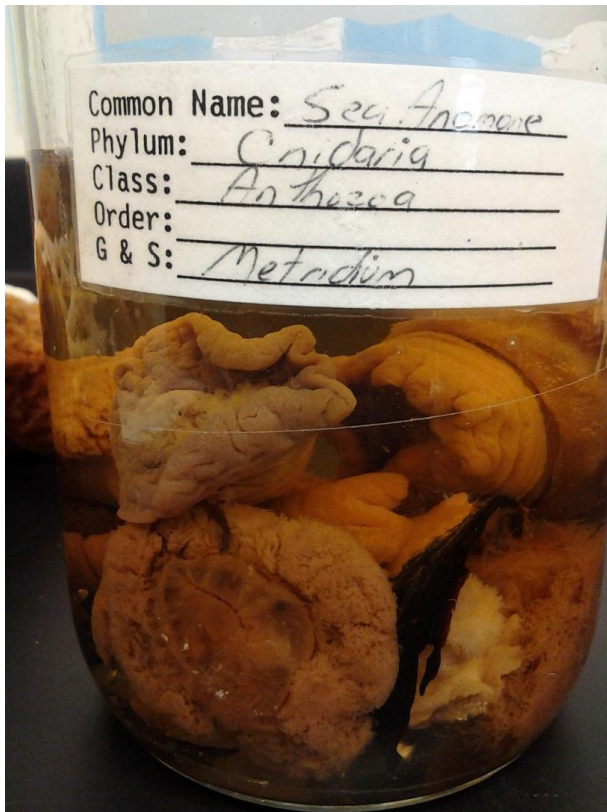
Mesoglea

Incomplete Digestive System

No coelom

Cnidocytes – stinging cells

# Phylum Cnidaria

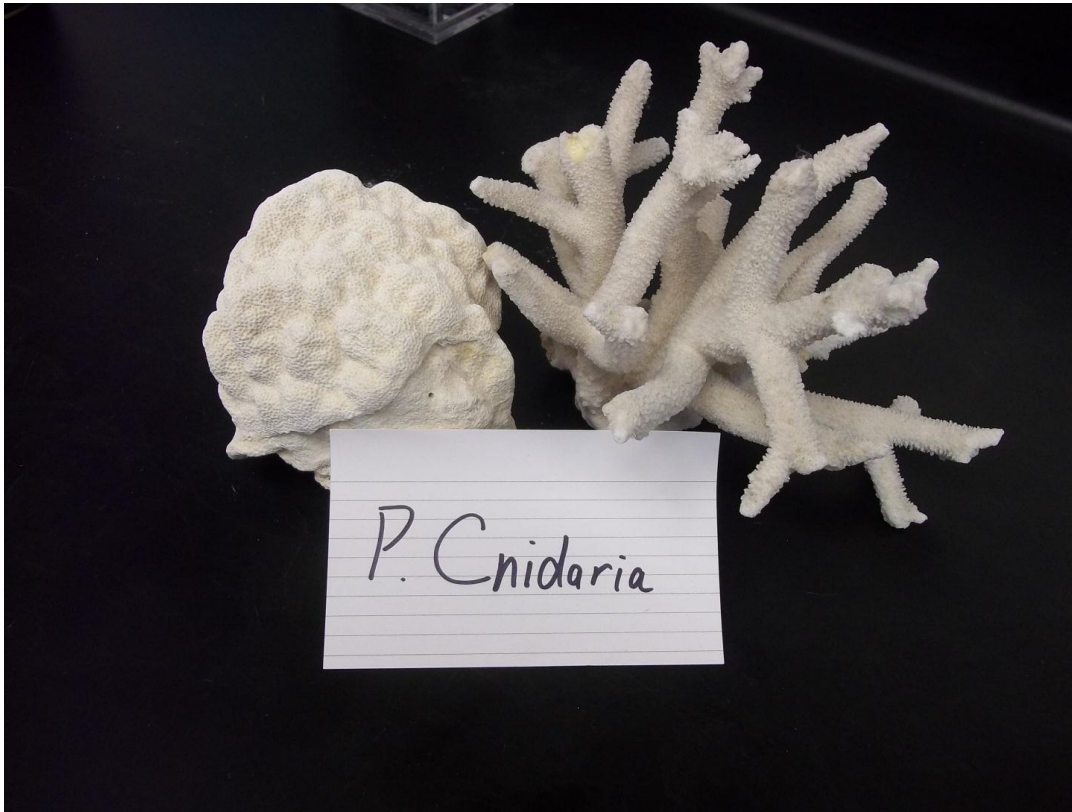


Common Name: Sea Anemone  
Phylum: Cnidaria  
Class: Anthozoa  
Order: \_\_\_\_\_  
G & S: Metridium

## Sea Anemone – Class Anthozoa

Anthozoans only have a polyp stage

# Phylum Cnidaria



## **Class Anthozoa**

- Corals are in the phylum Cnidaria, class Anthozoa

# Phylum Cnidaria



## Hydrocoral – Class Hydrozoa

Hydrozoans have both a polyp and a medusa stage, and live as colonial polyps.



# Phylum Cnidaria



## **Man of War – Class Hydrozoa**

The man of war jellyfish is an example of the medusa stage of cnidarians



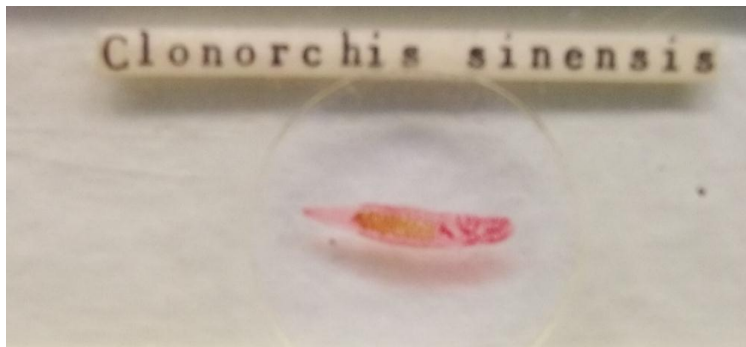
# Phylum Cnidaria



## **Cassiopeia – Class Scyphozoa**

Scyphozoans have only a medusa stage or a very reduced polyp stage.

# Phylum Platyhelminthes



## **Phylum Platyhelminthes**

consists of flatworms,  
tapeworms and flukes

### They have

Bilateral Symmetry

Eye Spots with ganglia and  
two ventral nerve cords

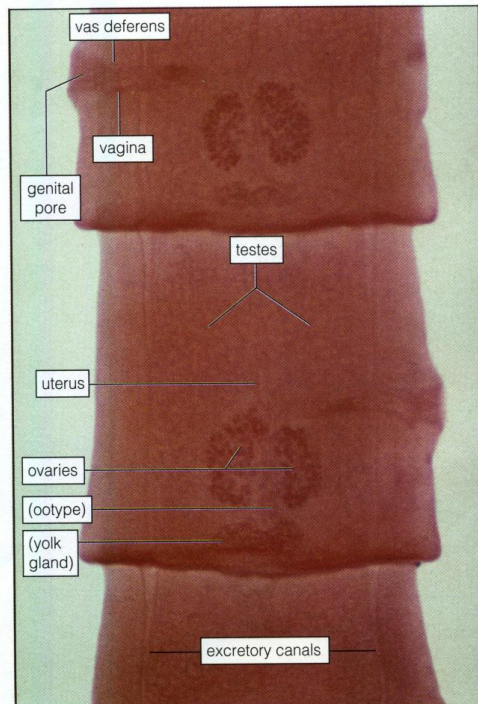
Incomplete digestive system

No segments

No coelom

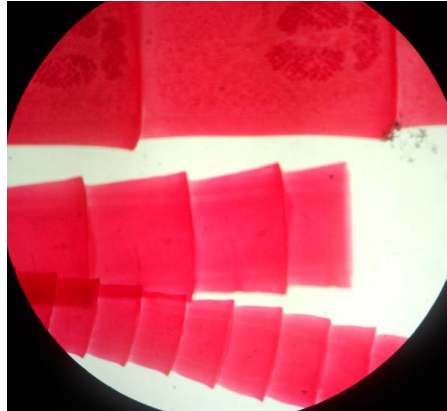
Protostomes

# Phylum Platyhelminthes

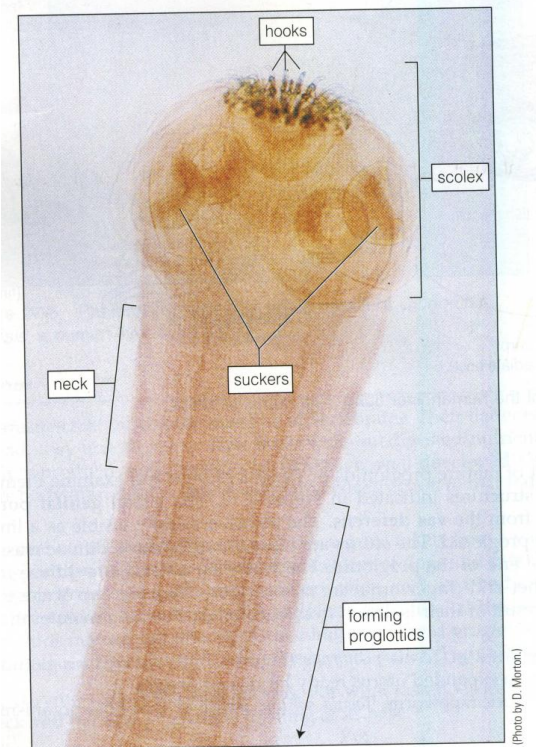


a

**Figure 27-9** Tapeworm mature proglottids (*Taenia pisiformis*).



Tapeworms



**Figure 27-8** Tapeworm scolex (*Taenia pisiformis*), w.m. (40×).

# Phylum Rotifera



**Phylum Rotifera** consists of microscopic organisms with some complex organ systems, despite their tiny size

Rotifers have

Bilateral Symmetry

Complete Digestive System

Distinctive crown of cilia that draws water into the mouth

Pseudocoelom

Ability to undergo parthenogenesis

Protostome Development



# Phylum Nematoda



## **Phylum Nematoda – Roundworms**

### Nematodes Have

Non-segmented body

Cuticle covering (form of  
exoskeleton)

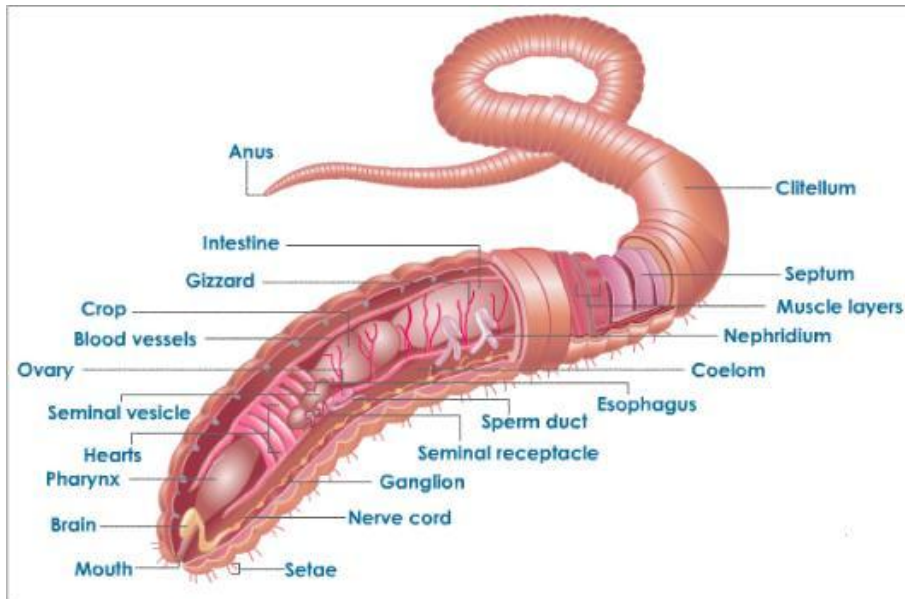
First complete “tube within  
a tube” body scheme

Pseudocoelom

Lateral Nerve Cords

Protostome Development

# Phylum Annelida



**Phylum Annelida** – Segmented worms – Earthworms, Leeches

Annelids Have

Segmented body

Complete Digestive tract

True coelom

Closed circulatory system

Gas Exchange through skin (earthworms)

Gills (marine worms)

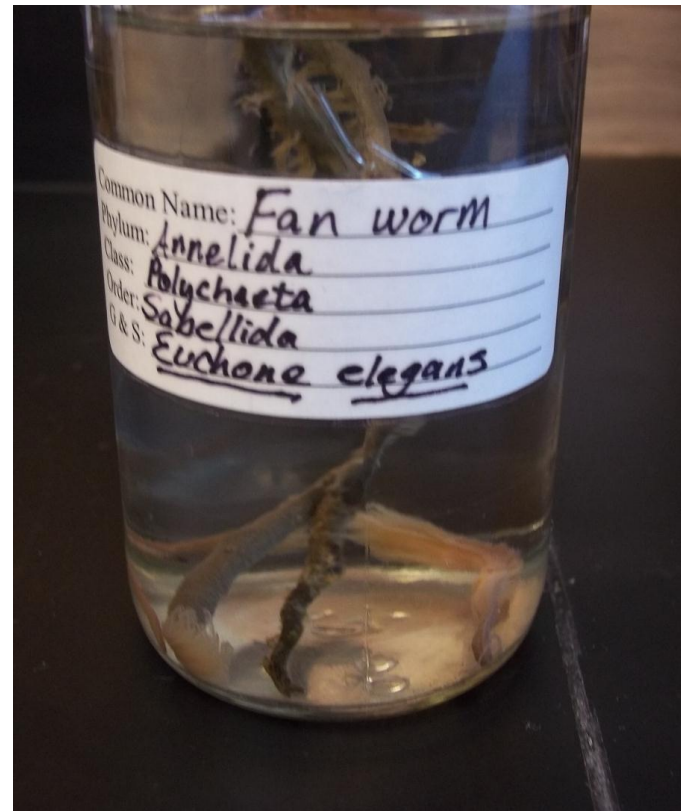
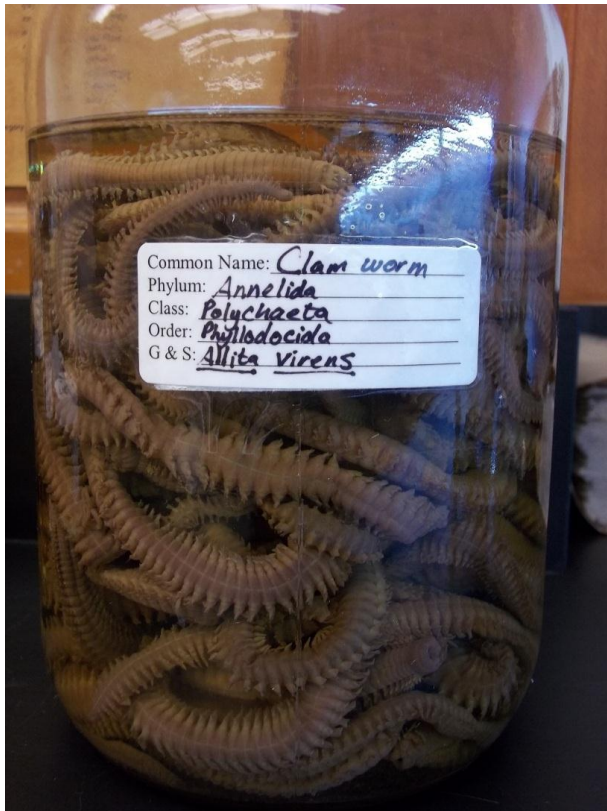
Pair of metanephridia in each segment

