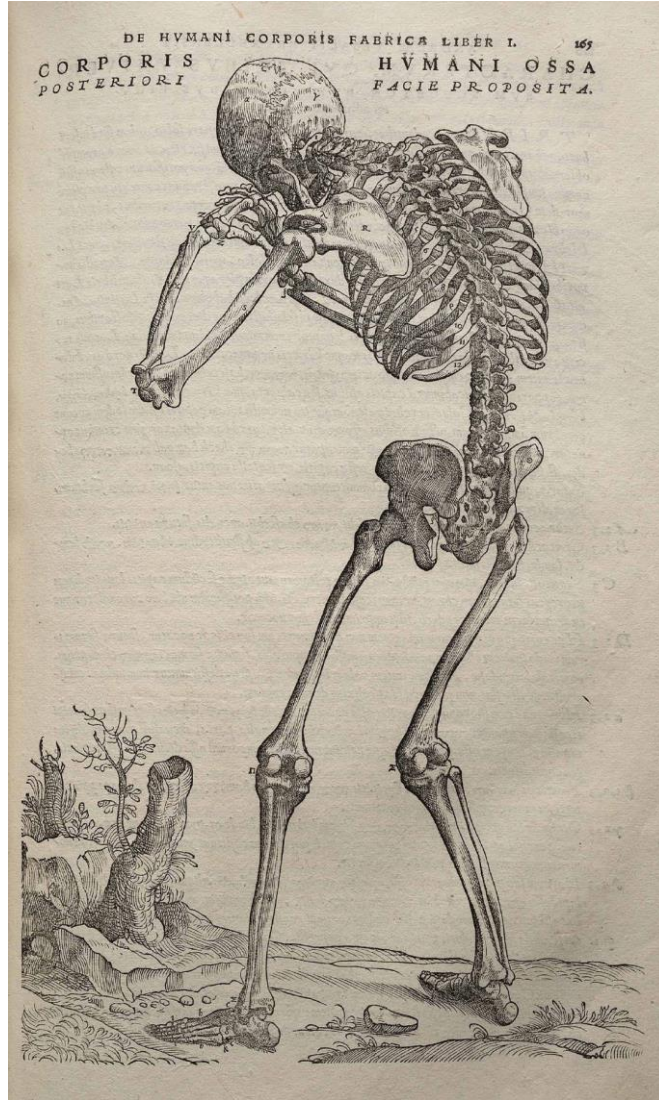


BONES

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<http://mdp120.org>

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READABILITY SCORE

60 %

SUMMARY

Osteology (Gk, osteon, bone, logos, science) is the branch of medicine concerned with the development and diseases of bone tissue. The human skeleton is composed of 206 bones in adults.

The skeletal system may be divided into two functional parts:

oThe axial skeleton consists of the bones of the head (cranium or skull), neck (hyoid bone and cervical vertebrae), and trunk (ribs, sternum, vertebrae, and sacrum).

oThe appendicular skeleton consists of the bones of the limbs, including those forming the pectoral (shoulder) and pelvic girdles.

The skeleton is composed of cartilages and bones. Cartilage is an avascular form of connective tissue consisting of extracellular fibers embedded in a matrix that contains cells localized in small cavities. Bone is a calcified, living, connective tissue that forms the majority of the skeleton. It consists of an intercellular calcified matrix, which also contains collagen fibers, and several types of cells within the matrix.

Bones function as:

- supportive structures for the body;
- protectors of vital organs; e.g., sternum and ribs protect the thoracic and upper abdominal viscera, skull and vertebral column protect the brain and spinal cord from injury.
- reservoirs of calcium and phosphorus;
- levers on which muscles act to produce movement; as seen in the long bones of the limbs
- containers for blood-producing cells.

The skull is supported on the summit of the vertebral column, and is of an oval shape, wider behind than in front. It is composed of a series of flattened or irregular bones which, with one exception (the mandible), are immovably jointed together. It is divisible into two parts:

(1) the cranium, which lodges and protects the brain, consists of eight bones

(2) the skeleton of the face, of fourteen

The thoracic cage (skeleton) is formed by the sternum and costal cartilages anteriorly, ribs laterally, and thoracic vertebrae posteriorly.

The vertebral column in an adult typically consists of 33 vertebrae arranged in five regions: 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal. The vertebrae gradually become larger as the vertebral column descends to the sacrum and then become progressively smaller toward the apex of the coccyx.

