



CHAPT. 7: The SKELETON

☆ *The bones and their specific parts will be identified in the laboratory. Study the images in your textbook and the laboratory exercises as you read about the different bones and their parts.*

Examine Fig. 7.1 for an overview of the skeleton.

THE AXIAL SKELETON

- ✎ how many bones form the axial skeleton?
- ✎ what are the three major regions of the axial skeleton?
- ✎ list the three numbered functions of the axial skeleton:



THE SKULL

- ✎ list the two groups of bones that form the skull:
- ✎ what is the function of the cranium?
- ✎ list the 5 functions of the facial bones:

Overview of Skull Geography

☠ name the two parts that the cranium can be divided into and indicate what each part forms?

☠ name the cavity that the brain is said to occupy:

☠ name the cavities that house the eyeballs:

☠ of the 85 or so openings of the skull, the most important of these provide passageways for what structures?

Cranium (Cranial Bones) *(as you study these, try to picture and feel where most of these are on your own skull!)*

☠ list the eight cranial bones:

☠ Frontal Bone

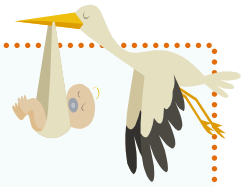
- forms the forehead, part of the orbits, and most of the anterior part of the cranium

☠ Parietal Bones and the Major Sutures

- the parietal bones form the sides and roof of the cranium
- a **suture** is a fibrous joint in which the articulating bones are connected by a small amount of short collagen fibers
 - name the four major sutures and indicate the specific cranial bones that they unite:

FONTANELLES

define **fontanelles** (from the glossary in the back!):



- read about fontanelles on page 244 and locate them in Fig. 7.36

☠ Occipital Bone

- forms the posterior part and most of the base of the cranium
- what parts connect through the **foramen magnum** in the base of the occipital bone?
- the rocker-like **occipital condyles** of the occipital bone articulate with depressions called superior articular facets on the first cervical vertebra (the atlas) to form the **atlanto-occipital joint**
 - this joint permits what action?
- hidden medially and superiorly to each occipital condyle is what canal?
 - what nerve passes through the hypoglossal canal?
- what is the **external occipital protuberance**?

☠ Temporal Bones

- form the sides and part of the floor of the cranium; form part of the zygomatic arch
- squamous part - the large flaring, somewhat flattened lateral part that abuts the squamous suture
 - **zygomatic process** - the zygomatic process of the temporal bone articulates with the temporal process of the zygomatic bone to form the **zygomatic arch**
 - describe the **mandibular fossa**:

★ so, the mandibular fossa of the temporal bone articulates with the condylar process of the mandible to form the **temporomandibular joint**

- the tympanic part surrounds what?

- petrous part

- what two cavities are housed inside the petrous part?

- the petrous part of the temporal bone is located on the inferior surface of the temporal bone

- it extends from what to what, and to what does it contribute?

- what does the petrous region look like?

- what does “petrous” mean?

- *foramina of the petrous part:*

- **jugular foramen** - provides a passageway for what?

- **carotid canal** - transmits what?

- **internal acoustic meatus** (*internal auditory meatus*) - transmits what?

- what is the function of the **mastoid process**?

- can you feel the mastoid process?!

- what is the function of the needle-like **styloid process**?

- what is the **stylomastoid foramen** between and what does it allow?

☠ Sphenoid Bone

- forms the middle portion of the base of the skull; it resembles a bat!

- why is it considered the keystone of the cranium?



- has a central **body** with paired sinuses called what?

describe the **sella turcica**:

- what is the **hypophyseal fossa** and what does it enclose?

- locate the **greater wings** and **lesser wings** on Fig. 7.7
- where do the **optic canals** lie and what do they allow?

- describe the **superior orbital fissure** and what it allows:

☠ Ethmoid Bone

- in the anterior floor of the cranium; it forms most of the bony area between what structures?

- **cribriform plates** - help form the roof of what?

· cribriform plates contain tiny holes called **olfactory foramina** (cribriform foramina)

- what do these foramina allow?



- between what does the **crista galli** project?

- what attaches to the crista galli?

- what does the **perpendicular plate** of the ethmoid form?

- **superior nasal conchae**
 - **middle nasal conchae**
- } elongated, curved scrolls of bone that curl in from the lateral walls of the nasal cavities ; these are part of the ethmoid bone
(there are inferior nasal conchae that are NOT part of the ethmoid, so they will be listed separately)

☠ Sutural Bones

- describe these bones:

Facial Bones *(as you study these, try to picture and feel where most of these are on your own skull!)*

- ☠ list the 14 facial bones:

☠ Mandible

- what is it also called?
- two upright **rami** (singular is ramus)
 - the **coronoid process** of each ramus is an insertion point for what?
 - the **condylar process (mandibular condyle)** articulates with what?