Both male and female reproductive organs

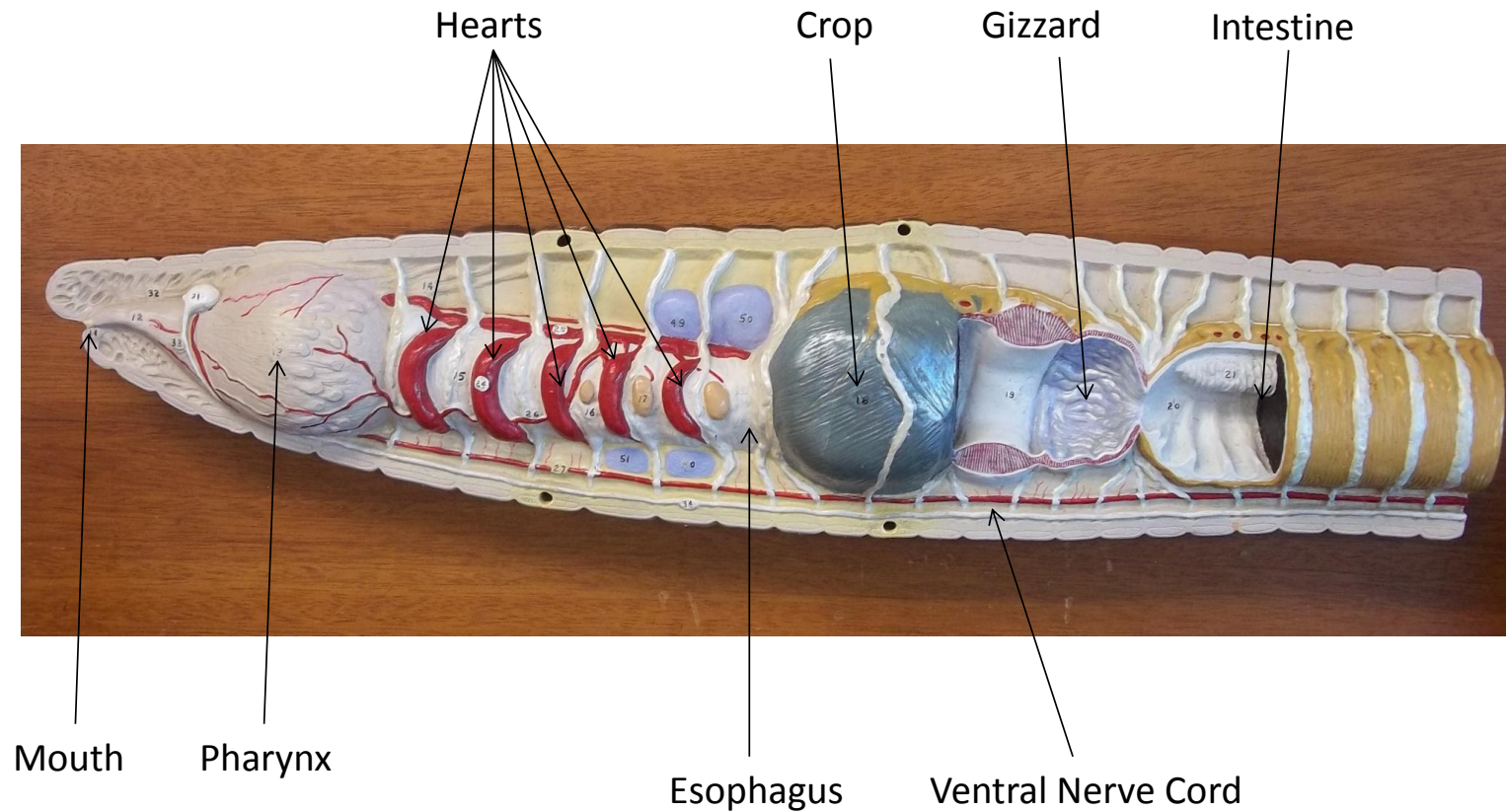
Protostome Development



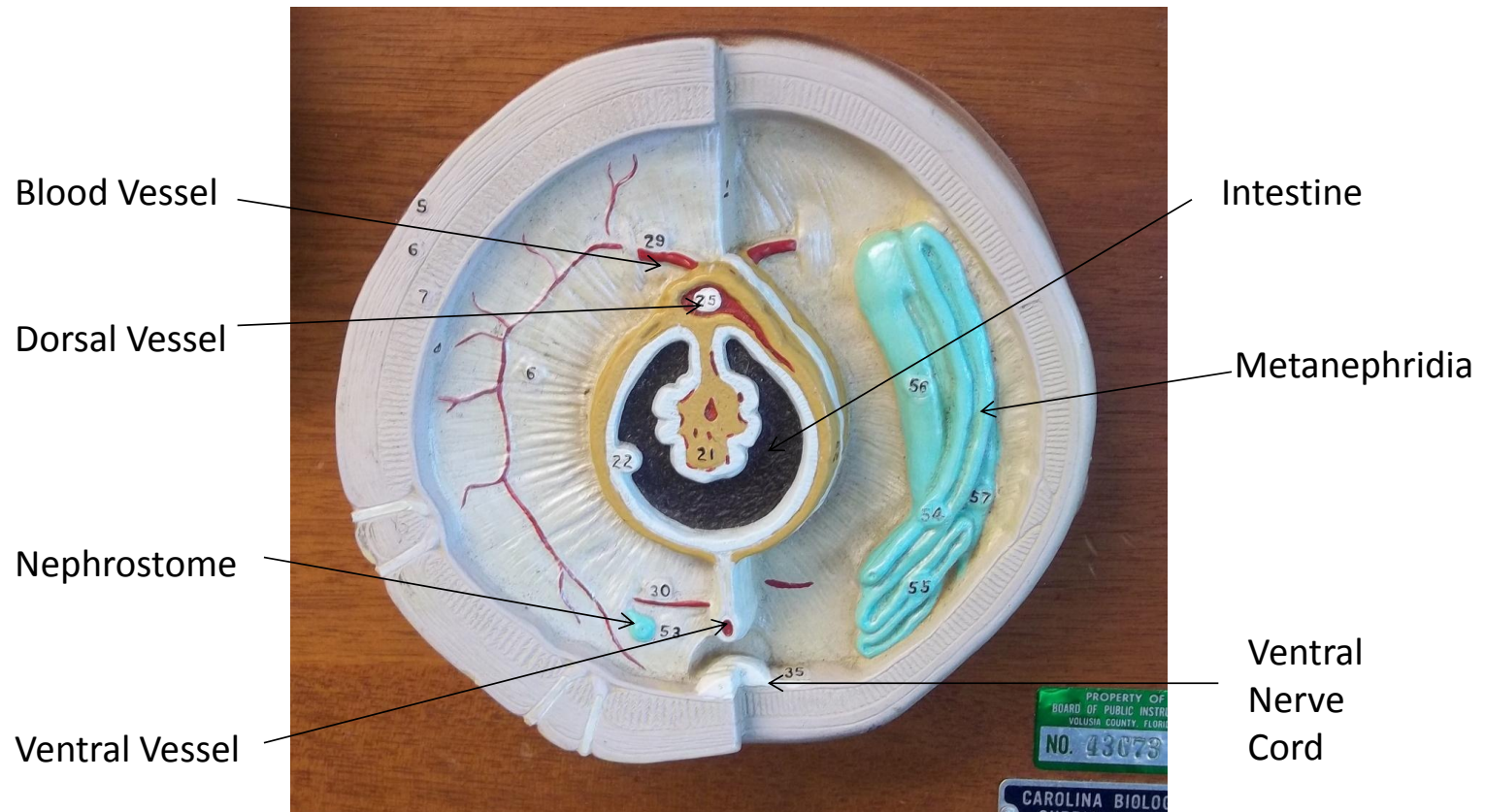
# Phylum Annelida



# Phylum Annelida - Model



# Phylum Annelida - Model





# Phylum Annelida - Model



How many “hearts” does  
an earthworm have?

5 PAIRS

Mouth

Aortic Arches

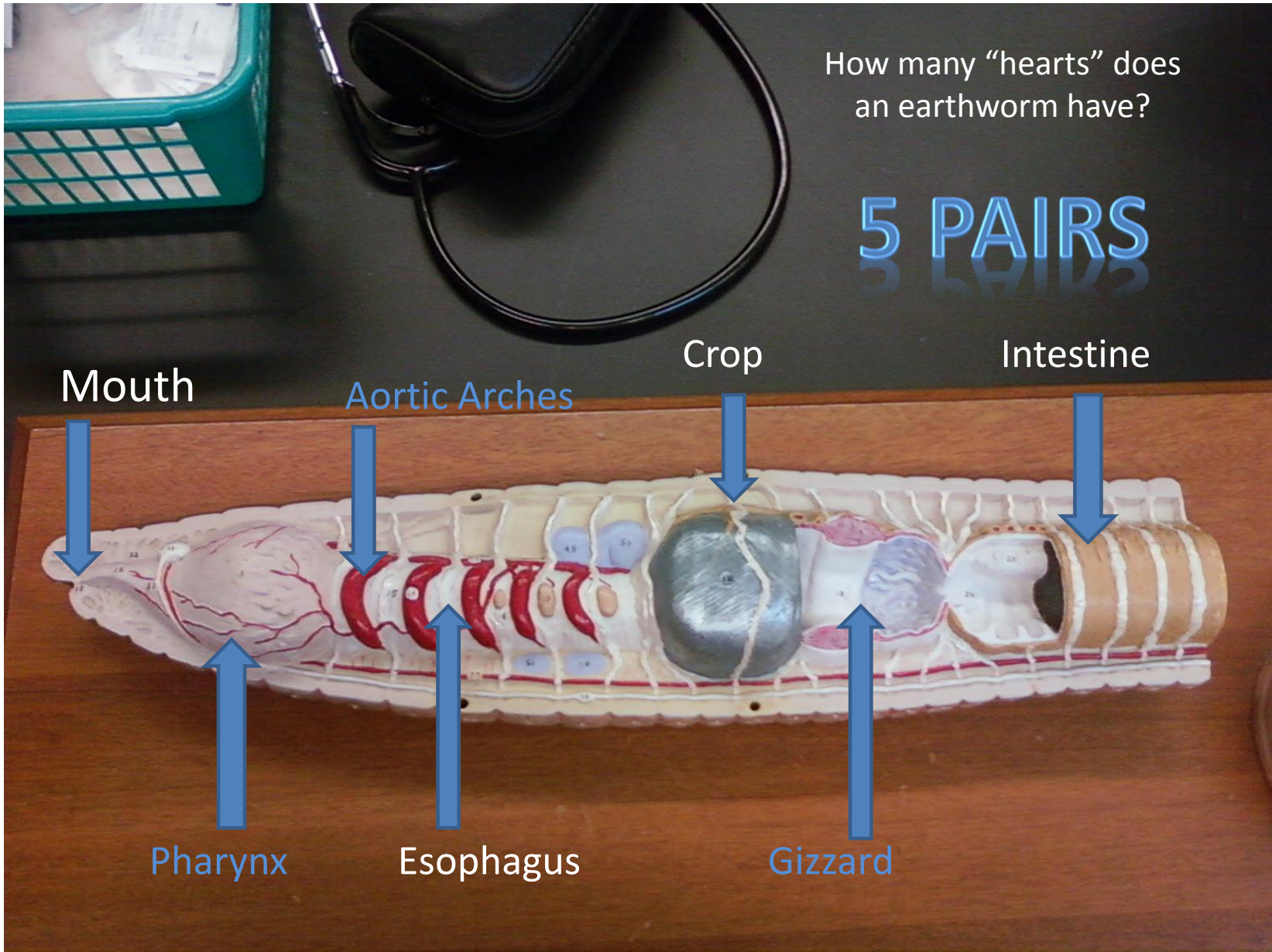
Crop

Intestine

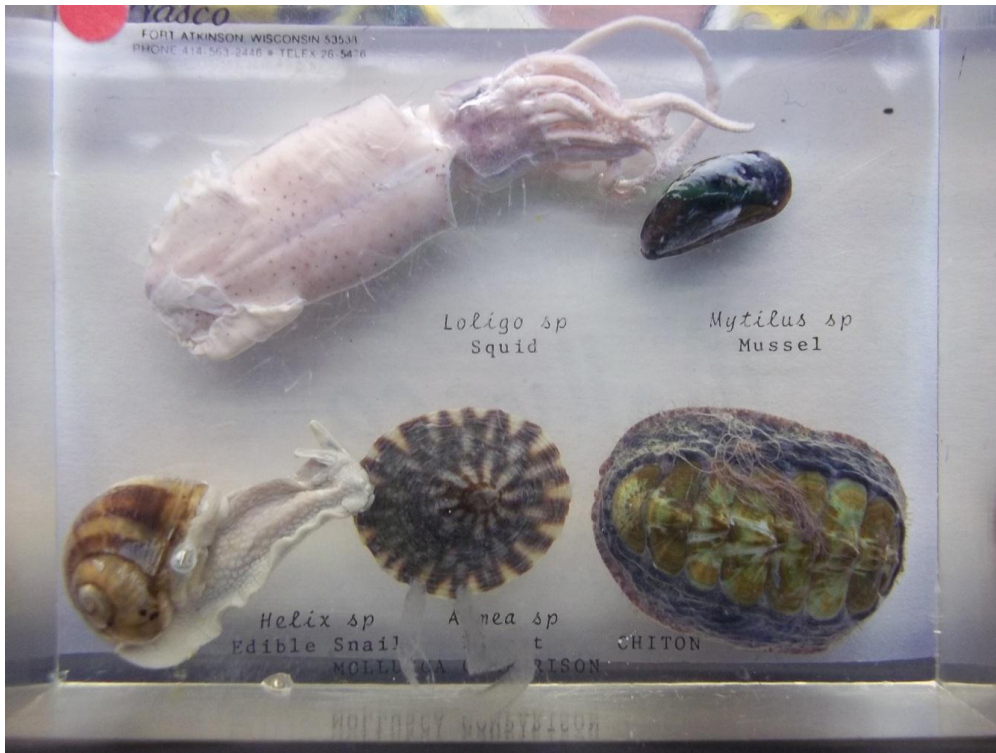
Pharynx

Esophagus

Gizzard



# Phylum Mollusca

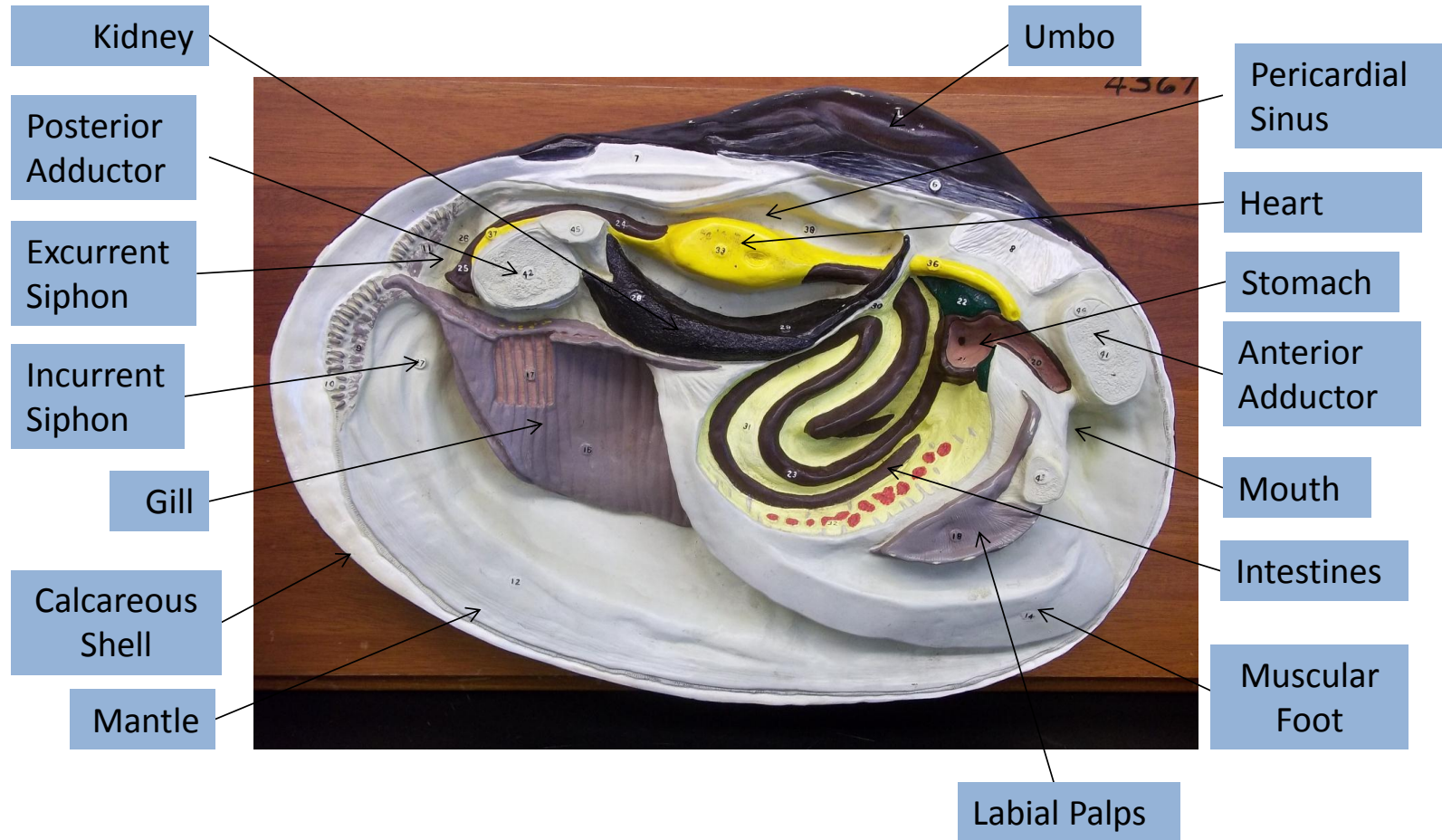


**Phylum Mollusca** includes animals like clams, octopi, snails, and mussels

Molluscs Have  
Bilateral Symmetry  
Complete digestive system  
True Coelom  
Most have open, but some have closed circulatory systems (squid/octopi)  
Calcereous Shells secreted by mantle  
Muscular foot  
Visceral Mass  
Protostome Development



# Phylum Mollusca – Class Bivalvia



# Phylum Mollusca



**Class Bivalvia** – Clams, Oysters, etc

Bivalves Have

Calcereous Shells secreted by the mantle, covers visceral mass

Muscular foot for movement

Complete digestive system

Open circulatory system

# Phylum Mollusca



## **Class Gastropoda – Snails, Slugs**

### Gastropods Have

Single spiraled shell, or no shell in slugs

Complete Digestive System

Undergo torsion in embryonic development

Distinct head with eyes

Have Radula

Have gills

# Phylum Mollusca



**Class Cephalopodia** – Squids, Octopi, Chambered Nautiluses

Cephalopods Have  
Closed Circulatory System  
Well Developed Brains  
Internalized or nonexistent shell (nautiluses are the only cephalopods with a shell)



# Phylum Arthropoda

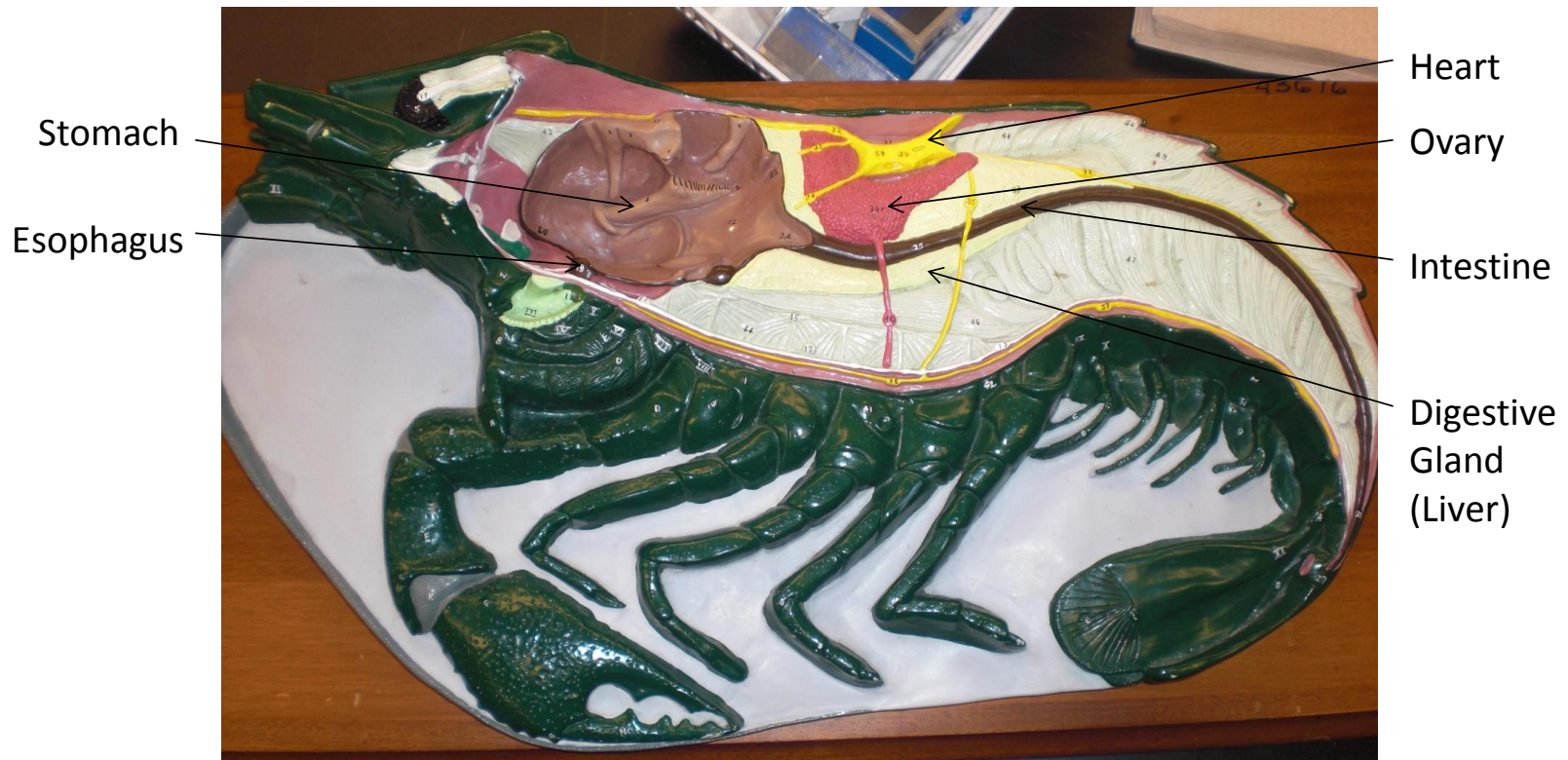


**Phylum Arthropoda –**  
Insects, Arachnids, and  
Crustaceans

Arthropods have  
Exoskeleton made of chitin  
Open circulatory system  
Bilateral Symmetry  
Complete Digestive Tract  
Ventral nerve cords  
Segmented Bodies  
Jointed legs  
Protostome Development