The clavicle (collar bone) connects the upper limb to the trunk. The shaft of the clavicle has a double curve in a horizontal plane. Its medial half articulates with the manubrium of the sternum. Its lateral half articulates with the scapula.

The scapula (shoulder blade) is a triangular flat bone that lies on the posterolateral aspect of the thorax. The scapula has an articular surface; a glenoid cavity (G. socket) for the articulation with the head of the humerus.

The humerus (arm bone), the largest bone in the upper limb, articulates with the scapula at the glenohumeral joint and the radius and ulna at the elbow joint.

The two forearm bones serve together to form the second unit of an articulated mobile strut (the first unit being the humerus), with a mobile base formed by the shoulder, that positions the hand.

The wrist, or carpus, is composed of eight carpal bones (carpals) arranged in proximal and distal rows of four: The proximal surfaces of the distal row of carpals articulate with the proximal row of carpals, and their distal surfaces articulate with the metacarpals.

The skeleton of the lower limb (inferior appendicular skeleton) may be divided into two functional components: the pelvic girdle and the bones of the free lower limb. The pelvic girdle is a ring of bones that connects the vertebral column to the two femurs. The primary functions of the pelvic girdle are bearing and transfer of weight; secondary functions include protection and support of abdominopelvic viscera and housing and attachment for structures of the genital and urinary systems. In the mature individual, the pelvic girdle is formed by three bones: Right and left hip bones (coxal bones; pelvic bones), sacrum. The tibia and fibula are the bones of the leg. The tibia articulates with the condyles of the femur superiorly and the talus inferiorly and in so doing transmits the body's weight. The fibula mainly functions as an attachment for muscles, but it is also important for the stability of the ankle joint.

The patella (knee cap) is the largest sesamoid bone in the body and is embedded in the quadriceps femoris tendon. The bones of the foot include the tarsus, metatarsus, and phalanges.

There are:

- 7 tarsal bones
- 5 metatarsal bones
- 14 phalanges

As you know from the previous lecture; the human skeleton is divided into two parts.

The axial skeleton has 80 bones. It is mainly the skeleton of our trunk. It starts with the skull (in Latin "cranium). We then have the vertebral column (spine; columna vertebralis; omurga). There are 22 bones in the skull. There are 33 vertebrae in the vertebral column. The five vertebrae of the sacrum fuse, as well as those four of the coccyx. Then we have two bones named as sacrum and coccyx. Therefore; we have 24 functional vertebrae; 1 sacrum and 1 coccyx. We have two sets of ear ossicles (little bones) named as uncus, stapes and malleus. Do not forget the thoracic cage! 24 ribs (12 on each side) and sternum in the middle. 12 thoracic vertebrae are the posterior components of the thoracic cage! But we have counted them within the vertebral column!

We also have one bone between the chin and larynx. This bone is called hyoid bone. It is important in swallowing.

Here is the list of bones of the axial skeleton

Cranium (Skull).....	22 bones
Vertebral column (Spine)	26 bones but 33 vertebrae (24 functional vertebrae; 1 sacrum and 1 coccyx: 26)
Ribs (Costae) and Sternum	25 bones
Hyoid bone	1 bone
Ear ossicles	6 bones (3x2)

TOTAL 80 BONES @ THE AXIAL SKELETON

What about the appendicular skeleton? The two limbs attached to our trunk. The upper limb has 64 bones, and the lower limb has 62 bones. The total number of bones of the appendicular skeleton is 126.

The arm has one bone (humerus), as well as the thigh (femur). Do not forget! Arm is between shoulder and elbow joint. The forearm is between the elbow and wrist joints. The forearm has two bones. Ulna lies medially, and radius lies laterally. The leg is the part of the lower limb under the knee. It also has two bones. Tibia lies anteromedially. Fibula is the bone on the lateral side.

Each finger /toe is made by phalanges. The first finger (thumb or big toe) has two phalanges, the other four has three.

