Lab Structure and Goals

The lab is organized around the different vertebrate groups-jawless fish, cartilaginous fish, bony fish, amphibians, turtles, lizards/snakes, birds, and mammals. At the specific tables covering each of the vertebrate groups, you will find representative examples of vertebrate groups. Additional material that describes and illustrates the skeletal anatomy of each group and, where applicable, locomotor adaptations of that group, will be available at the tables.

Goals:
1. For each vertebrate group, examine the skeletal material and be able to locate the structures associated with each group.
2. Examine the skeletal material, specimens, and live animals associated with the following types of locomotion: swimming, terrestrial locomotion, fossorial (digging), locomotion without limbs, and flight. Compare the skeletons and specimens of each different group, paying attention to the anatomy of the pectoral and pelvic girdles, limbs, and external coverings. Pay particular attention to the differentiation of the vertebral column.

VI. Lepidosauria – Squamata – Lizard/Snakes

Anatomy – Lizard
1. Examine the modified **DIAPSID skull** of the lizard (two temporal fossae/fenestra)

Lower jaw
2. **Dentary** 3. **Articular**

Anatomy – Snake
1. Examine the modified DIAPSID **skull** of the rattlesnake

Vertebral Column
2. **Vertebral column**
3. **Cervical** vertebrae
4. **Precaudal** vertebrae (trunk)
5. Free **ribs**
6. **Postcaudal** vertebrae (fused ribs/no ribs)

Locomotion – Snakes
1. **Undulation**
2. **Rectilinear**
3. **Concertina**

VII. Crocodilia – Alligators/Crocodiles

Anatomy – Alligator
1. Examine the DIAPSID **skull**
2. **Secondary palate**
3. **Frontal** bone
4. **Parietal** bone

Upper jaw
5. **Premaxilla**
6. **Maxilla**

Lower jaw
7. **Dentary**
8. **Angular**

Vertebral column
9. **Vertebral column**
10. **Cervical** vertebrae
11. **Thoracic** vertebrae
12. **Ribs**
13. **Lumbar** vertebrae
14. **Sacral** vertebrae
15. **Caudal** vertebrae
16. **Sternum**

Pectoral girdle
17. **Pectoral girdle**
18. **Scapula**
19. **Clavicle**
20. **Forelimbs**
21. **Humerus**
22. **Radius**
23. **Ulna**
24. **Carpals**

Pelvic girdle
25. **Pelvic girdle**
26. **Ilium**
27. **Ischium**
28. **Pubis**
29. **Hindlimbs**
30. **Femur**
31. **Tibia**
32. **Fibula**
33. **Tarsals**

VIII. Aves – Birds

Anatomy

The avian skeleton is well adapted for flight. Major bones are not solid but filled with air. Observe the broken hindlimb bone and look for 'struts' for support. Examine the pigeon skeleton and locate the following structures and know the functions of the indicated (*) structures:

Skull
1. Examine the DIAPSID **skull**
2. **Frontals**
3. **Nasals**

Upper Jaw
4. **Premaxilla**
5. **Maxilla**

Lower jaw
6. **Dentary**

Vertebral column
7. **Vertebral column**
8. **Cervical** vertebrae
9. **Thoracic** vertebrae
10. **Synsacrum**
11. **Pygostyle***
12. **Ribs**
13. **Unicate process***
14. **Sternum**
15. **Keel***

Pectoral girdle

16. **Pectoral girdle**
17. **Fucula***
18. **Coracoid**
19. **Scapula**
20. **Trioseal canal***
21. **Forelimbs**
22. **Humerus**
23. **Radius**
24. **Ulna**
25. **Carpals**
26. **Metacarpals**
27. **Digits**

Pelvic girdle

28. **Pelvic girdle**
29. **Ilium**
30. **Ischium**
31. **Pubis**
32. **Hindlimbs**
33. **Femur**
34. **Tibiotarsus**
35. **Tarsus**
36. **Hallux**

Locomotion

Compare and contrast the length of tarsometatarsus, number, and position of toes, presence/absence of webbing or lobes these birds (mounts).

IX. Mammalia – Mammals

Anatomy

Skull

1. Examine the SYNAPSID **skull**
2. **Frontal** bones
3. **Parietal** bones

Upper jaw

4. **Maxilla**
5. **Dentary**

Vertebral column

6. **Vertebral column**
7. **Cervical** vertebrae
8. **Thoracic** vertebrae
9. **Ribs**
10. **Lumbar** vertebrae
11. **Sacral** vertebrae
12. **Caudal** vertebrae
13. **Sternum**

Pectoral girdle

14. **Pectoral girdle**
15. **Scapula**
16. **Clavicle**

Pelvic girdle

17. **Pelvic girdle**
18. **Ilium**
19. **Ischium**
20. **Pubis**

Forelimbs

21. **Forelimbs**
22. **Humerus**
23. **Radius**
24. **Ulna**
25. **Carpals**
26. **Metacarpals**
27. **Digits**

Hindlimbs

28. **Hindlimbs**
29. **Femur**
30. **Tibia**
31. **Fibula**
32. **Tarsals**
33. **Metatarsals**
34. **Digits**

Locomotion

Mammals exhibit many adaptations for terrestrial and arboreal (trees) locomotion. Examine the skeletons of the dog, cat, bat, armadillo, and limbs of the pronghorn, paying attention to foot position. Know the difference between plantigrade, digitigrade, and unguligrade. Know how the relative lengths, fusion, or reduction of bones in limbs and feet, and how the presence/absence and size of clavicle offer different advantages for different types of locomotion.

1. **Plantigrade**
2. **Digitigrade**
3. **Unguligrade**