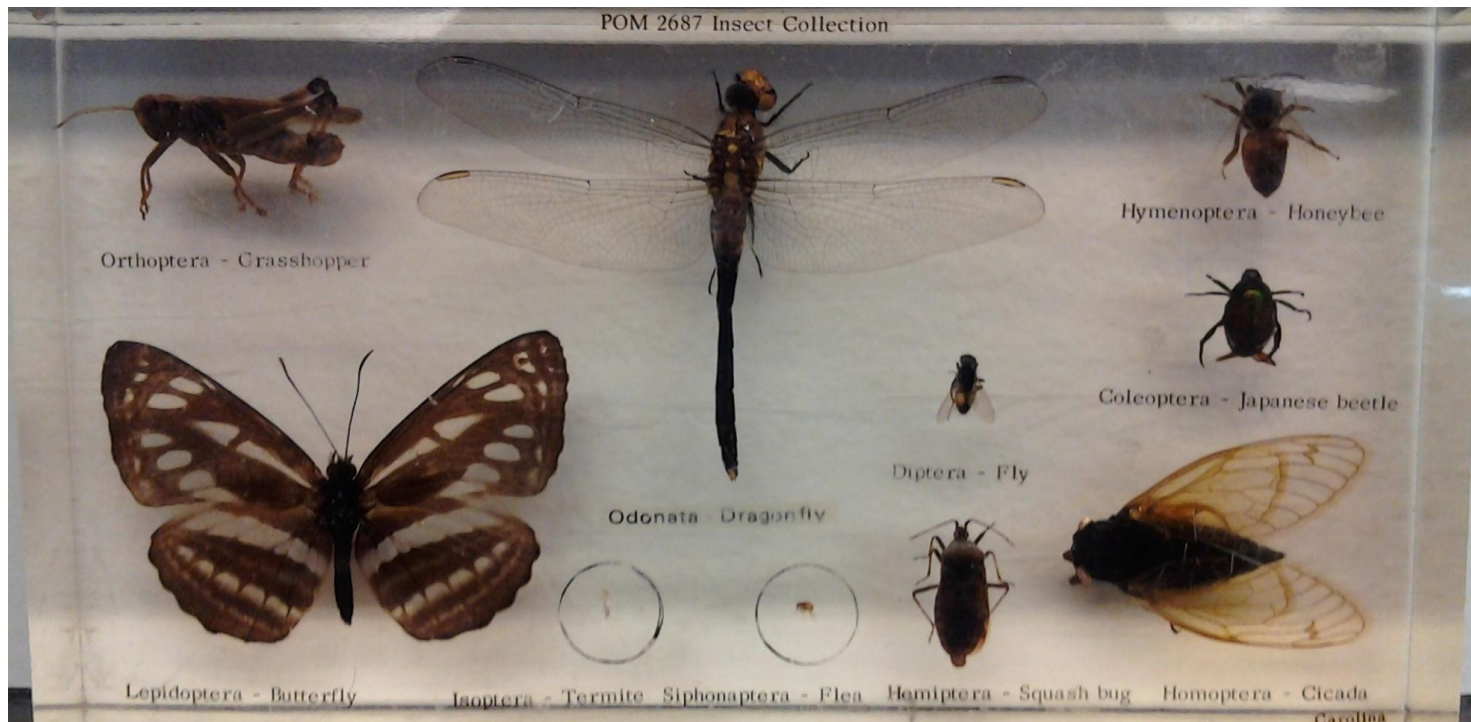
# Phylum Arthropoda



# Phylum Arthropoda

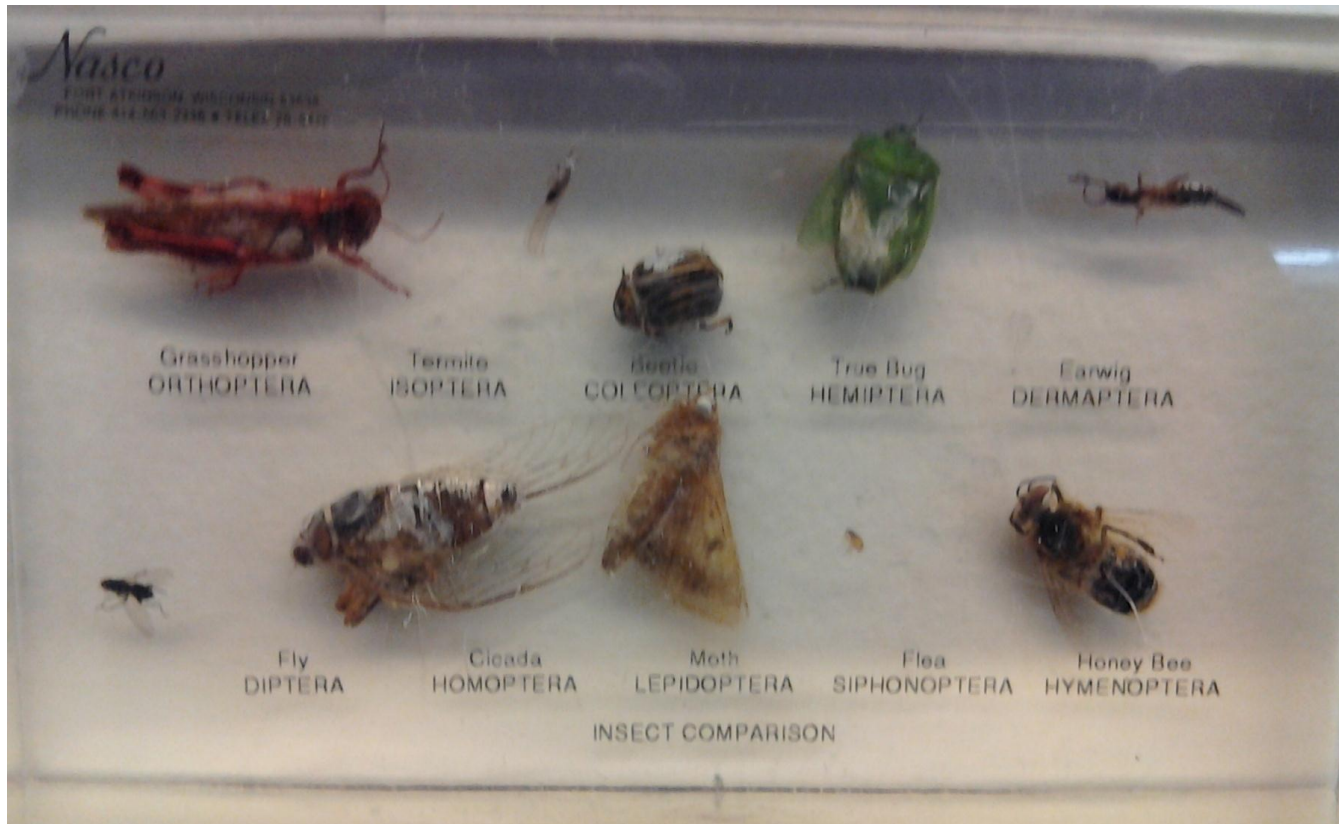


# Phylum Arthropoda

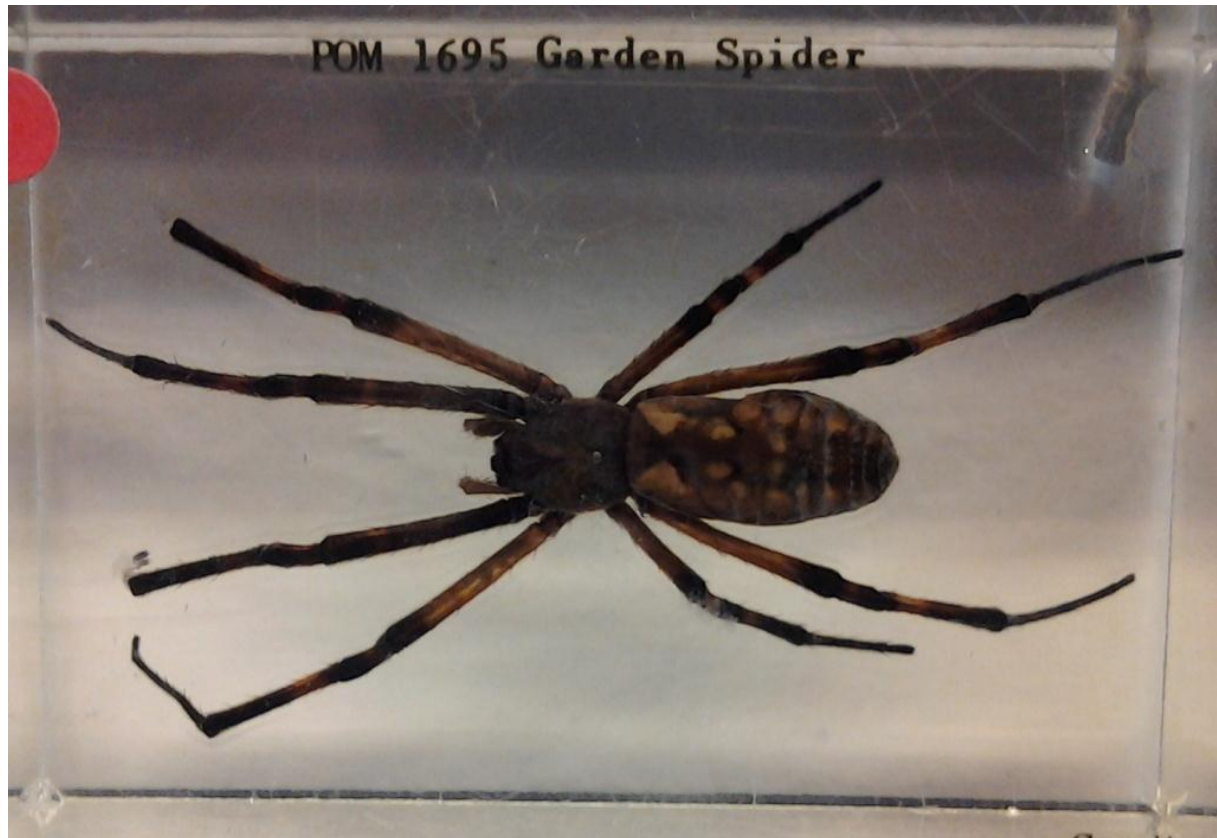




# Phylum Arthropoda



# Phylum Arthropoda





# Phylum Echinodermata



**Phylum Echinodermata** – Sea stars, sea urchins, sea cucumbers

Echinoderms Have

Bilateral symmetry as larvae, radial symmetry as adults

Endoskeleton of calcium carbonate

Closed circulatory system

Water vascular system

Tube feet

Madreporite (entry/exit to water vascular system)

Deuterostome Development

# Phylum Echinodermata



# Phylum Echinodermata



# Phylum Hemichordata



**Hemichordates – Acorn worms and Pterobranchs**

## Hemichordates

Rare

Deuterostomes

Three Body Regions

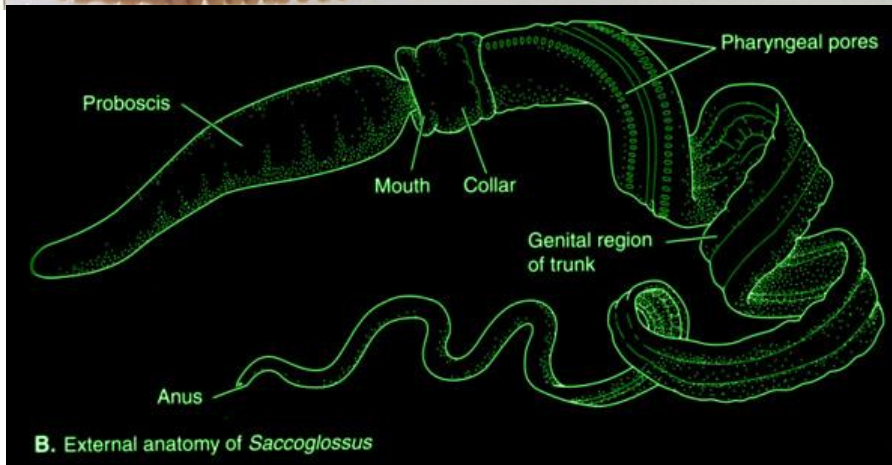
Proboscis

Collar

Trunk

Marine Organisms

Pharyngeal Gill Slits





# Phylum Chordata



**Phylum Chordata** – All chordates, including tunicates, lancelets, hagfish, lamprey, sharks, fish, amphibians, reptiles, and mammals

**Everything after this slide is in Phylum Chordata**

All Chordates Have

Bilateral symmetry

Closed circulatory system

Complete digestive tract

True Coelom

Deuterostome Development

**A hollow dorsal nerve cord**

**A notochord**

**Pharyngeal gill slits**

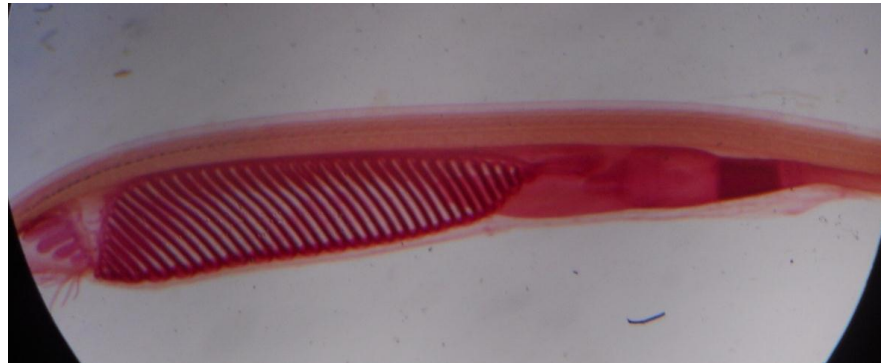
**Post anal tail**

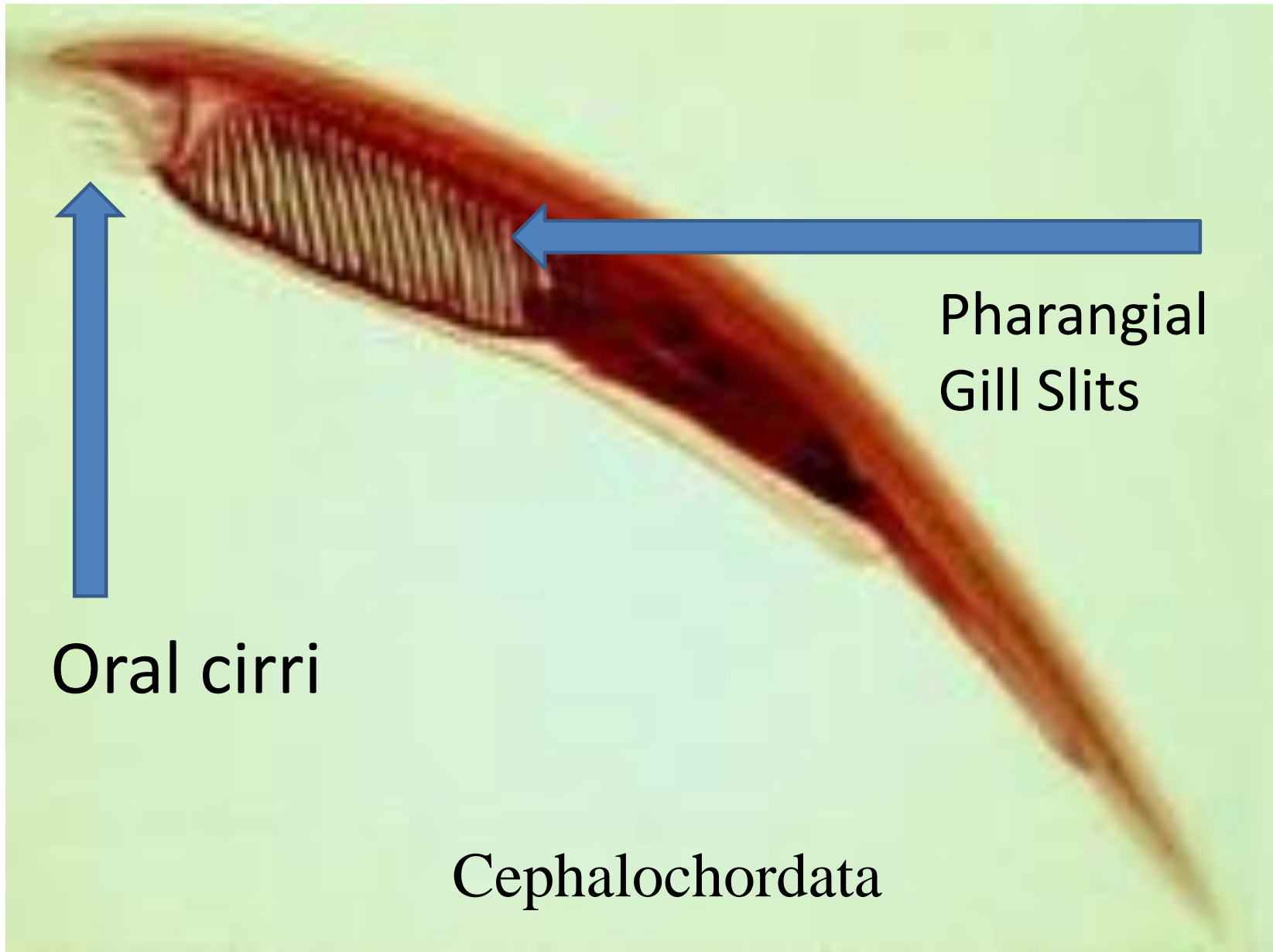


# Sub-Phylum Cephalochordata



**Sub-phylum Cephalochordata – Lancelets**  
First Chordates





# Sub-Phylum Urochordata



## **Sub-Phylum Urochordata – Sea Squirt**

### Tunicates

Lose post-anal tail and notochord in adulthood



# Sub-Phylum Vertebrata

- Myxini (Craniate not Vertebrate)
- Petromyzontida
- Chondrichthyes
- Osteichthyes
  - Actinopterygii
  - Actinista
  - Dipnoi
- Amphibia
- Reptilia
  - Aves
- Mammalia
- All VERTEBRATES have a backbone, in addition to all the characteristics of chordates.



