Some important anatomical terms:

Superior (Cranial)

Closer to the head

Inferior (caudal)

Away from the head

Anterior (ventral)

Toward the front of the body

Posterior (dorsal)

Toward the back of the body

Medial

Toward the midline of the body

Lateral

Away from the midline of the body

Proximal

Closer to the trunk

Distal

Away from the trunk

Superficial

Toward the surface of the body

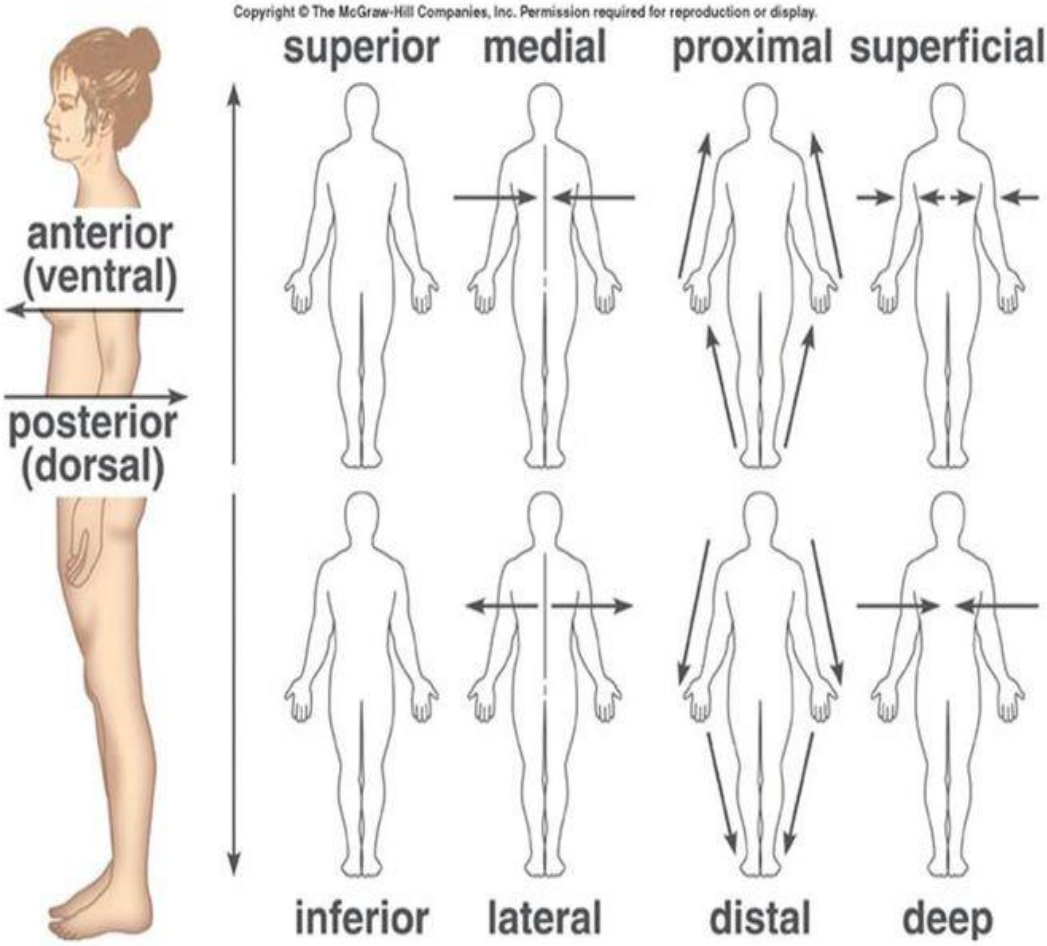
Deep

Away from the surface of the body

Internal: inside the body

External: outside the body

Fig. 1.2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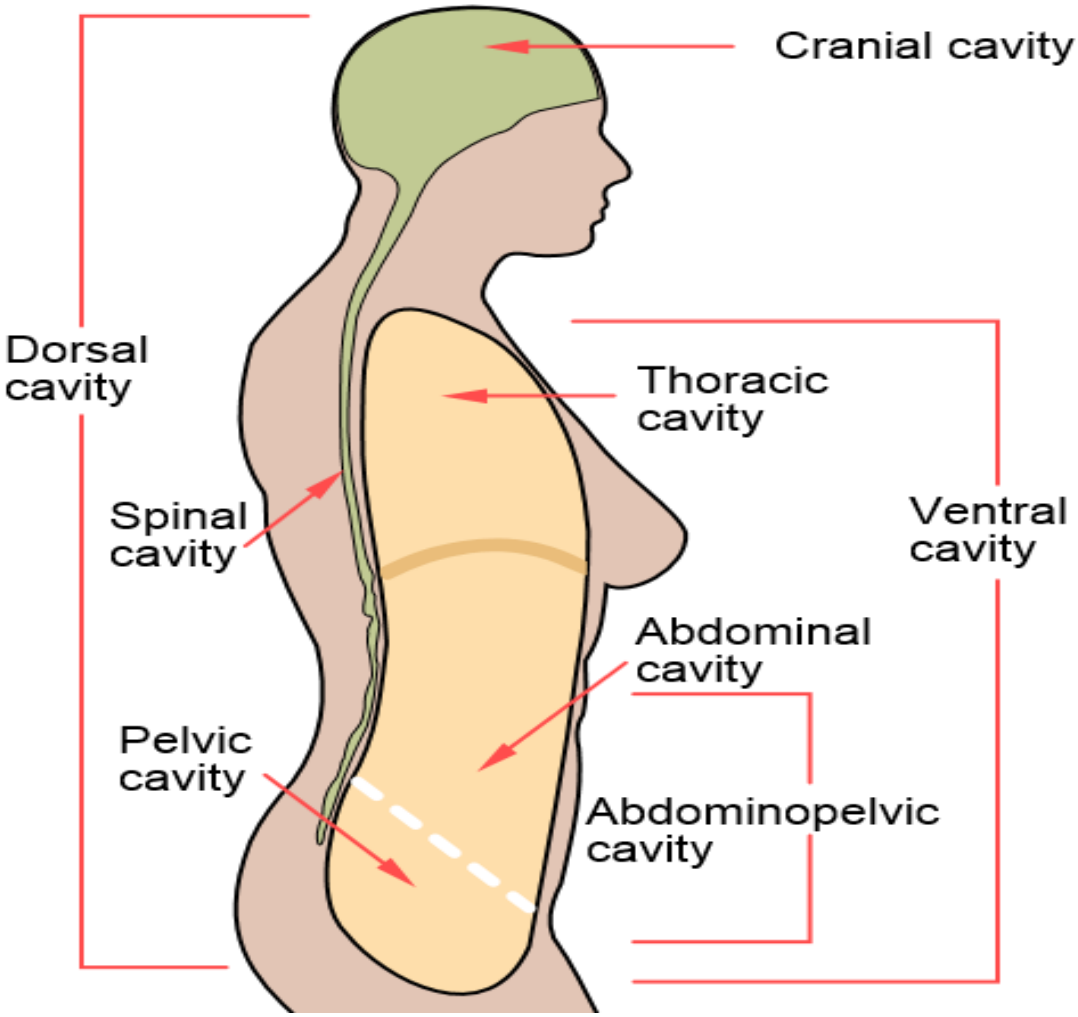
superior
medial
proximal
superficial
anterior
(ventral)
posterior
(dorsal)
inferior
lateral
distal
deep

Type of body cavities:

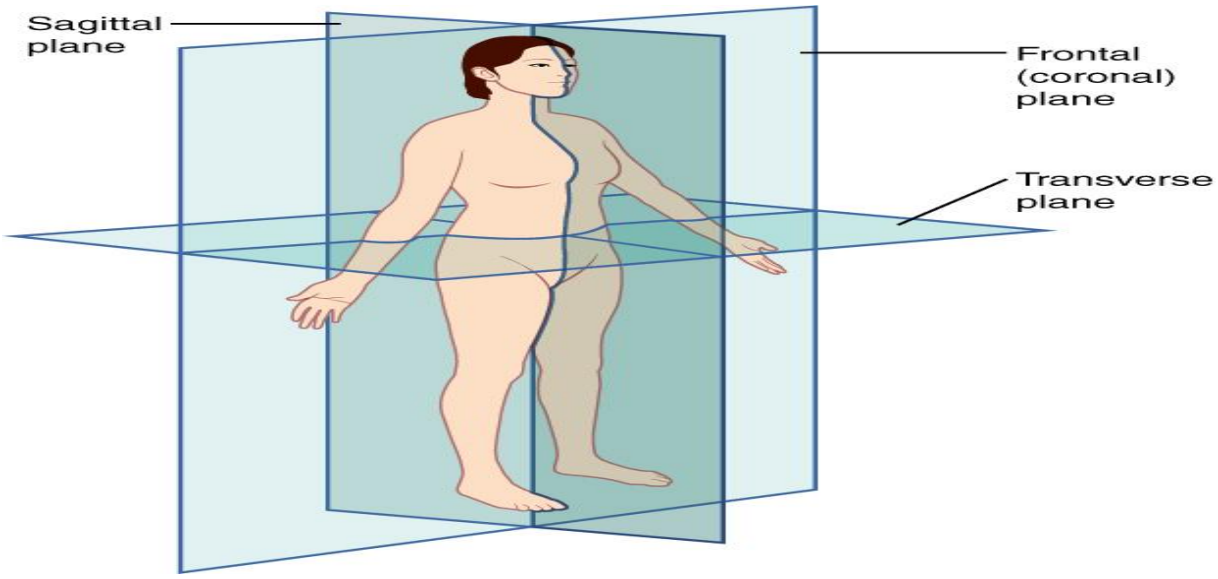


Anatomical Planes المستويات التشريحية:

١- Sagittal (median) plane المستوى المتوسط او السهمي

٢- Frontal (Coronal) plane المستوى الاكليليكي او التاجي

٣- Transvers (Horizontal) plane المستوى الافقي او المستعرض



planes**,** referring to two-dimensional *sections* of the body.

