ANIMAL BIOLOGY LABORATORY
Lab 9: Phylum Chordata – Subphylum Vertebrata – Fishes & Amphibians

Read pages 195, 199-200, 205, and 214 in your lab manual before coming to lab.

Objectives:
• Recognize the basic structure and organization of taxa:
• Class Cephalaspidomorphi
• Class Chondrichthyes
• Class Osteichthyes
• Class Amphibia
• Order Caudata (Urodela)
• Order Gymnophiona (Apoda)
• Order Anura (Salientia)
• Compare and contrast the basic structure and organization of cartilaginous and bony fishes.
• Compare and contrast the three major groups of amphibians
• Be able to identify the correct taxonomic group (Kingdom, Phylum, Class, Order, etc.) of example specimens

Subphylum Vertebrata (fish, amphibians, reptiles, birds, & mammals)
• Cartilaginous/bony backbone
• Notochord
• Postanal tail
• Pharyngeal gill slits (at some point in development)
• Skull around the brain

Exercise 16A Figs. 16.1-16.3 & pp. 195-199: Sea Lamprey Anatomy

Class Petromyzontida (lampreys)
• Fishlike
• Cartilaginous skeleton
• Sucking mouth with teeth and rasping tongue – no jaws
• No paired appendages

Identify the following internal/*external* structures:
• Dorsal and Caudal fins
• Gill openings
• Intestine
• Notochord
• Gonad
• Anus • Liver
• Mouth

Review Questions
All questions pp. 196-199

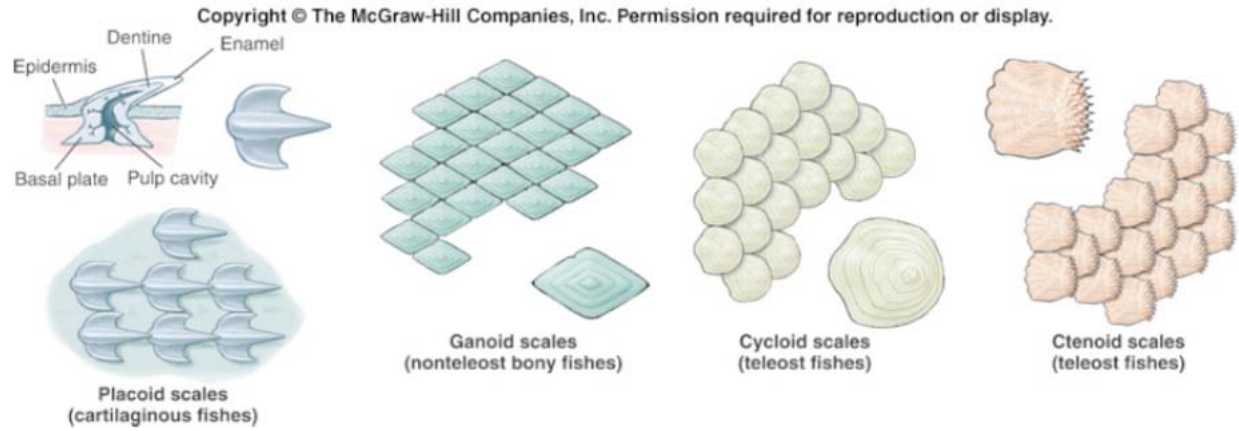
Fishes

4 basic scale types:

• **Placoid** scales are small, conical in shape (almost tooth-like). They characterize the Chondrichthyes.

• **Ganoid** scales are diamond shaped and present in primitive bony fishes like the gar.