So, name the bones and their specific parts that form the temporomandibular joint:

- the horizontal portion of the mandible is the **body**; what does the body anchor?
- the superior border of the body of the mandible is called what?
 - what does the **alveolar process** (alveolar margin) contain?
 - what are the sockets called in which teeth are embedded?
- what is the **mandibular symphysis**?

- where are the **mandibular foramina** located and what do they permit?

- where are the **mental foramina** located and what do they allow?

☠ Maxillary Bones (Maxillae)

- fused medially and form what?
- what does the **alveolar process** contain?
- the **palatine processes** of the maxillae fuse medially, forming what?

☠ Zygomatic Bones

- what is their common name?

☠ Nasal Bones

- are fused medially to form what?

☠ Lacrimal Bones

- contain part of the passageway that drains tears from the surface of the eye into what?

☠ Palatine Bones

- they have **horizontal plates** that form the posterior part of what structure?

☠ Vomer

- lies in the nasal cavity, where it forms the inferior part of what structure?

☠ Inferior Nasal Conchae

- they are the largest of the three pairs of conchae and, like the other two pairs (*the superior and inferior nasal conchae of the ethmoid*), they form part of the lateral walls of what?

Special Characteristics of the Orbits and Nasal Cavity



☠ Orbits

- describe the orbits:
- along with the eyes, what else is housed in the orbits?
- the walls of each orbit are formed by parts of how many bones?!

☠ The Nasal Cavity

- the wall of the nasal cavity is constructed of what two types of tissue?
- it is divided into right and left parts by what structure?
- what forms the bony portion of the septum?
- what is the cartilage that forms the septum anteriorly called?
- what are the nasal septum and nasal conchae covered with?
- what is the function of the mucosa?
- what is the function of the nasal conchae?

☠ Paranasal Sinuses

- name the bones of the skull that contain paranasal sinuses (which we refer to as plain old “sinuses”!):
- describe **paranasal sinuses**:

- small openings connect the sinuses to what?
- what are the functions of paranasal sinuses?

- note the paranasal sinuses shown in Fig. 7.14

Hyoid Bone

- note the hyoid bone on Figure 7.15
- describe where it is located:
- what makes it unique?!
- what are the functions of the hyoid bone?

THE VERTEBRAL COLUMN

General Characteristics

- what are other names for the vertebral column?
- describe the functions of the vertebral column:

- it includes of a series of separate bones that are called what?





Regions and Curvatures

- name the 5 major regions of the vertebral column and indicate the number of vertebrae in each region:
- name the four normal curvatures of the vertebral column:
- indicate the functions of the curvatures of the vertebral column:
- locate the regions of the vertebral column and the curvatures on Figure 7.16 (and on you!)



ABNORMAL CURVES OF
THE VERTEBRAL
what is scoliosis?
kyphosis? lordosis?



Ligaments

- name the general structures that assume the role of holding the vertebrae of the vertebral column in place:
- describe the **ligamentum flavum**:



Intervertebral Discs

- are found between the bodies of adjacent vertebrae (see Fig. 7.18 c)
- name and describe the two parts that form each intervertebral disc:
- describe the functions of the intervertebral discs:

General Structure of Vertebrae

◦ as you study the parts of a typical vertebra, observe the parts in Fig. 7.19



Body - thick, disc-shape anterior part



Vertebral Arch

- extends posteriorly from the body and is formed by pedicles and laminae

- describe the **pedicles**:

- describe the **laminae**:

· what do the pedicles have on their superior and inferior surfaces?

- name the lateral openings formed by the notches between adjacent vertebrae:

- what pass through the intervertebral foramina?



Vertebral Foramen

- an opening enclosed by what parts?

- collectively, the vertebral foramina of all vertebrae form what long canal?

- what passes through this canal?



Processes

· how many processes does a typical vertebra have and from what do they project?

· describe a **spinous process**:

* What part of a vertebra are you feeling when you run a hand down the middle of the back?

· describe a **transverse process**:

- indicate the general function of the transverse and spinous processes:
- name the other types of processes:
- define facets:
 - the facets of the articular processes articulate with the those of adjacent vertebrae



Regional Vertebral Characteristics

- examine Fig. 7.20 to Fig. 7.21 and Table 7.2 as you study the types of vertebrae



Cervical Vertebrae

- how many cervical vertebrae are there and how are they identified?
- list the distinguishing features of the “typical” cervical vertebrae (C₃ to C₇):

- ☆ the presence of the transverse foramen in the transverse process is a characteristic, distinguishing feature of all 7 cervical vertebrae!!