- **The *sagittal plane*** is the plane that divides the body or an organ vertically into right and left sides.
- **The *frontal plane*** is the plane that divides the body or an organ into an anterior (front) portion and a posterior (rear) portion.
- **The *transverse plane*** is the plane that divides the body or organ horizontally into upper and lower portions. Transverse planes produce images referred to as cross sections.

Body Organs and Tissues Terms:

Brain

Nerve

Spinal Cord

Cranium

Skull

Heart

Valve

Cardiac

Artery

Vene

Capillary

Vascular

Epithelial

Connective

Stomach

Digestive

Liver

Spleen

Lung

Pulmonary

Femur

Ribs

Intestine

Colon

Bone

Kidney

Renal

Bronchia

Trachea

Epiglottis

Tongue

Esophagus

Tonsils

Vertebra

Muscle

Skeletal

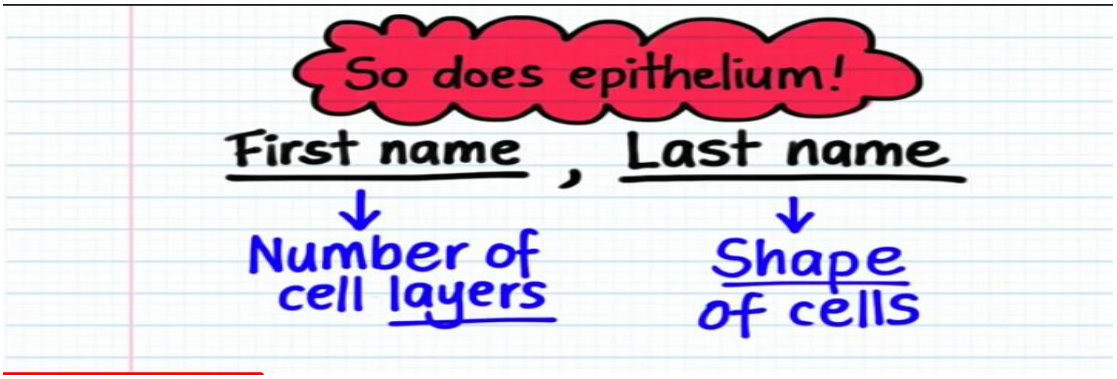
Lymphoid

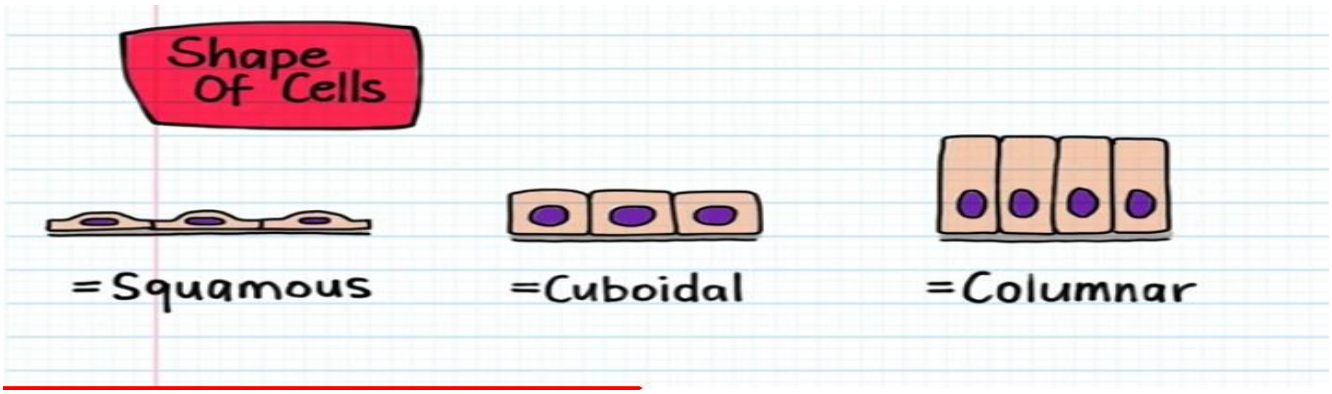
Anatomy of Epithelial Tissues

Epithelial tissue : type of tissue that lines the surfaces and cavities of your body's organs

Epithelium has two names. The first name indicates the number of cell layers, the second describes the shape of its cell. Based on the number of cell layers, epithelia can either be **simple or stratified**.

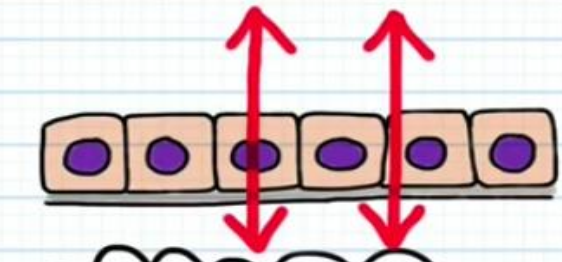
- **Simple epithelia**– consist of a single cell layer (
- **Stratified epithelia–** are composed of two or more cell layers





