Appendicular lab

Identify different types of foot postures: plantigrade, digitigrade, unguligrade – be able to give example for each
Give example of animals that are: cursorial, arboreal, fully aquatic, fossorial
Give a skeletal feature you would expect for: cursorial, arboreal, fully aquatic, fossorial

Pectoral girdle

bird: scapula, coracoid, furcula (fused clavicles)
frog: scapula, suprascapula, coracoid, clavicle
mammals: scapula, clavicle (absent in many mammals), coracoid (platypus only)
turtle: scapula, acromion, coracoid

Axial

bird: keel of sternum, uncinate processes, synsacrum
frog: urostyle
mammals: sternum

Pelvic girdle

bird, frog, mammals, turtle: ilium, pubis, ischium, acetabulum, pubic symphysis
opossum: also has prepubis
bird: no pubic symphysis

Limbs:

bird: humerus, radius, ulna, femur, tibiotarsus, tarsometatarsus, phalanges
frog: humerus, radioulna, carpals, femur, tibiofibula, tarsals
mammals: humerus, radius, ulna, olecranon process (of ulna), carpals, metacarpals, femur, tibia, fibula, tarsals, calcaneum, metatarsals, phalanges
deer leg: note that fibula is absent, metacarpals and metatarsals fused into a cannon bone

Parts of human limb bones: human disarticulated only

tibia: medial and lateral condyle, medial malleolus
femur: medial and lateral condyle
ulna: olecranon process

Tibia and fibula
Consider the various skeletons in terms of the type of locomotion the animal uses. We have examples of cursorial mammals, such as deer, pig, cat, dog. Take a look at the traits of cursorial mammals and compare them to the traits some non-cursorial mammals (beaver, opposum, ringtail, green monkey). Note grooves in joints of deer limbs.Digitigrade animals have more flexibility to aid in capture of prey. These figures indicate some skeletal differences:

**Figure 24.15**
Fetlock joint of a pronghorn, Antilocapra, showing strengthening of a hinge joint by splines and grooves.
We also have some examples of arboreal mammals that have various modes of locomotion in the trees. The limbs of the sloth are long relative to their body. Since they are hanging when moving, their limb bones can be fairly long and slender because they don’t have to combat buckling. The limb joints of the sloth, green monkey and spider monkey (?) tend to be unrestricted (ex: short olecranon process) to allow for much rotation. Also, compare the features of the arm swinging primate (spider monkey) to ones that leap in the trees (green monkey, marmoset).
Also consider the features of two different aerial vertebrates - the bird and bat. Note that the long forearm of the bat is due to an extension of the radius and the ulna is very reduced (find it by finding the olecranon process). Both have keel-like extensions of the sternum (very prominent in birds). In bats, metacarpals and phalanges of digits 2-5 are elongated and are enclosed in skin webs.
We have two semi-aquatic mammals, the seal and beaver. In the seal, much of the propulsion comes from lateral undulation of the hindlimbs. Seals steer with their forelimbs, which must be stiff and paddle-like, but be able to turn and fold for a recovery stroke. Their digits at the leading edge of their flipper are larger, which helps it be more streamlined during the recovery stroke. Beavers completely fold their limbs for a recovery stroke. We have one fully aquatic mammal, a porpoise. Hind limbs are absent externally but some vestigial bones are present internally. Humerus, radius, ulna all are greatly shortened with many extra phalanges. The neck loses flexibility and their cervical vertebrae are thin and fused.
We have two semi-fossorial mammals, the hedgehog and mole (limbs only). Hedgehogs dig with their forelegs and kick the dirt back with their hindlimbs. Digging mammals tend to have short, rotatable limbs (more power, better to fit in a burrow), longer olecranon process, long claws, shorter radius than humerus, wide humerus (for attachment of wide muscles).

**Figure 25.6** SOME ADAPTATIONS FOR SCRATCH-DIGGING shown by lateral views of left forelimb skeletons.
FIGURE 6-1 Divisions of the skeletal system. The axial skeleton is indicated in yellow. (a) Anterior view. (b) Posterior view.
Figure 8-12.
Skeleton of a seal, Phocidae.
(Hatt 1946)

Figure 8-13.
Skeleton of a porpoise.
(Hatt 1946)

Figure 2. Skeleton of Cat
Figure 8.31  Skeleton of a chicken.
**Figure 9.36** Foot postures. Unguligrade, digitigrade, and plantigrade designs for feet. Note how changes in foot posture produce relatively longer limbs.

After Hildebrand.
Figure 2.6 Skeleton of the bullfrog. Ventral view.
Figure 2.7  Skeleton of the leopard frog. Dorsal view.