

Puspa Shrestha

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OF	REMARKS
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PARTICULARS OF THE EXPERIMENTS PERFORMED

S.No.	NAME OF EXPERIMENT	PAGE	DATE OF EXPERIMENT	DATE OF SUBMISSION	REMARKS
1.	TO STUDY TISSUES AND DIVERSITY IN SHAPES AND SIZE OF ANIMAL CELLS		2078-07-12	2078-08-03	X
2.	TO STUDY EMBRYOLOGICAL SLIDES OF FROG		2078-08-10	2078-08-17	X
3.	TO DISSECT RAT SO AS TO EXPOSE ITS 1) Alimentary canal 2) General Anatomy 3) Male reproductive system 4) Female reproductive system 5) Brain		2078-08-17	2078-09-09	X
4.	TO STUDY HUMAN BONES		2078-12-23	2079-01-09	

EXPERIMENT NO: 1

NAME OF EXPERIMENT: TO STUDY TISSUES AND DIVERSITY IN SHAPES AND SIZE OF ANIMAL CELLS

COMMENTS ON SIMPLE SQUAMOUS EPITHELIUM

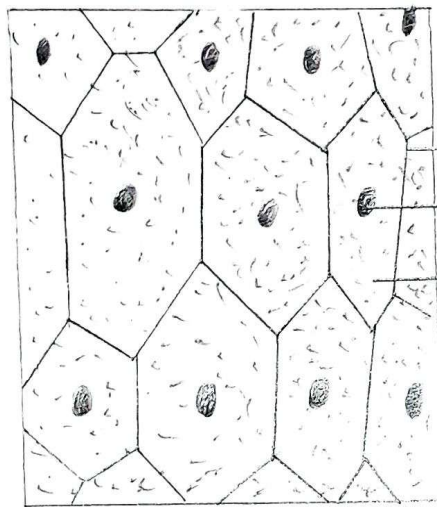
1. It is a single layered membrane composed of thin flat, hexagonal cells.
2. The cells are filled with granular cytoplasm and centrally placed large spherical nucleus.
3. All the cells are lightly fitted together by their edges as the tiles on the mosaic floor, so also known as pavement epithelium.
4. It is found on the lining at skin layer, cavity, blood vessels and inner lining of ducts.
5. It helps in protection, absorption, filtration and exchange of gases.

COMMENTS ON SIMPLE CUBOIDAL EPITHELIUM

1. It is made by cube like cells. The name simple cuboidal is derived from its square or cuboidal shape. The surface area of cells are roughly irregular and hexagonal.
2. Cells are filled with granular cytoplasm and centrally located large prominent spherical nucleus.

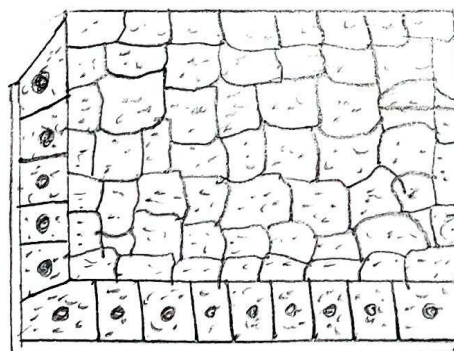
TO STUDY TISSUES AND DIVERSITY IN SHAPES AND SIZE OF ANIMAL CELLS

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Cell membrane
Nucleus
Cytoplasm

fig. Simple Squamous Epithelium



Cell membrane
Cytoplasm
Basement membrane

fig. Simple cuboidal epithelium

3. The tissue lie on the basement membrane living on kidney tubules, salivary glands gut lining, pancreatic ducts, urinate tubules and reproductive glands.
4. The cuboidal epithelium helps in secretion, absorption and excretion.

COMMENTS ON ADIPOSE TISSUE

1. It is a modified areolar tissue formed for accumulation of fat so the cells are known as Adipocytes. When Adipocytes store large, single fat droplet and brown Adipocytes stores many small fat droplets.
2. The fat cells are large round with number of fat droplets which later fuse to form a large fat globule. Each cell bears a thin peripheral ring like layer of cytoplasm enclosing a nucleus at one side.
3. They are loose network of fibre which support the large fat laden cells.
4. They are confined below the skin, heart, blood vessels, bone marrow and eye orbit.

COMMENTS ON HYALINE CARTILAGE

1. It is a skeletal tissue. It is strong, flexible and elastic in nature. It is composed of homogeneous, translucent bluish semi-solid bearing many small

proteins called chondrins. The chondrins are embedded in delicate collagen fibres.

2. It is confined at trachea; larynx, connection between ribs and breasts bones.
3. It helps to connect bodily organs, protects the delicate vital organs from injuries.
4. The matrix encloses numerous single or small groups of cartilage cells called chondrocytes. The cells are surrounded by a fluid filled space called lacunae.

COMMENTS ON SIMPLE COLUMNAR EPITHELIUM

1. It is composed of many tall column or pillar like cells each placed side by side. They are taller than wide and stand on basement membrane.
2. Cells contain an oblong-nucleus embedded in granular cytoplasm towards base at different level.
3. It forms the lining of gut, gall bladder, stomach, intestine, ureter and uterine wall, some cells may specialize for sensory reception to be found in nose, ears and tongue.
4. It helps in protection, secretion, absorption and excretion.

COMMENTS ON AREOLAR CONNECTIVE TISSUE

1. It is composed of Jelly like matrix. It enclose mesh of fine fibre, fixed cells and wandering cells.

TO STUDY TISSUES AND DIVERSITY IN SHAPES AND SIZE OF ANIMAL CELLS

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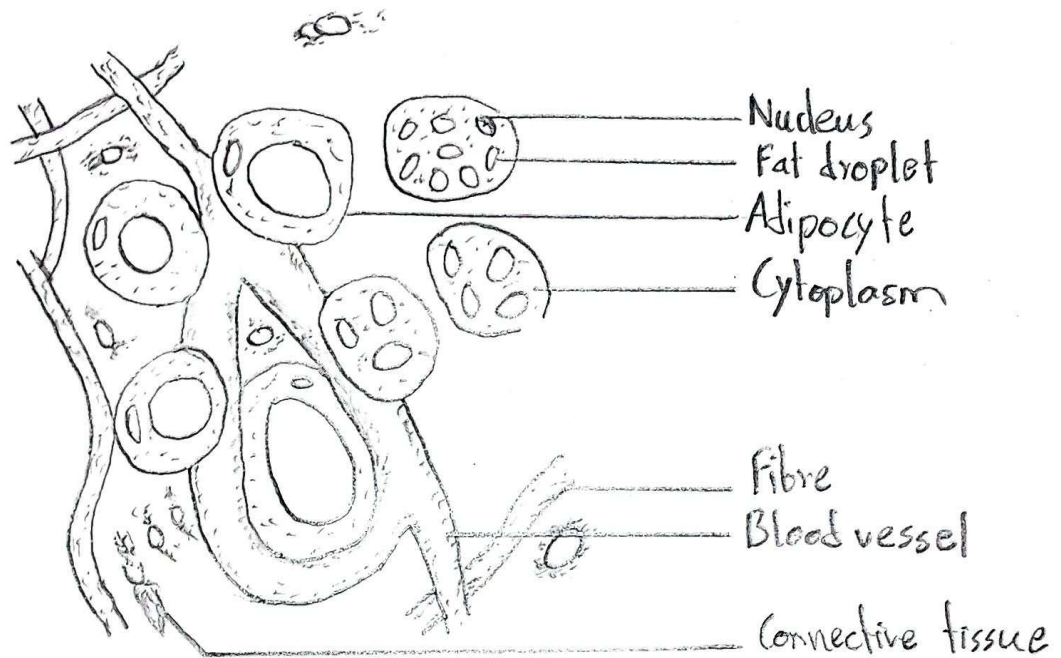


fig. Adipose Tissue

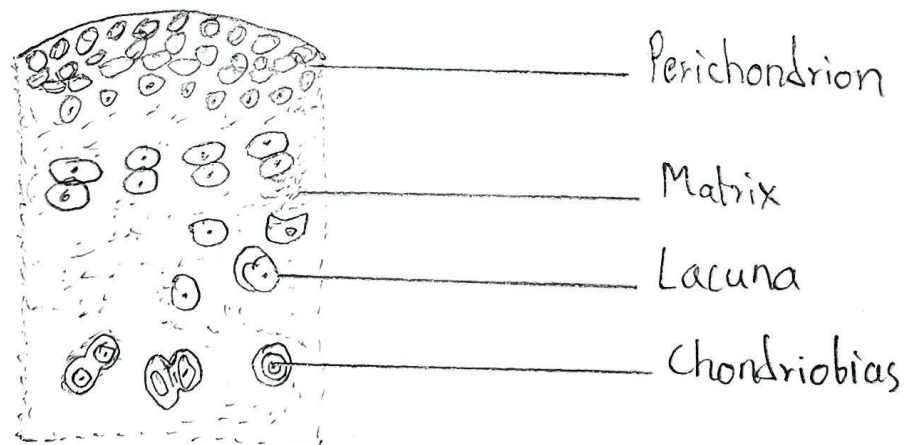


fig. Hyaline Cartilage

2. Fibres are of two types namely white collagen and yellow elastic fibres. The collagen fibres are tough and not elastic while the elastic fibres are thin and elastic in nature.
3. Tissue contains five types of cells. They are:
 - i. Fibroblasts tissues are large flat cells forming white and yellow fibres.
 - ii. ~~Mac~~ Macrophages are irregular shapes phagocytic cells. They digest bacteria and foreign materials.
 - iii. Most cells are large amoeboid cells present in blood.
 - iv. Lymphocyte cells produce antibodies to destroy foreign matters.
4. The tissue occurs in between the visceral organs so known as packing tissue because they pack space between the organs.