Number of Cell Layers

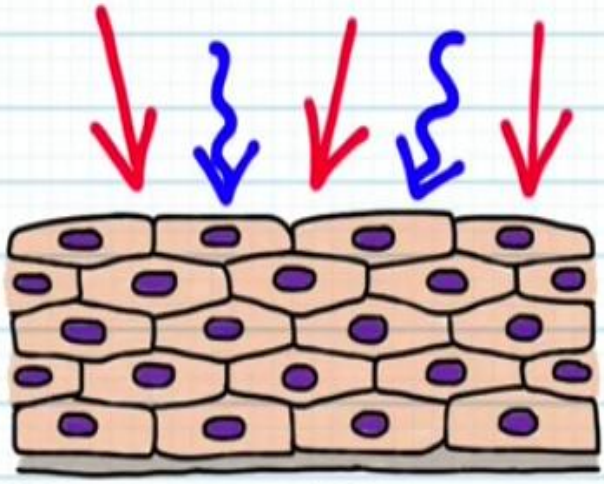
1 layer of cells
= simple



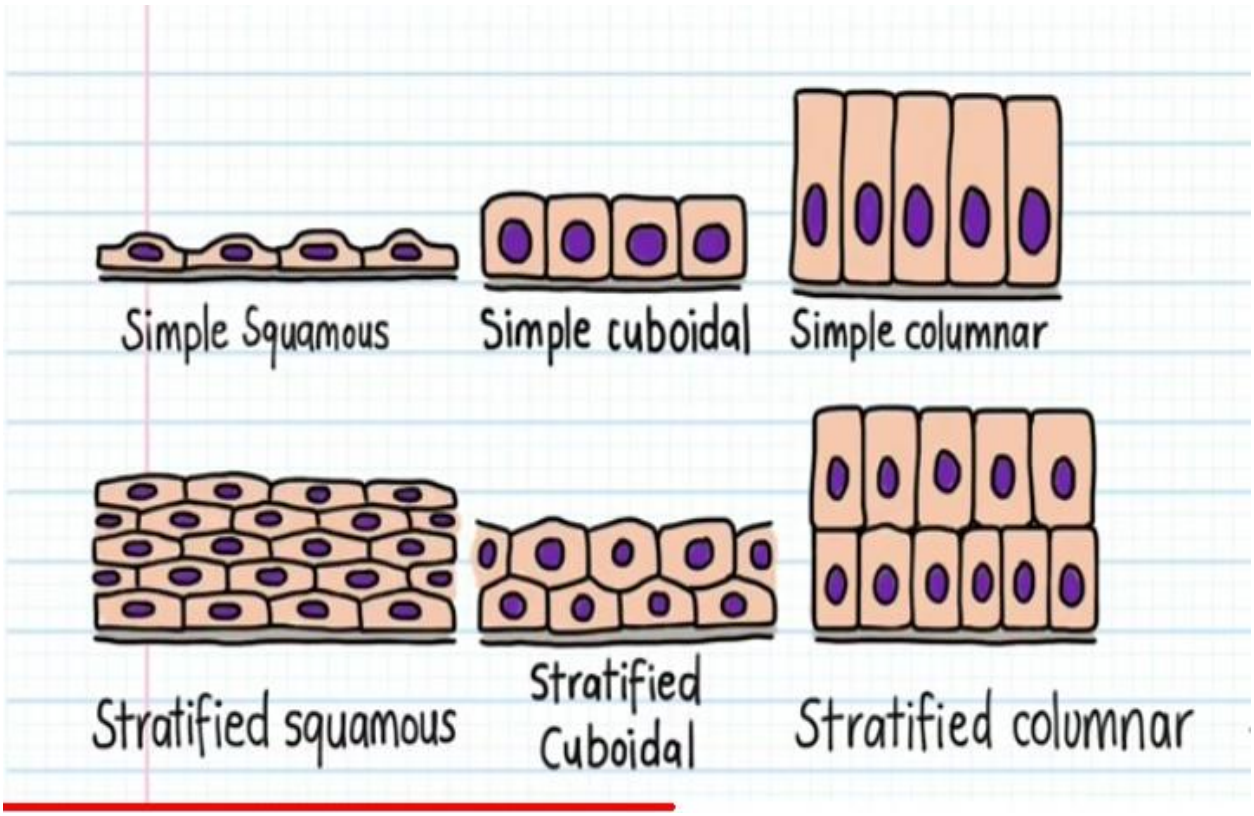
Where absorption or diffusion occur

Number of Cell Layers

More than 1 layer of cells
= Stratified

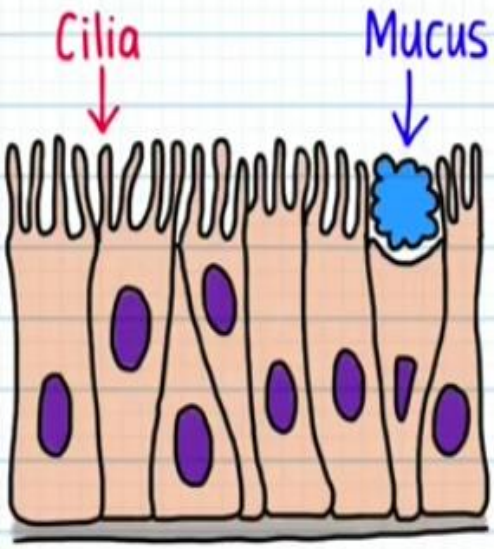


Protection against abrasion, friction and bacteria


Simple Squamous
Simple cuboidal
Simple columnar
Stratified squamous
Stratified Cuboidal
Stratified columnar


Pseudostratified columnar
Transitional
But wait, There's more!

Pseudostratified columnar



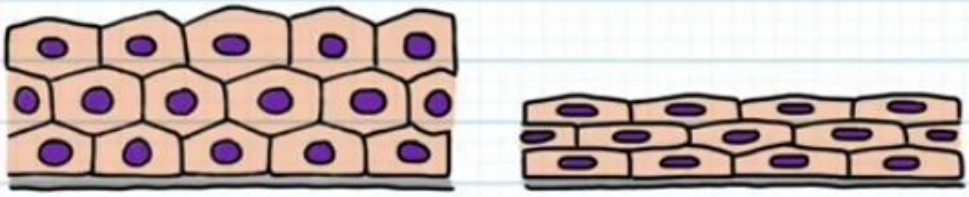
"Pseudo" = false

Just 1 layer thick

Found in nasal cavity & trachea

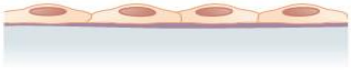
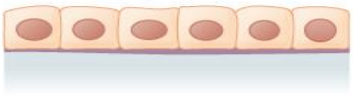
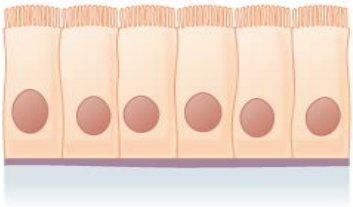
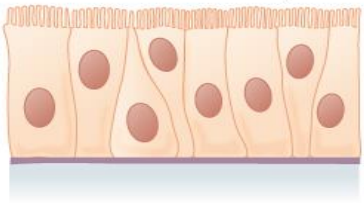
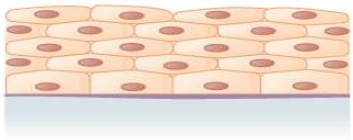
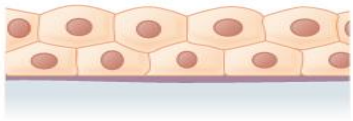
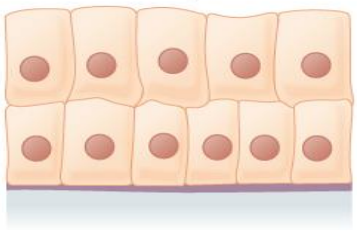
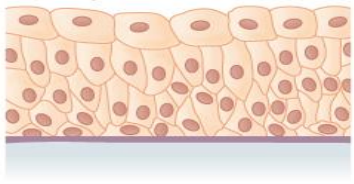
Transitional Epithelium

Can stretch without breaking!



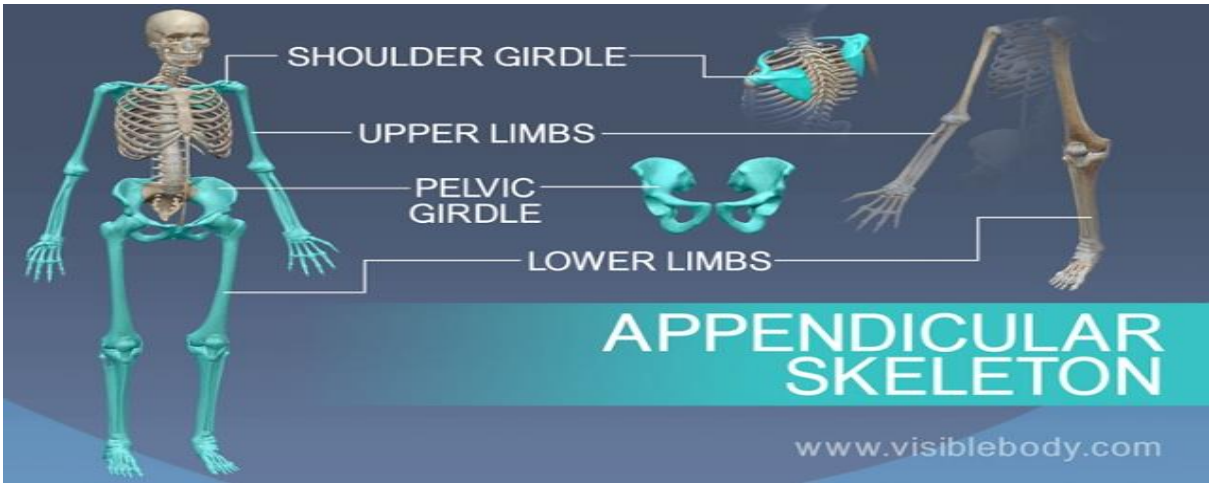
Empty bladder = Stratified cuboidal

Full bladder = Stratified squamous

Cells	Location	Function
Simple squamous epithelium 	Air sacs of lungs and the lining of the heart, blood vessels, and lymphatic vessels	Allows materials to pass through by diffusion and filtration, and secretes lubricating substance
Simple cuboidal epithelium 	In ducts and secretory portions of small glands and in kidney tubules	Secretes and absorbs
Simple columnar epithelium 	Ciliated tissues are in bronchi, uterine tubes, and uterus; smooth (nonciliated tissues) are in the digestive tract, bladder	Absorbs; it also secretes mucous and enzymes
Pseudostratified columnar epithelium 	Ciliated tissue lines the trachea and much of the upper respiratory tract	Secretes mucus; ciliated tissue moves mucus
Stratified squamous epithelium 	Lines the esophagus, mouth, and vagina	Protects against abrasion
Stratified cuboidal epithelium 	Sweat glands, salivary glands, and the mammary glands	Protective tissue
Stratified columnar epithelium 	The male urethra and the ducts of some glands	Secretes and protects
Transitional epithelium 	Lines the bladder, uretha, and the ureters	Allows the urinary organs to expand and stretch