The list of the bones of the upper limb

Scapula.....	2 bones (1x2)
Clavicle.....	2 bones (1x2)
Humerus.....	2 bones (1x2)
Ulna.....	2 bones (1x2)
Radius.....	2 bones (1x2)
Bones of the hand.....	54 bones (27x2) (4 carpal bones in two rows: <u>8 carpal bones, 5 metacarpal bones; 14 phalanges</u>)
TOTAL	64 BONES

The list of the bones of the lower limb

Hip (Pelvic bone; os coxae).....	2 bones (1x2)
Femur.....	2 bones (1x2)
Tibia.....	2 bones (1x2)
Fibul.....	2 bones (1x2)
Patella.....	2 bones (1x2)
Bones of the foot.....	52 bones (26x2) (<u>7 tarsal bones, 5 metatarsal bones; 14 phalanges</u>)
TOTAL	62 BONES

TOTAL OF 126 BONES @ THE APPENDICULAR SKELETON



A TOTAL OF 206 BONES IN THE BODY

1. AXIAL SKELETON

1.1. SKULL [CRANIUM]

The skull has 22 bones, excluding the ossicles of the ear. The mandible forms the lower jaw. Except for the bones of the skull are attached to each other by sutures. They are immobile. The only bone that moves in the skull is the mandible.

The [skull](#) is supported on the summit of the vertebral column. It has an oval shape. The skull is wider behind than in front. It is composed of a series of flattened or irregular bones. The skull means “cranium” in Latin. The cranium is divided into two parts.

(1) Neurocranium lodges and protects the brain. It has 8 bones.

(2) The skeleton of the face has 14 bones. The skeleton of the face is also called viscerocranium or splanchnocranium. Why? Both viscerum and splanchnium mean “organ”. The face has a series of organs like eyes, nose, mouth etc. That is why we call the facial skeleton as viscerocranium.

So the skull has 22 bones totally.

1.1.1. NEUROCRANIUM

The frontal bone, sphenoid and occipital bones and the ethmoid bone are single bones. The bones on the sides of the neurocranium; the parietal bones and temporal bones are paired bones. The neurocranium has two parts; the cap; superior part “calvaria” and basicranium (base of the neurocranium).

2.1.1. Frontal Bone: is at the front of the skull. It forms the skeleton of the forehead. It enters into the formation of the roofs of the orbital and nasal cavities. The frontal bone has three parts. 1. Squamous part 2. Orbital part 3. Nasal part. It is the squamous part forming the skeleton of the forehead.

2.1.2. Parietal Bones: form, by their union, the sides and roof of the cranium. Each bone is irregularly quadrilateral in form. The external surface is convex, smooth.

2.1.3. Sphenoid Bone: is at the base of the skull in front of the temporals and basilar part of the occipital. It resembles a bat with its wings extended. It is divided into a median portion or body, and two great and two small wings extending outward from the sides of the body. Two processes project from it below. It supplies the bed for the pituitary gland (Sella turcica; Turkish saddle).

2.1.4. Temporal Bones: are at the sides and base of the skull. The temporal bone consists of the pathway to the inner ear. It contributes to the formation of the jaw with the mandible. The temporal bone 3 parts:

1. Squamous part
2. Tympanic part
3. Petromastoid part

2.1.5. Ethmoid bone: is exceedingly light and spongy. It is cubical in shape. It is at the anterior part of the base of the cranium, between the two orbits, at the roof of the nose. It contributes to each of these cavities. The olfactory nerve fibers pass through this bone.

2.1.6. Occipital bone: is at the back and lower part of the cranium. It is trapezoid in shape. It is curved on itself. It is pierced by a large oval aperture. This opening (hole) is called foramen magnum. Through foramen magnum the cranial cavity communicates with the vertebral canal. 4 parts of the occipital bone arranged around the foramen magnum: 1. Squama 2. Basilar part 3.4. Lateral (condylar) portions

1.1.2. CRANIAL FOSSAE

2.2.1. Anterior cranial fossa: The inferior and anterior parts of the frontal lobes of the brain occupy the anterior cranial fossa, the shallowest of the three cranial fossae.

2.2.2. Middle cranial fossa: The butterfly-shaped middle cranial fossa has a central part composed of the sella turcica on the body of the sphenoid and large, depressed lateral parts on each side.

2.2.3. Posterior cranial fossa: The posterior cranial fossa is the largest and deepest of the three cranial fossae. The posterior cranial fossa is formed mostly by the occipital bone.

1.2. FACIAL BONES

The viscerocranium has 14 bones. Only the mandible and vomer are single bones. The remaining 6 bones are paired bones.

1. The Nasal Bones: are two small oblong bones, varying in size and form in different individuals; they are placed side by side at the middle and upper part of the face, and form, by their junction, “the bridge” of the nose.