C₇

- how does the spinous process of C₇ differ from the other cervical vertebrae?
- it is palpable and can be used as a landmark for what?
- what is C₇ also called?

The first and second cervical vertebrae, called the atlas and axis, are unique:



Atlas (C1)

- it is a ring of bone with anterior and posterior arches
- does the atlas have a body or spinous process?
- the deep, concave **superior articular facets** of the atlas articulate with what specific part of the occipital bone of the skull?
 - the joint formed by this articulation is the atlanto-occipital joint
 - what movement does this joint allow?



- so, now for practice, name the bones and their specific parts that form the atlanto-occipital joint:

Axis (C2):

- describe the **dens** of the axis:
- the dens of the axis articulates with the anterior arch of the atlas to form the atlanto-axial joint
 - this joint allows what type of movement of the head?

- so, now for practice, name the bones and their specific parts that form the atlanto-axial joint:



Thoracic Vertebrae

- how many thoracic vertebrae are there in the vertebral column?
- with what do they all articulate?
- the body of thoracic vertebrae is roughly what shape?
 - the bodies have facets that receive what parts of the ribs?
- the vertebral foramen is what shape?
- describe the spinous process:
- the transverse processes have facets for articulating with what parts of ribs?



Lumbar Vertebrae

- how many lumbar vertebrae are there in the vertebral column?
- how do their pedicles and laminae differ from those of other vertebrae?
- describe their spinous processes:
- what shape are their vertebral foramina:



Sacrum

- what shape is the sacrum?
- it is formed by the fusion of how many sacral vertebrae?

- laterally, each auricular surface of the sacrum articulates with the ilium of the two hip bones to form what joint?

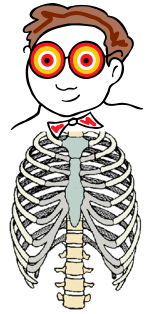


Coccyx

- what shape is the coccyx?
- what does it consist of?

THE THORACIC CAGE

- define **thorax**:
- list the four elements that form the **thoracic cage**:
- what are the functions of the thoracic cage?



Sternum

- what is the common name for the sternum?
- name (and read about) the three parts that it consists of:
- the sternum articulates with the clavicle and costal cartilages of the ribs



Ribs

(see Figs. 7.22 and 7.23 as you study this material)

- there are how many pairs of ribs?
- all ribs attach posteriorly to what?
- the first through 7th pairs are called true ribs; define true ribs:
 - what is another name for true ribs?
- the 8th through 12th pairs are called false ribs; why are they called false ribs?

- the 8th, 9th and 10th pairs are false ribs specifically called vertebrochondral ribs
- describe the vertebrochondral ribs:



- the 11th and 12th pairs are false ribs specifically called floating (vertebral) ribs
- describe the floating ribs:

- head of a rib
 - the **facet of the head** of a rib articulates with the **body of a vertebra**
 - the **tubercle of a rib** articulates with the **transverse process of a vertebra**
- **intercostal spaces** are the spaces between ribs; they are occupied by intercostal muscles, which lift and depress the thorax during breathing

THE APPENDICULAR SKELETON

✎ consists of bones of the upper and lower appendages and bones of the girdles (pectoral girdle and pelvic girdle) that attach the appendages to the axial skeleton

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THE PECTORAL (SHOULDER) GIRDLE



- what is another name for the pectoral girdle?
- what does the pectoral girdle consist of?
- what do the pectoral girdles attach and provide?
- does the pectoral girdle allow a high degree of mobility?
 - summarize the two factors that this mobility is due to:

☠ Clavicles

- what is the common name for the clavicles?
- what two bones does each clavicle articulate with?

☠ Scapulae

- what is the common name for the scapulae?
- what is the shape of a scapula?
- describe the **glenoid cavity**:
 - the glenoid cavity of the scapula articulates with the head of the humerus to form the glenohumeral joint, which is commonly known as the shoulder joint
- is the **spine** of the scapula on the anterior or posterior surface?
 - what is the **acromion** and where is it located?
- the acromion of the scapula articulates with the clavicle, forming what joint?

THE UPPER LIMB

ARM

- name the bone of the arm:

☠ Humerus

- with what three bones does the humerus articulate?

proximal end of the humerus:

- describe the **head** of the humerus:
 - what does it fit into (articulate with)?
 - so, again, what specific bones and their parts form the glenohumeral joint?

distal end of the humerus:

- **trochlea**
 - is the trochlea medial or lateral?