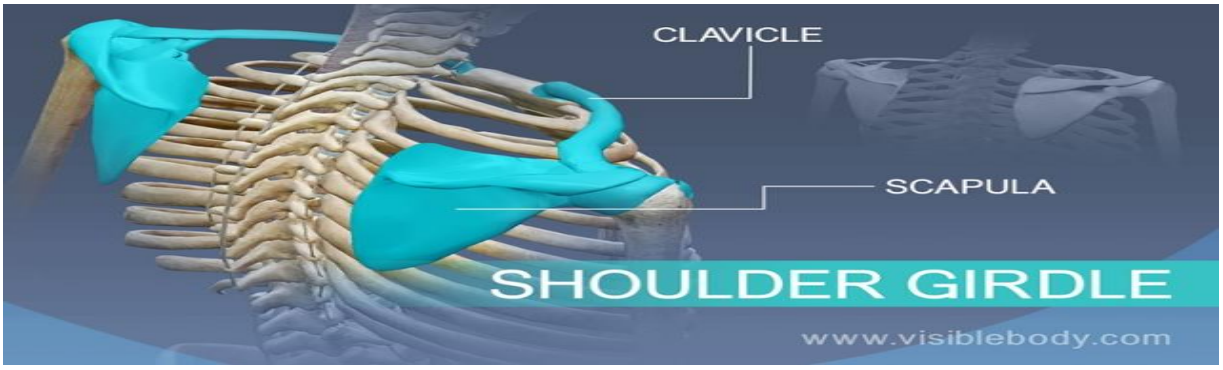
Appendicular Skeleton

Hips, Shoulders, Arms, and Legs: Bones of the Appendicular Skeleton



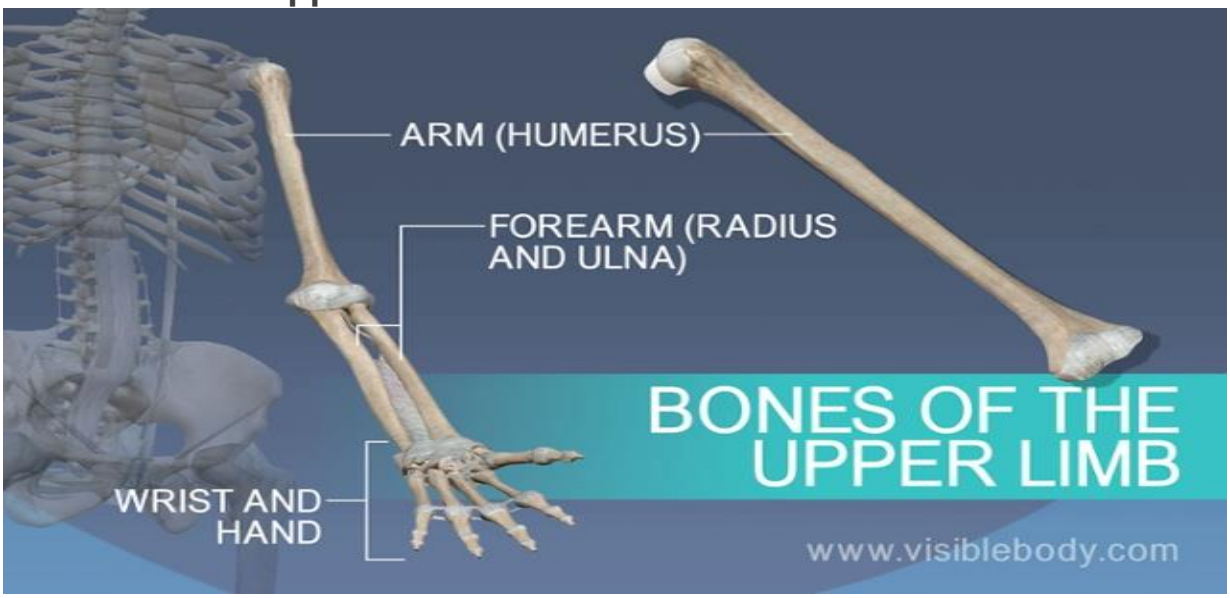
Let’s take a look at the bones of the appendicular skeleton.

١. The Bones of the Shoulder Girdle

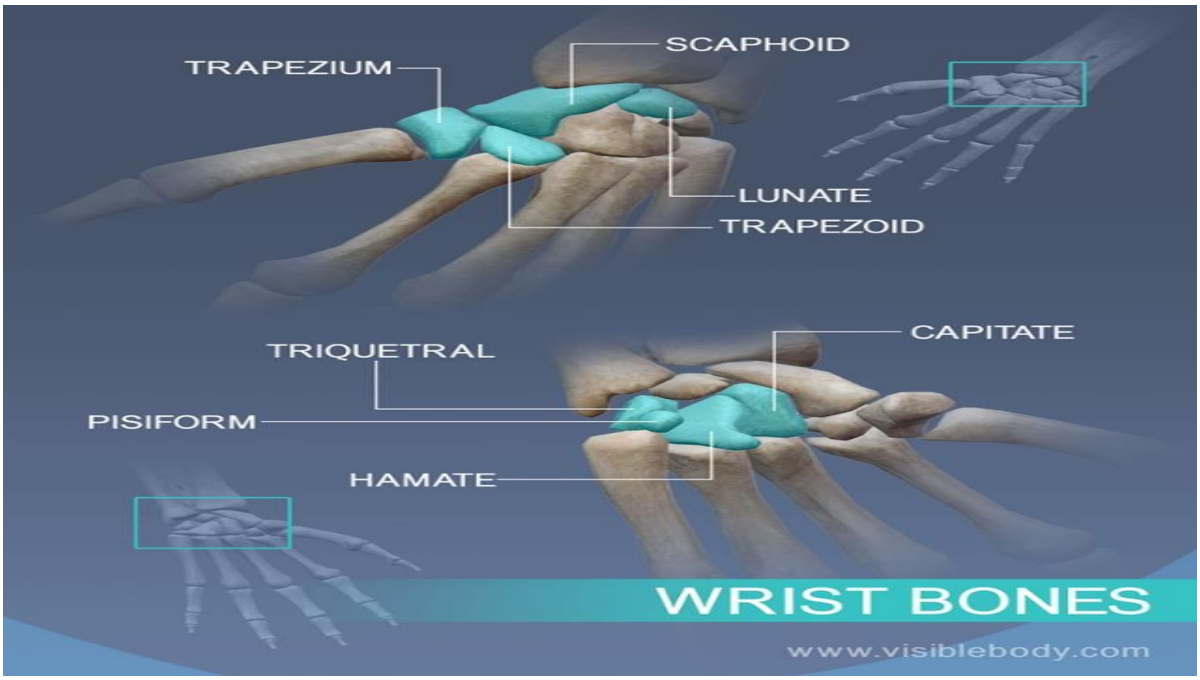


The **pectoral** or **shoulder girdle** consists of the scapulae and clavicles. The shoulder girdle connects the bones of the upper limbs to the axial skeleton. These bones also provide attachment for muscles that move the shoulders and upper limbs.

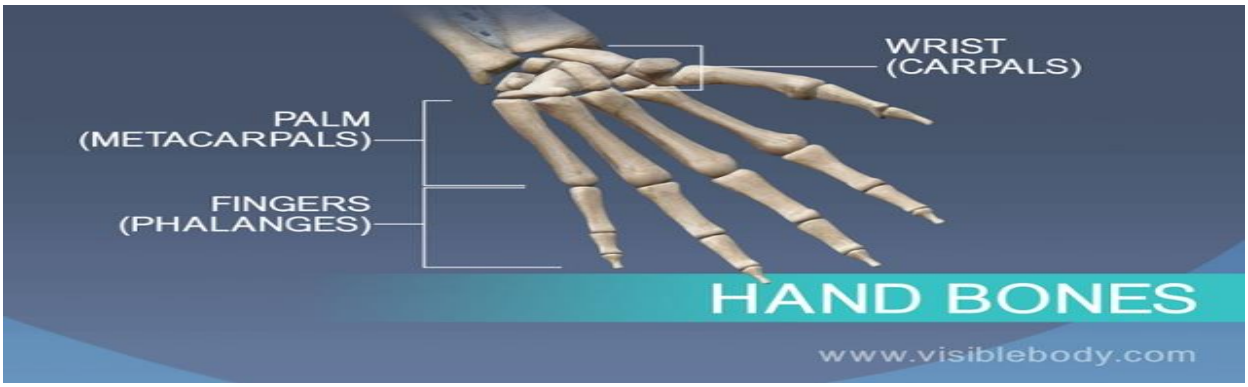
. Bones of the Upper Limbs



The **upper limbs** include the bones of the arm (humerus), forearm (radius and ulna), wrist, and hand. The only bone of the arm is the humerus, which articulates with the forearm bones–the radius and ulna–at the elbow joint. The ulna is the larger of the two forearm bones.

