

ACTIVITY 3: AXIAL SKELETON AND LONG BONE DISSECTION

Objectives:

- 1) **How to get ready:** Read [Chapter 7, McKinley et al., Human Anatomy, 4e](#). All text references are for this textbook. Learning the meanings of the bone markings and features is very helpful. There are tables provided in your text and at the end of this activity for understanding the meanings of common bone markings. Refer to these as you are studying bone anatomy.
- 2) Observe and dissect a fresh long bone from a cow. **YOU MUST BRING GLOVES FOR THIS ACTIVITY.** Read dissection instructions **BEFORE** coming to lab.
- 3) Identify the cranial and facial bones and important bone markings on each.
- 4) Identify the vertebrae and other features of the vertebral column, and important bone markings on each.
- 5) Identify the ribs and sternum and important bone markings on each.
- 6) **Before next class:** Preview Appendicular Skeleton terms lists from SLCC Anatomy Laboratory website or your printed laboratory manual and your textbook.

COW BONE DISSECTION

Dissection Instructions:

1. Acquire all dissection materials. (1 set per table)
 - Dissection tray
 - Scalpel
 - Probe
 - Cow bone
 - Gloves (Supply your own)
 - Forceps
2. After getting cow bone back to your table, place it on your tray, cut side up, and begin to examine it closely. Notice that within the compact bone there are red dots. Those dots are broken blood vessels within the compact bone.
3. **Procedure**
 - A) **Take probe and carefully dig into the yellow bone marrow in an attempt to find a nutrient artery** (highly unlikely). Bone is living tissue and is highly vascularized. Next dig out all of the marrow from the cavity to expose the trabeculae (spongy bone portions) visible on the side toward the epiphysis. These trabeculae are the network that makes up the spongy bone. Within this spongy bone you will find an area that will be red and bloody, this is the red bone marrow and the site of blood cell production (hematopoiesis).
 - B) Now look toward the outside of the bone to the outer lining of the shaft. Take a forceps and peel away the periosteum. The periosteum serves as a place of attachment for tendons and ligaments and an anchor for blood vessels. Notice the difference between the tendons and ligaments that attach to the periosteum and the periosteum itself. See the difference in the appearance of the fibers.
 - C) Now look for cartilage (fibrocartilage and hyaline cartilage). Hyaline will be located at the ends where the bone will articulate with another bone. In some cases fibrocartilage will be visible in the shape of a C on the end of the cow tibia. Closely look at the difference between the two cartilages.
 - D) Identify all of the structures on the following list before properly disposing of your specimen.
 - E) **YOU MUST DISPOSE OF THE COW BONE AS INSTRUCTED, AND COMPLETELY CLEAN, DRY, AND PUT AWAY ALL INSTRUMENTS AND TRAYS IN ORDER TO EARN YOUR PARTICIPATION GRADE FOR THE LAB.**

STRUCTURES TO IDENTIFY – COW BONE DISSECTION

TEXT REFERENCES

fig. 6.4, p. 151

- diaphysis
- compact bone tissue (forming most of the diaphysis and the outside of all bones)
- proximal and distal epiphysis (form the ends of the long bone)
- articular surface *with* hyaline cartilage
- metaphysis
- epiphyseal line or epiphyseal (growth) plate
- medullary (marrow) cavity
- yellow bone marrow
- spongy bone tissue
- red bone marrow
- trabeculae (thin bony plates running within spongy bone tissue) within spongy bone
- periosteum (dense irregular connective tissue covering the outside of all bones)
- endosteum (connective tissue lining the inside of the medullary cavity in the diaphysis)
- nutrient artery (if visible)

AXIAL SKELETON BONES AND FEATURES

STRUCTURES TO IDENTIFY

TEXT REFERENCES

SUTURES: Know which bones are joined by each major suture, and be able to identify the sutures from any view of the cranium.

fig. 7.5, 7.6, p. 179-180;
described p. 185

- coronal suture**
- sagittal suture**
- squamous suture**
- lambdoid suture**

PARANASAL SINUSES: Air-filled chambers named for the bone in which they are housed. They can be identified in different sections of the skull.

fig. 7.27

- frontal sinus**
- ethmoidal sinus**
- sphenoidal sinus**
- maxillary sinus**

FONTANELLES: These are features (soft spots) of the fetal skull.

fig. 7.24; p. 200

- anterior/frontal fontanelle**
- sphenoidal fontanelle**
- mastoid fontanelle**
- posterior fontanelle**

TABLE 1. CRANIAL AND FACIAL BONES. You are responsible for **determining left or right** on all paired cranial and facial bones. Paired bones are indicated by (2) in parentheses.