TO STUDY TISSUES AND DIVERSITY IN SHAPES AND SIZE OF ANIMAL CELLS

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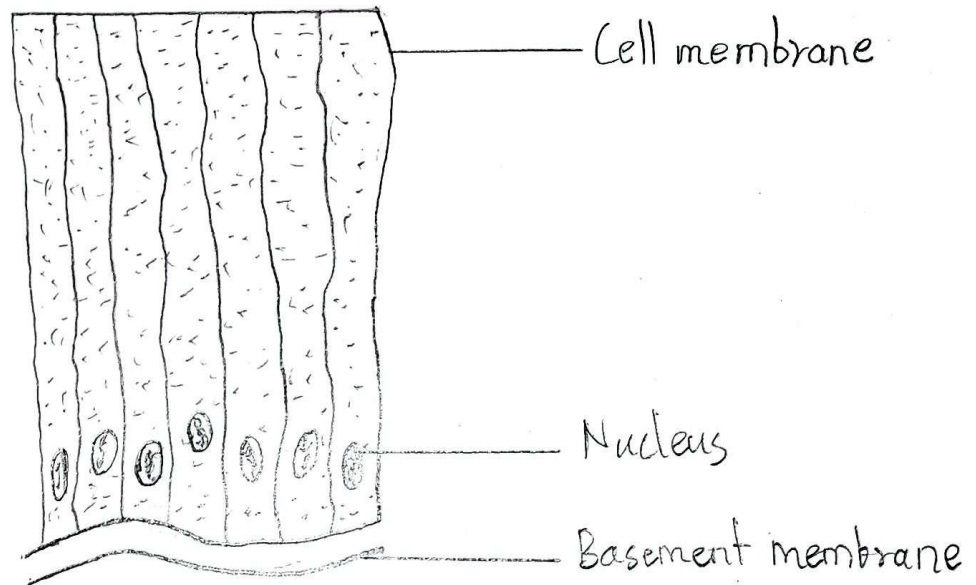


fig. Simple columnar epithelium

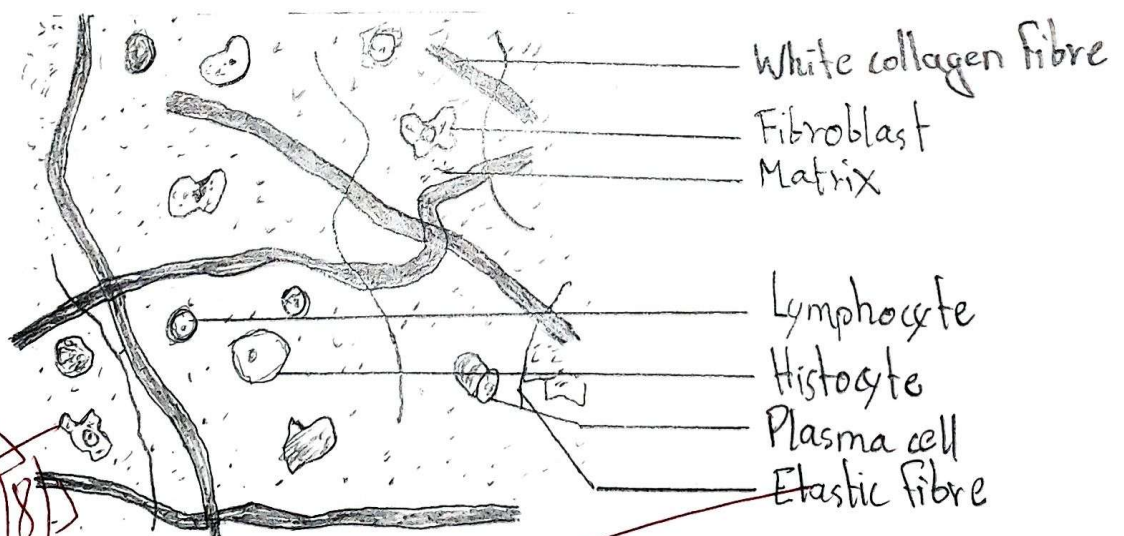


fig. Areolar Tissue

EXPERIMENT NO. 2

NAME OF EXPERIMENT: TO STUDY EMBRYOLOGICAL SLIDES OF FROG

Embryology is the study of different stages of development from zygote to adult form. It is also known as developmental biology.

a) Fertilized egg

1. The egg or ovum of frog is a special cell measuring about 1.5 mm diameter.
2. It is encircled by inner vitelline membrane and outer thick albumen membrane.
3. The upper half portion of egg is superficially pigmented with blackish brown colour and called animal pole or hemisphere. The animal pole contains a fertilized egg nucleus surrounded by cytoplasm.
4. The lower half portion of egg is occupied by white yolk and is called vegetal pole or hemisphere.
5. Between animal and vegetal poles, there is a gray crescent area which marks future dorsal side.

TO STUDY EMBRYOLOGICAL SLIDES OF FROG

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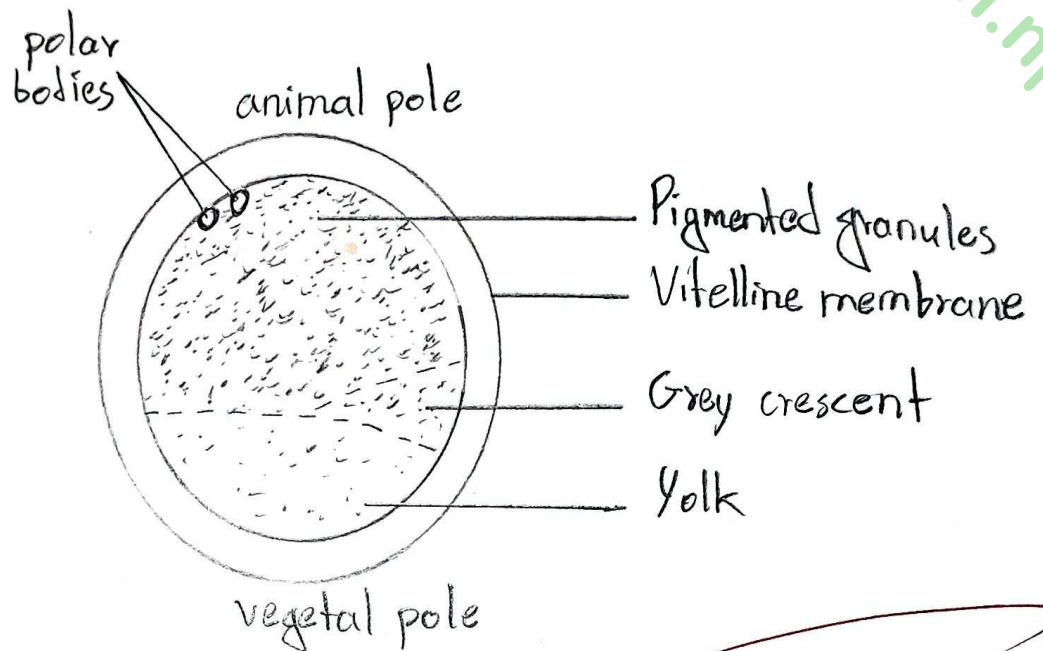


fig. Fertilized egg

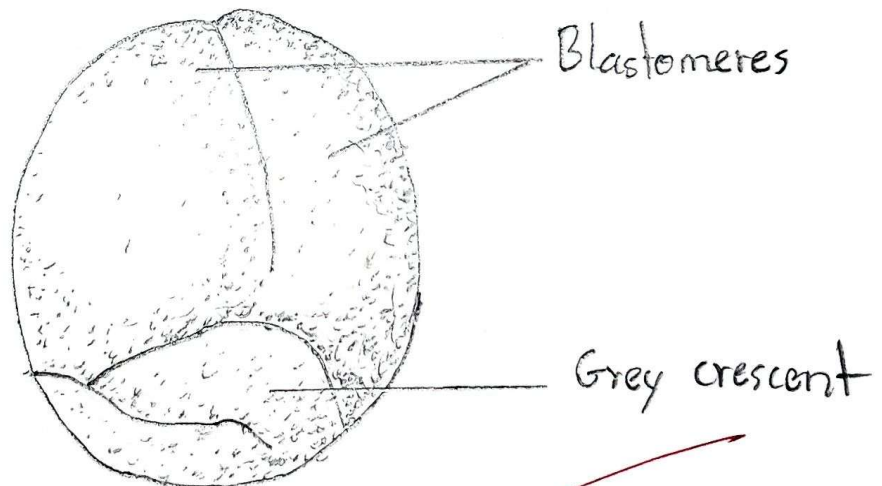


fig. Two-celled stage.