- **coronoid process** = an anterior projection that forms the “lip” of the trochlear notch
 - it receives the trochlea of the humerus
- **trochlear notch** = a deep concave area between the olecranon and the coronoid process
 - it articulates with the trochlea of the humerus and forms part of the elbow joint
- describe the **radial notch** and indicate what it articulates with:

distal end of the ulna:

- **head** of the ulna
- what runs from the **styloid process**, which is medial to the head of the ulna?

Radius

- is the radius on the medial or lateral side of the forearm
- is it on the thumb-side or little finger side?

proximal end of the radius:

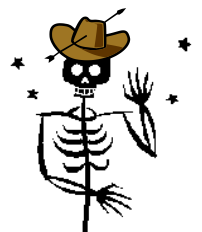
- **head**
 - what is the head of the radius shaped like?
 - with what does the superior surface of the head articulate?
 - medially, what does the head of the radius articulate with?
- **radial tuberosity**
 - describe the radial tuberosity:
 - what does it anchor?

distal end of the radius:

- **ulnar notch**
 - a medial, somewhat triangular depression; with what does it articulate?
- **styloid process**
 - a lateral projection, which provides an anchoring site for what?

HAND

- the skeleton of the hand includes what?



Carpus

- what is the common name for the carpus?
- how many **carpals** form the carpus?

Metacarpus

- what is the common name for metacarpus?
- how many **metacarpals** are there?

Phalanges

- what is the common name for the phalanges of the hand?
- how many phalanges form the hand?
- what is the singular term for phalanges?
- how many phalanges form the thumb? · how many phalanges form each of the other digits?

THE PELVIC (HIP) GIRDLE

- × what are the functions of the pelvic girdle?



- × the pelvic girdle is formed by a pair of two **coxal bones** (os coxae or hip bones)
- × anteriorly the two coxal bones unite at the pubic symphysis
- × posteriorly the ilium of each coxal bone articulates with the sacrum, forming the sacroiliac joint



- × name the four bones that form the bony pelvis (listed in the legend for Figure 7.30):

- × list the 3 separate bones that each coxal bone consists of during childhood:

- describe these bones in an adult:

★ acetabulum

- describe the acetabulum:

- what does it receive?

So, each **coxal bone** is formed by the fusion of three bones:

1. ILIUM

- describe the ilium:
- the **auricular surface** of the ilium articulates with the auricular surface of the sacrum, forming what joint?

2. ISCHIUM - the inferior, posterior portion of the coxal bone

3. PUBIS (Pubic bone) - the anterior and inferior part of the coxal bone

- name the midline joint between the two pubic bones:
- what type of cartilage does it consist of?

THE LOWER LIMB

THIGH

Femur

proximal end of femur:

- **head**
 - the ball-like **head** of the femur articulates with the acetabulum of the hip bone (coxal bone), forming the hip (coxal) joint
 - describe the **fovea capitis**:
 - what does the ligament associated with it connect?
- **neck** - the constricted region distal to the head of the femur; why is it a common site of fracture?
- **greater trochanter**
· **lesser trochanter** } serve as sites of attachment for what?

distal end of femur:

- **lateral condyle**
· **medial condyle** } wheel-like; what do they articulate with?
- describe the **patellar surface** and name what it articulates with:
- describe the **intercondylar fossa**:

Patella

- describe the patella:

- what are the functions of the patella?

LEG

- name the two parallel bones of the leg:
- what are they connected by?
- the tibia and fibula articulate with each other proximally and distally at joints called what?

Tibia

- is it the medial or lateral bone of the leg (*see Fig. 7.32 to decide!*)?

proximal end of tibia:

- **lateral condyle and medial condyle**
 - what do they look like?

 - what do they articulate with?

- the articulation of the condyles of the femur and the condyles of the tibia form the tibiofemoral joint, or knee joint
- **tibial tuberosity**
 - a roughened area on the anterior surface to which what attaches?

distal end of the tibia:

- distally the tibia is flat where it articulates with what?

- what does the **medial malleolus** form?

Fibula

- is it in the medial or lateral part of the leg?
- describe the fibula:
- it articulates proximally and distally with what?
- the **lateral malleolus** forms what?
 - what does the lateral malleolus articulate with?

FOOT

Indicate the two important functions of the foot:



Tarsus

- how many **tarsals** (tarsal bones) form the tarsus?
 - 2 tarsals to know specifically:
 - talus** - what two bones does it articulate with superiorly?
 - calcaneus** - the bone in the heel of the foot
 - what does the calcaneus carry on its superior surface?
 - what attaches to the posterior surface of the calcaneus?



Metatarsus

- how many **metatarsals** are there?



Phalanges

- how many phalanges are there in one foot?
- how many in the big toe?
- how many in each of the other toes?