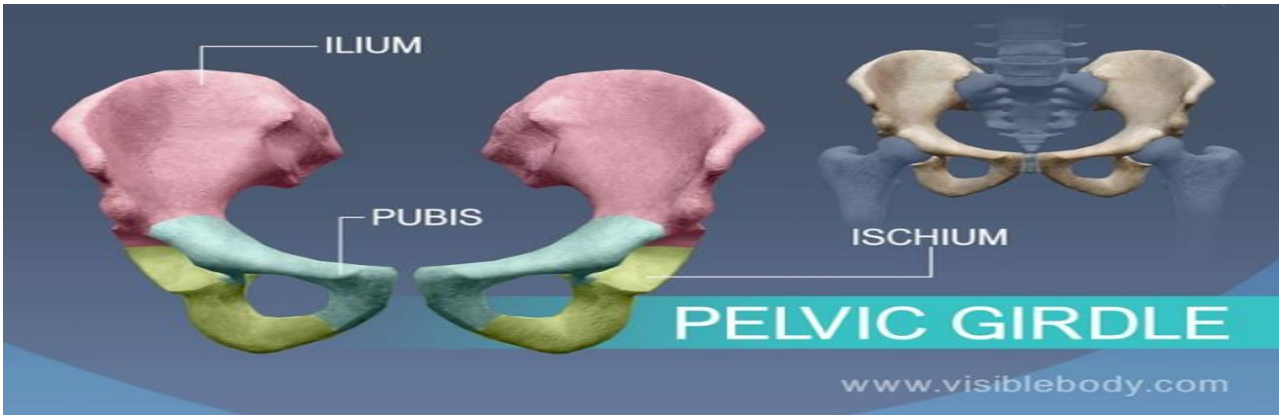


Wrist Bones. The wrist, or carpus, consists of eight carpal bones. The eight carpal bones of the wrist are the **S**caphoid, **L**unate, **T**riquetral, **P**isiform, **T**rapezoid, **T**rapezium, **C**apitate, **H**amate.

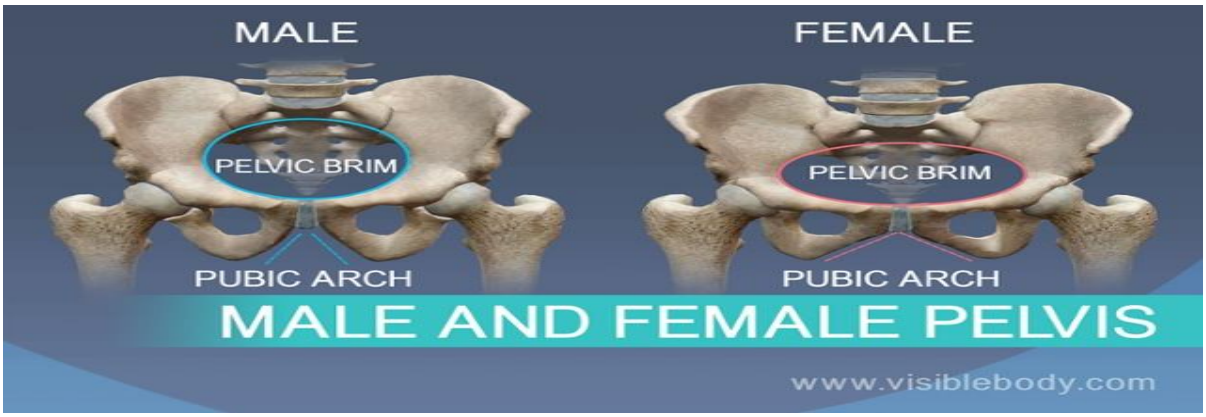


Hand Bones. The hand includes ٨ bones in the wrist, ٥ bones that form the palm, and ١٤ bones that form the fingers and thumb. The wrist bones are called **carpals**. The bones that form the palm of the hand are called **metacarpals**. The **phalanges** are the bones of the fingers.

٣. The Bones of the Pelvis



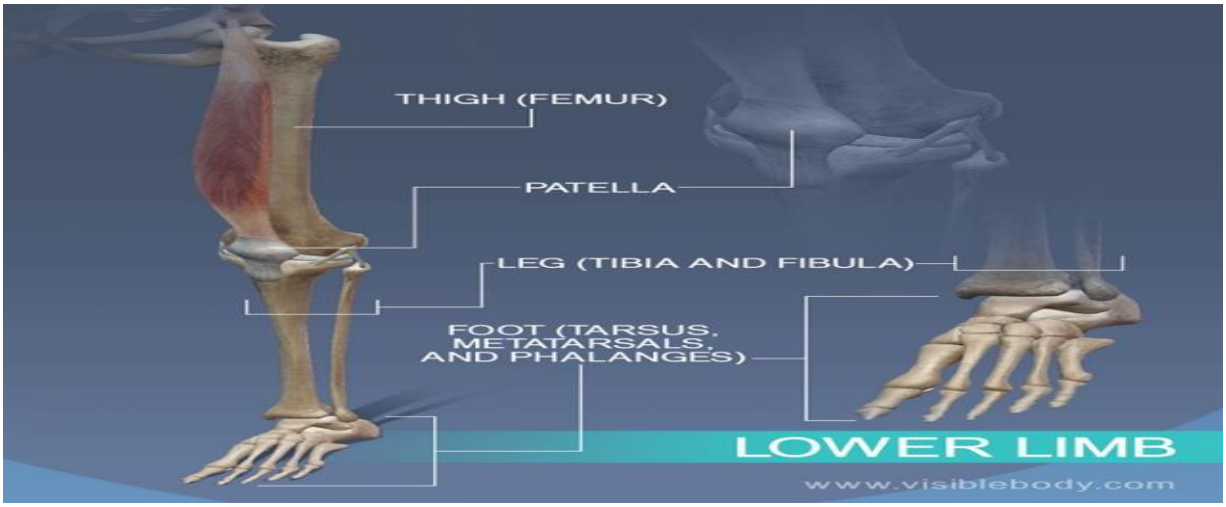
The **pelvic girdle** is a ring of bones attached to the vertebral column that connects the bones of the lower limbs to the axial skeleton. The pelvic girdle consists of the right and left hip bones. Each hip bone is a large, flattened, and irregularly shaped fusion of three bones: the ilium, ischium, and pubis.



Female and Male Pelvis. The female and male pelvises differ in several ways due to childbearing adaptations in the female.

- The female pelvic brim is larger and wider than the male's.
- The angle of the pubic arch is greater in the female pelvis (over ٩٠ degrees) than in the male pelvis (less than ٩٠ degrees).
- The male pelvis is deeper and has a narrower pelvic outlet than the female's.

٤. The Bones of the Lower Limbs



The **lower limbs** include the bones of the thigh, leg, and foot. The femur is the only bone of the thigh. It articulates with the two bones of the leg–the larger tibia (commonly known as the shin) and smaller fibula. The thigh and leg bones articulate at the knee joint that is protected and enhanced by the patella bone that supports the quadriceps tendon. The bones of the foot include the tarsus, metatarsus, and phalanges.

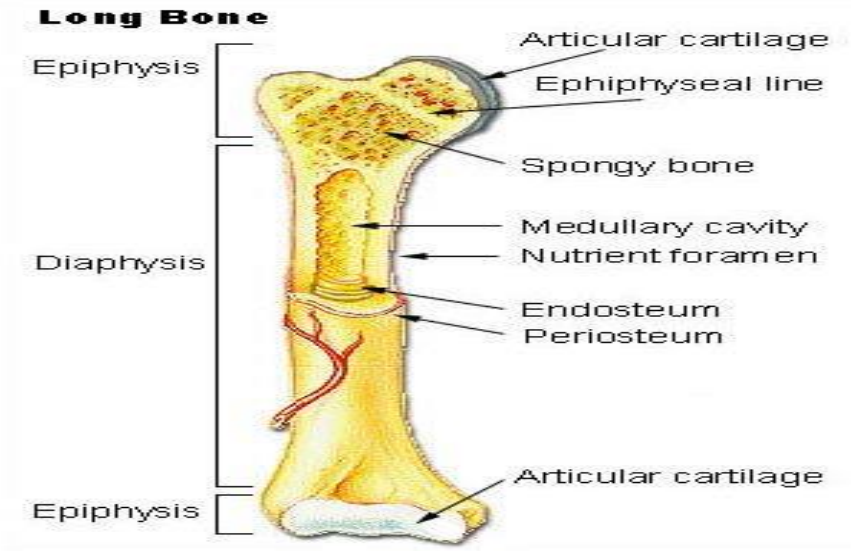
Foot Bones. The bones of the foot consist of the tarsal bones of the ankle, the phalanges that form the toes, and the metatarsals that give the foot its arch. As in the hand, the foot has five metatarsals, five proximal phalanges, five distal phalanges, but only four middle phalanges (as the foot's "big toe" has only two phalanges).

Ankle Bones. The ankle, or tarsus, consists of seven tarsal bones: the calcaneus, talus, cuboid, navicular, and three cuneiforms.