2. The Maxillæ (Upper Jaw): are the largest bones of the face, excepting the mandible, and form, by their union, the whole of the upper jaw. Each assists in forming the boundaries of three cavities, viz., the roof of the mouth, the floor and lateral wall of the nose and the floor of the orbit.

3. The Lacrimal Bone: the smallest and most fragile bone of the face, is situated at the front part of the medial wall of the orbit.

4. The Zygomatic Bone (Malar Bone): is small and quadrangular, and is situated at the upper and lateral part of the face: it forms the prominence of the cheek, part of the lateral wall and floor of the orbit. The zygomatic arch is formed by the zygomatic process of the temporal bone and the temporal process of the zygomatic bone.

5. The Palatine Bone: is situated at the back part of the nasal cavity. It contributes to the walls of three cavities: the floor and lateral wall of the nasal cavity, the roof of the mouth, and the floor of the orbit.

6. The Inferior Nasal Concha (Concha Nasalis Inferior; Inferior Turbinate Bone): extends horizontally along the lateral wall of the nasal cavity.

7. The Vomer: is situated in the median plane, but its anterior portion is frequently bent to one or other side. It is thin, somewhat quadrilateral in shape, and forms the hinder and lower part of the nasal septum.

8. The Mandible (Lower Jaw): the largest and strongest bone of the face, serves for the reception of the lower teeth.

1.2. THORACIC CAGE

The [thoracic cage](#) (skeleton) is formed by the sternum and costal cartilages anteriorly, ribs laterally, and thoracic vertebrae posteriorly.

1.2. 1. Ribs

Ribs (L. costae) are curved, flat bones. The ribs form most of the thoracic cage. Costal cartilages prolong the ribs anteriorly. They contribute to the elasticity of the thoracic wall. The costal cartilages provide a flexible attachment for their anterior ends. The first 7 costal cartilages attach directly and independently to the sternum. The 8th, 9th, and 10th articulate with the costal cartilages just superior to them. The costal cartilages of these 3 ribs form a continuous, articulated, cartilaginous **costal margin**. The 11th and 12th costal cartilages form caps on the anterior ends of the corresponding ribs. They do not reach or attach to any other bone or cartilage.

Intercostal spaces separate the ribs and their costal cartilages from one another. The spaces are named according to the rib forming the superior border of the space—for example, the 4th intercostal space lies between ribs 4 and 5. There are 11 intercostal spaces and 11 intercostal nerves. Intercostal spaces are occupied by intercostal muscles and membranes, and two sets (main and collateral) of intercostal blood vessels and nerves, identified by the same number assigned to the space.

True (vertebrocostal) ribs (1st-7th ribs): They attach directly to the sternum through their own costal cartilages.

False (vertebrochondral) ribs (8th, 9th, and usually 10th ribs): Their cartilages are connected to the cartilage of the rib above them; thus their connection with the sternum is indirect.

Floating (vertebral, free) ribs (11th, 12th, and sometimes 10th ribs): The rudimentary cartilages of these ribs do not connect even indirectly with the sternum; instead they end in the posterior abdominal musculature.

Parts of a typical rib

Head: wedge-shaped and has one facet for articulation with the numerically corresponding vertebra and one facet for the vertebra superior to it.

Neck: connects the head of the rib with the body at the level of the tubercle.

Tubercle: located at the junction of the neck and body; articulates with the corresponding transverse process of the vertebra.

Body (shaft): thin, flat, and curved, is most markedly at the **costal angle** where the rib turns anterolaterally. The inferior margin of the internal surface is marked by a distinct **costal groove**, which provides some protection for the intercostal nerve and vessels.

1.2.2. Sternum

The sternum (G. sternon, chest) is the long, flat bone. It forms the middle of the anterior part of the thoracic cage. It directly overlies and affords protection for mediastinal viscera in general and much of the heart in particular. The sternum is commonly known as the breastbone.

The sternum is divided into three parts:

- ✗ Manubrium = Upper part. It means "handle"
- ✗ Body
- ✗ Xiphoid process "swordfish like projection"

The sternum has the costal facets (places for articulation) for the first seven ribs.