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20/8/17

b) Two-celled stage

1. The division and redivision of zygote is called cleavage or segmentation.
2. It is the first stage in cleavage process.
3. Cleavage is holoblastic and complete.
4. The first division is vertical.
5. It begins as a small depression at the animal pole and gradually extends to the vegetal pole.
6. This furrow divides the egg completely into two equal cells called blastomeres.

c) Four-celled stage

1. It is also called second cleavage.
2. It is holoblastic, complete and equal.
3. The division is vertical but at right angle to the first.
4. Finally four cells or blastomeres are formed which are of equal size.

d) Eight-celled stage

1. It is also called third cleavage.
2. It is holoblastic but unequal.
3. After second division the third division is horizontal passing just above the equatorial plane.

4. The division results 8 unequal blastomeres.
5. All together there form 8 cells among them upper four cells are smaller known as micromeres and the lower four cells are larger called megameres or macromeres.
6. Megameres lie at the vegetal pole and micromeres at animal pole.

e) Morula stage

1. This step is taken place by two vertical divisions which result 16 cells. The 4th step is followed by two horizontal divisions forming 32 cells.
2. Continuous divisions occur resulting 128 cells or blastomeres.
3. The megameres are the yolk-laden cells which multiply slower.
4. Micromeres are small and devoid of yolk, therefore, these multiply rapidly.
5. So many cells are arranged in such a way that they make a structure like a fruit of mulberry. Hence it is called morula.

f) V.S. of Blastula

1. The fertilized egg undergoes many divisions

TO STUDY EMBRYOLOGICAL SLIDES OF FROG

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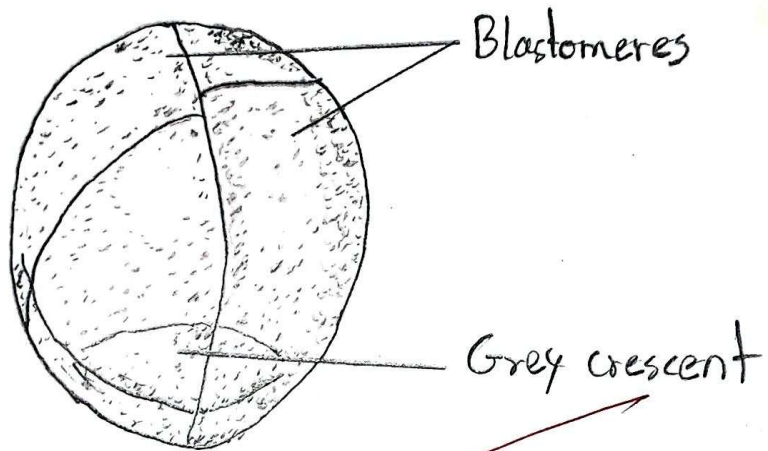


fig. Four celled stage

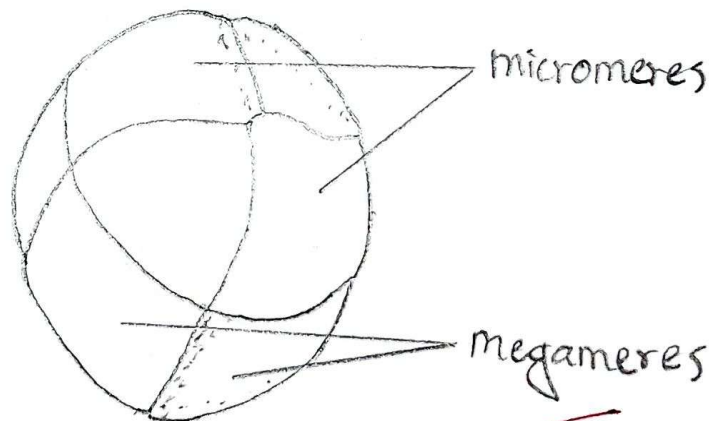


fig. Eight celled stage

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and blastula is formed.

2. It is characterized by the presence of a internal fluid filled cavity known as blastocoel.
3. The blastocoel is surrounded by blastomeres.
4. Blastomeres are distinguished into smaller micromeres and larger megameres.
5. On the upper side of blastocoel or at the animal pole micromeres are present.
6. Megameres are the larger yolk laden cells, which lie at the vegetal pole or lower side of blastocoel.
7. Blastula develops into gastrula.

8) V.S. of Gastrula

1. In gastrula stage, the single layered embryo develops into double layered.
2. It is characterized by the migration and re-arrangement of cells.
3. It includes three important changes occurring simultaneously epiboly, imboly and rotation of embryo.
4. Poorly developed germinal layers are seen.
5. An archenteron appears and blastocoel starts to be narrow.
6. The epidermis is well differentiated in the ventro-lateral portion towards the animal pole.

7. Beginning of formation of neural plate and notochord.
8. The area of endoderm is very well developed.
9. Thin mesoderm is also seen on ventral side towards posterior pole.

TO STUDY EMBRYOLOGICAL SLIDES OF FROG

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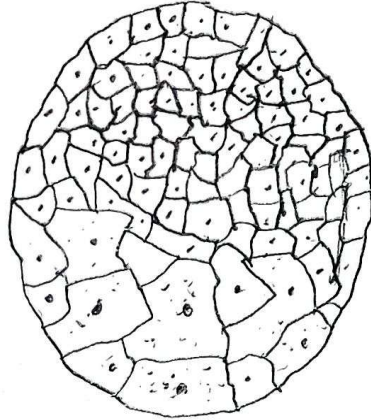


fig. Morula stage

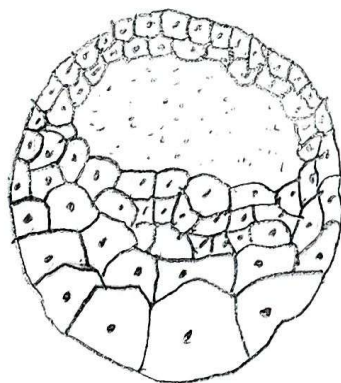


fig. V.S of Blastula

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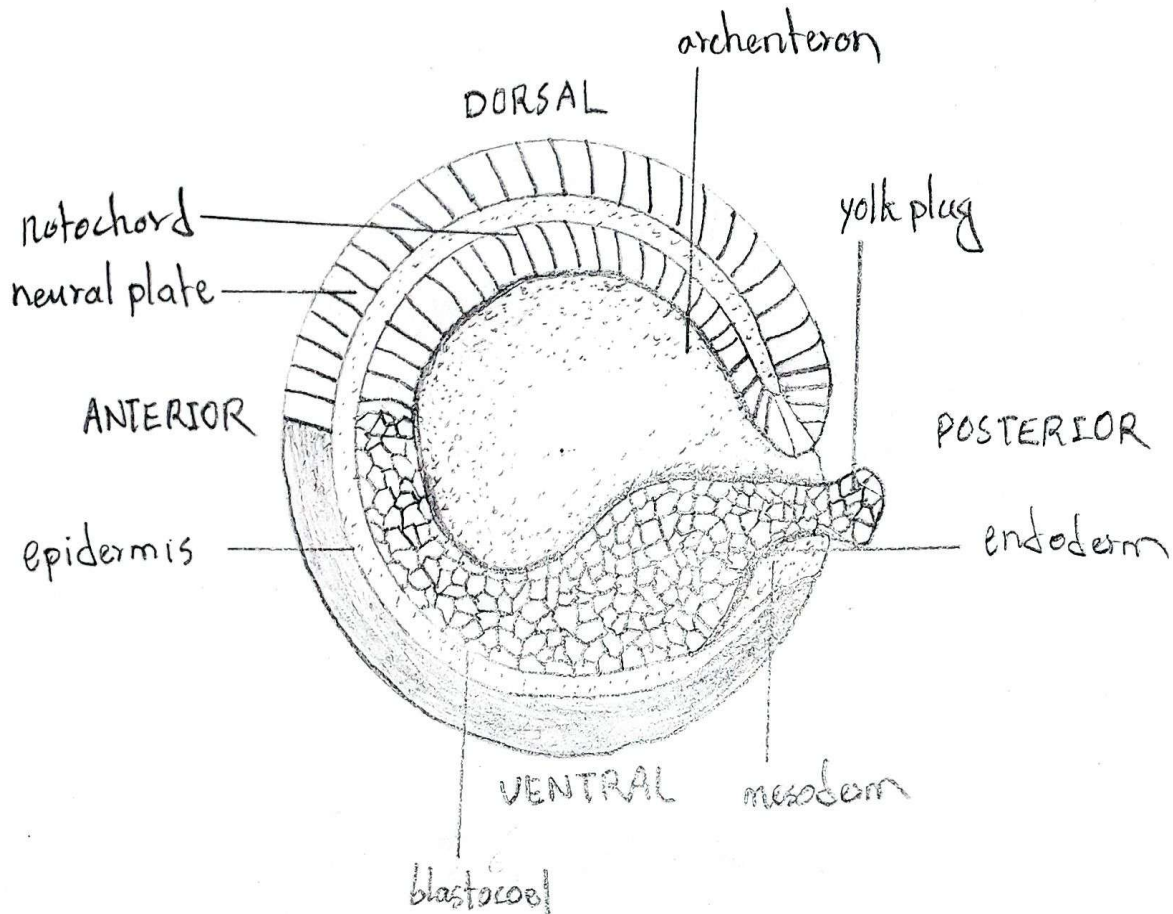


fig. V.S. of gastrula

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EXPERIMENT NO. 3

NAME OF EXPERIMENT: TO DISSECT RAT SO AS TO EXPOSE ITS

- 1) General Anatomy
- 2) Alimentary Canal
- 3) Male reproductive system
- 4) Female reproductive system
- 5) Brain