# Class Myxini



## **Class Myxini – Hagfish**

Hagfish have

Cephalization, but no backbone

Are not true vertebrates

Craniates

# Class Petromyzontida



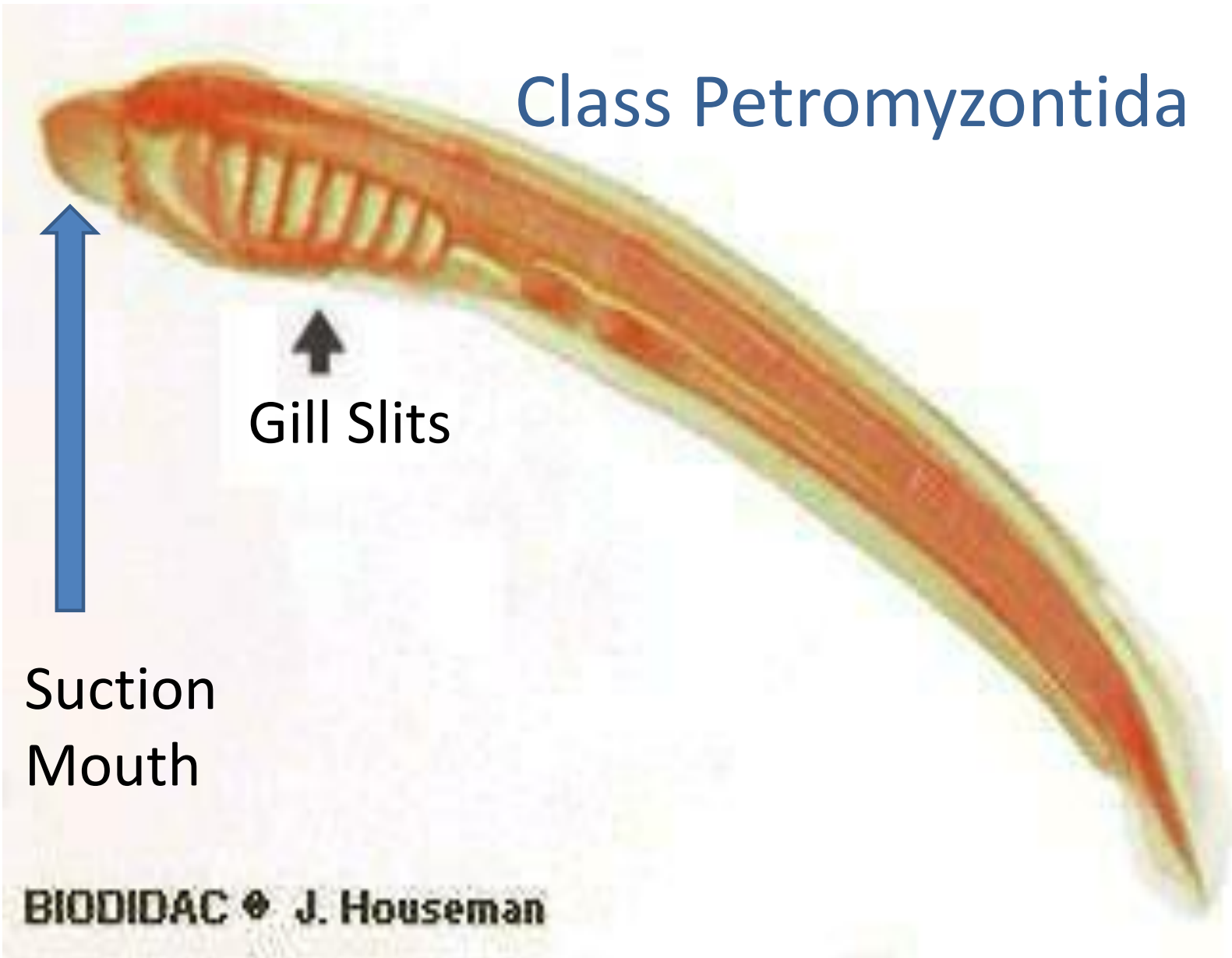
## **Class Petromyzontida – Lampreys**

Lampreys Have  
Teeth

True Backbone, no jaw



## Class Petromyzontida



# Class Chondrichthyes



**Class Chondrichthyes** – Sharks, skates and rays

Chondrichthyans Have

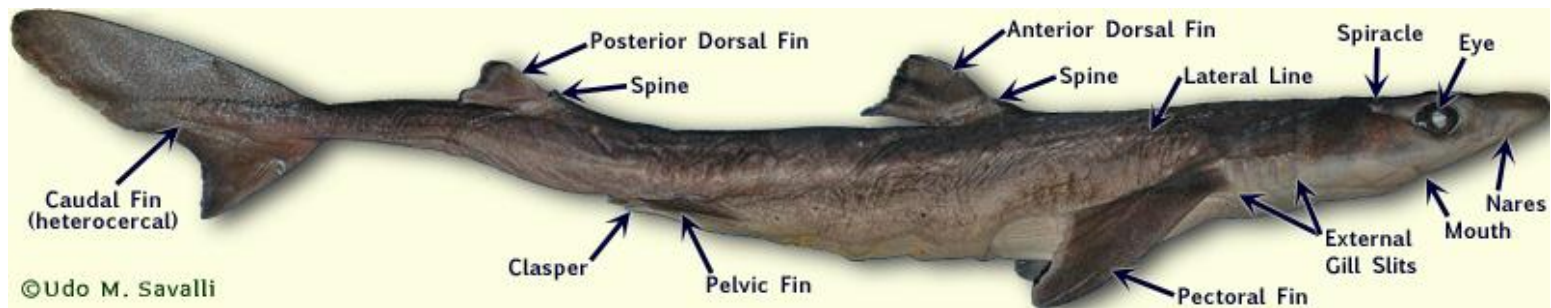
Living Skeleton made entirely of cartilage