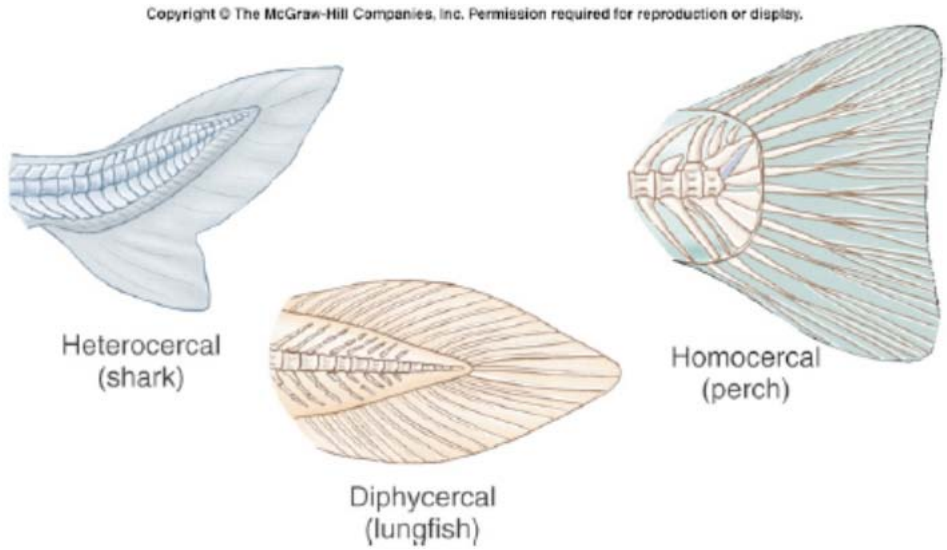
• **Cycloid** and **Ctenoid**, they characterize modern bony fish (*teleosts*). These are thin and flexible.



*Be able to identify the different types -either in slide form or in a diagram. Also be able to identify which fish types have which scales.

3 basic caudal fins:

• Heterocercal • Homocercal • Diphycercal



Exercise 16B Figs. 16.5-16.8 & pp. 199-204: Sea Lamprey Anatomy

Class Chondrichthyes (skates, rays, and sharks)
• Fishlike with ventral mouth
• Jaws present
• Paired appendages
• Cartilaginous skeleton
• Many have heterocercal tail
• No swim bladder, no operculum

Identify the following internal/external structures:
• All fins
• Ampullae of Lorenzini
• Mouth
• Anus
• Claspers (male)
• Gill slits
• Heart
• Liver
• Stomach
• Intestine
• Testes (male)
• Spleen

Review Questions
All questions pp. 201-204

Actinopterygii Dissections
(see instructions: Lab Manual Exercise 16C pp. 205-209; Figs. 16.9-16.11)

Class Actinopterygii (*non-teleost*: gar & bowfin) (*teleost*: perch, trout, bass, & catfish)
• Bony skeleton, usually a terminal mouth
• Usually homocercal tail
• Swim bladder and operculum present

Identify the following internal/*external* structures:
• All fins:
* *Dorsal*
* *Pelvic*
* *Pectoral*
* *Anal*
* *Caudal*
• Lateral line
• Operculum
• Anus
• Heart
• Swim bladder
• Stomach
• Intestine
• Kidneys
• Liver
• Gills
• Pyloric cecum

Identify the following skeletal structures:
• Premaxilla
• Anterior dorsal fin
• Caudal fin
• Vertebral column
• Opercular bones
• Posterior dorsal fin
• Ribs

Review Questions
All questions pp. 205-209.

Exercise 17B, D, & E: Amphibian Anatomy

Frog Dissection

(see instructions : Lab Manual pp. 217; 223-228; Figs. 17.1, 17.4-17.8)

Class Amphibia (frogs, toads, salamanders, & caecilians)
- Skin with mucoid secretions (moist and usually no external scales)
- Larvae usually aquatic
- 3-chambered heart
- Adults are aquatic, semi-terrestrial, or terrestrial
- Respiration by lungs, gills, skin, and mouth lining

Order Caudata (*Urodela*) (salamanders)
- Body with head, trunk, and long tail
- Usually 2 pairs of equal-sized limbs
- Some respire through skin
- Some salamanders retain larval characteristics into adulthood: e.g., external gills, absence of eyelids, presence of lateral line, and a fin-like tail

Order Gymnophiona (*Apoda*) (caecilians)
- Body limbless and wormlike
- Small scales present in some species
- Tail absent

