Phylum Chordata; Subphylum Vertebrata
Amphibians & Reptiles

(Bio 1413; Ziser, 2008)

[Exercise 19 & 20; p 297]

Classification:

Class: Amphibia (frogs and salamanders)
-reproduction tied to water, many adults live on land
-immatures undergo metamorphosis to adult
-bones denser and stronger than those of fish
-two pairs of appendages: pectoral and pelvic
-some respiration through lungs
-most with smooth moist skin without scales

Class: Reptilia (snakes, lizards, turtles)
-reproduction not tied to water
-skin covered with *epidermal* scales; impermeable to water & air
-heart usually three but sometimes four chambered
-all respiration through lungs
-lay amniote eggs

Lab Activities:

1. Read introductory material beginning on p 297
   *****The frog is dissected as a representative of both amphibians and reptiles since the basic skeletal structure and internal anatomy is very similar between the groups. The skeletal adaptations for jumping and the lack of a tail are, of course, unique to frogs and not characteristic of most amphibians or reptiles*****

2. Frog – External Structure (p 298) **preserved**: frogs
   Know: **head, trunk, forelimbs, hind limbs, eyes, nostrils, eyelids, nictitating membrane, tympanic membrane, anus**

3. Skeletal Systems

   A. *Necturus* Skeleton ***Necturus* skeleton**
   The skeleton of *Necturus* , a salamander, is more representative of the generalized amphibian (& reptile) skeletal plan. Note the general features below:
      a. The vertebrate skeleton is subdivided into the **axial** (skull, vertebrae, rib cage) and **appendicular** (pectoral & pelvic girdles and appendages) skeletons
      b. the **vertebral column** provides a rigid framework for muscle action especially the leg muscles.
      c. abdominal organs are suspended from the **axial skeleton** which bears most of the body weight.
      d. the short leg bones support the animal and lift it off the ground

   B. Frog Skeleton (p 301) **Frog skeleton**
      a. Observe the axial and appendicular skeletons of the frog and the salamander (*Necturus*); What are the similarities and differences
      b. Compare the **pectoral** and **pelvic appendage** bones with those of the frog. What differences do you observe?
      c. How has the frog skeleton been modified for jumping?

C. Snake Skeleton **Snake Skeleton**

a. Compare the snake skeleton with the two amphibian skeletons that you have examined. Note the absence of an **appendicular skeleton**. What are other similarities, what are the differences?

b. Note the structure of the snake jaw, how is it modified

D. Turtle Shell (p320) **Turtle shells**

a. What bones make up the shell? How are they modified. Use the illustrations on demonstration to answer.

2. Amphibians Skin **slide**: amphibian skin, cs

Use illustration provided and those from your text to find: **epidermis, dermis** and numerous **mucous glands**

3. Reptile Skin **slide**: reptile skin, cs

Compare the relatively thin amphibian skin with the skin of a typical reptile which has been thickened and waterproofed with the addition of **epidermal scales**. How do the scales of the snake differ from the scales of the shark or fish? Are they *homologous* or *analogous*?

4. Frog Internal Anatomy (p 308) **preserved**: frog

*****skip muscular system*****

Know: **internal nares, tongue, heart, lungs, stomach, small intestine, large intestine, liver, gall bladder, kidney, fat body, ovary, testis, urinary bladder**

5. Amphibian and Reptile Hearts **heart plastimount**

The hearts of both amphibians and most reptiles are three chambered; with a right and left atrium and a single ventricle (see fig 19-10, p313). Compare the hearts of the frog and snake with that of the fish in the plastimount display.

a. What are the advantages of the extra chamber?

b. Does the circulation pattern differ between these tetrapods and fish with only a two chambered heart.

6. Amphibian and Reptile Nervous Systems **brain plastimount**

Compare the brains of the frog (see fig 19-11, p 317 & fig 19-12, p 318)and turtle with that of the perch in the plastimount display

a. Is the cerebrum of the frog and turtle relatively larger or smaller that that of the fish?

b. Is the overall brain larger?

Demonstrations:

- Frog Anatomy
- Representative Amphibians - be able to recognize the class of each of the animals on display
- Representative Reptiles - be able to recognize the class of each of the animals on display in pictures and preserved
- The Amniotic Egg - note the general strucutre of the **amniotic egg**. Be able to name and describe the

general functions of the **four extraembryonic membranes**. What is the advantage of this type of egg over that produced by fish and amphibians.

- Comparative vertebrate brains - compare the relative size of the **olfactory lobes, cerebrum, optic lobes, cerebellum,** and **medulla** to the brains of other vertebrate classes

- Comparative vertebrate hearts and circulatory systems - compare and contrast the structure of the **heart**, the number and structure of the **chambers**, and the **circuits** of blood flow in the amphibian and repitile compared to other vertebrate classes.

Notebook Suggestions:

→ As we study each of the major vertebrate classes compare the structure, function and efficiency of each of the systems. What changes are occurring as we progress through the simplest to the more complex classes?

→ Can you see any advantages to these changes?

→ Which features are simply specializations for the animal's particular lifestyle and which represent evolutionary advances first appearing in a particular vertebrate class?