BONE	BONE MARKINGS	SIGNIFICANCE	TEXT REFERENCE
<input type="checkbox"/> frontal	<input type="checkbox"/> supraorbital foramen	supraorbital artery and nerve	p. 181
	<input type="checkbox"/> frontal sinus	moistens air	
<input type="checkbox"/> parietal (2)			
<input type="checkbox"/> nasal (2)			p. 178
<input type="checkbox"/> sphenoid	<input type="checkbox"/> greater wing		pp. 182, 184, 190-191
	<input type="checkbox"/> lesser wing		
	<input type="checkbox"/> sella turcica	houses pituitary gland	
	<input type="checkbox"/> optic foramen/canal	CNII (optic nerve)	
	<input type="checkbox"/> foramen ovale	CNV (mandibular branch)	
	<input type="checkbox"/> foramen rotundum	CNV (maxillary branch)	
	<input type="checkbox"/> foramen spinosum	middle meningeal vessels	
	<input type="checkbox"/> foramen lacerum		
	<input type="checkbox"/> superior orbital fissure ¹	CNIII; CNIV; CNV (ophthalmic branch); CNVI	
	<input type="checkbox"/> inferior orbital fissure ²	CNV (maxillary branch)	
	<input type="checkbox"/> sphenoidal sinus	moistens air	p. 181
	<input type="checkbox"/> lateral and medial plates		
<input type="checkbox"/> pterygoid processes			
<input type="checkbox"/> ethmoid	<input type="checkbox"/> perpendicular plate	superior part of nasal septum	pp. 184, 193
	<input type="checkbox"/> superior & middle nasal concha	increase surface area for warming and filtering air	
	<input type="checkbox"/> cribriform plate (and foramina)	passageway for olfactory nerves	
	<input type="checkbox"/> crista galli	attachment site for dura mater to skull	
<input type="checkbox"/> inferior nasal concha (2)		increase surface area for warming and filtering air	p. 178
<input type="checkbox"/> lacrimal (2)	<input type="checkbox"/> lacrimal groove		p. 180
<input type="checkbox"/> zygomatic (2)	<input type="checkbox"/> temporal process	form anterior portion of zygomatic arch (cheekbone)	p. 180
<input type="checkbox"/> maxilla (2)	<input type="checkbox"/> infraorbital foramen	infraorbital artery; CNV (maxillary branch)	pp. 178, 180, 197
	<input type="checkbox"/> alveolar processes	contain upper teeth	
	<input type="checkbox"/> palatine process	form anterior portion of hard palate	
	<input type="checkbox"/> incisive foramen (fossa) ²	branches of nasopalatine nerve (from CNV)	

¹ Between sphenoid and temporal bones

² Between two maxilla

BONE	BONE MARKINGS	SIGNIFICANCE	TEXT REFERENCE
<input type="checkbox"/> mandible	<input type="checkbox"/> body		pp. 178, 180, 198
	<input type="checkbox"/> ramus		
	<input type="checkbox"/> alveolar processes	contain lower teeth	
	<input type="checkbox"/> angle		
	<input type="checkbox"/> mental foramen	CNV (mandibular branch); blood vessels	
	<input type="checkbox"/> coronoid process	insertion point of temporalis muscle	
	<input type="checkbox"/> mandibular condyle or condylar process	forms joint w/ mandibular fossa of temporal bone	
	<input type="checkbox"/> mandibular notch		
<input type="checkbox"/> temporal (2)	<input type="checkbox"/> zygomatic process	forms posterior portion of zygomatic arch (cheekbone)	pp. 180-181, 188
	<input type="checkbox"/> squamous region	remember: squamous means flat	
	<input type="checkbox"/> styloid process	attachment for hyoid and tongue muscles	
	<input type="checkbox"/> mastoid process	insertion for sternocleidomastoid muscle	
	<input type="checkbox"/> external acoustic/auditory meatus	opening to the auditory canal	
	<input type="checkbox"/> petrous part		
	<input type="checkbox"/> jugular foramen	internal jugular vein; CNIX; CNX; CNXI	
	<input type="checkbox"/> carotid canal	internal carotid artery	
	<input type="checkbox"/> mandibular fossa	forms joint with mandibular condyle	
	<input type="checkbox"/> internal acoustic/auditory canal (meatus) ³	CNVII and VIII and blood vessels to inner ear	
<input type="checkbox"/> occipital	<input type="checkbox"/> foramen magnum	spinal cord (out); vertebral arteries (in); CNXI (in)	pp. 179, 182, 184, 189
	<input type="checkbox"/> hypoglossal canal	CNXII (hypoglossal nerve)	
	<input type="checkbox"/> external occipital protuberance and crest	attachment site for neck/back muscles	
	<input type="checkbox"/> occipital condyles	articulate with atlas (1 st cervical vertebra)	
<input type="checkbox"/> palatine (2)	<input type="checkbox"/> horizontal plate	form posterior portion of hard palate	pp. 181-182, 192, 196-197
<input type="checkbox"/> vomer		forms inferior part of nasal septum	pp. 178, 181-182, 195