COMMENTS UPON ALIMENTARY CANAL

1. Mouth is a transverse opening bounded by soft and fleshy upper and lower lips. It leads to buccal cavity.
2. Buccal cavity is a wide cavity between mouth and pharynx and furnished with a thick muscular rough surfaced tongue on the lower floor and teeth on side jaws. The roof is formed by hard palate followed by soft palate which ends in a free flap called uvula.
3. Pharynx is a space between buccal cavity and oesophagus. It is divided into nasal and buccal part. The buccal part leads to oesophagus.
4. Oesophagus is a long narrow tube passing through neck and opening into stomach by piercing the diaphragm.
5. Stomach is a sac like structure lying immediately

TO DISSECT RAT SO AS TO EXPOSE ITS ALIMENTARY CANAL

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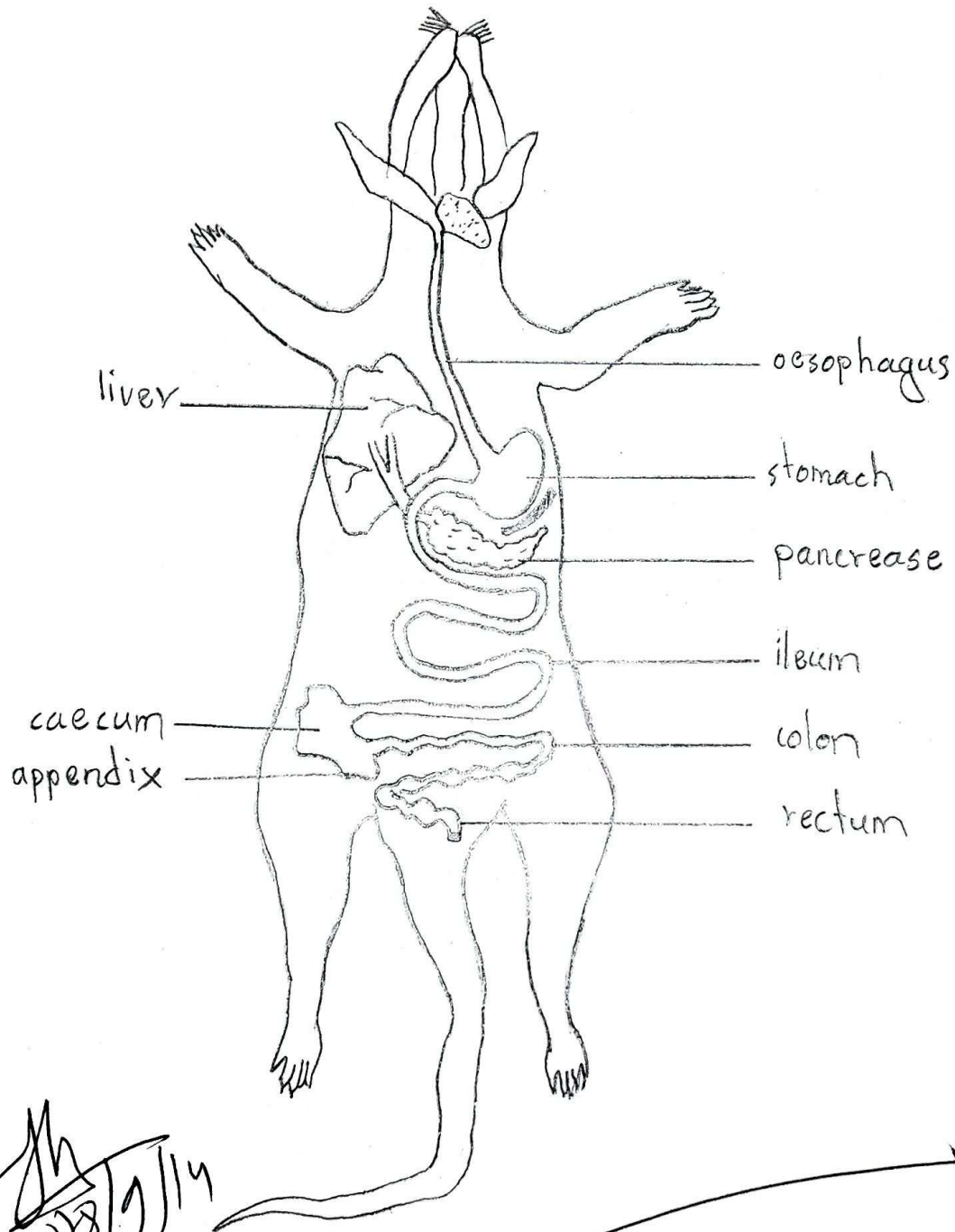


fig. Alimentary canal of rat

behind the diaphragm. It is divisible into cardiac, fundic and pyloric part.

6. Small intestine is a very long coiled organ proximally joined with stomach and distally with large intestine. It is divisible into duodenum and ileum.
7. Duodenum is a C shaped uncoiled part joining with small intestine.
8. Ileum is a long coiled part ending to a round sacculus rotundus of large intestine.
9. Large intestine is shorter than small intestine and divisible into caecum, colon and rectum.
10. Caecum is a thin walled sac like structure located at the junction between colon and rectum.
11. Colon is a wide tube showing a beaded appearance due to the bulges called haustra.
12. Rectum is a thin walled straight tube which opens to anus having sphincter muscles.
13. Liver is a large five lobed reddish brown gland located just behind the diaphragm. From each lobe runs out a hepatic duct.
14. Gall bladder is a small thin walled ~~situated~~ bladder situated at the depression of right central lobe. It gives out cystic duct which after uniting with hepatic duct forms common bile duct to open into duodenum.
15. Pancrease is an irregular membranous gland lying in the curvature of duodenum. It gives out pancreatic

duct which opens into the proximal end of duodenum.

16. Spleen is an enlarged reddish gland attached to the posterior side of stomach.

EXPERIMENT NO. 4

NAME OF EXPERIMENT: TO STUDY HUMAN BONES

COMMENTS ON SKULL

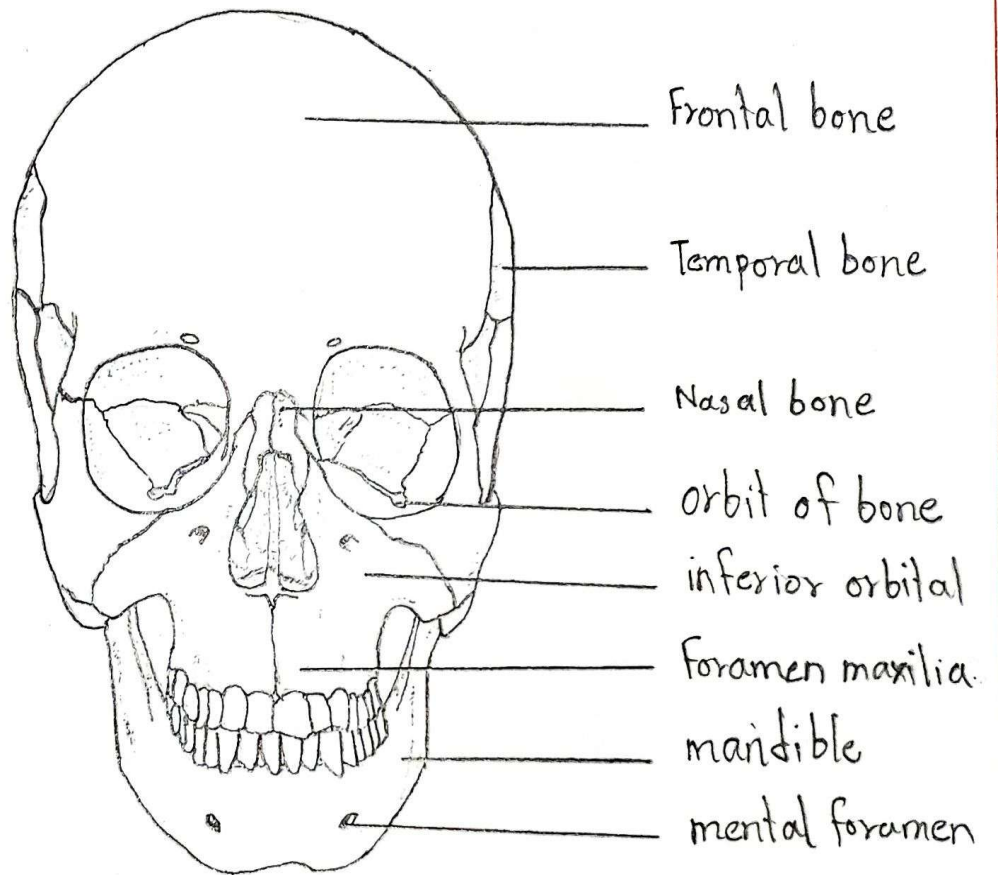
1. It is the bony structure present at the top of the vertebral column.
2. The skull consists of 8 cranial bones and 14 facial bones.
3. The 8 cranial bones include: 1 frontal bone, 2 parietal bones, 2 temporal bones, 1 occipital bone, 1 sphenoid bone and 1 ethmoid bone.
4. The cranial bones form the cranium cavity (brain case) that encloses and protects the brain, eyes, and ears.
5. The bones of the cranium are fit together by wavy, immovable sutures.
6. The ~~facial~~ 14 facial bones include: 2 zygomatic (cheek) bones, 2 maxillae, 2 nasal bones, 2 lacrimal bones, 1 vomer, 2 palatine bones, 2 inferior conchae and 1 mandible.