Ancient chondrichthyans had  
bone skeletons

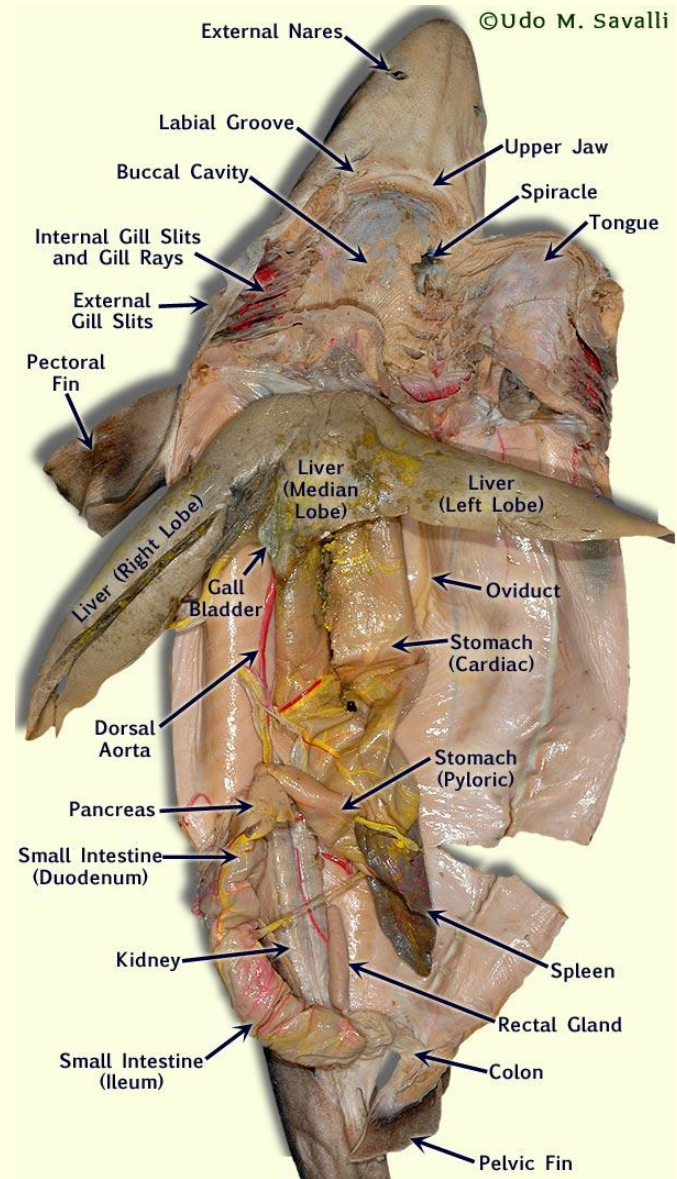
Fins for swimming



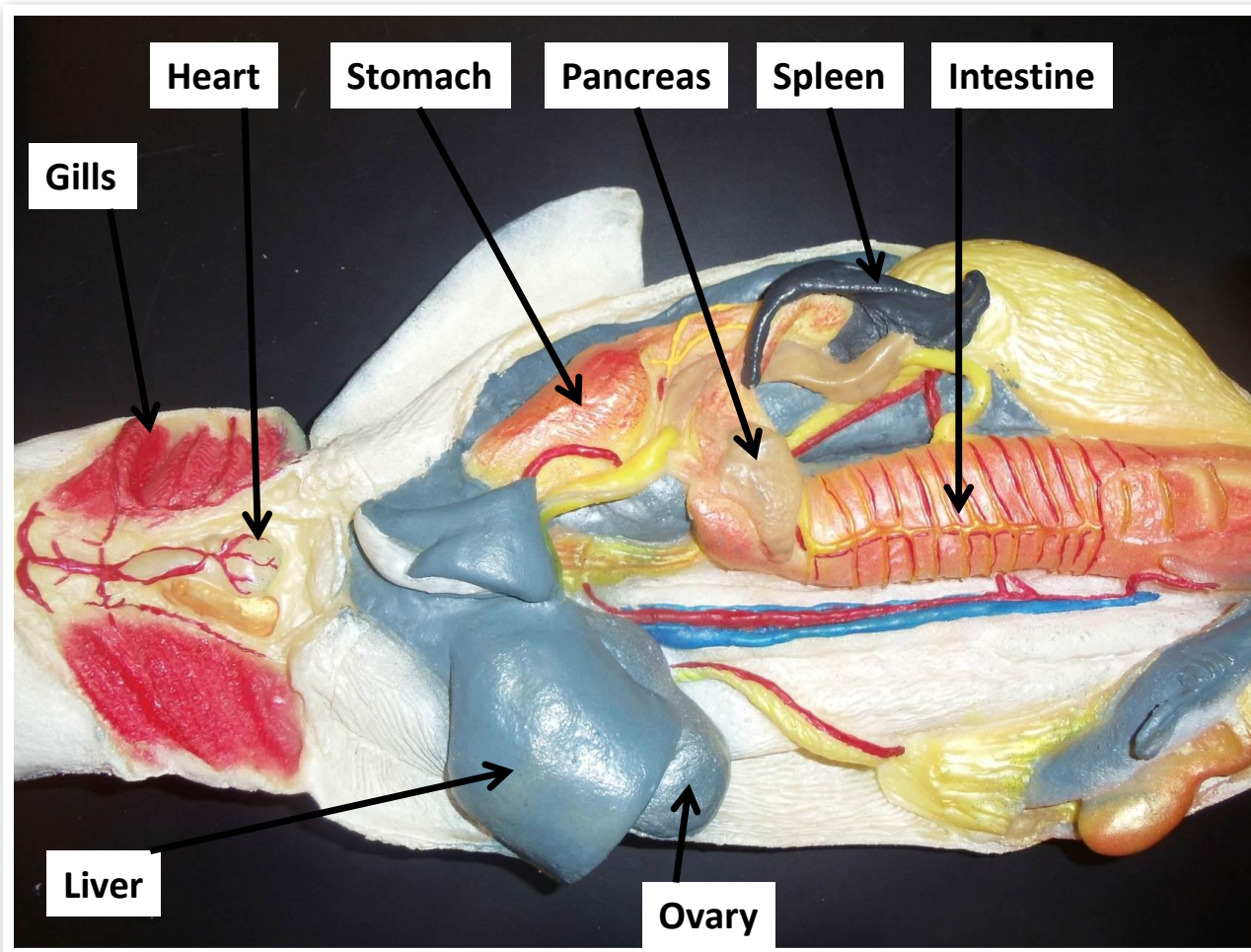
# Spiny Dogfish Shark



# Spiny Dogfish Shark

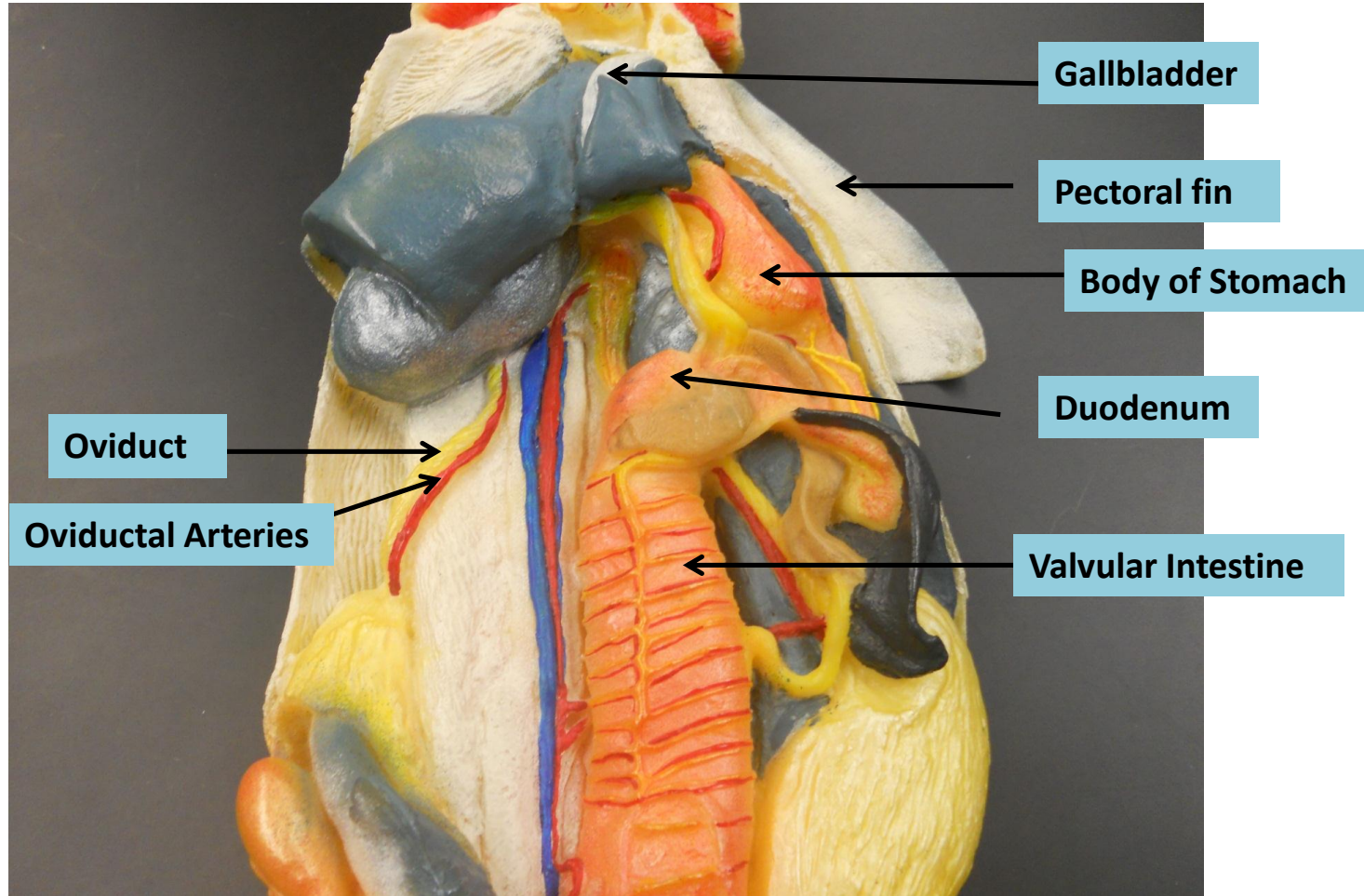


# Spiny Dogfish Shark



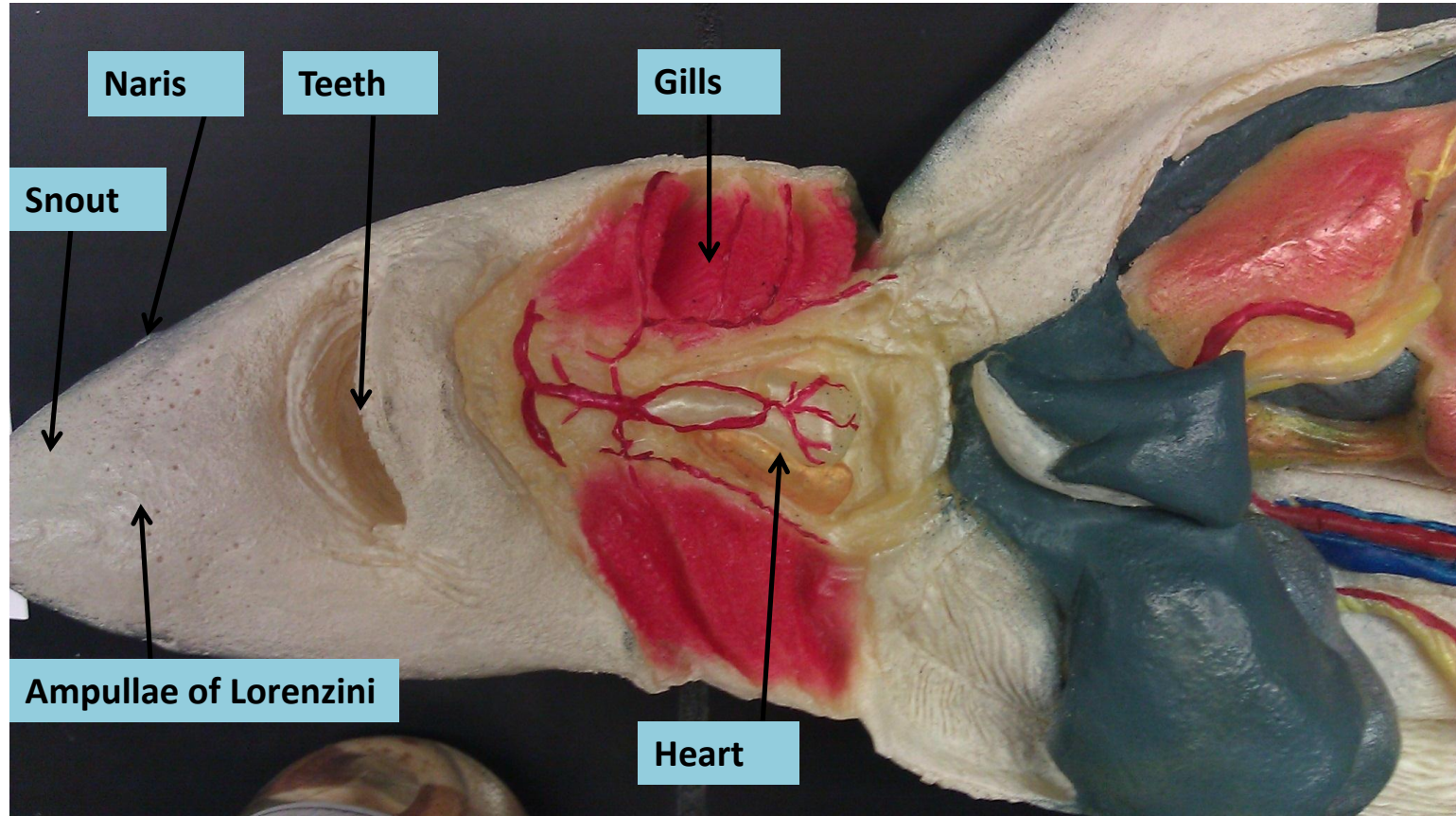


# Spiny Dogfish Shark

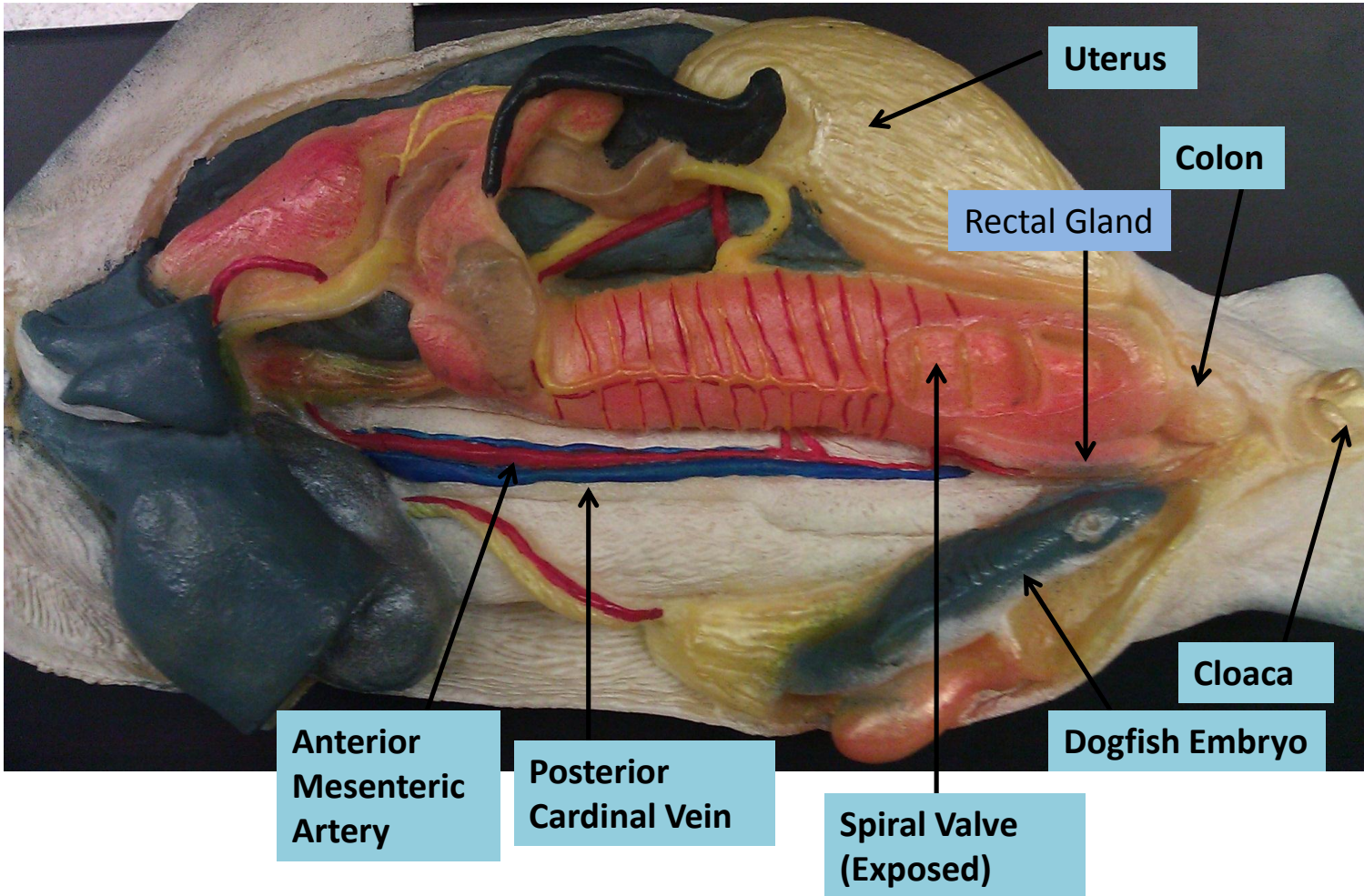




# Spiny Dogfish Shark

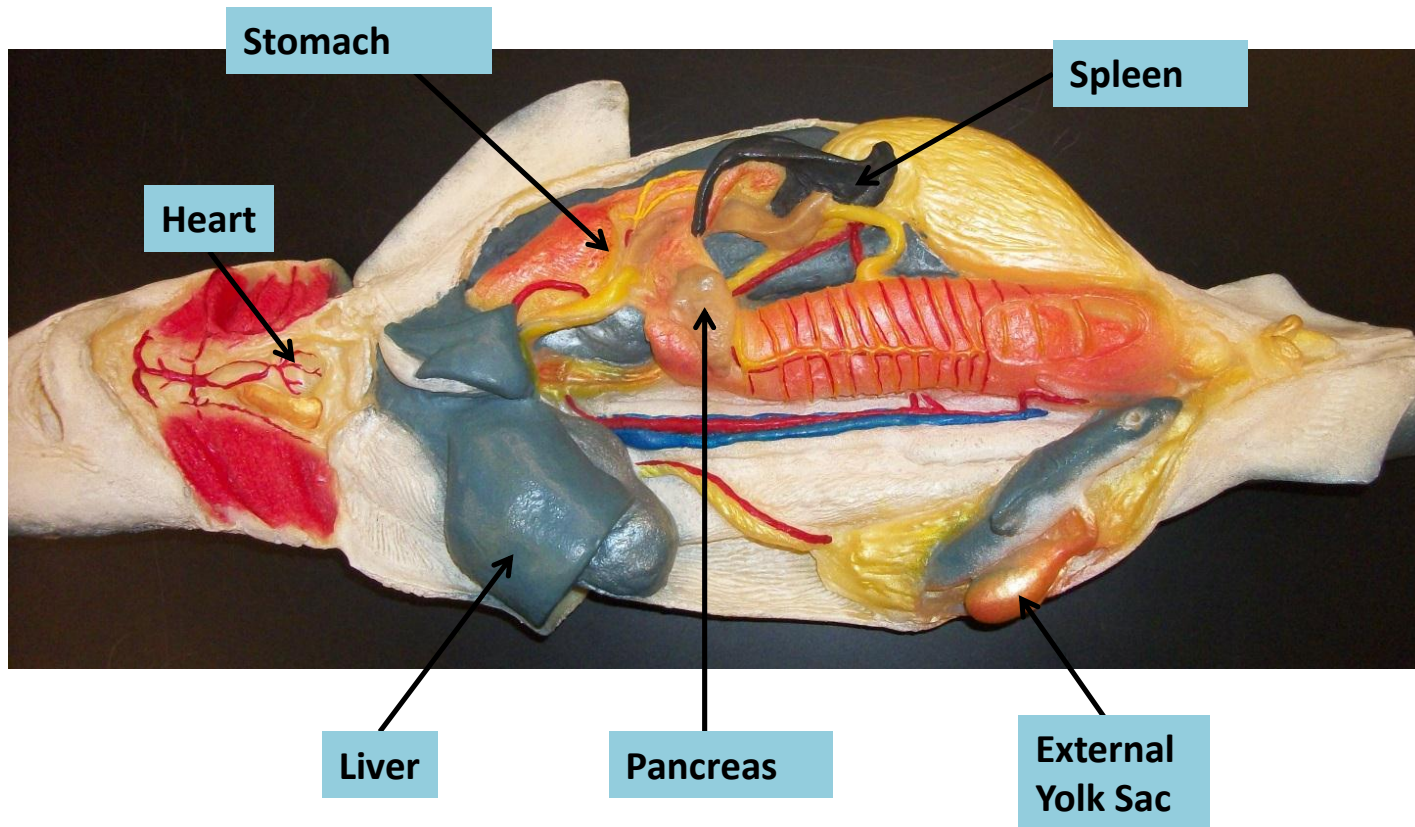


# Spiny Dogfish Shark





# Spiny Dogfish Shark

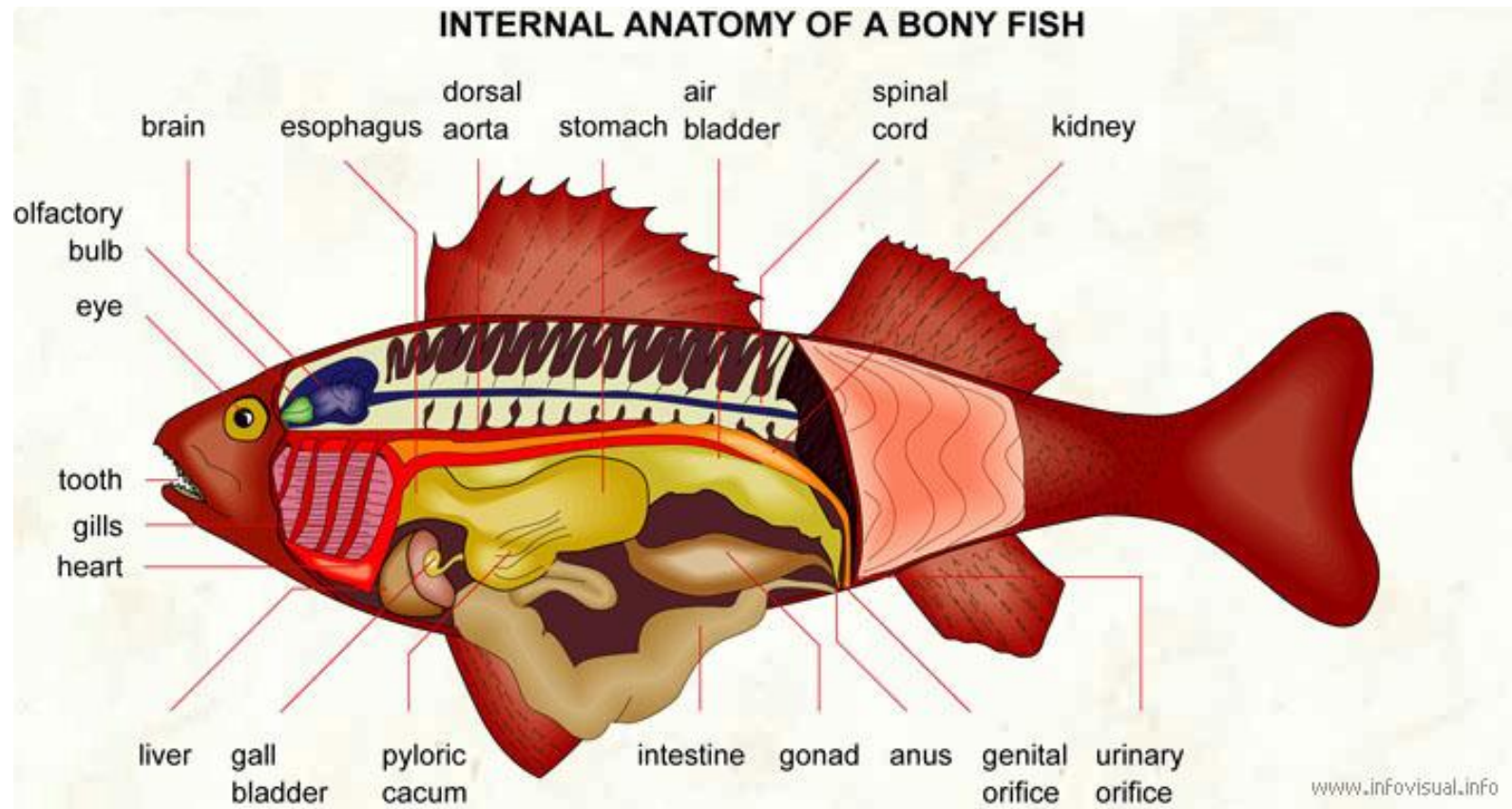


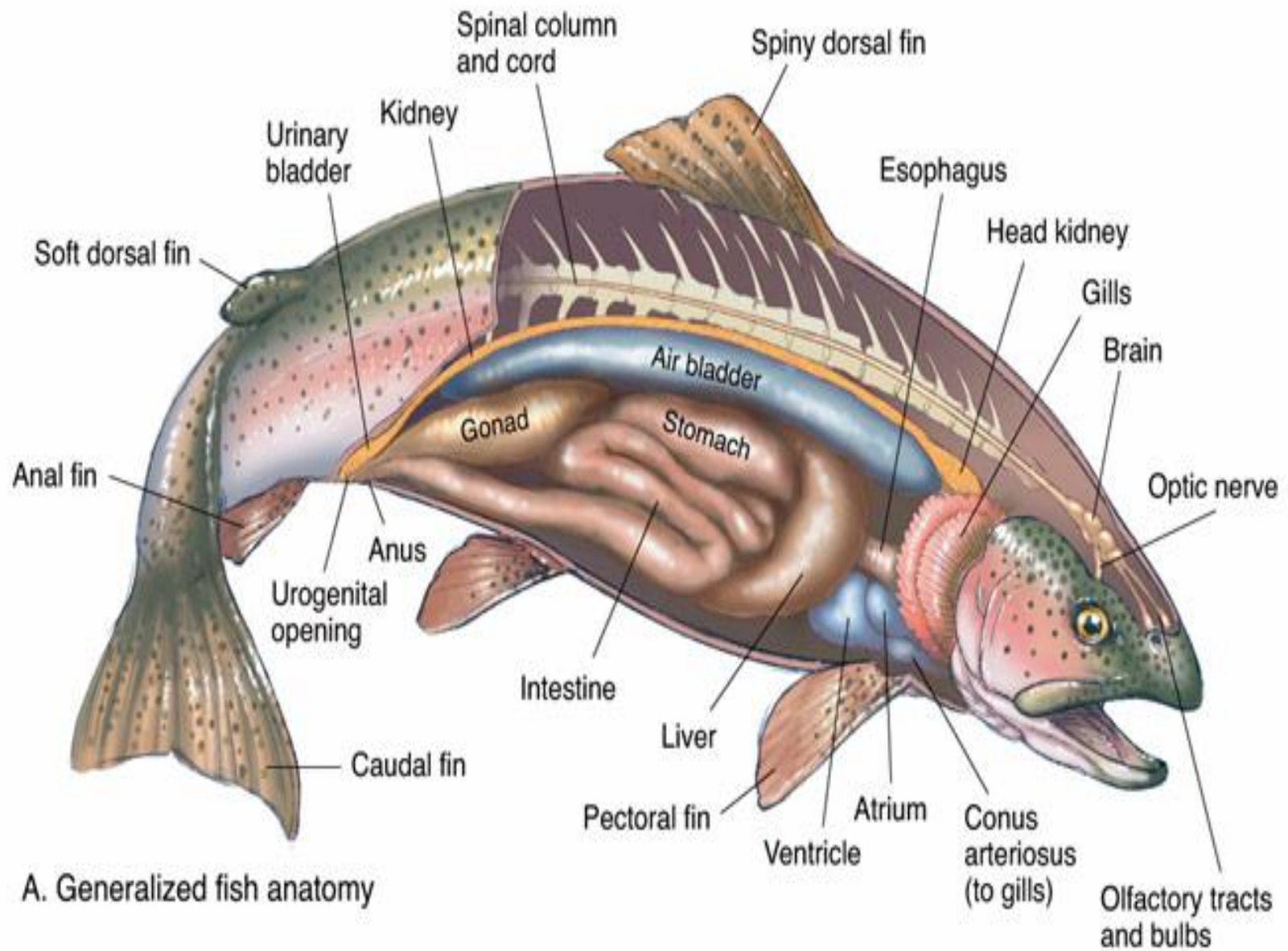
# Superclass Osteichthyes

- Comprised of 3 classes
  - Actinopterygii : Rayfin fish
  - Actinista : Lobefin fish
  - Dipnoi : Lung fish
- All Osteichthyans have a bony, living skeleton
- Have Scales
- Are cold-blooded