Foot Arches. The arches of the foot are formed by the interlocking bones and ligaments of the foot. They serve as shock-asborbing structures that support body weight and distribute stress evenly during walking.

- The longitudinal arch of the foot runs from the calcaneus to the heads of the metatarsals, and has medial and lateral parts.
- The transverse arch of the foot runs across the cuneiforms and the base of the metatarsal bones.

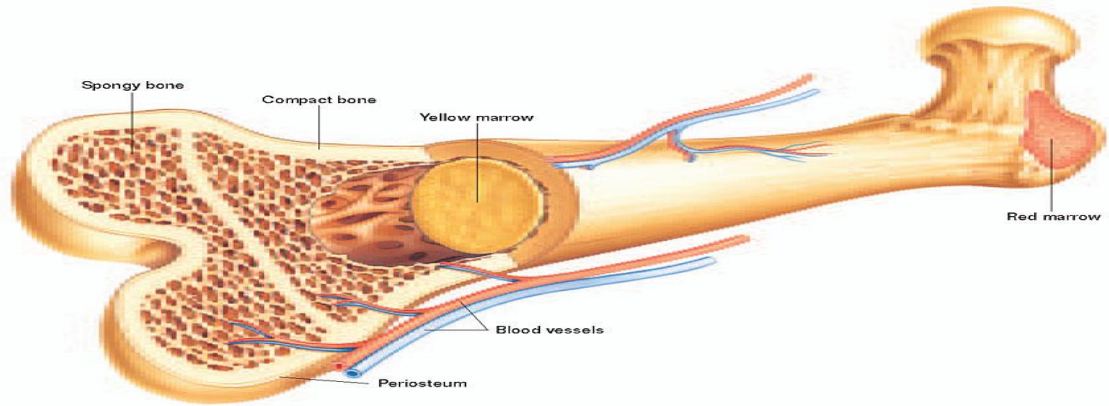
Parts of Bones:



At birth, each long bone is made of three individual bones separated by hyaline cartilage.

- Each end bone is called an epiphysis (epi = on; physis = to grow)
- While the middle bone is called a diaphysis (dia = passing through).
- The epiphyses and diaphysis grow towards one another and eventually fuse into one bone.
- The region of growth and eventual fusion in between the epiphysis and diaphysis is called the metaphysis (meta = after).

Once the long bone parts have fused together, the only hyaline cartilage left in the bone is found as articular cartilage on the ends of the bone that form joints with other bones. The articular cartilage acts as a shock absorber and gliding surface between the bones to facilitate movement at the joint.



Looking at a bone in cross section :

There are several distinct layered regions that make up a bone.

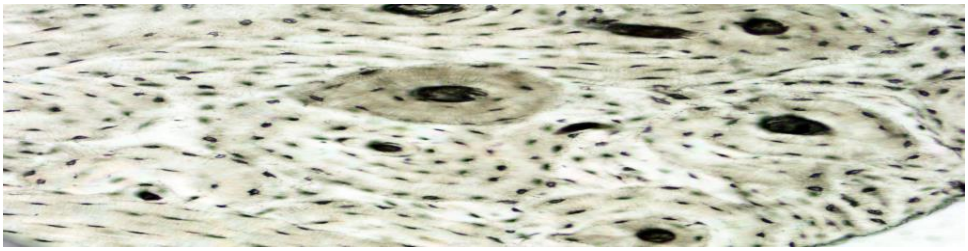
The outside of a bone is covered in a thin layer of **dense irregular connective tissue** called the **periosteum.**

The periosteum contains:

- **Strong collagen fibers** that are used to firmly anchor tendons and muscles to the bone for movement.
- **Stem cells and osteoblast cells** in the periosteum are involved in the growth and repair of the outside of the bone due to stress and injury.
- **Blood vessels** present in the periosteum provide energy to the cells on the surface and inside of the bone.
- **Nervous tissue** and many nerve endings to give bone its sensitivity to pain when injured.

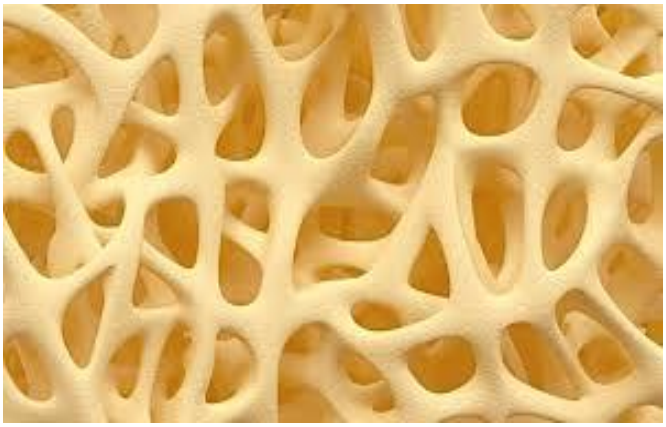
Deep to the periosteum is the **compact bone**

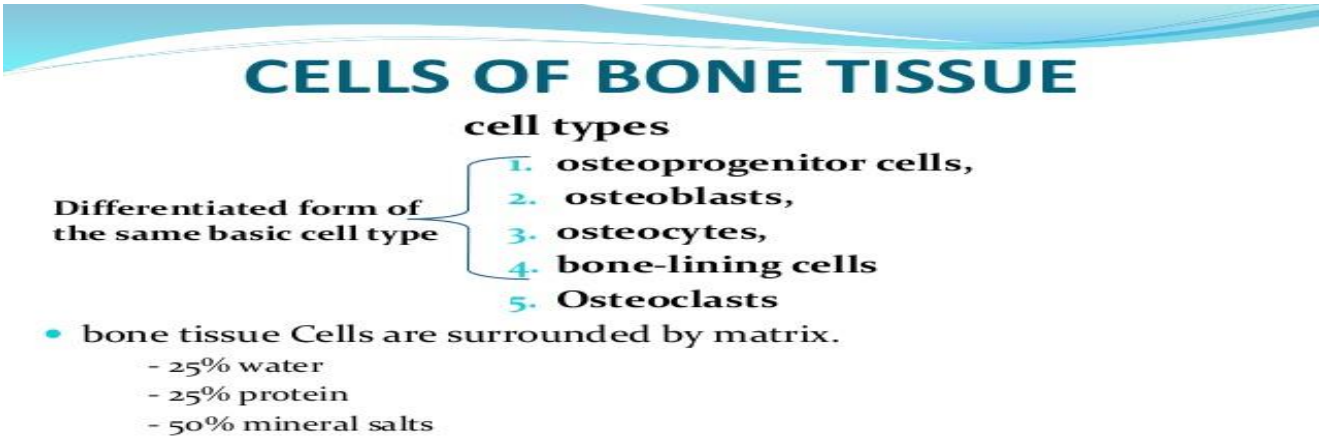
Compact bone is made of a matrix of **hard mineral salts** reinforced with tough **collagen fibers**. Many tiny cells called **osteocytes** live in small spaces in the matrix and help to maintain the strength and integrity of the compact bone.

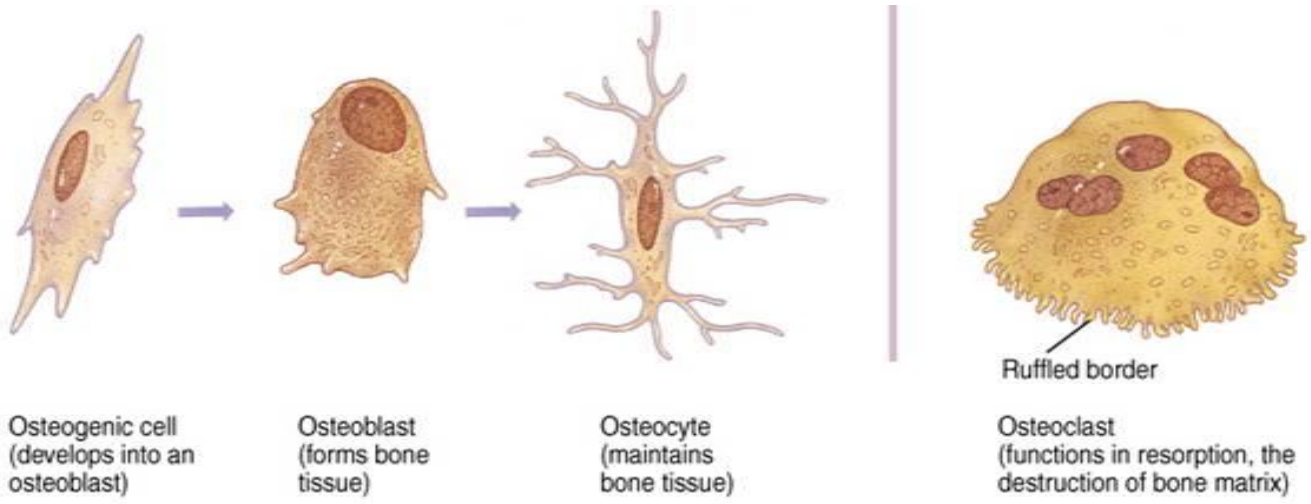


Deep to the compact bone layer is a region of spongy bone

Keeping bones light but strong. **Long bones have a spongy bone on their ends** but have a **hollow medullary cavity** in the middle of the diaphysis. **The medullary cavity** contains **red bone marrow** during **childhood**, eventually turning into **yellow bone marrow** after **puberty**.