COMMENTS ON STERNUM

1. The sternum or breastbone is a partially T-shaped bone that forms the anterior middle portion of the thoracic cage.
2. It is differentiated into three parts: manubrium,

TO STUDY HUMAN BONES

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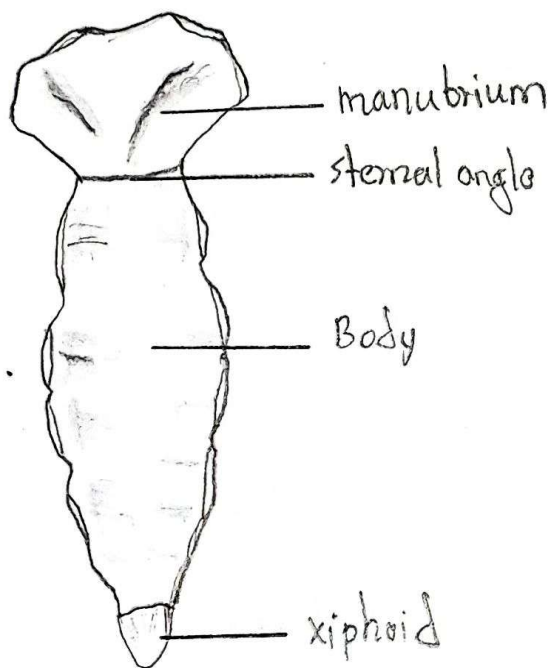


Frontal view of human skull

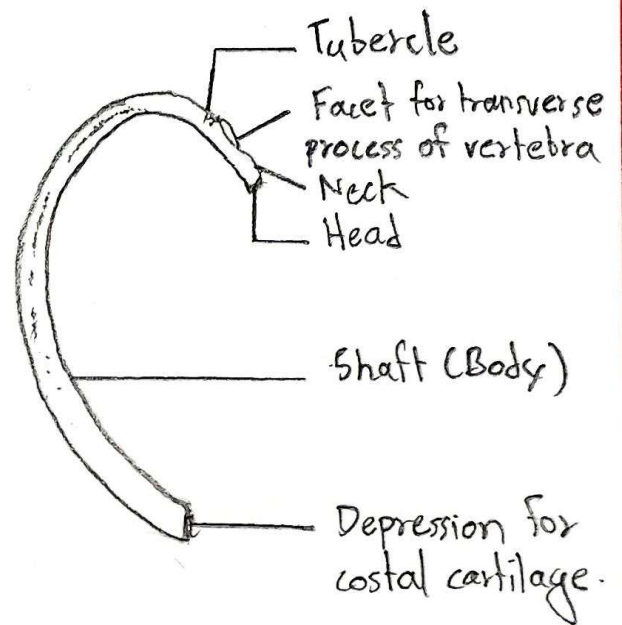
TO STUDY HUMAN BONES

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Sternum



A typical rib.

- body, and xiphoid process.
3. A pair of clavicle articulates with manubrium through sternoclavicular joints.
4. The first seven pairs of ribs (true ribs) articulate with the manubrium and body of the sternum through costal cartilages.
5. The xiphoid process of sternum gives attachment to several important muscles, including the diaphragm.

COMMENTS ON RIBS.

1. There are 12 pairs of ribs in the rib cage.
2. Each rib is a long, narrow, curved bone with an anteriorly attached piece of hyaline cartilage, the costal cartilage.
3. All of the ribs articulate posteriorly with the thoracic vertebrae. They can be categorized into three types: true ribs, false ribs and floating ribs.
4. The first seven pairs (1st to 7th) of ribs are called true ribs. They articulate directly with the sternum through costal cartilages.
5. The next three pairs (8th, 9th and 10th) of ribs are called false ribs. Their cartilages join the 7th rib cartilage.
6. The last two pairs (11th and 12th) of ribs are called floating ribs because they do not articulate with the sternum at all.

COMMENTS ON ATLAS

1. Atlas is the first cervical vertebra, the bone on which the skull rests.
2. Its anterior surface has a pair of articular facets through which it articulates with the two occipital condyles of the skull (atlas-occipital joints).
3. It has no distinct body or spinous process but has two short transverse processes.

COMMENTS ON AXIS

1. Axis is the second cervical vertebra and lies below the atlas.
2. It has a small body with a small upward projection called the odontoid process or dens.
3. The odontoid process articulates with the atlas through atlanto-axial joints (a type of pivot joint).
4. The head rotates left and right on this joint.

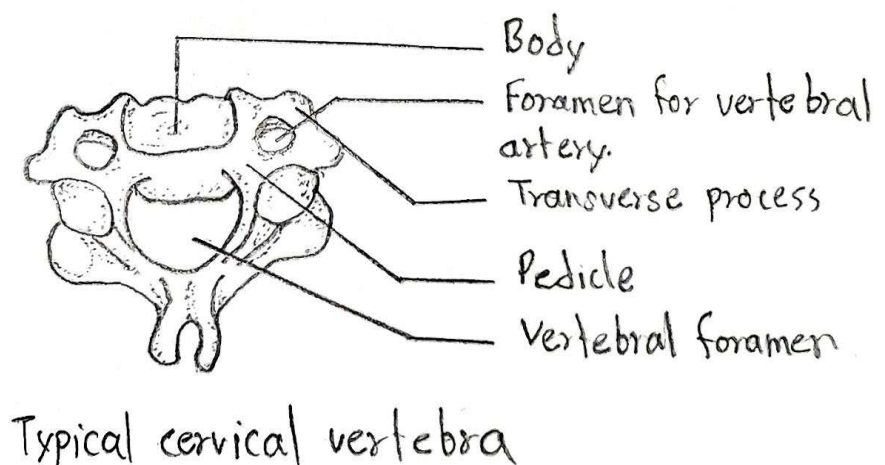
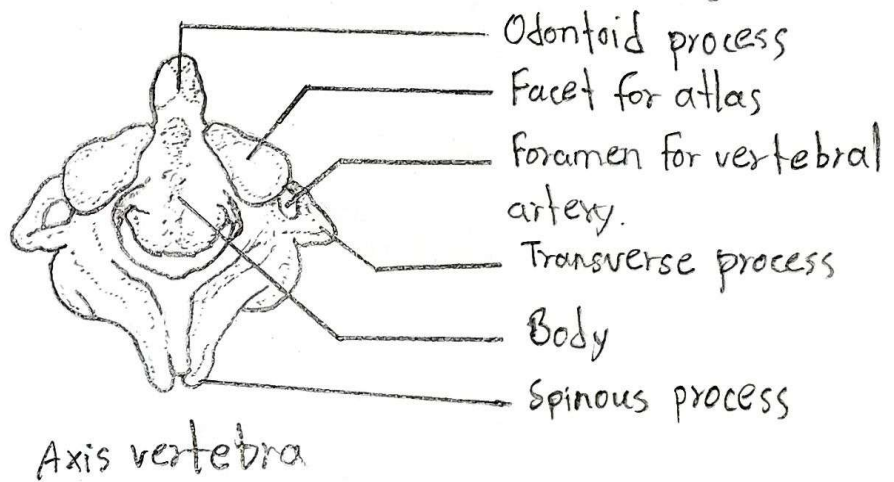
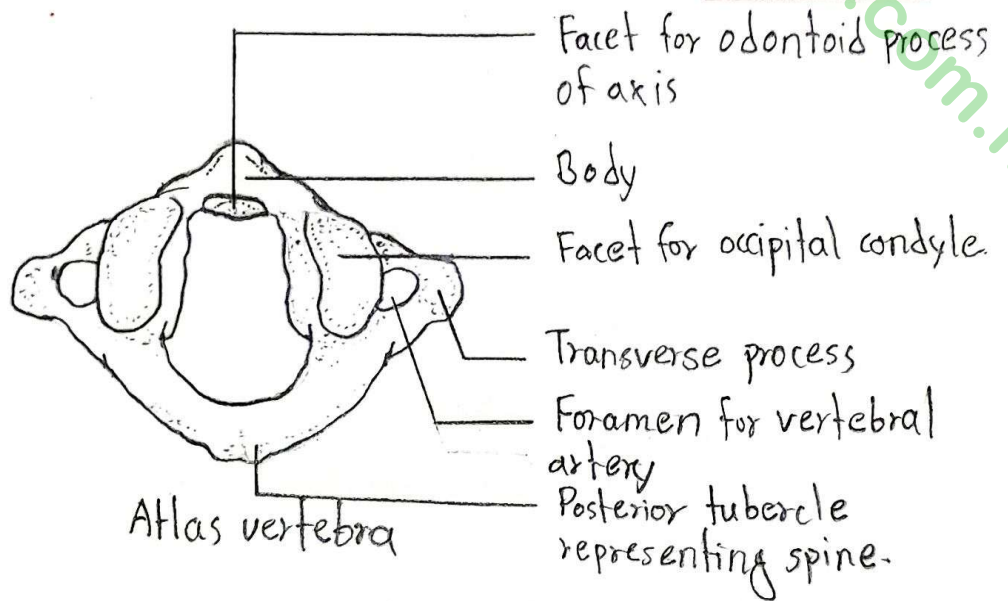
COMMENTS ON TYPICAL CERVICAL VERTEBRAE

1. The 3rd, 4th, 5th, 6th and 7th vertebrae of the neck are the typical cervical vertebrae.
2. In typical cervical vertebrae, the spinous process is short and bifid (except C7). The transverse process is reduced and the vertebral foramen is triangular & relatively large.