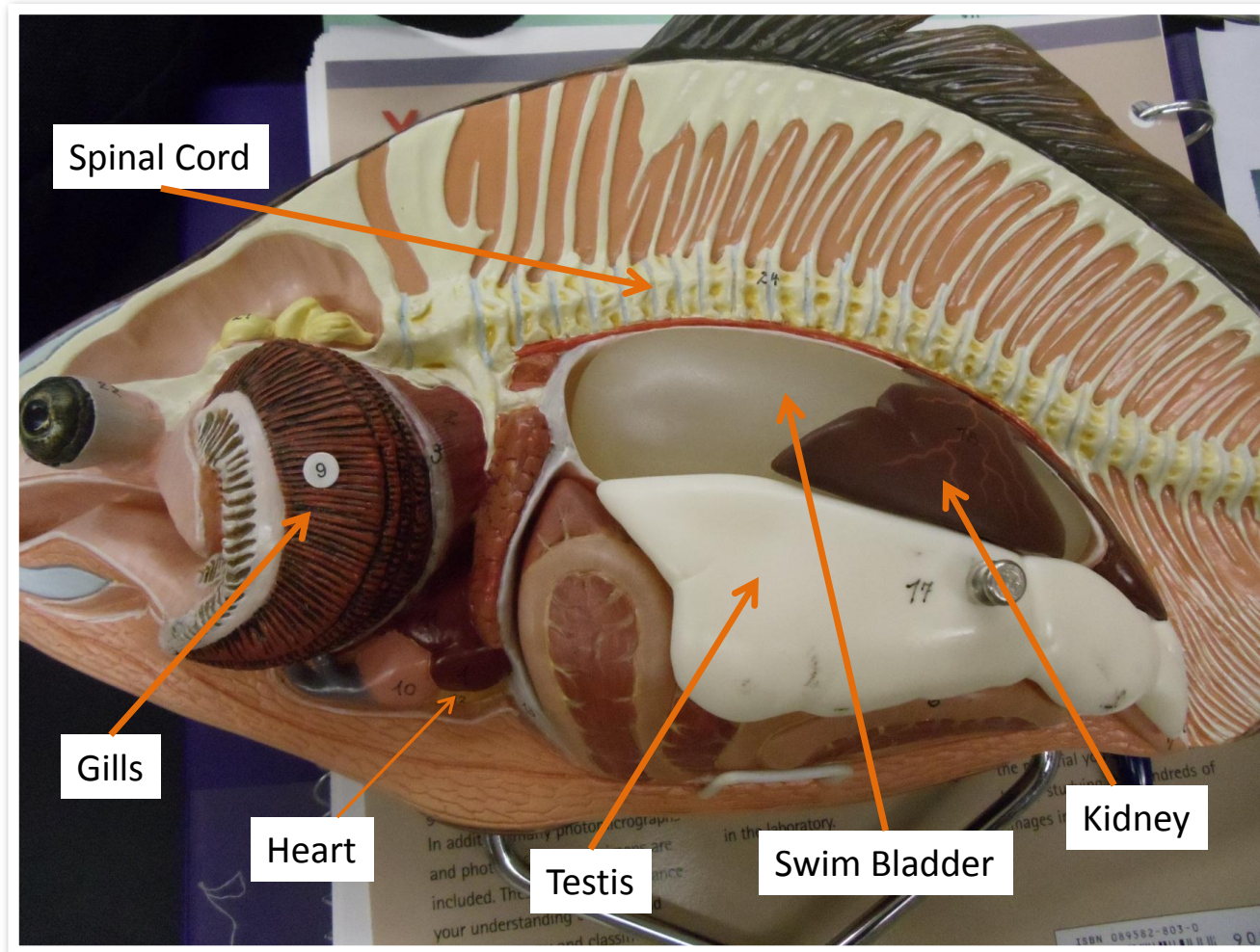


# Superclass Osteichthyes



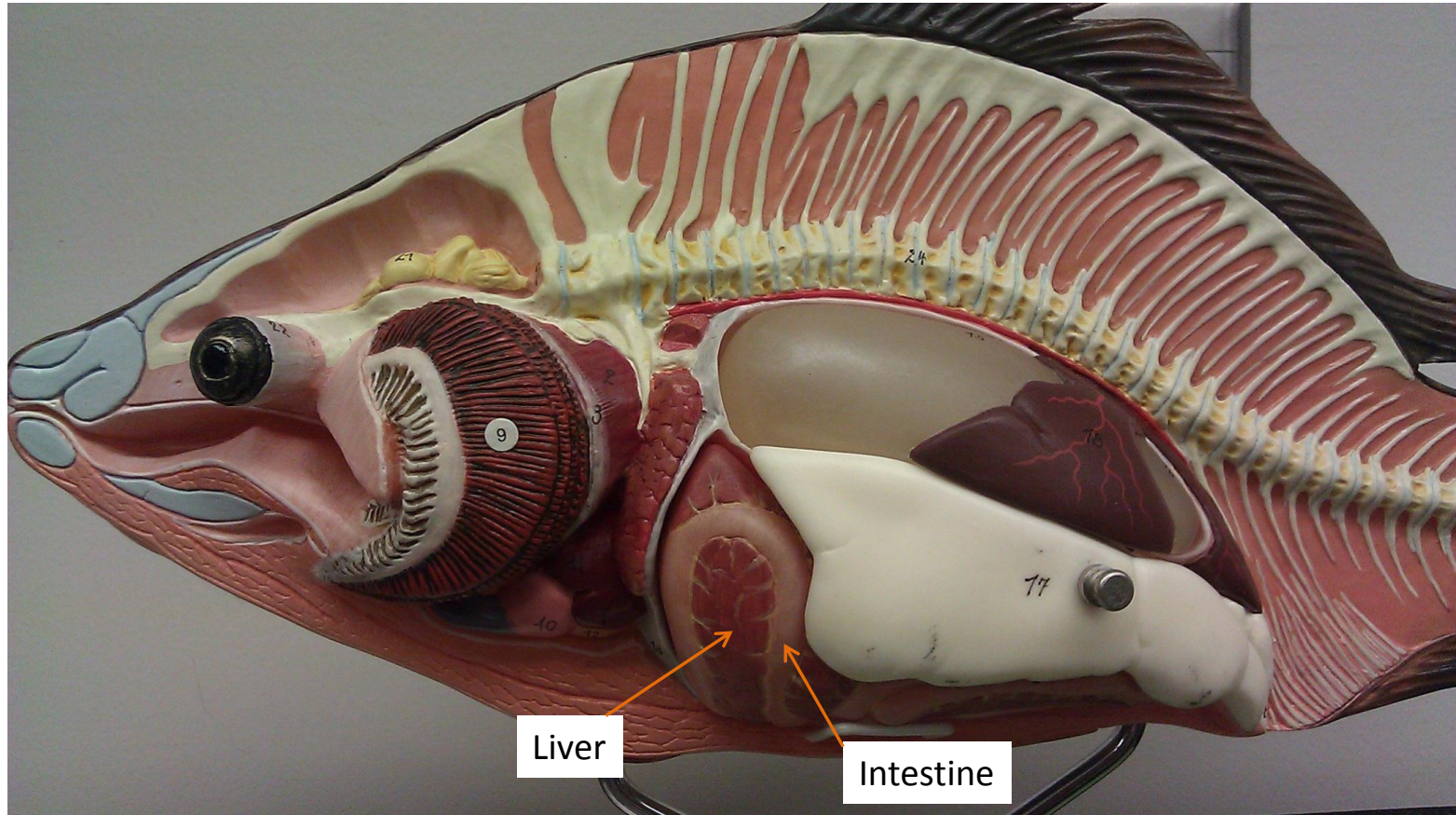


# Carp – Class Actinopterygii



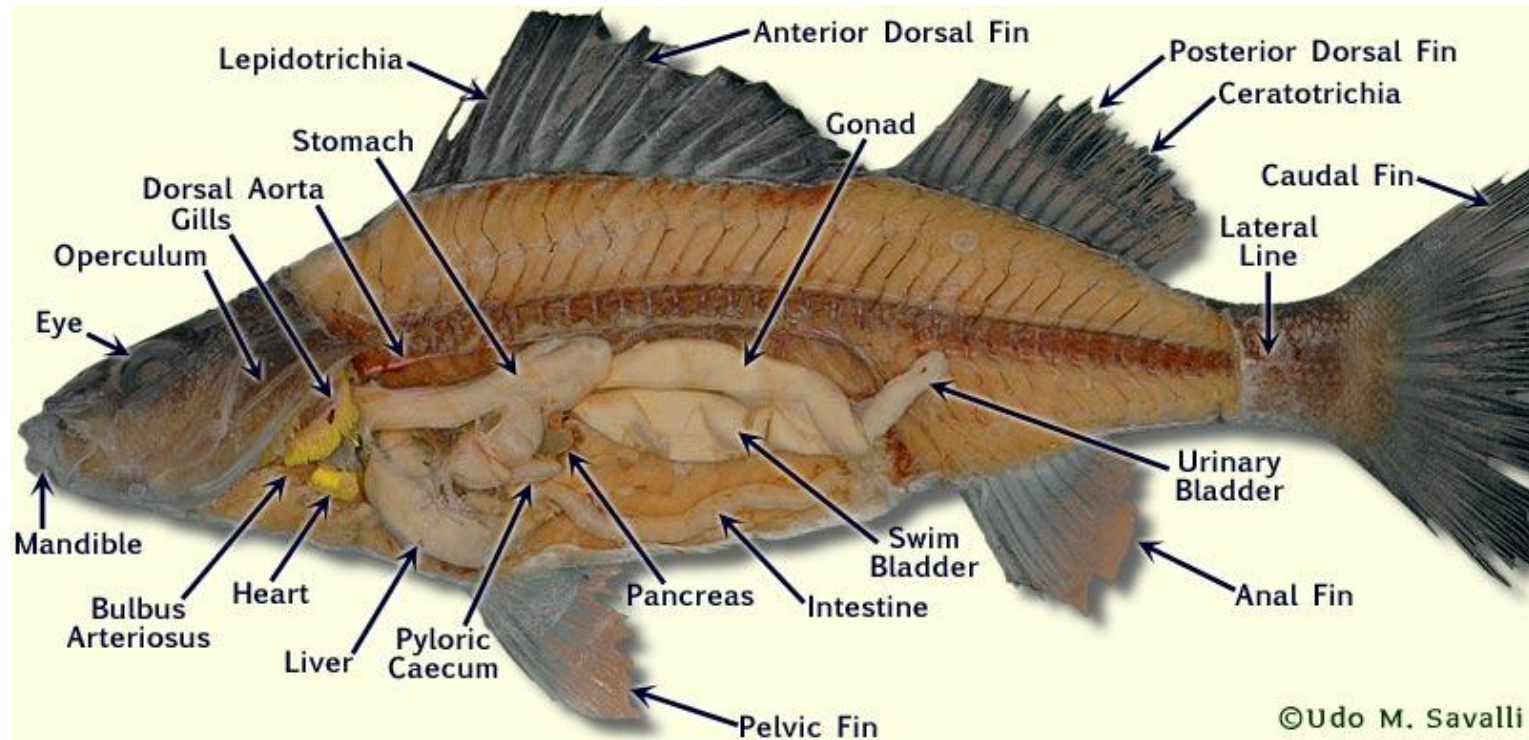


# Carp – Class Actinopterygii

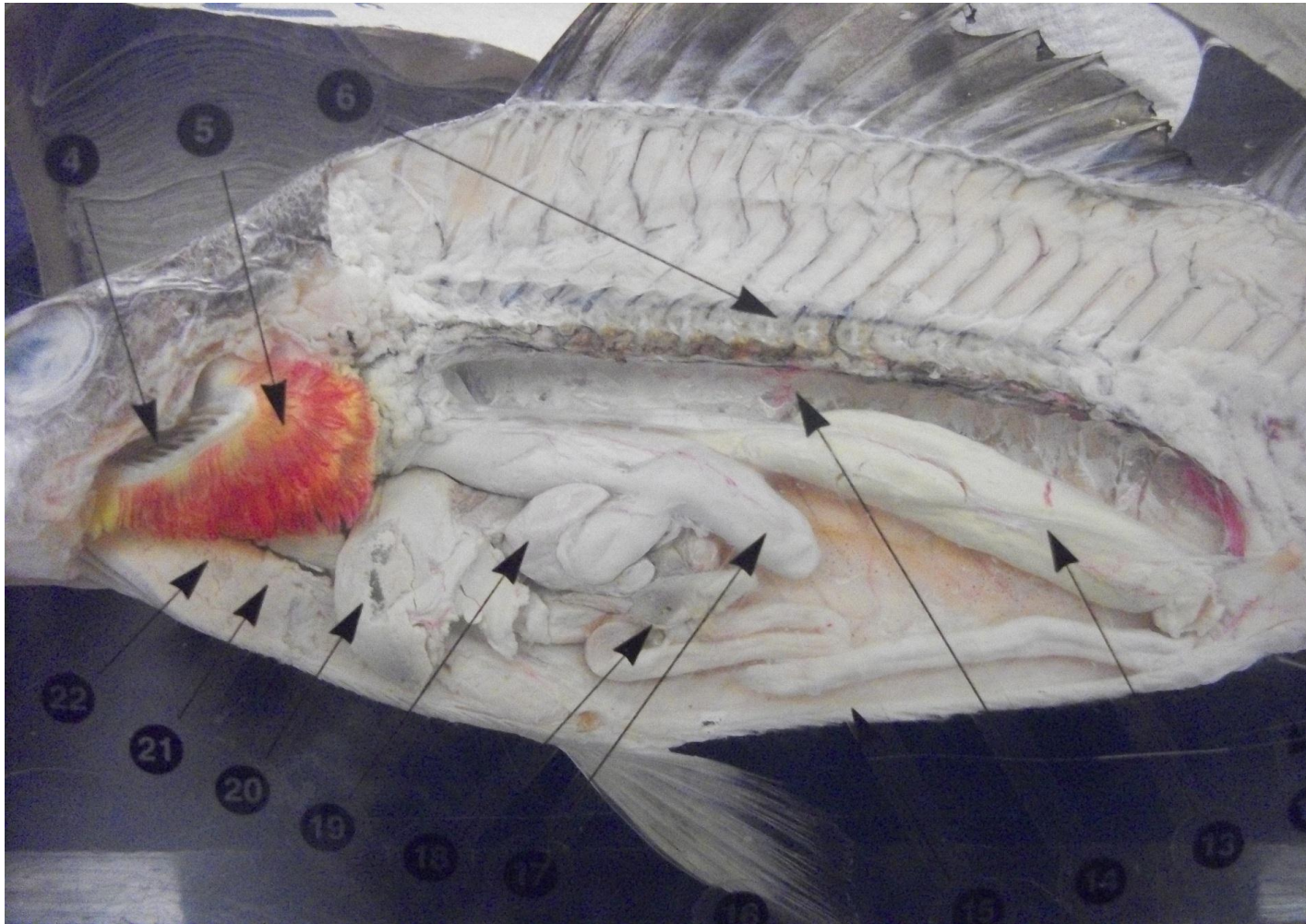




# Yellow Perch - Actinopterygii

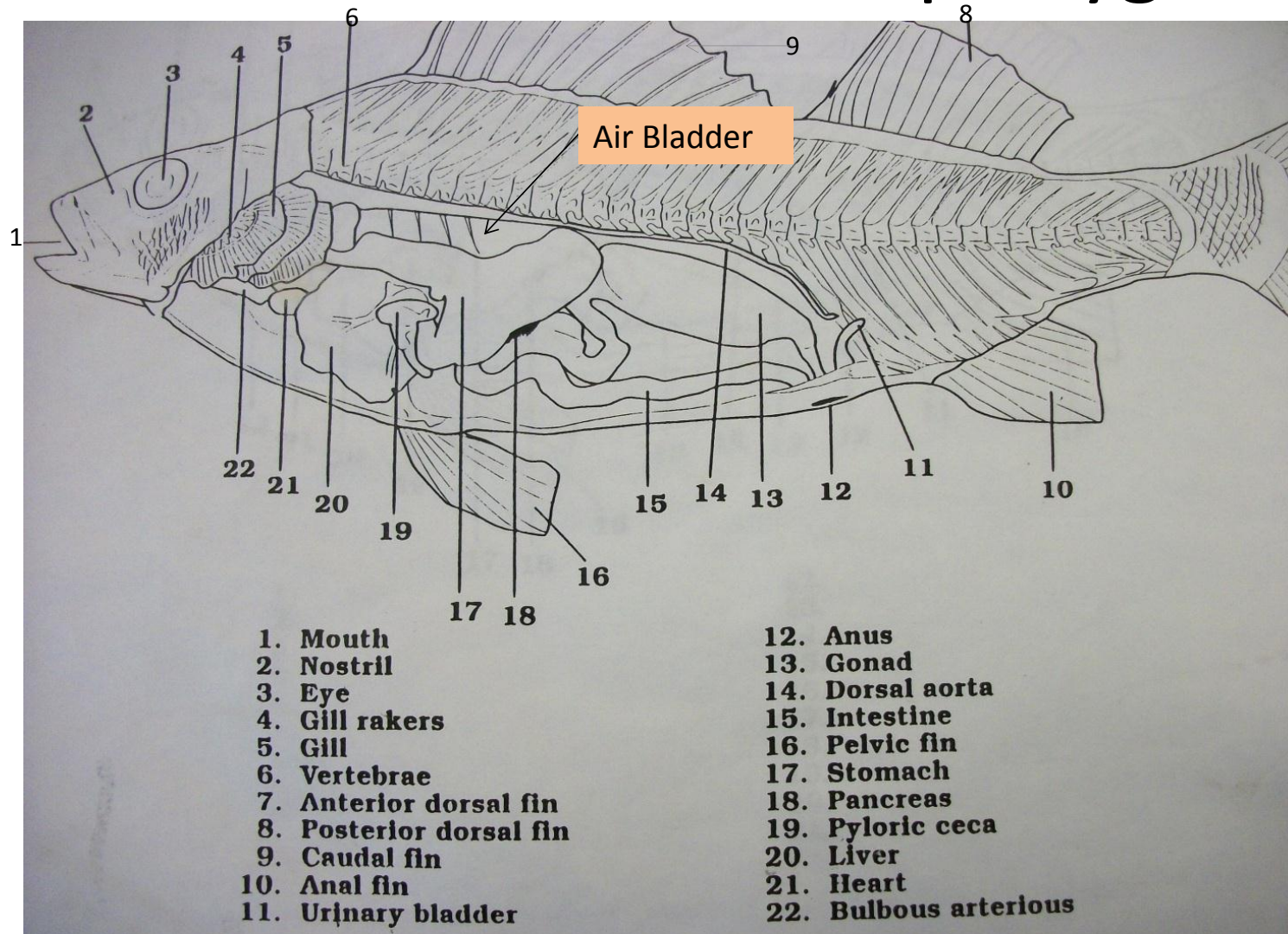


# Yellow Perch - *Actinopterygii*

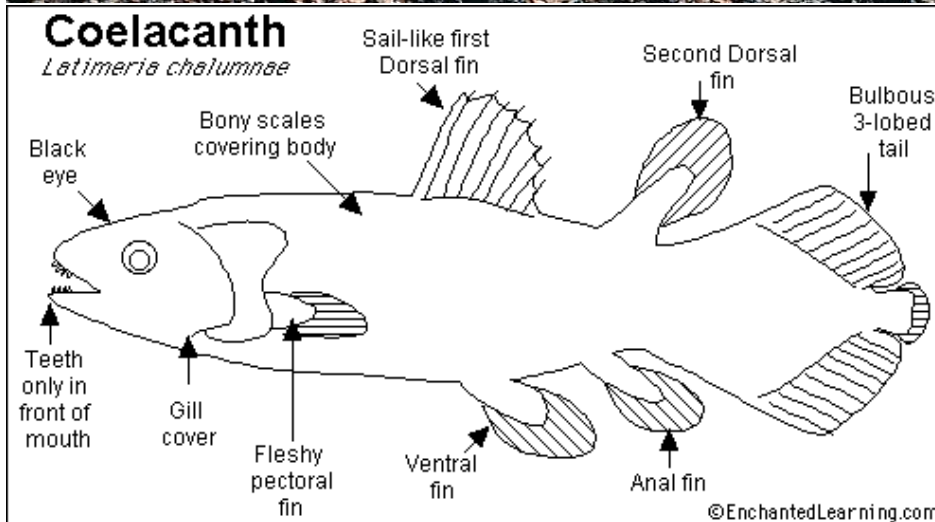




# Yellow Perch - Actinopterygii



# Class Actinista



**Class Actinista** – Lobe finned fish  
Only remaining genus is Latimeria (coelacanths)

Have  
Muscular bony fins  
Vestigial lung



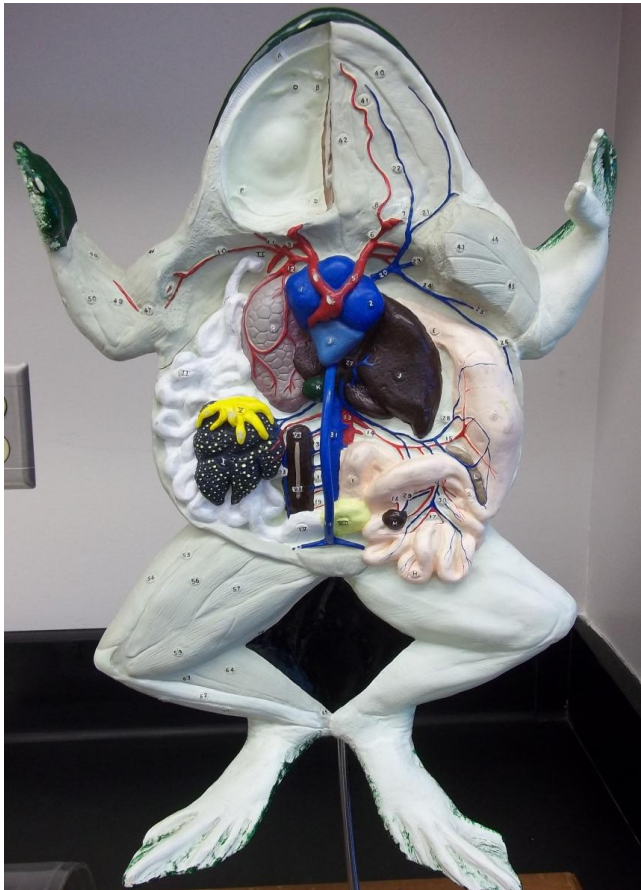
# Class Dipnoi



**Class Dipnoi – Lungfish**

Lungfish Have  
Functional Lungs  
Modified fins

# Class Amphibia



**Class Amphibia** - Frogs, Salamanders, Newts

Amphibians Have

Legs

Lungs – in adult

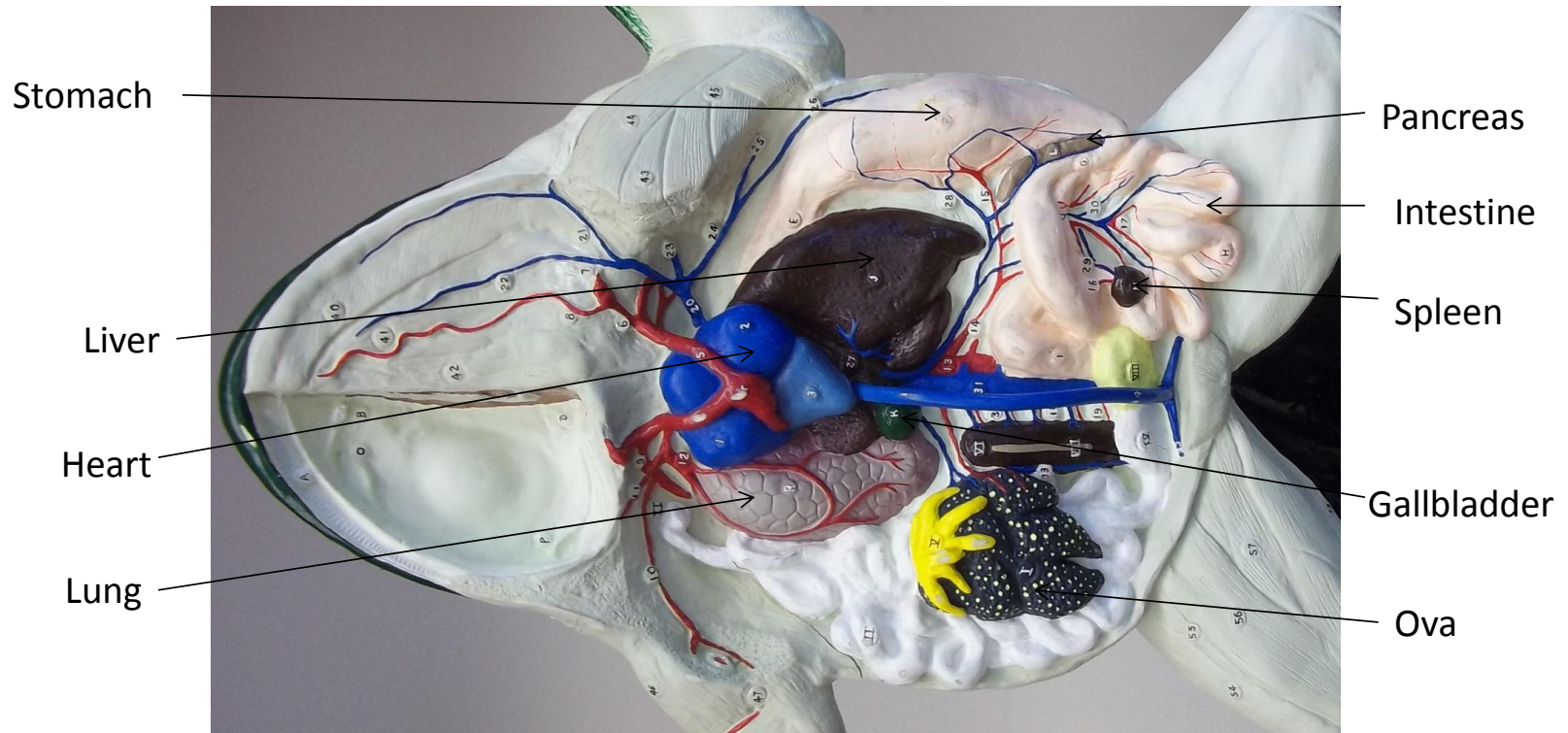
Gills – in tadpole

Breathe through skin

3 Chambered heart

Cold-Blooded

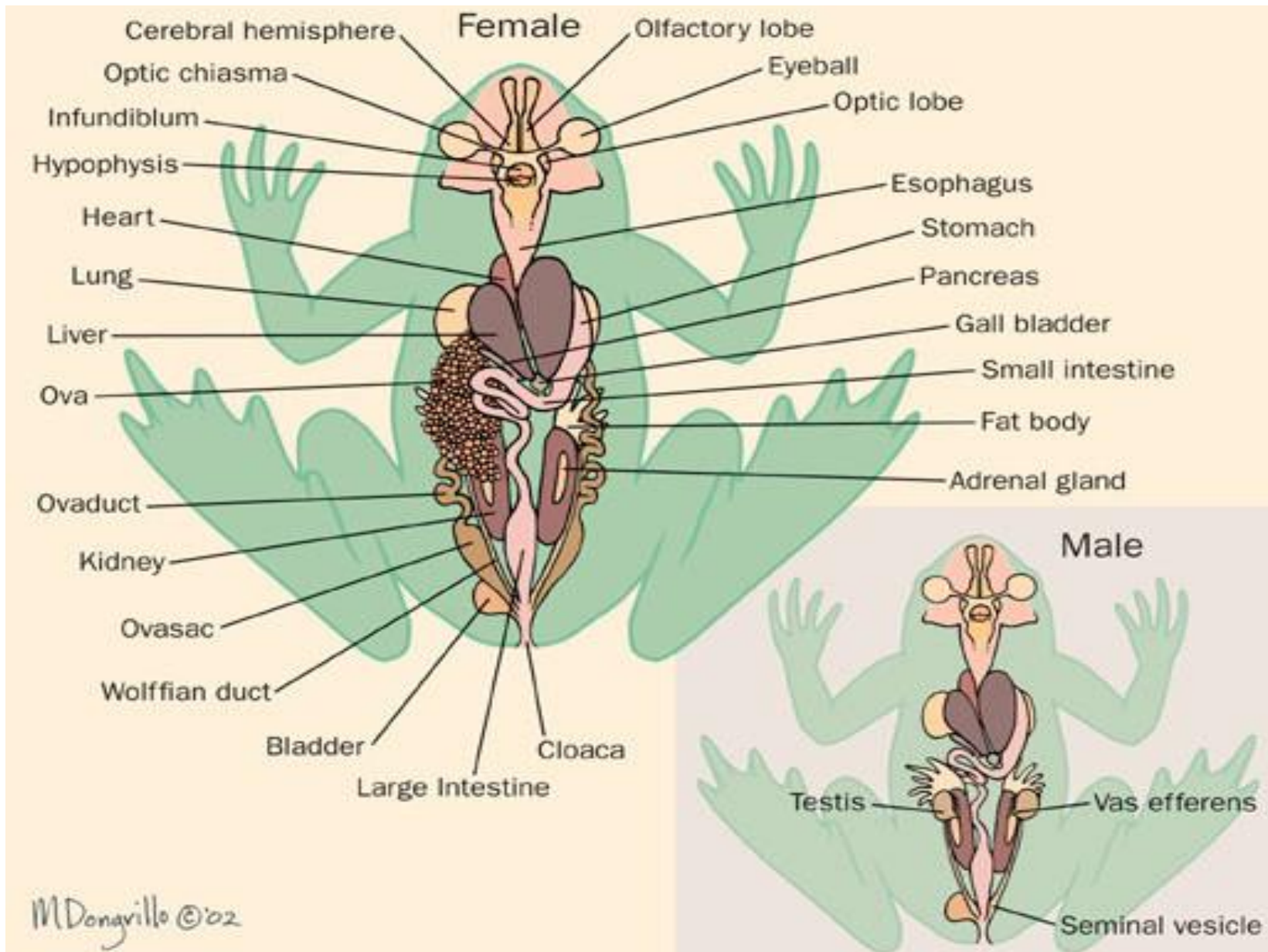
# Class Amphibia



# Class Amphibia







# Class Reptilia



**Class Reptilia** – Snakes, lizards, turtles, birds, dinosaurs (extinct)

Reptiles have

Scales