Bone Cells		
Cell type	**Function**	**Location**
Osteogenic cells	Develop into osteoblasts	Deep layers of the periosteum and the marrow
Osteoblasts	Bone formation	Growing portions of bone, including periosteum and endosteum
Osteocytes	Maintain mineral concentration of matrix	Entrapped in matrix
Osteoclasts	Bone resorption	Bone surfaces and at sites of old, injured, or unneeded bone

Bone Lining Cells

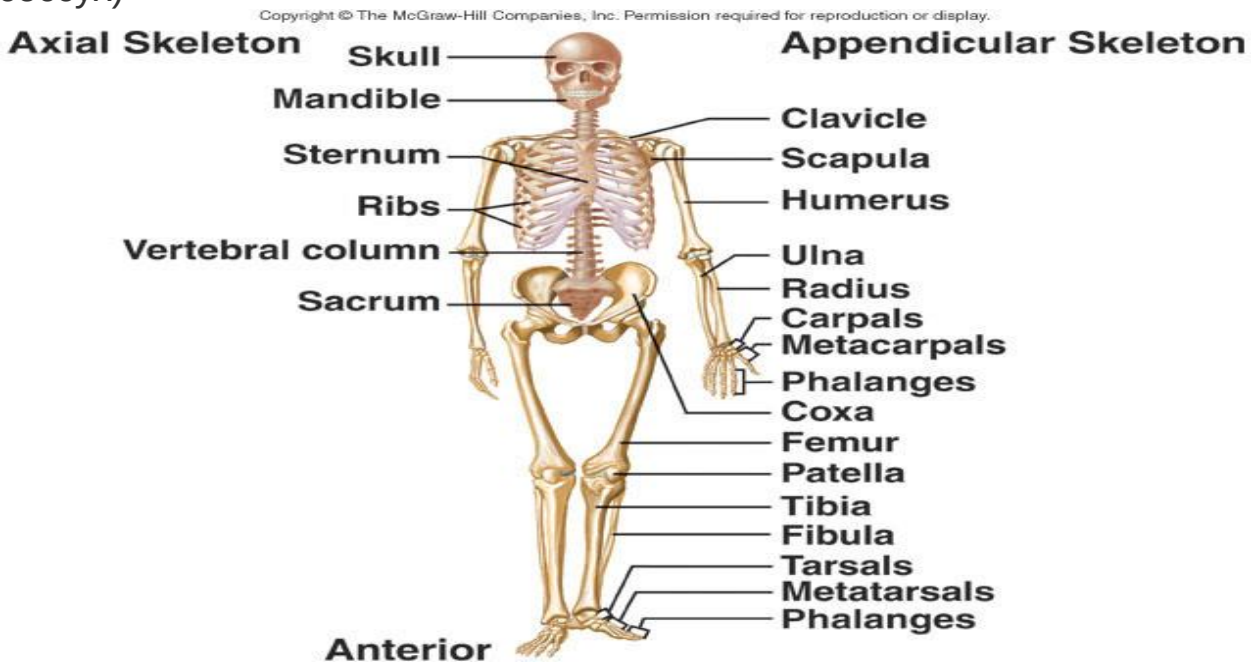
- Flat cells on bone surfaces believed to help maintain matrix
- On external bone surface called periosteal cells
- Lining internal surfaces called endosteal cells

Skeletal System

Bones of the Axial Skeleton

The Axial Skeleton is the central core of the human body housing and **protecting its vital organs**.

The axial skeleton consists of ٨٠ bones:

- ٢٩ bones in the head - (٨ cranial and ١٤ facial bones) and then also ٧ accociated bones (٦ auditory ossicles and the Hyoid Bone)
- ٢٥ bones of the thorax - (the sternum and ٢٤ ribs)
- ٢٦ bones in the vertebral column (٢٤ vertebrae, the sacrum and the coccyx)
- 

The function of the Axial skeleton

The Axial Skeleton has ٢ functions.

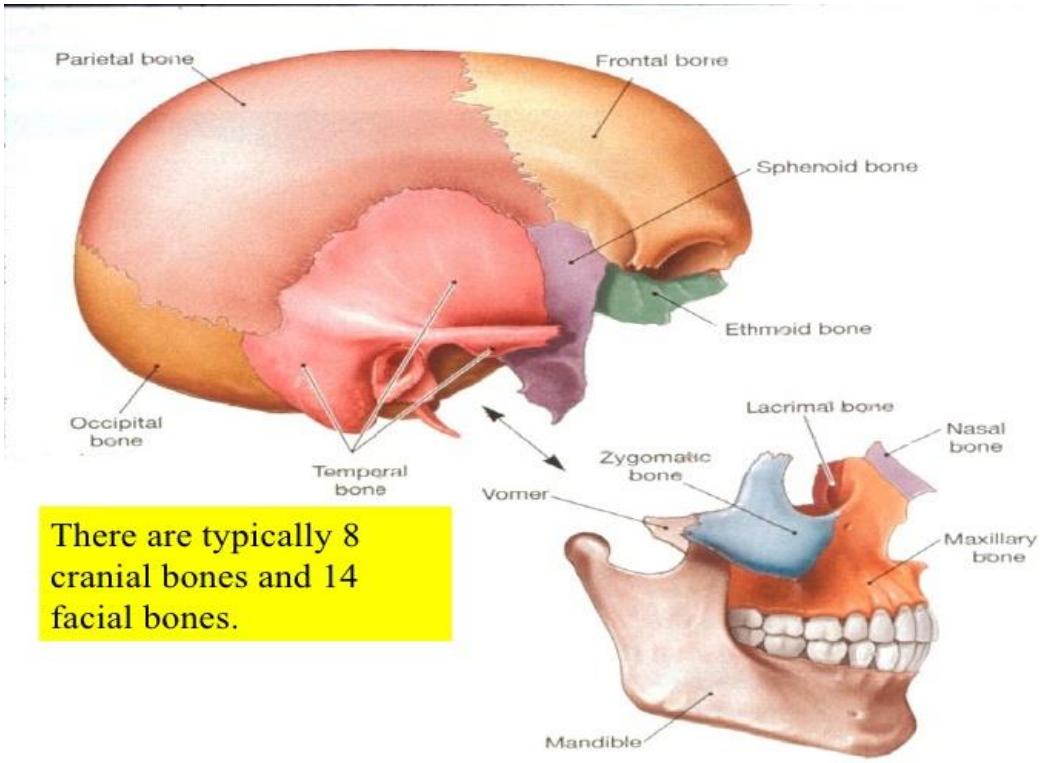
١- **Support and protect** the organs in the dorsal and ventral cavities.

٢- **It creates a surface for the attachment of muscles**.

Bones of the Appendicular skeleton:

- ٤ bones in the shoulder girdle (clavicle and scapula each side)
- ٦ bones in the arm and forearm (humerus,ulna and radius)
- ٥٨ bones in the hands (carpals ١٦, metacarpals ١٠, phalanges ٢٨ and sesamoid ٤)
- ٢ pelvis bones
- ٨ bones in the legs (femur, tibia, patella and fibula)
- ٥٦ bones in the feet (tarsals, metatarsals , phalanges and sesamoid)

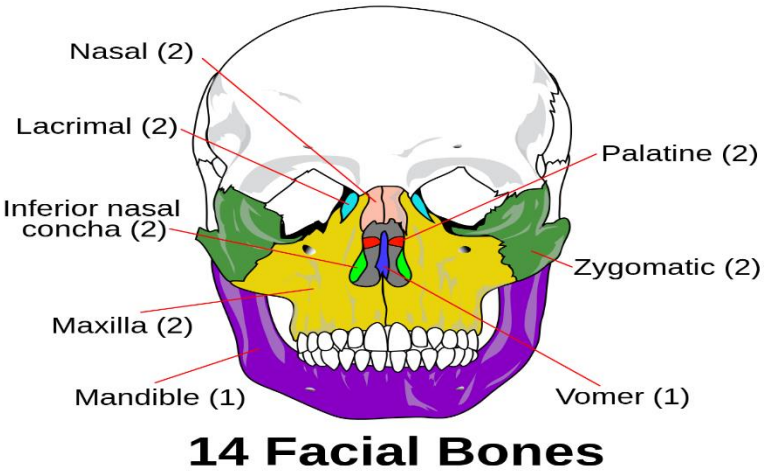
Bones of the Skull (cranial bones and facial bones):