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3. The body of the vertebra articulates with the body of the superior vertebra through uncovertebral joints.
4. There are two superior and two inferior articular processes between the pedicle and lamina.
5. The two superior articular processes articulate with the two inferior articular processes of the vertebra above.

COMMENTS ON THORACIC VERTEBRAE

1. The thoracic vertebrae are located inferior to the cervical vertebrae and superior to the lumbar vertebrae.
2. They are twelve in number and are larger than the cervical vertebrae because this section of the vertebral column has to support more body weight.
3. Distinguishing features of the thoracic vertebrae includes the presence of the facets on the sides of the bodies for articulation with the heads of the ribs, and facets on the transverse processes for articulation with the tubercles of the ribs (except the 11th and 12th vertebrae).
4. There are two superior and two inferior articular processes. The two superior articular processes articulates with the two inferior articular processes of the vertebra above.
5. The bodies of the thoracic vertebrae increase in

size from the first to the twelfth vertebrae.

6. They have circular vertebral foramen.
7. Their spinous processes are long, more pointed and angled sharply downward.

COMMENTS ON LUMBAR VERTEBRAE

1. Lumbar vertebrae are five in number and occur in the abdominal region.
2. They are the largest vertebrae as they support the weight of the entire upper body.
3. Vertebral body is kidney-shaped and the vertebral foramen is triangular shaped.
4. Their spinous processes are short, flat and hatchet shaped.
5. They lack foramina on transverse processes and facets on the sides of the body.
6. There are two superior and two inferior articular processes of the vertebra above.
7. The fifth lumbar (L5) vertebra articulates with the first sacral (S1) vertebra.

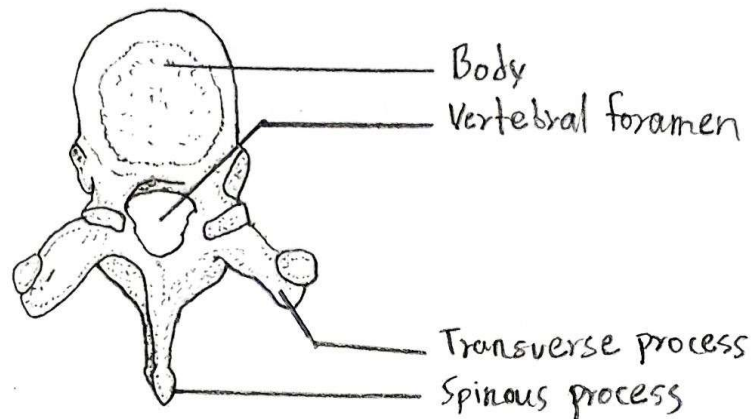
COMMENTS ON SACRAL VERTEBRAE (SACRUM)

1. Sacrum is a wedge-shaped vertebra located at the upper back part of the pelvic cavity.
2. The sacrum is formed by the fusion of five sacral vertebrae (S1-S5) at the age between 18-30 years.

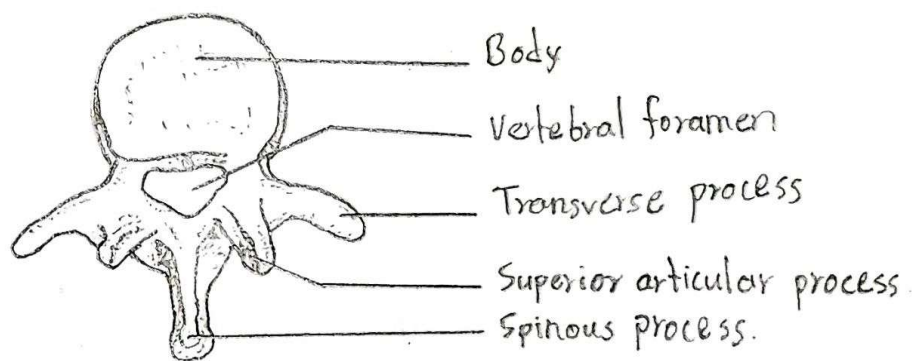
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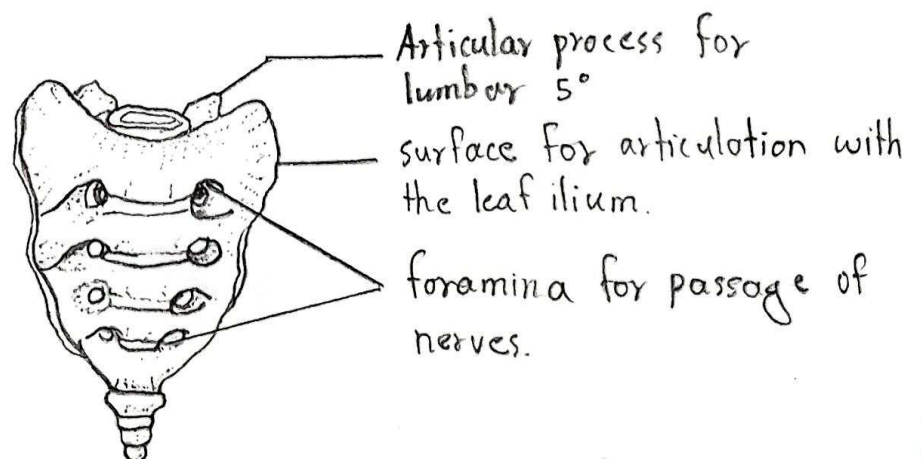
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Thoracic vertebra



Lumbar vertebra



Sacrum and coccyx

3. It has four pairs of sacral foramina.
4. The upper part of the sacrum (base) articulates with the last lumbar vertebra (lumbosacral joint), and its lower part (apex) with the coccyx (sacrococcygeal joint).
5. On each side, it articulates with the ilium (sacroiliac joints).
6. In women sacrum is shorter, wider and more curved.

COMMENTS ON CAUDAL VERTEBRAE (COCCYX OR TAILBONE)

1. The coccyx is a triangular vertebra below the sacrum.
2. The coccyx is formed by the fusion of 4 coccygeal vertebrae by age 30.
3. It represents a vestigial tail, hence the common term tailbone.
4. All the caudal vertebrae lack pedicles, laminae and spinous processes.

COMMENTS ON PECTORAL GIRDLE

1. The shoulder girdle consists of two scapulae (shoulder blades) and two clavicles (collar bones).
2. Scapula is a large, triangular and flat bone attached to the posterior chest wall by muscles.
3. The posterior surface of the scapula is crossed obliquely by a prominent ridge, the spine, which divides the bone into two concave areas, the supraspinous and infraspinous fossae.

4. The clavicle is a long bone with two curvatures.
5. It articulates with the manubrium of the sternum at one end and with the acromion process of the scapula at other end.
6. The clavicle provides the only bony link between the upper limb and the axial skeleton.

COMMENTS ON PELVIC GIRDLE

1. The pelvic girdle, also known as the hip bone, is a ring-like bony structure, located in the lower part of the trunk. It connects the axial skeleton to the lower limbs.
2. Hip bone consists of two halves each is called coxal or innominate bone.
3. Each coxa (half) is formed by three bones, the ilium, ischium and pubis, that fuse together during the late teenage years.
4. These three hip bones, the ilium, ischium and pubis converge to form a deep, cup-shaped cavity on the lateral surface called the acetabulum.
5. The head of the femur articulates with the acetabulum to form the hip joint.