3 chambered heart with partial septum (complete in crocodilians and birds)

Cold-blooded (except for birds)



# Class Reptilia



# Sub-Class Aves



**Sub-Class Aves** – Birds, are part of reptilia, but are distinct from other reptiles

## Birds Have

Feathers (modified scales)

4 Chambered Heart

Warm Blooded

Hollow Bones



# Class Mammalia



**Class Mammalia** - Canines, Primates, Humans, Rhinos, etc.

Mammals Have

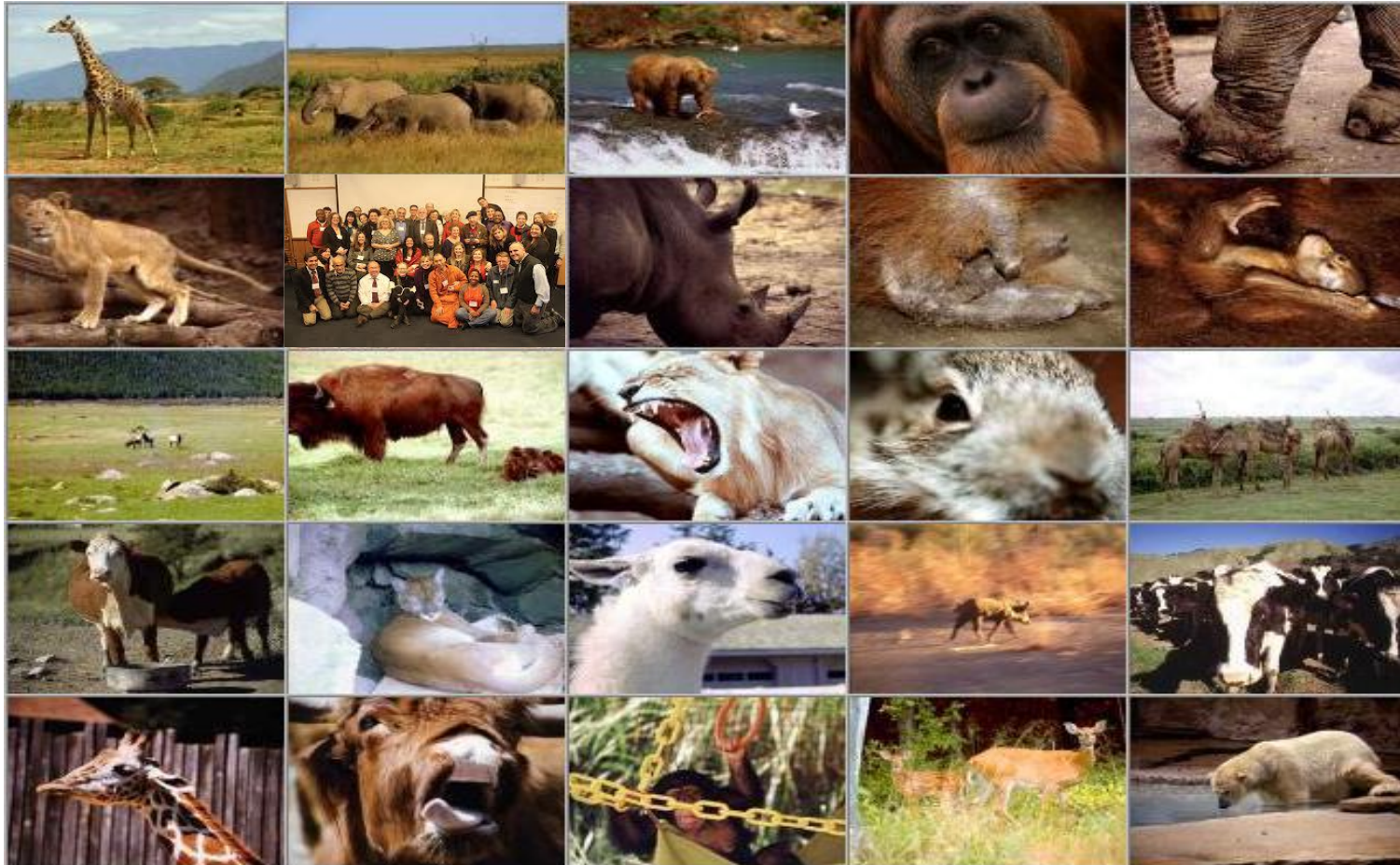
Hair

4 chambered heart

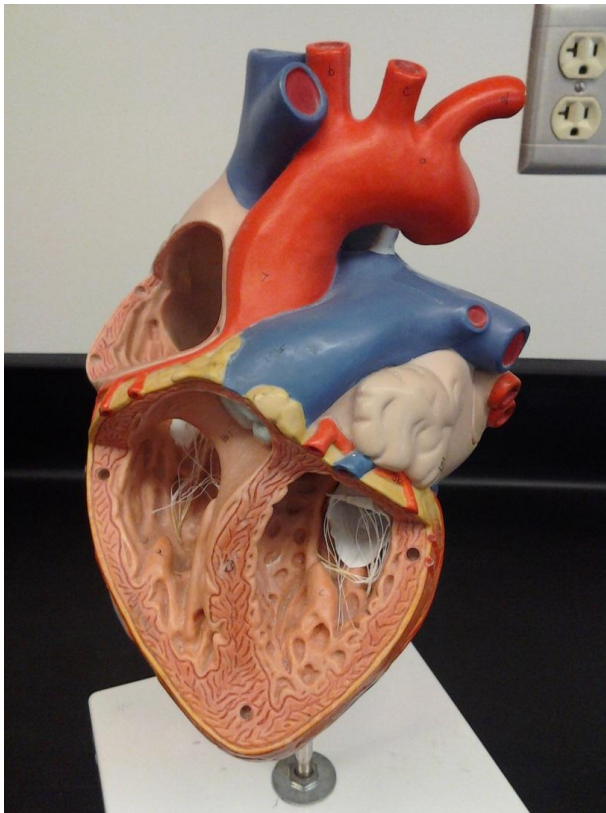
Milk

Warm-Blooded

# Class Mammalia



# Circulation – The Heart



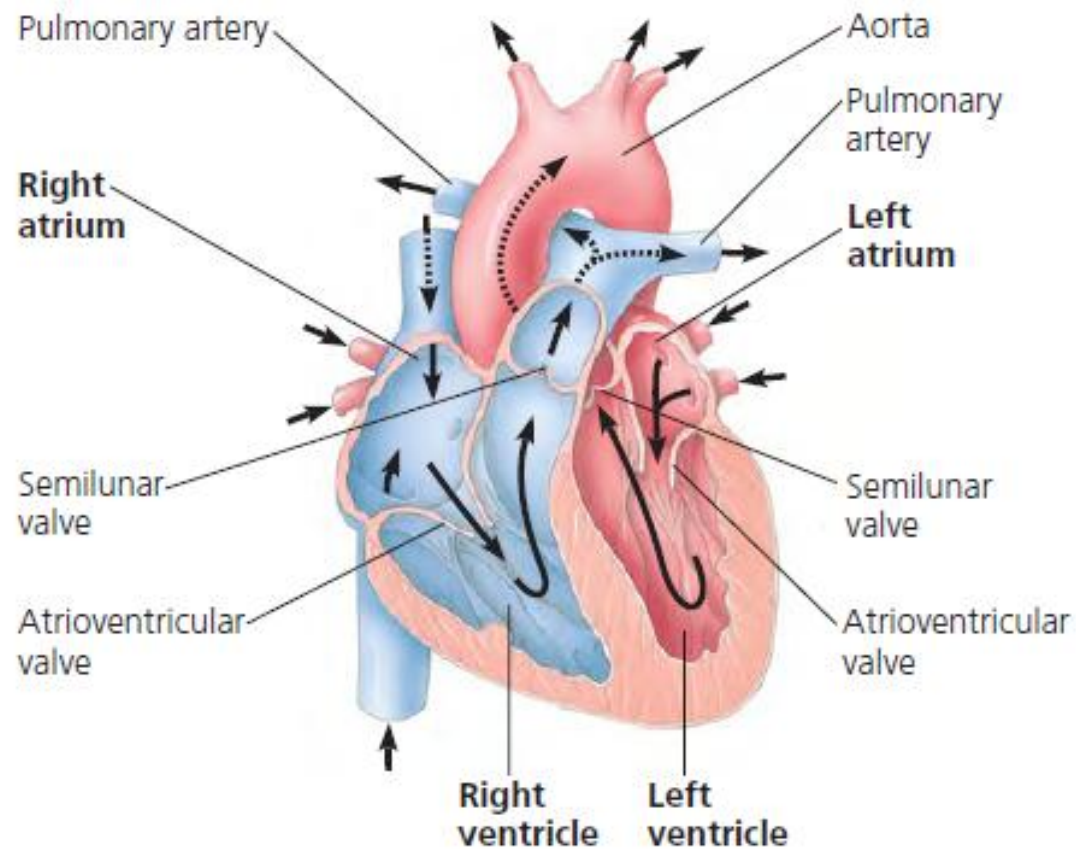
## The Mammalian Heart

Four Chambers – Right and left Atrium and right and left ventricles

Two Atrioventricular Valves – Tricuspid and Bicuspid

Two Semilunar Valves – Aortic and Pulmonary

# Circulation





## THE HEART

**LARGE VEIN**  
(From upper body)

**PULMONARY ARTERY**  
(To right lung)

**PULMONARY VEINS**  
(From right lung)

**RIGHT ATRIUM**

**RIGHT VENTRICLE**

**LARGE VEIN**  
(From lower body)

**PULMONARY ARTERY**  
(To left lung)

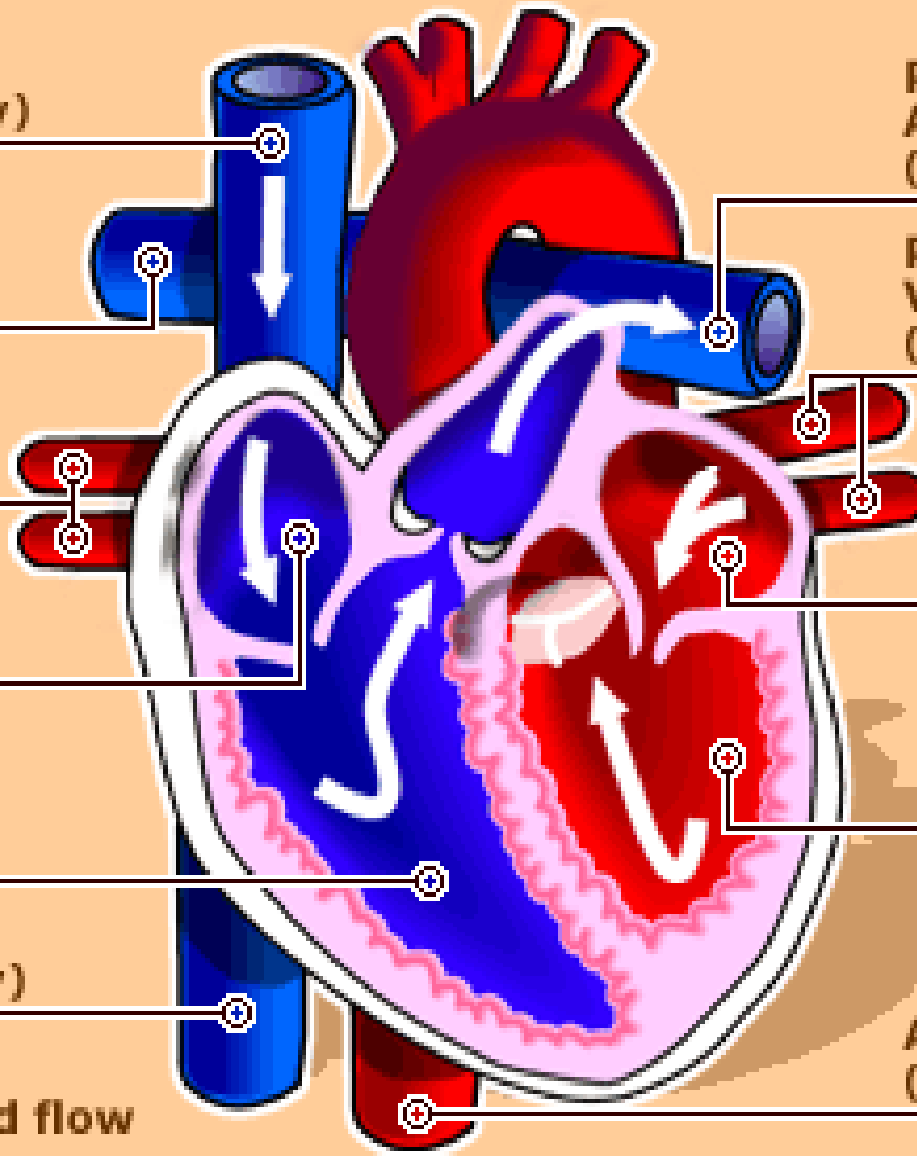
**PULMONARY VEINS**  
(From left lung)