1.3. VERTEBRAL COLUMN [SPINE]

The vertebral column is flexible as it consists of many relatively small bones. These small bones are called vertebrae (singular = vertebra). The vertebrae are separated by resilient intervertebral discs. The **vertebral column** in an adult typically consists of 33 vertebrae. They are arranged in five regions. Regions and number of vertebrae in each region: 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal. The vertebrae gradually become larger as the vertebral column descends to the sacrum. Then they become progressively smaller toward the apex of the coccyx. The change in size reflects the amount of body's weight one vertebra is carrying as the column descends. The vertebrae reach maximum size immediately superior to the sacrum. From that point, the weight is transferred to the pelvic girdle at the sacroiliac joints.

Vertebrae vary in size and other characteristics from one region to another. They also change to a lesser degree within each region. The basic structure of a vertebra, however, is the same.

A typical vertebra consists of a vertebral body, a vertebral arch, and seven processes.

Seven processes arise from the vertebral arch of a typical vertebra: one median spinous process, two transverse processes and four articular processes. The spinous process of the seventh cervical vertebra is prominent, that is why we call the seventh cervical vertebra as "vertebra prominens" prominent vertebra.

The vertebral body is the more massive, roughly cylindrical, anterior part of the bone. It gives strength to the vertebral column. It also supports body weight. The size of the vertebral bodies increases as the column descends as each bears progressively greater body weight.

The vertebral arch is posterior to the vertebral body. The vertebral arch and the posterior surface of the vertebral body form the walls of the vertebral foramen. The succession of vertebral foramina in the articulated vertebral column forms the vertebral canal (spinal canal), which contains the spinal cord and the roots of the spinal nerves that emerge from it.

- 7 cervical vertebrae between the thorax and skull characterized mainly by their small size and the presence of a foramen in each transverse process, bifid spinous process, except C7.
- 12 thoracic vertebrae characterized by their articulated ribs, spinous processes projecting inferiorly.
- 5 lumbar vertebrae are inferior to the thoracic vertebrae. They form the skeletal support for the posterior abdominal wall. The lumbar vertebrae are characterized by their large size, small processes spinosus. These processes project posteriorly.
- 5 sacral vertebrae fused into one single bone called the sacrum. It articulates on each side with a pelvic bone. It is a component of the pelvic wall.
- Inferior to the sacrum is a variable number, usually four, of coccygeal vertebrae, which fuse into a single small triangular bone called the coccyx.

Normally the vertebral column has curvatures; cervical lordosis, thoracic kyphosis, and lumbar lordosis. Enlarged curvatures or decreases in these curvatures are related to pathologies. Kyphosis is abnormal curvature of the vertebral column in the thoracic region, producing a "hunchback" deformity. Lordosis is abnormal curvature of the vertebral column in the lumbar region, producing a swayback deformity.

2. APPENDICULAR SKELETON

2.1. BONES OF THE UPPER LIMB & SHOULDER GIRDLE

Bones of the upper limb

2.1.1. CLAVICLE (TR. KÖPRÜCÜK KEMİĞİ)

The **clavicle** (collar bone) connects the upper limb to the trunk. The clavicle is the only bony attachment between the trunk and the upper limb. It is palpable along its entire length. It has a gentle S-shaped contour, with the forward-facing convex part medial and the forward-facing concave part lateral. These curvatures increase the resilience of the clavicle.

The shaft of the clavicle has a double curve in a horizontal plane. Its medial half articulates with the manubrium of the sternum. Its lateral half articulates with the scapula. The clavicle is the first bone in the body where the ossification starts. It is also the last bone to get ossified. The clavicle:

- increases the range of motion of the limb.
- affords protection to the neurovascular bundle supplying the upper limb.
- transmits shocks (traumatic impacts) from the upper limb to the axial skeleton.

2.1.2. SCAPULA (TR. KÜREK KEMİĞİ)

The **scapula** (shoulder blade) is a triangular flat bone that lies on the posterolateral aspect of the thorax. It lies over the 2nd to 7th ribs.

The scapula is a large, flat triangular bone with:

- three angles (lateral, superior, and inferior) ,
- three borders (superior, lateral. and medial) ,
- two surfaces (costal and posterior) , and
- three processes (acromion, spine, and coracoid process)

You can feel the spine of scapula on the posterior surface under your skin. The line between the two spines of scapula is called interspinal line. It is at the level of the fourth thoracic vertebra. It is important clinically. You can listen to the sound of superior lobe of the lung above this line, and inferior lobe of the lung below this line. The lateral part of the spine is called acromion. Acromion means “top of the shoulder”. There is also another process. It is called coracoid process. The scapula has an articular surface. It is called the glenoid cavity (G. socket). The head of the humerus articulates with scapula at the glenoid cavity.