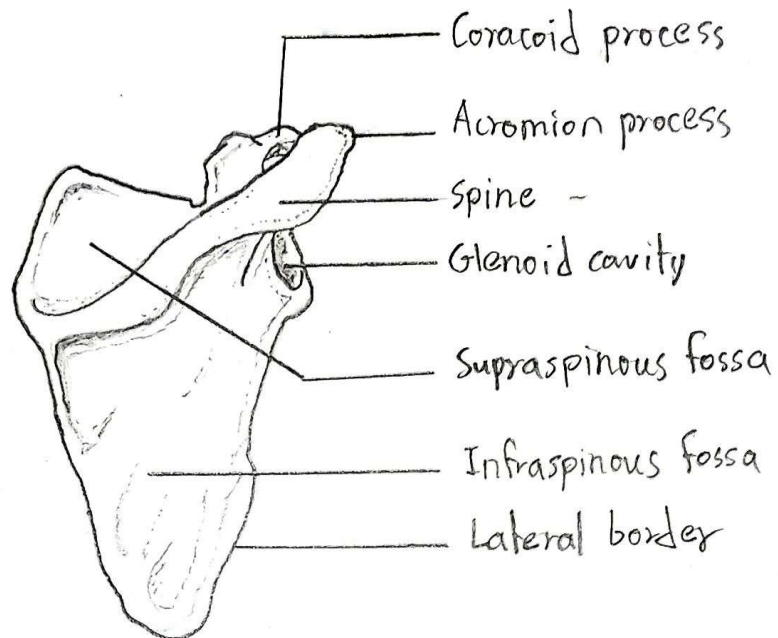
COMMENTS ON HUMERUS

1. The humerus is a long bone in the upper arm that extends from the shoulder to the elbow.
2. The head of humerus is a hemispherical shape that

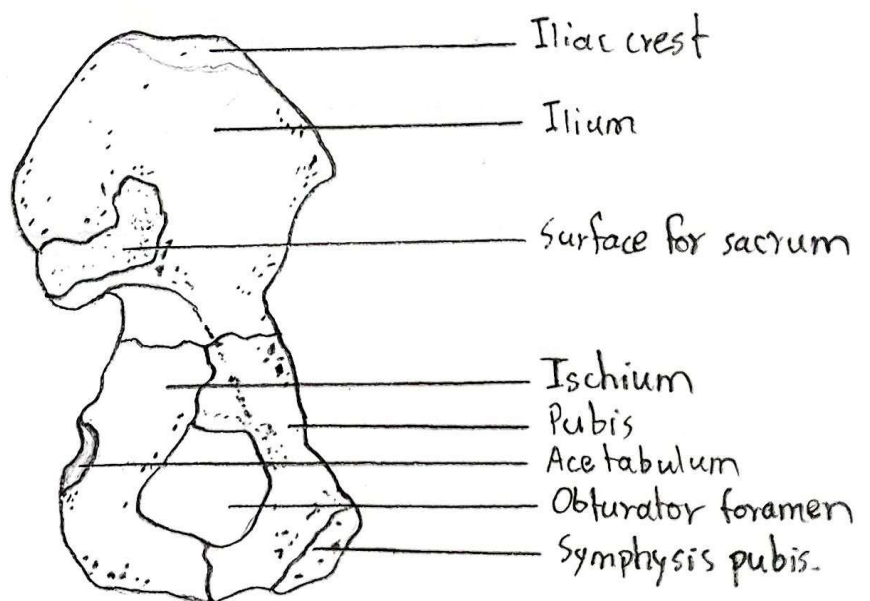
TO STUDY HUMAN BONES

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Pectoral girdle



Pelvic girdle or hip girdle.

articulates with the glenoid fossa of scapula.

3. A bicipital groove is a deep groove that separates the greater tubercle from the lesser tubercle. Bicipital groove and tubercles give attachment to muscles.
4. The proximal half of the shaft is cylindrical, whereas the distal half is triangular.
5. On the lateral side of the shaft, is a roughened surface known as the deltoid tuberosity where the deltoid muscle attaches.

COMMENTS ON RADIUS AND ULNA

The radius and the ulna are two separate bones of the forearm that extend from the elbow to the wrist. The radius is on the thumb side and the ulna is on the little finger side. Radius and ulna articulate with proximal and distal radioulnar joints.

1. Proximally, the head of radius articulates with the capitulum of humerus as part of the elbow joint.
2. Distally, radius articulates with carpal bones to form wrist joint.
3. A hook-shaped process, located on the proximal ulnar end is the olecranon process. It fits into the olecranon fossa of the humerus.

4. Shaft of the ulna is triangular in shape and tapers distally.

COMMENTS ON BONES OF THE HAND

Each human hand has 27 bones which can be divided into three groups: carpals or wrist bone (8), the metacarpals or palm bone (5) and the phalanges or finger bones (14).

a. Carpals (bones of wrist)

1. There are eight carpal bones arranged in two rows of four.
2. In the distal row, all of the carpal bones articulate with the metacarpals.
3. These bones are closely fitted together and held in position by ligaments.

b. Metacarpals (bones of palm)

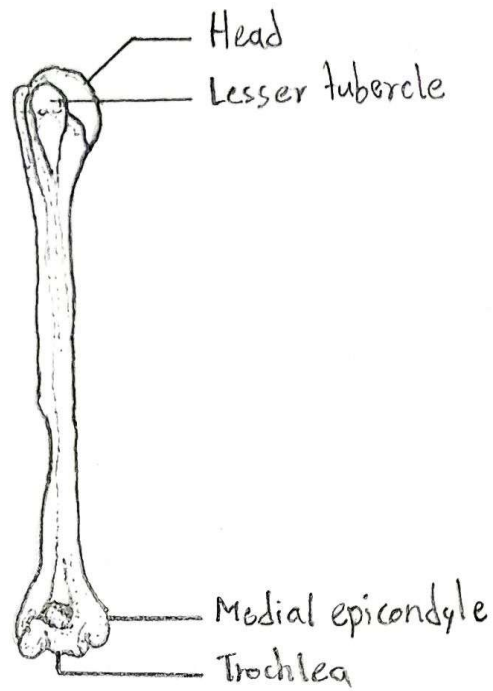
1. The metacarpals are a group of 5 long bones of the palm, between the phalanges and the carpals.
2. They are labelled with numbers 1-5 going from to ulnar direction.

c. Phalanges (bones of fingers)

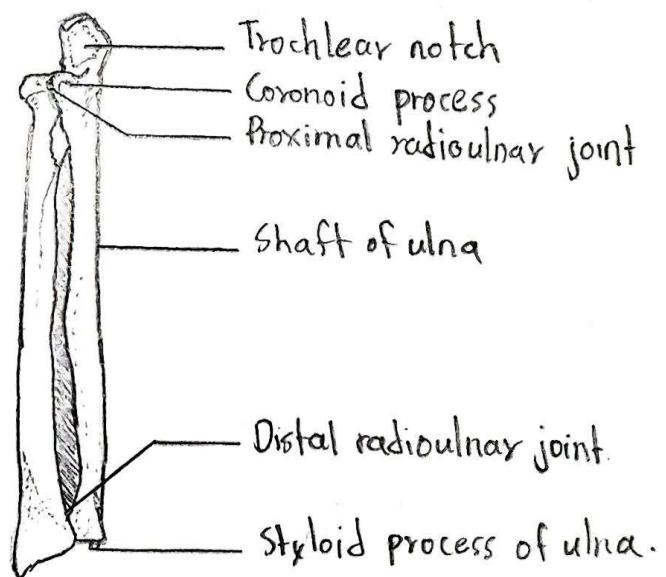
1. Phalanges are the small bones of the fingers.
2. Even though the phalanges are small in size, they are classified as long bones because of their

TO STUDY HUMAN BONES

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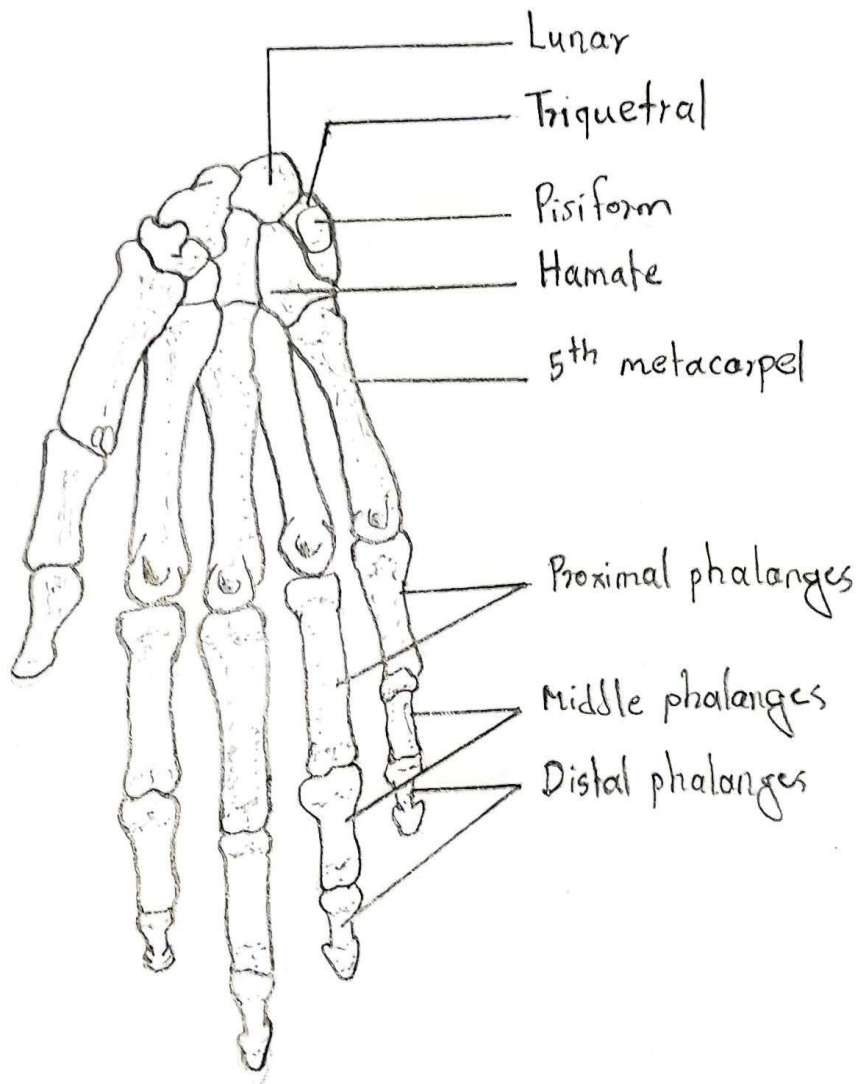
Bones of humerus



Bones of radio ulna

TO STUDY HUMAN BONES

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 Date .