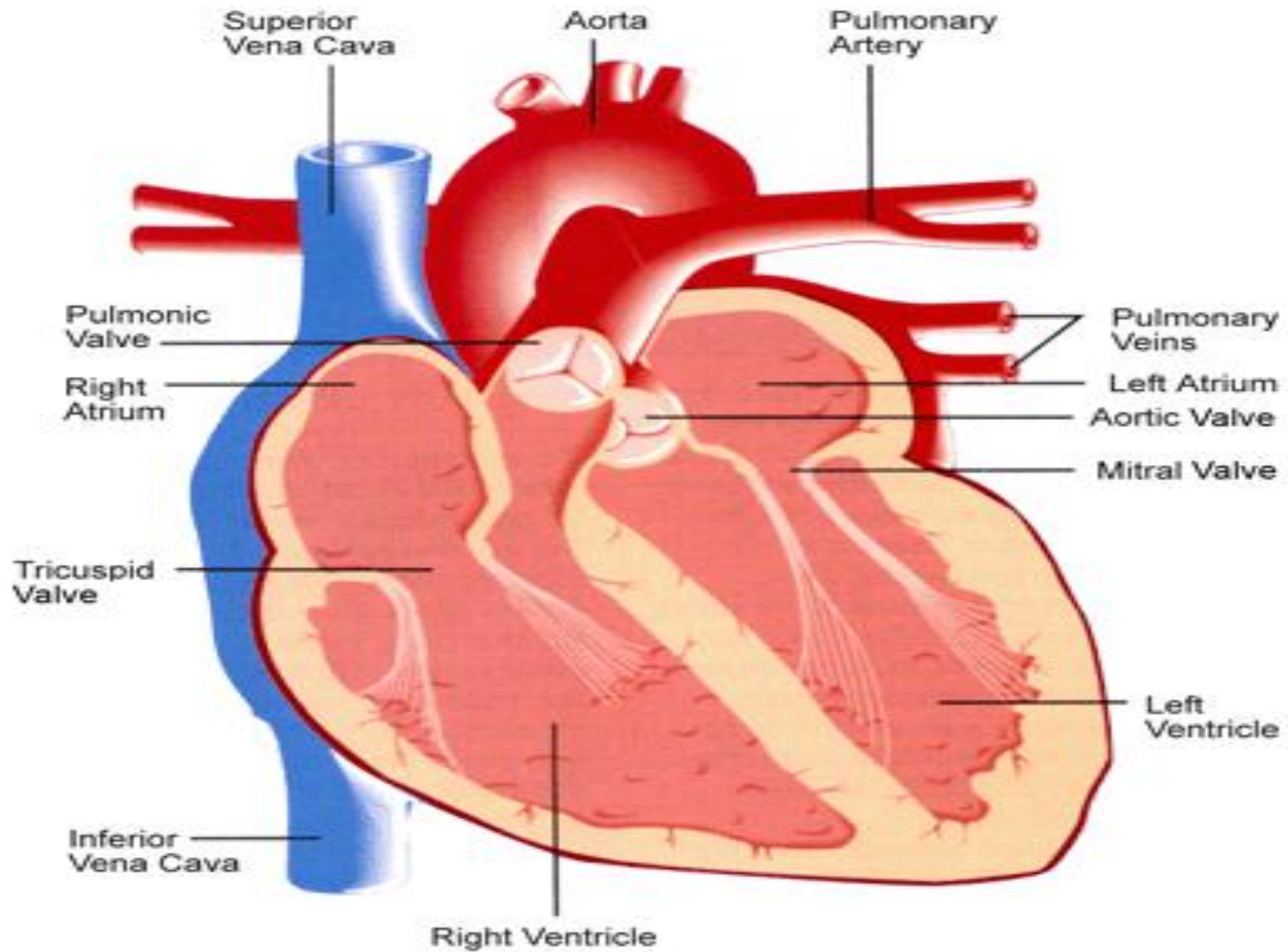
**LEFT ATRIUM**

**LEFT VENTRICLE**

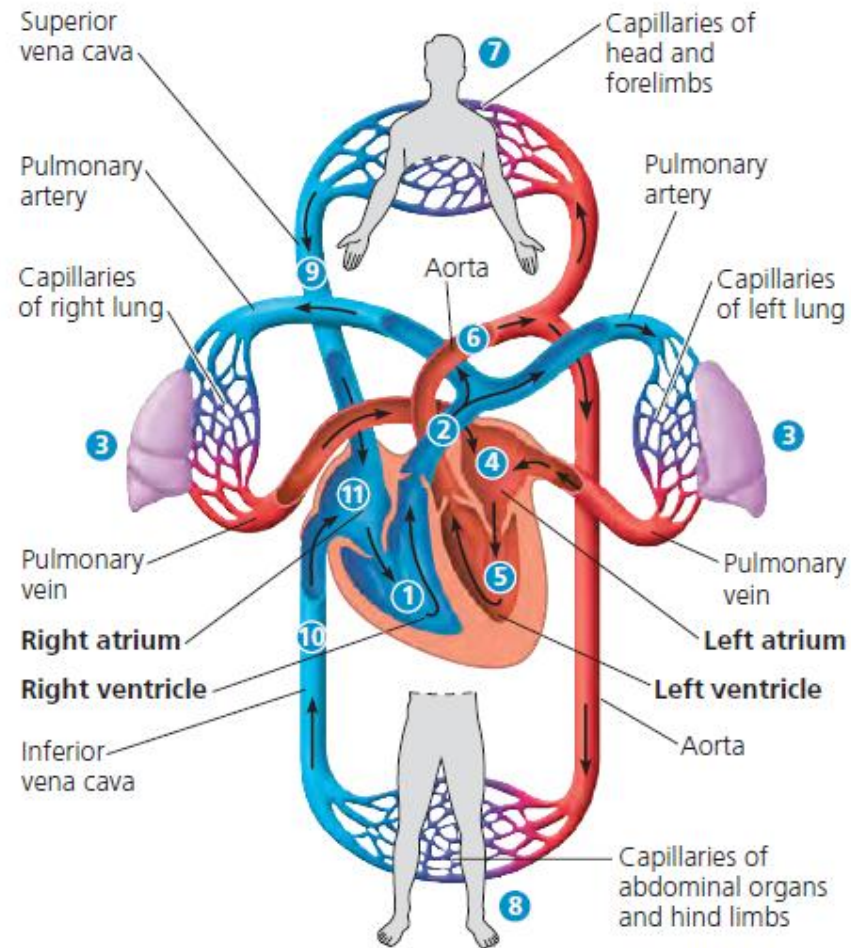
**AORTA**  
(To lower body)

**Key** → **Blood flow**



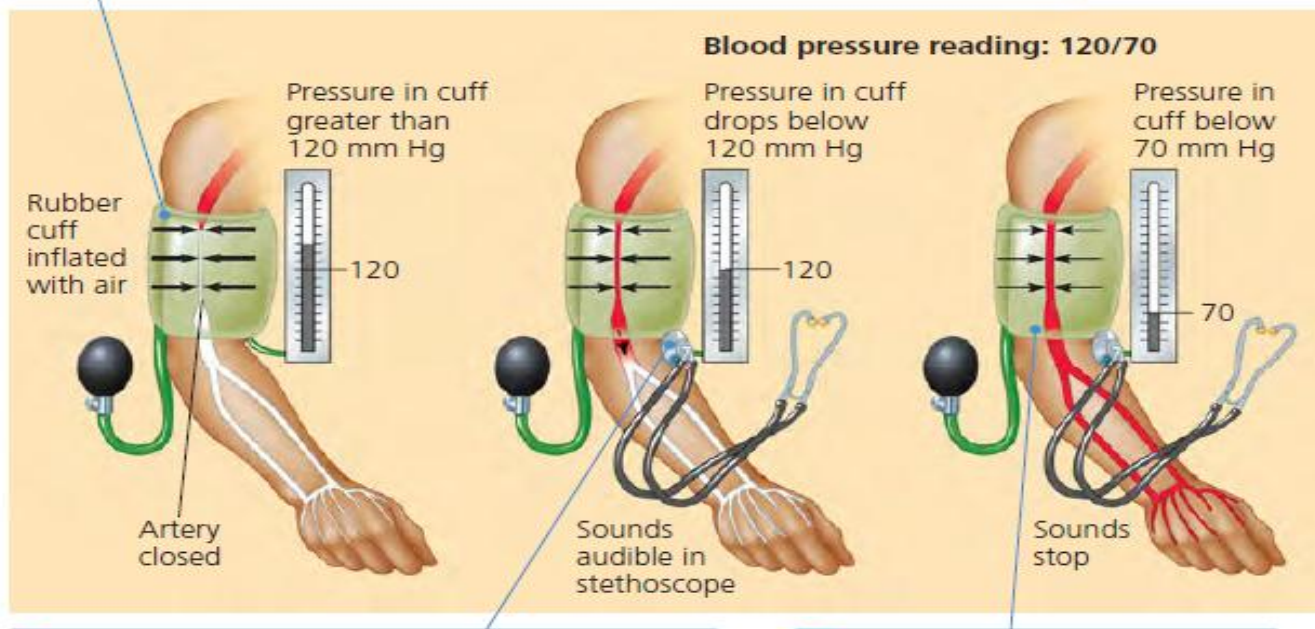


# Circulation



# Blood Pressure

① A sphygmomanometer, an inflatable cuff attached to a pressure gauge, measures blood pressure in an artery. The cuff is inflated until the pressure closes the artery, so that no blood flows past the cuff. When this occurs, the pressure exerted by the cuff exceeds the pressure in the artery.



② The cuff is allowed to deflate gradually. When the pressure exerted by the cuff falls just below that in the artery, blood pulses into the forearm, generating sounds that can be heard with the stethoscope. The pressure measured at this point is the systolic pressure.

③ The cuff is allowed to deflate further, just until the blood flows freely through the artery and the sounds below the cuff disappear. The pressure at this point is the diastolic pressure.



# Tissue Types

- Epithelial Tissue
  - Covers the outside of the body and lines organs and body cavities
  - Squamous, Cuboidal, Columnar
  - Simple, Stratified, Pseudostratified
- Connective Tissue
  - Sparse population of cells scattered through extracellular matrix
  - Bone, Blood, Cartilage, Fibrous, Loose, Adipose,
- Muscle Tissue
  - Contracts
  - Skeletal, Smooth, Cardiac
- Nervous Tissue
  - Receive, process and transfer information
  - Neurons, Glia

# Epithelial Tissue

Stratified Squamous – multilayered, regenerates rapidly, found in harsh environments in/on the body



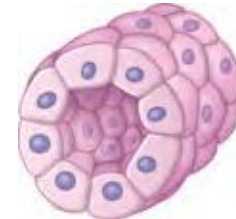
Simple Squamous – single layer of flat cells, found in capillaries



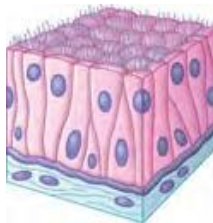
Simple Columnar – single layer of tall column-like cells, found in intestines



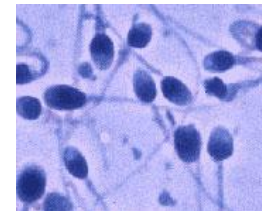
Simple Cuboidal – single layer of cube-shaped cells, found in kidneys and glands



Pseudostratified Columnar – squished and abnormally shaped columnar cells, usually ciliated, found in upper respiratory tract

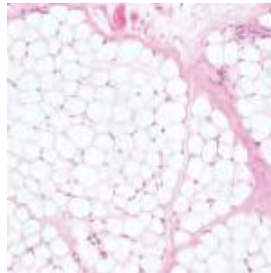


Reproductive Cells – sperm and egg cells are haploid gametes

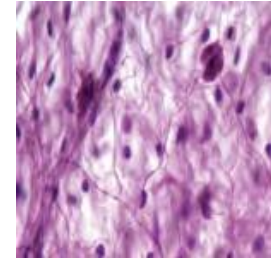


# Connective Tissue

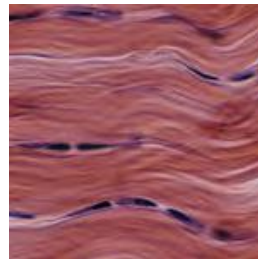
Adipose – Cells contain a large fat droplet, used for energy storage



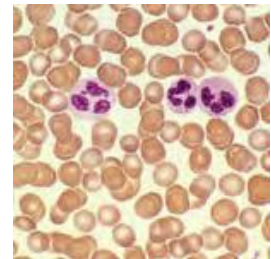
Loose/Areolar - binds epithelia and organs in place, has loosely connected fibers



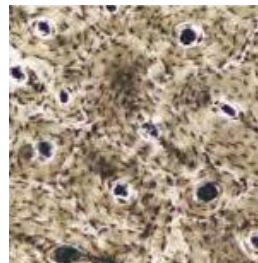
Fibrous – dense with collagenous fibers, found in tendons and ligaments



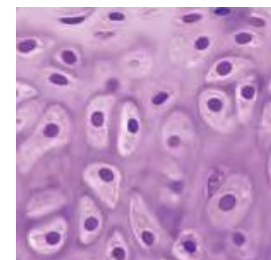
Blood – made up of plasma, erythrocytes, leukocytes and platelets, carries nutrients and wastes



Bone – Osteocytes, osteoblasts, and osteoclasts suspended in an extracellular matrix of hard calcium

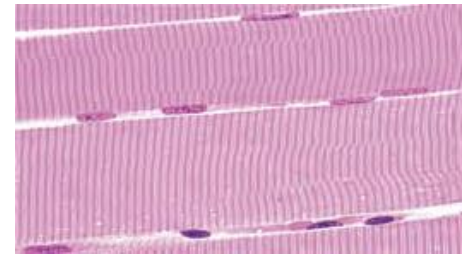


Cartilage – chondrocytes secrete a rubbery matrix of collagen and chondroitin sulfate, found in joints

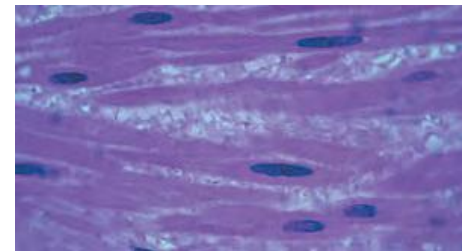


# Muscle Tissue

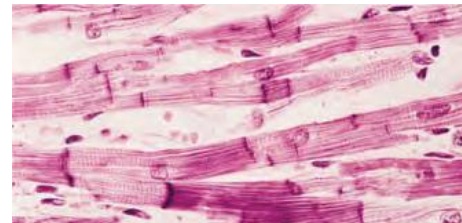
Skeletal Muscle – Bundles of long, un-branched, striated cells, responsible for voluntary movement, made up of sarcomeres



Smooth Muscle – non-striated and spindle shaped, responsible for involuntary activity of things like the stomach and constriction/dilation of arteries



Cardiac Muscle – branched and striated, has intercalated disks to help transfer of electrical signals, found only in the heart, responsible for contraction of the walls of the heart

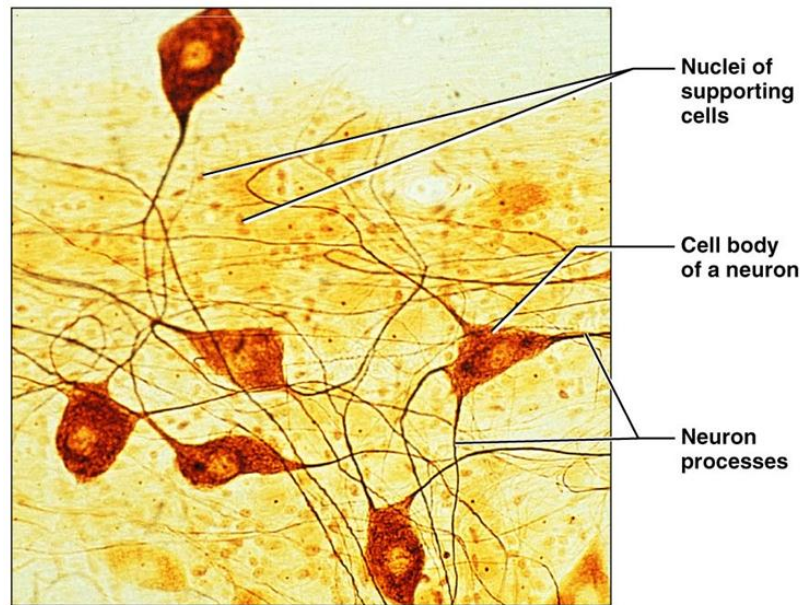




# Nervous Tissue

Neurons – Receive and transmit signal throughout the body via the nervous system. Have dendrites for receiving impulses from other nerve cells and axons for sending out impulses to other cells

Glia – cells that support, nourish, and insulate the neurons



**Photomicrograph:** Neurons (100×)



# DAYTONA STATE COLLEGE

## Questions



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<http://www.daytonastate.edu/asc/ascsciencehandouts.html>