³ Between temporal and occipital bones

TABLE 2. VERTEBRAE: Most of the 32 vertebrae have the following features to identify: *lamina, pedicle, transverse process, articular processes, vertebral foramen, body, intervertebral foramen.*

BONE NAME	# BONES	BONE MARKING	DESCRIPTION & RELATED STRUCTURES OF IMPORTANCE
pp. 205- 210, fig. 7.28, 7.29, Table 7.5			
<input type="checkbox"/> typical vertebra (pl. vertebrae)	32 total	<input type="checkbox"/> lamina	connects transverse to spinous process
		<input type="checkbox"/> pedicle	connects body to transverse process
		<input type="checkbox"/> transverse process	process directed laterally
		<input type="checkbox"/> spinous process	process directed posteriorly
		<input type="checkbox"/> articular processes (superior and inferior)	form joints between adjacent vertebrae
		<input type="checkbox"/> vertebral foramen	contains spinal cord
		<input type="checkbox"/> body	largest part of the vertebra
		<input type="checkbox"/> intervertebral disc (not a bone)	intervertebral discs are fibrocartilage found between adjacent vertebral bodies
<input type="checkbox"/> intervertebral foramen		between two vertebrae, contains spinal nerves	
<input type="checkbox"/> cervical vertebra	7	<input type="checkbox"/> transverse foramen	contains vertebral artery
<input type="checkbox"/> atlas (C1)			C1 has no body; body has become the dens (of the axis)
<input type="checkbox"/> axis (C2)		<input type="checkbox"/> odontoid process (dens)	has odontoid process (dens) fused body of C1; articulates with atlas
<input type="checkbox"/> vertebra prominens (C7)		<input type="checkbox"/> spinous process	very large, easily felt under the skin
<input type="checkbox"/> thoracic vertebra	12		transverse process contains facets for articulation of the angle of a rib.
<input type="checkbox"/> lumbar vertebra	5		
p. 211, fig. 7.31			
<input type="checkbox"/> sacrum	5 (fused)	<input type="checkbox"/> anterior sacral foramina	contain ventral (anterior) rami of sacral spinal nerves
		<input type="checkbox"/> posterior sacral foramina	contain dorsal (posterior) rami of sacral spinal nerves
		<input type="checkbox"/> median sacral crest	represents fused spinous processes of sacral vertebrae
		<input type="checkbox"/> auricular surfaces	ear-like process, articulates with the iliac bones
		<input type="checkbox"/> superior articular processes	articulate with inferior articular processes of L5
<input type="checkbox"/> coccyx	2 to 3 (fused)	<input type="checkbox"/> cornu (horns)	small horns that point superiorly

TABLE 3. STERNUM AND RIBS

BONE	BONY LANDMARK	TEXT REFERENCE
<input type="checkbox"/> STERNUM		
<input type="checkbox"/> manubrium	<input type="checkbox"/> sternal (jugular) notch	described p. 212; fig. 7.32
	<input type="checkbox"/> sternal angle	
	<input type="checkbox"/> clavicular notch	
	<input type="checkbox"/> costal notches	
<input type="checkbox"/> body	<input type="checkbox"/> costal notches	
<input type="checkbox"/> xiphoid process		
<input type="checkbox"/> RIBS		
<input type="checkbox"/> true ribs (1-7)	<input type="checkbox"/> head (<i>capitulum</i>) of rib	described p. 213; fig. 7.33
	<input type="checkbox"/> neck of rib	
	<input type="checkbox"/> tubercle of rib	
	<input type="checkbox"/> angle	
	<input type="checkbox"/> costal groove	
	<input type="checkbox"/> shaft (body)	
<input type="checkbox"/> false ribs (8-12)	no direct contact with sternum	
<input type="checkbox"/> floating ribs (11-12)	no contact with sternum	