The Bones of Wrist, Hand and Fingers.

structural characteristics.

3. They articulate with the metacarpal bones and with each other.

COMMENTS ON FEMUR (THIGH BONE)

1. Femur is the strongest and longest bone of the body located in the thigh region.
2. The head of the femur is almost spherical that projects anteriorly from the neck.
3. The head articulates with the acetabulum of the pelvic girdle to form the hip joint.
4. Two rough projections below the neck are the greater trochanter and the lesser trochanter.

COMMENTS ON TIBIA AND FIBULA

The tibia and fibula are two separate long bones in the lower leg. The tibia is larger than the fibula. These bones articulate with each other by proximal and distal tibiofibular joints.

a) Tibia

1. The proximal end of the tibia has two articular surfaces: medial condyle and lateral condyle.
2. The tibial condyles articulate with the femoral condyles within the knee joint.
3. A bony extension of the tibia on the distal end is called the medial malleolus.

6) Fibula

1. The proximal end of the fibula is characterized by an irregularly shaped head and a short neck.
2. The shaft of the fibula is long and triangular. It is the site for muscle attachment.
3. The interosseous membrane between tibia and fibula attaches those two bones.

COMMENTS ON BONES OF THE FOOT

The human foot has 26 bones which are divided into three groups: Tarsal bone (7), Metatarsal bones (5) and phalanges (14).

a) Tarsal (Ankle bones)

1. There are seven tarsal bones arranged in three groups that form the posterior part of the foot.
2. The proximal tarsal bones are the talus and calcaneus.
3. The intermediate tarsal bone is the navicular.
4. The calcaneus is the largest tarsal bone that forms the heel of the foot.

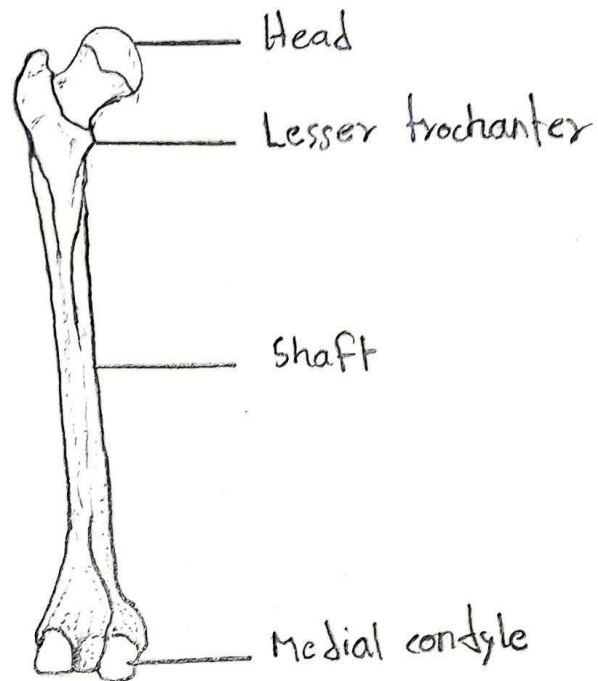
b) Metatarsal

1. The metatarsal of the foot consists of five long bones. They are named 1-5 from big toe to little toe side.
2. Along with the tarsals, the metatarsals form the arches of the foot.
3. These bones are closely fitted together and held in

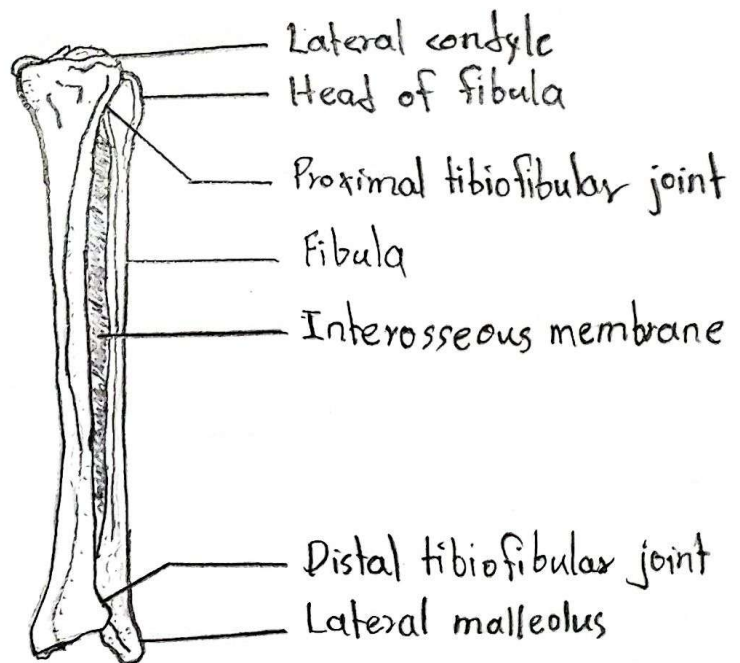
TO STUDY HUMAN BONES

Roll No. 11

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Bones of femur

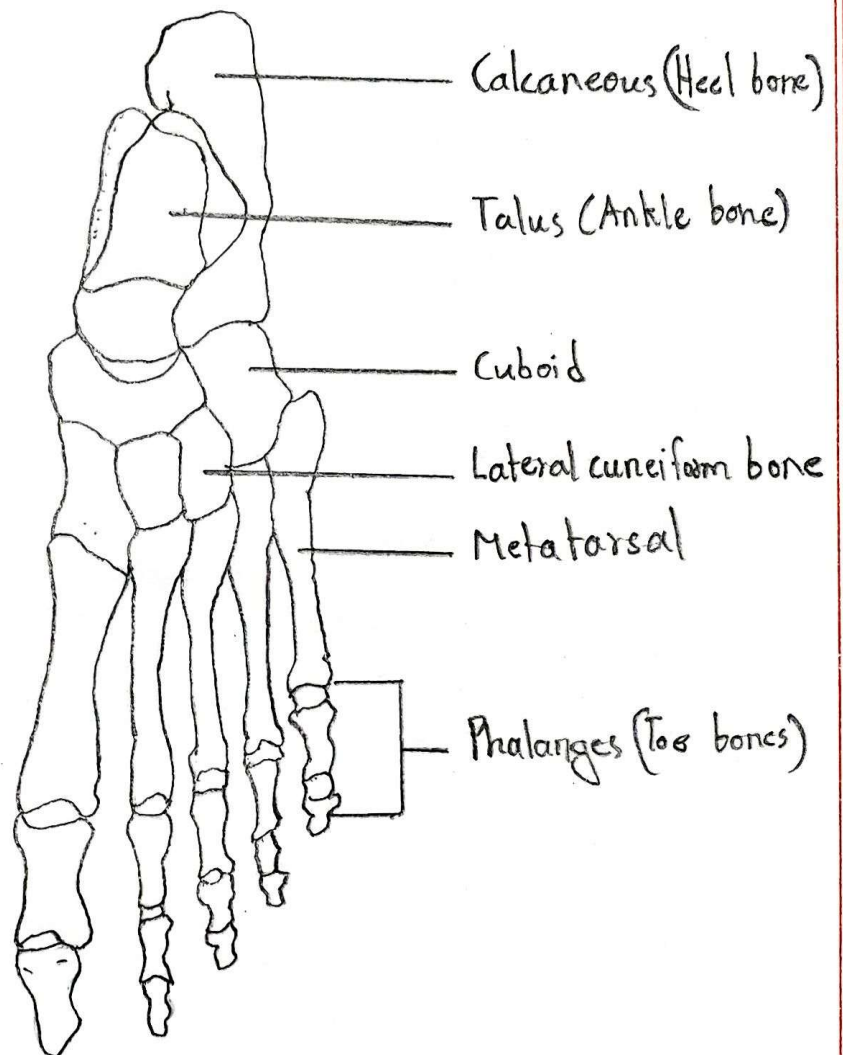


Bones of tibio fibula

TO STUDY HUMAN BONES

Roll No. 11

Date



Bones of foot

position by ligaments.

c) Phalanges (Toe bones)

1. The phalanges are the small but long bones of the toes.
2. They articulate with the metatarsal bones and with each other.