The Cranial bone including (٨ bones):

١. The Sphenoid Bone
٢. The Ethmoid Bone
٣. The Frontal Bone
٤. The Occipital Bone
٥. The Temporal Bone
٦. The Parietal Bone

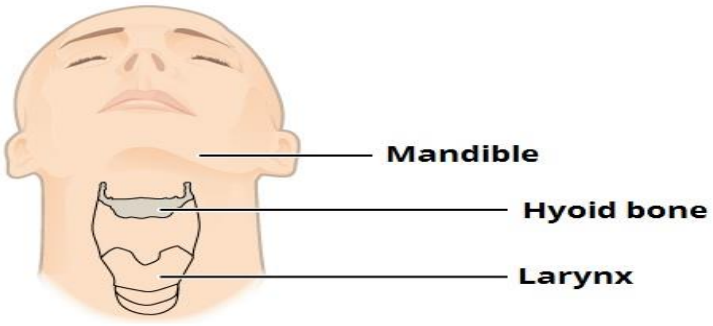
- The facial bones (١٤)



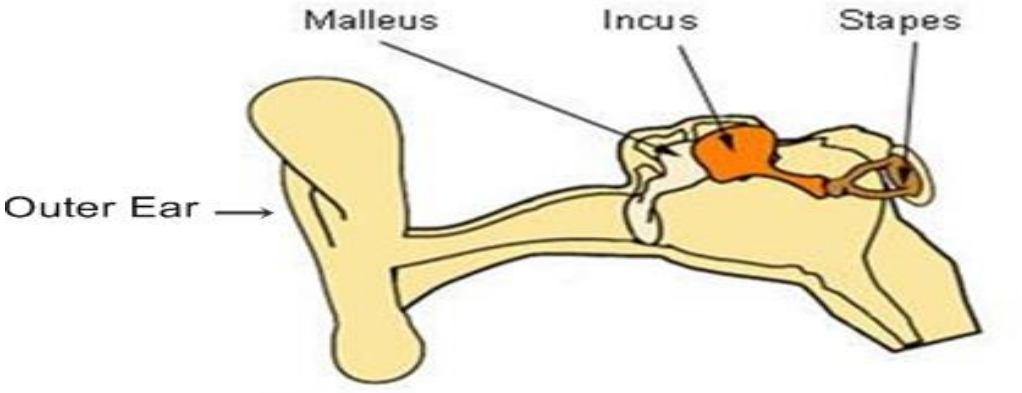
14 Facial Bones

  - The nasal bones (٢)
  - The maxillae (upper jaw) (٢)
  - The lacrimal bone (٢)
  - The zygomatic bone or cheekbone (٢);
  - The palatine bone (٢)
  - The inferior nasal concha (٢)
  - The vomer
  - The mandible (lower jaw)

- **The hyoid bone (not connected to any other bone)**
- The hyoid **is a small, U-shaped bone** found just **inferior to the mandible**. The hyoid is the only bone in the body that does not form a joint with any other bone.



- **In the middle ears (٦) :**
  - malleus (٢)
  - incus (٢)
  - stapes (٢)



The Ribs *(or Costas)* and The Sternum *(or Breast Bone)*

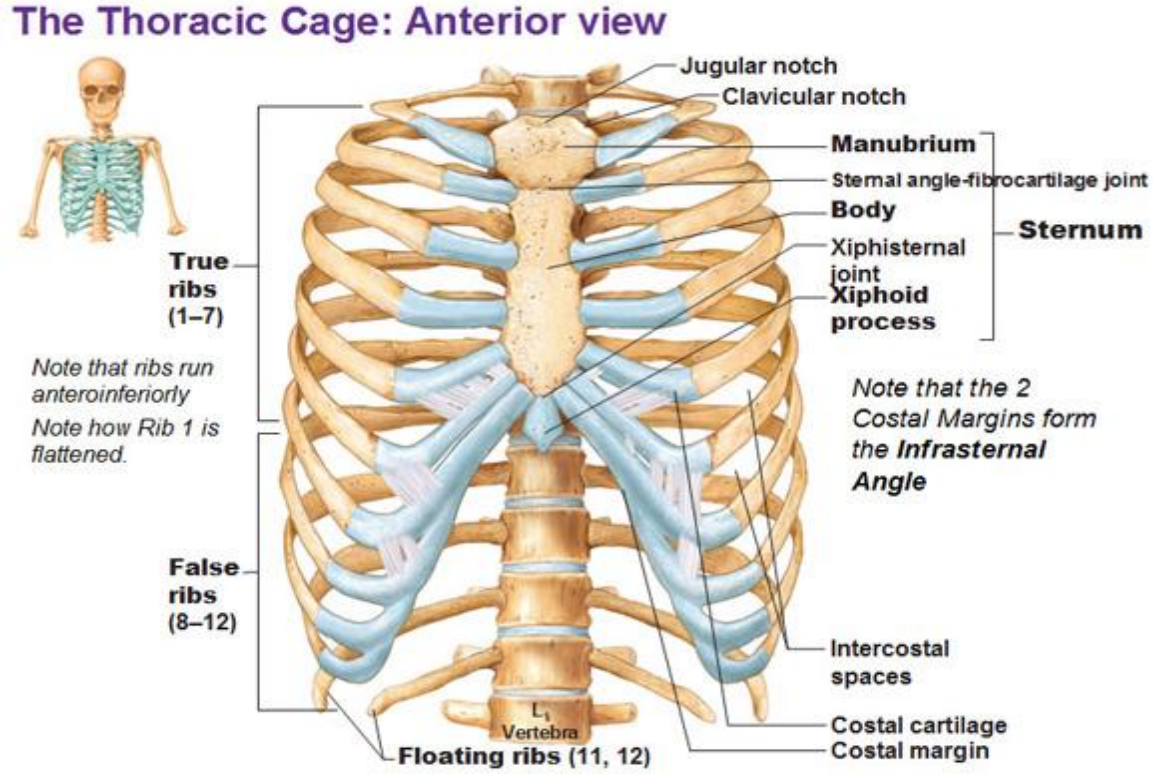
The rib cage, *or thoracic cage*, is a bony/cartilaginous structure surrounding the thoracic cavity and supporting the pectoral girdle.

How many ribs do humans have?
١٢ pair, or ٢٤ total ribs

A typical human rib cage consists of ٢٤ ribs :

١. **sternum**
٢. **costal cartilages,**
٣. **١٢ thoracic vertebrae**

making up the thoracic wall and providing attachments for muscles *(neck, thorax, upper abdomen, and back)*. ***All ribs are attached in the back to the thoracic vertebrae.***



True Ribs, *or Vertebrosternal Ribs, or ١-٧* — are attached to the sternum by costal cartilage,

False Ribs, *or Vertebrochondral Ribs, or ٨-١٠* — join with the costal cartilages of the true ribs

Floating Ribs, *or Vertebral Ribs, or ١١ and ١٢* — do not have any anterior connection to the sternum

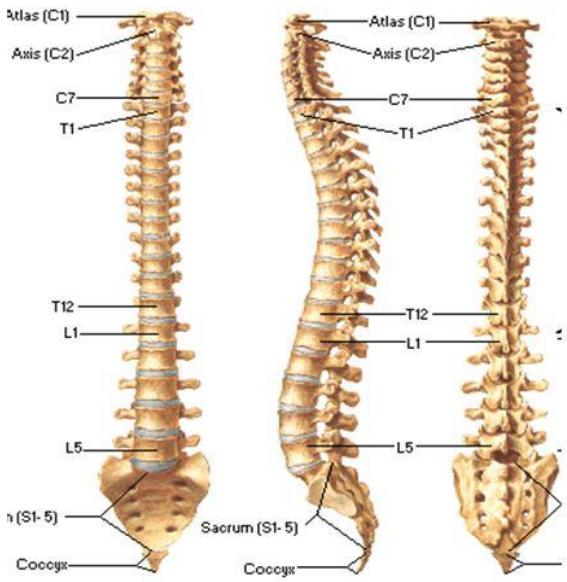
Costal Cartilage — bars of ***hyaline cartilage*** which serve to prol

Vertebrae Column:

Twenty-six vertebrae form the vertebral column of the human body. They are named by region:

Vertebral Column

- Part of the axial skeleton
- 33 vertebrae
  - **7** Cervical
  - **12** Thoracic
  - **5** Lumbar
  - **5** Sacral
  - **4** Coccygeal



Cervical (neck) - ٧ vertebrae

Thoracic (chest) - ١٢ vertebrae

Lumbar (lower back) - ٥ vertebrae

Sacrum - ١ vertebra

Coccyx (tailbone) - ١ vertebra