7

The Skeleton
Part C

Cervical Vertebrae

- Seven vertebrae (C_1-C_7) are the smallest, lightest vertebrae
- C_3-C_7 are distinguished with an oval body, short spinous processes, and large, triangular vertebral foramina
- Each transverse process contains a transverse foramen

Cervical Vertebrae

Cervical Vertebrae: The Atlas (C_1)

- The atlas has no body and no spinous process
- It consists of anterior and posterior arches, and two lateral masses
- The superior surfaces of lateral masses articulate with the occipital condyles

Cervical Vertebrae: The Atlas (C_1)

Cervical Vertebrae: The Axis (C_2)

- The axis has a body, spine, and vertebral arches as do other cervical vertebrae
- Unique to the axis is the dens, or odontoid process, which projects superiorly from the body and is cradled in the anterior arch of the atlas
- The dens is a pivot for the rotation of the atlas

Cervical Vertebrae: The Axis (C_2)

Cervical Vertebrae: The Atlas (C_2)

Thoracic Vertebrae

- There are twelve vertebrae (T_1-T_{12}) all of which articulate with ribs
- Major markings include two facets and two demifacets on the heart-shaped body, the circular vertebral foramen, transverse processes, and a long spinous process
- The location of the articulate facets prevents flexion and extension, but allows rotation of this area of the spine

Thoracic Vertebrae

Lumbar Vertebrae

- The five lumbar vertebrae (L_1-L_5) are located in the small of the back

and have an enhanced weight-bearing function
- They have short, thick pedicles and laminae, flat hatchet-shaped spinous processes, and a triangular-shaped vertebral foramen
- Orientation of articular facets locks the lumbar vertebrae together to provide stability

Lumbar Vertebrae

Sacrum

- Sacrum
  - Consists of five fused vertebrae (S_1-S_5), which shape the posterior wall of the pelvis
  - It articulates with L_5 superiorly, and with the auricular surfaces of the hip bones
  - Major markings include the sacral promontory, transverse lines, alae, dorsal sacral foramina, sacral canal, and sacral hiatus

Coccyx

- Coccyx (Tailbone)
  - The coccyx is made up of four (in some cases three to five) fused vertebrae that articulate superiorly with the sacrum

Sacrum and Coccyx: Anterior View

Sacrum and Coccyx: Posterior View

Bony Thorax (Thoracic Cage)

- The thoracic cage is composed of the thoracic vertebrae dorsally, the ribs laterally, and the sternum and costal cartilages anteriorly
- Functions
  - Forms a protective cage around the heart, lungs, and great blood vessels
  - Supports the shoulder girdles and upper limbs
  - Provides attachment for many neck, back, chest, and shoulder muscles
  - Uses intercostal muscles to lift and depress the thorax during breathing

Bony Thorax (Thoracic Cage)

Bony Thorax (Thoracic Cage)

Sternum (Breastbone)

- A dagger-shaped, flat bone that lies in the anterior midline of the thorax
- Results from the fusion of three bones – the superior manubrium, the body, and the inferior xiphoid process

- Anatomical landmarks include the jugular (suprasternal) notch, the sternal angle, and the xiphisternal joint

Ribs

- There are twelve pair of ribs forming the flaring sides of the thoracic cage
- All ribs attach posteriorly to the thoracic vertebrae
- The superior 7 pair (true, or vertebrosternal ribs) attach directly to the sternum via costal cartilages
- Ribs 8-10 (false, or vertebrocondral ribs) attach indirectly to the sternum via costal cartilage
- Ribs 11-12 (floating, or vertebral ribs) have no anterior attachment

Ribs

Structure of a Typical True Rib

- Bowed, flat bone consisting of a head, neck, tubercle, and shaft

Appendicular Skeleton

- The appendicular skeleton is made up of the bones of the limbs and their girdles
- Pectoral girdles attach the upper limbs to the body trunk
- Pelvic girdle secures the lower limbs

Pectoral Girdles (Shoulder Girdles)

- The pectoral girdles consist of the anterior clavicles and the posterior scapulae
- They attach the upper limbs to the axial skeleton in a manner that allows for maximum movement
- They provide attachment points for muscles that move the upper limbs

Pectoral Girdles (Shoulder Girdles)

Clavicles (Collarbones)

- The clavicles are slender, doubly curved long bones lying across the superior thorax
- The acromial (lateral) end articulates with the scapula, and the sternal (medial) end articulates with the sternum
- They provide attachment points for numerous muscles, and act as braces to hold the scapulae and arms out laterally away from the body

Clavicles (Collarbones)

Scapulae (Shoulder Blades)

- The scapulae are triangular, flat bones lying on the dorsal surface of the rib cage, between the second and seventh ribs
- Scapulae have three borders and three angles
- Major markings include the suprascapular notch, the supraspinous and infraspinous fossae, the spine, the acromion, and the coracoid process

Scapulae (Shoulder Blades)