The scapula and clavicle along with manubrium of sternum form the shoulder girdle. The shoulder girdle is also known as pectoral girdle.

2.1.3. HUMERUS

The humerus (arm bone), the largest bone in the upper limb, articulates with the scapula at the glenohumeral joint and the radius and ulna at the elbow joint.

Just like all the long bones, humerus has two ends and a body. The proximal end of the humerus has a head, surgical and anatomical necks, and greater and lesser tubercles. The intertubercular sulcus (bicipital groove) is between the greater and lesser tubercles. The greater tubercle lies laterally. The lesser tubercle is medial to the greater tubercle at an anterior position.

The spherical head of the humerus articulates with the glenoid cavity of the scapula. The surgical neck of the humerus is a common site of fracture. It is the narrow part distal to the head and tubercles. It is oriented in the horizontal plane between the expanded proximal part of the humerus (head, anatomical neck, and tubercles) and the narrower shaft. Medial and lateral epicondyles are at the distal end. These bony projections are site of attachments for muscles of the forearm. The capitulum articulates with the radius. The trochlea articulates with ulna. Radial fossa is superior to capitulum. The head of radius enters here during extension of the elbow joint.

Coronoid fossa is for the proximal part of ulna. Olecranon fossa is on the posterior surface of the distal end. Olecranon enters here during the flexion of the elbow joint.

2.1.4. ULNA & RADIUS

The two forearm bones serve together to form the second unit of an articulated mobile strut (the first unit being the humerus), with a mobile base formed by the shoulder, that positions the hand. Ulna and radius have the interosseus membrane in between.

The **ulna** is the stabilizing bone of the forearm and is the medial and longer of the two forearm bones. Its more massive proximal end is specialized for articulation with the humerus proximally and the head of the radius laterally. The olecranon forms the swelling of the elbow joint. Ulna has styloid process distally. The head of ulna is at the inferior end of the bone. But the head of radius is at the proximal (superior) end of the bone.

The **radius** is the lateral and shorter of the two forearm bones. Proximally, the head of the radius is concave for articulation with the humerus during flexion and extension of the elbow joint. The head also articulates with the ulna. The shaft of the radius, in contrast to that of the ulna, gradually enlarges as it passes distally. The distal end accommodates the head of the ulna. Its lateral aspect becomes increasingly ridge-like, terminating distally in the radial **styloid process**.

2.1.5. BONES OF THE HAND

The wrist, or carpus, is composed of eight carpal bones (carpals) arranged in proximal and distal rows of four: The proximal surfaces of the distal row of carpals articulate with the proximal row of carpals, and their distal surfaces articulate with the metacarpals.

The **metacarpus** forms the skeleton of the palm of the hand between the carpus and the phalanges. It is composed of five metacarpal bones (metacarpals). The proximal bases of the metacarpals articulate with the carpal bones, and the distal heads of the metacarpals articulate with the proximal phalanges and form the knuckles. Each digit has three phalanges except for the first (the thumb), which has only two.

2.2. BONES OF THE LOWER LIMB & PELVIC GIRDLE

The skeleton of the lower limb (inferior appendicular skeleton) is formed by pelvis and the bones of the free lower limb. [The skeleton of the] Pelvis (Leğen kemiği) is formed by the right hip bone; left hip bone; sacrum and The pelvic girdle is rather a functional term. The pelvic girdle is a ring of bones. This ring connects the vertebral column to the two femora. Its primary function is bearing and transferring of weight. Its secondary functions include protection and support of abdominopelvic viscera and housing and attachment for structures of the genital and urinary systems. In the mature individual, the pelvic girdle is formed by three bones: Right and left hip bones (coxal bones; pelvic bones), sacrum. [Bones of the lower limb](#) As you see; coccyx is not a part of the pelvic girdle, but the skeleton of the pelvis.

2.2.1. HIP BONE

The mature hip bone (L. os coxae) is the large, flat pelvic bone. The hip bone is formed by the fusion of three primary bones. These bones are ilium, ischium, and pubis. Around the age of 14-16 these three bones fuse and form the hip (pelvic) bone. The **acetabulum** (L., shallow vinegar cup) is the large cup shaped cavity or socket on the lateral aspect of the hip bone. It articulates with the head of the femur to form the hip joint. All three primary bones forming the hip bone contribute to the formation of the acetabulum.