Order Anura (*Salientia*) (frogs and toads)
- Head and trunk fused
- Tail absent
- Two pairs of limbs; hindlimbs elongated
- Large mouth and lungs
- Anuran tongues are attached at the front of the mouth for projection to capture prey

Identify the following internal/external structures:
- Tympanum
- Vent
- Dorsolateral fold
- Nostrils
- Heart
- Lungs
- Liver
- Kidney
- Cloaca
- Gall bladder
- Spleen
- Stomach
- Small intestine
- Large
- Intestine
- Ovary (female)
- Testes (male)

Identify the following skeletal structures:
- Tibiofibula
- Femur
- Scapula
- Humerus
- Radioulna
- Urostyle
- Clavicle

Review Questions

All questions pp. 223-228.

Necturus Anatomy & Skeleton

Identify the following internal/*external* structures:

- *Gular fold*
- *Gills*
- *Vent*
- *Heart*
- Lungs
- Liver
- Gall bladder
- Spleen
- Stomach
- Pancreas
- Small intestine
- Large intestine
- Ovary (female)
- Testes (male)

Identify the following skeletal structures:

- Tibia
- Fibula
- Humerus
- Radius
- Ulna
- Scapula
- Femur

Figure 14.11 The external anatomy of a mud puppy, *Necturus*.
1. Cranium
2. Eye
3. Dentary
4. External gill
5. Forelimb
6. Tail
7. Hind limb

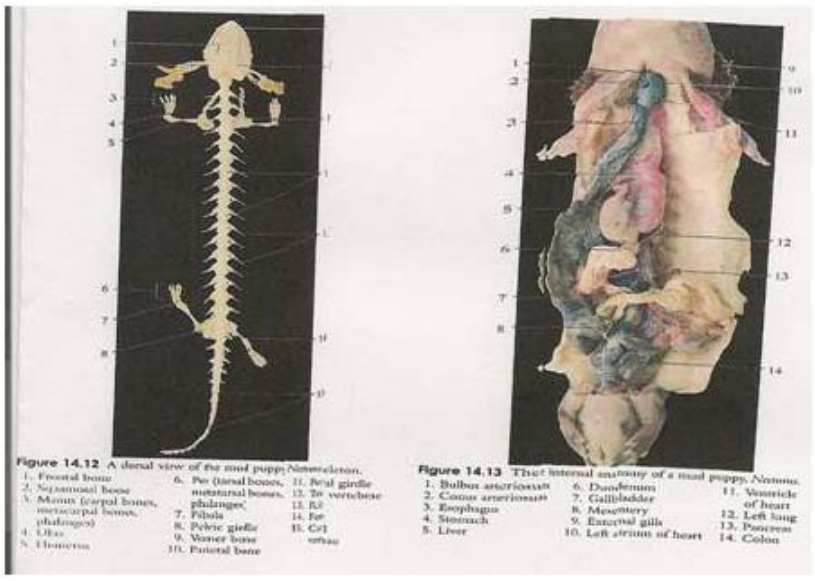


Figure 14.12 A dorsal view of the mud puppy *Necturus* skeleton.
1. Frontal bone
2. Squamosal bone
3. Manus (carpal bones, metacarpal bones, phalanges)
4. Ulna
5. Humerus
6. Pes (tarsal bones, metatarsal bones, phalanges)
7. Fibula
8. Pelvic girdle
9. Vomer bone
10. Parietal bone
11. Pectoral girdle
12. Trunk vertebrae
13. Rib
14. Femur
15. Caudal vertebrae

Figure 14.13 The internal anatomy of a mud puppy, *Necturus*.
1. Bulbus arteriosus
2. Conus arteriosus
3. Esophagus
4. Stomach
5. Liver
6. Duodenum
7. Gallbladder
8. Mesentery
9. External gills
10. Left atrium of heart
11. Ventricle of heart
12. Left lung
13. Pancreas
14. Colon

Read pages 231-238 in your lab manual before coming to lab next week.