2.2.2. SACRUM

The sacrum (L. sacred) is a wedged-shaped bone. It is usually composed of 5 fused sacral vertebrae in adults. It is located between the hip bones. The sacrum forms the roof and posterosuperior wall of the posterior half of the pelvic cavity. The sacral canal is the continuation of the vertebral canal in the sacrum.

2.2.3. COCCYX

The **coccyx** (tail bone) is a small triangular bone. It is usually formed by fusion of the four rudimentary coccygeal vertebrae. The coccyx is the remnant of the skeleton of the embryonic tail. The coccyx does not participate with the other vertebrae in support of the body weight when standing. It, however, when sitting may

flex anteriorly somewhat, indicating that it is receiving some weight. The coccyx provides attachments for muscles.

2.2.4. FEMUR

The femur is the longest and heaviest bone in the body. It transmits body weight from the hip bone to the tibia when a person is standing. The femur consists of a shaft (body) and two ends, superior or proximal and inferior or distal. The head of the femur is spherical. It articulates with the acetabulum of the pelvic bone. The neck of the femur is a cylindrical. It connects the head to the shaft (body) of the femur. It projects superomedially from the shaft at an angle of approximately 125°. It projects slightly forward. The orientation of the neck relative to the shaft increases the range of movement of the hip joint.

The upper part of the shaft of the femur bears a greater and lesser trochanter. They are the attachment sites for muscles that move the hip joint. The shaft of the femur descends from lateral to medial in the coronal plane with a slight inclination from the vertical axis. The distal end of the femur is therefore closer to the midline than the upper end of the shaft. The gluteus maximus muscle is attached to the gluteal tuberosity. The gluteal tuberosity is at the proximal end of femur on the posterior surface.

The distal end of femur has medial and lateral condyles. The projections above them are medial and lateral epicondyles. They are the attachment sites for the muscles of the leg. The anterior cavity for the condyles is called patellar surface (for patella). The posterior cavity is called intercondylar fossa. The distal end of femur is slightly rotated medially by nature.

2.2.5. TIBIA & FIBULA & PATELLA

The tibia and fibula are the bones of the leg. The tibia articulates with the condyles of the femur superiorly and the talus inferiorly. This way, it transmits the body's weight. The fibula mainly functions as an attachment for muscles. It is also important for the stability of the ankle joint.

The **tibia** (shin bone) is on the anteromedial side of the leg. It is nearly parallel to the fibula. The tibia is the second largest bone in the body. It provides an increased area for articulation and weight transfer. The anterior border of the tibia is the most prominent border. The anterior border and the adjacent medial surface are subcutaneous. That is why the bone is commonly known as the "shin". The periosteal covering and overlying skin are vulnerable to bruising.

The inferior surface of the shaft and the lateral surface of the **medial malleolus** articulate with the talus. The interosseous border of the tibia is sharp. It gives attachment to the interosseous membrane. This membrane unites the two leg bones. Inferiorly, the tibia articulates with the distal end of the fibula.

The **fibula** is a slender bone. It is posterolateral to the tibia. The interosseous membrane is between tibia and fibula. It is a connection between these two bones. The fibula has no function in weight-bearing. It serves mainly for muscle attachment. The distal end enlarges. This enlargement becomes the **lateral malleolus**. The proximal end of the fibula consists of an enlarged head superior to a small neck. The head has a pointed apex. The **patella (knee cap)** is the largest sesamoid bone. It is embedded in the quadriceps femoris tendon.

2.2.6. BONES OF THE FOOT

The bones of the foot include the tarsus, metatarsus, and phalanges.

There are:

- 7 tarsal bones (calcaneus, talus, navicular bone, the three cuneiforme bones –medial, intermediate, lateral and cuboid bone)
- 5 metatarsal bones
- 14 phalanges

The calcaneus (L., heel bone) is the largest and strongest bone in the foot. When standing, the calcaneus transmits the majority of the body's weight from the talus to the ground. The metatarsus (anterior or distal foot, forefoot—) consists of five metatarsals that are numbered from the medial side of the foot. The 14 phalanges are as follows: the 1st digit (great toe) has 2 phalanges (proximal and distal); the other four digits have 3 phalanges each: proximal, middle, and distal.