East Point College of Pharmacy

East Point Campus, Jnana Prabha, Virgo Nagar Post
Bengaluru – 560049, Karnataka

Approved
by
Pharmacy Council of India, New Delhi

Affiliated
to
Rajiv Gandhi University of Health Sciences
Karnataka
Bengaluru – 560 041
India

LAB MANUAL

HUMAN ANATOMY AND PHYSIOLOGY I

B. PHARM 1st SEMESTER

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

B Pharmacy

Program Outcomes (PO's)

PO 1- Pharmacy Knowledge

Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 2- Planning Abilities

Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO 3- Problem analysis

Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

PO 4- Modern tool usage

Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 5- Leadership skills

Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO 6- Professional Identity

Understand, analyse and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO 7- Pharmaceutical Ethics

Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions

PO 8- Communication

Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions

PO 9- The Pharmacist and society

Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10- Environment and sustainability

Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 11- Life-long learning

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

Programme Specific Outcomes (PSO's)	
PSO 1	Acquire a thorough foundational knowledge in pharmaceutical sciences, including pharmacology, pharmaceutics, medicinal chemistry, and pharmacognosy, to excel in further academic pursuits
PSO 2	Gain expertise in the application of contemporary pharmaceutical techniques and technologies, enhancing employability across various sectors including the pharmaceutical industry, academia, and research institutions.
PSO 3.	Equip with entrepreneurial skills and knowledge of pharmaceutical business management, including market analysis, product development, regulatory affairs, and financial planning, to initiate and run successful ventures in the pharmacy sector

Course Outcomes (CO's)
Code: BP107P Human Anatomy and Physiology- I
CO 1: Explain the gross morphology, structure, and functions of various organs of the human body
CO 2: Describe the various homeostatic mechanisms and their imbalances
CO 3: Identify the various tissues and organs of different systems of human body
CO 4: Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc and record blood pressure, heart rate, pulse and respiratory volume

SL NO	LIST OF THE EXPERIMENT
1	Study of compound microscope.
2	Microscopic study of epithelial and connective tissue
3	Microscopic study of muscular and nervous tissue
4	Identification of axial bones
5	Identification of appendicular bones
6	Introduction to hemocytometry.
7	Enumeration of white blood cell (WBC) count
8	Enumeration of total red blood corpuscles (RBC) count
9	Determination of bleeding time
10	Determination of clotting time
11	Estimation of hemoglobin content
12	Determination of blood group.
13	Determination of erythrocyte sedimentation rate (ESR).
14	Determination of heart rate and pulse rate.
15	Recording of blood pressure.

Experiment No. 1

Aim: Study of compound microscope.

Types of microscopes:

1. Microscopes used in clinical practice are **light microscopes**. They are called light microscopes because they use a beam of light to view specimens.
2. A **compound light microscope** is the most common microscope used in microbiology. It consists of two lens systems (combination of lenses) to magnify the image. Each lens has a different magnifying power. A compound light microscope with a single eye- piece is called monocular; one with two eye-pieces is said to be binocular.
3. Microscopes that use a beam of electrons (instead of a beam of light) and electromagnets (instead of glass lenses) for focusing are called **electron microscopes**. These microscopes provide a higher magnification and are used for observing extremely small microorganisms such as viruses.

PARTSOF MICROSCOPE

The main parts of the microscope are the eye-pieces, microscope tube, nosepiece, objective, mechanical stage, condenser, coarse and fine focusing knobs, and light source.

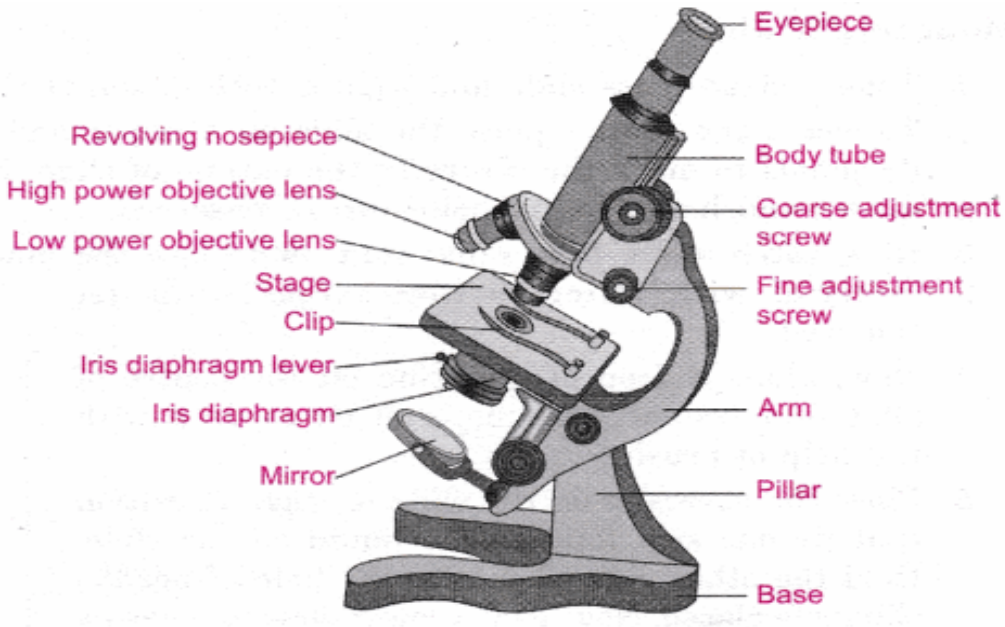

Fig. A compound microscope

Compound Microscope Parts:

– A high power or compound microscope achieves higher levels of magnification than a stereo or low power microscope. It is used to view smaller specimens such as cell structures which cannot be seen at lower levels of magnification. These key microscope parts are illustrated and explained below.

Structural Components:

1. **Base (foot):** It is U or horseshoe-shaped metallic structure that supports the whole microscope.
2. **Pillar:** It is a short upright part that connects to base a swell as arm.
3. **Arm (Limb):** It is a curved metallic handle that connects with the arm by inclination joint. It supports stage and body tube.
4. **Stage:** It is a metallic platform with a central hole fitted to the lower part of the arm. Microscopic slides held on the stage by either simple side clips or by a mechanical stage.
5. **Body tube:** It is meant for holding ocular and objective lenses at its two ends. The end holding ocular lens is called head while the end containing3-4 objective lens is called nose piece. The body tube has an internal pathway for the passage of light rays which form the enlarged image or microscopic objects.
6. **Draw tube:** It is a small tube that remains fixed at the upper end of the body tube. It holds eyepiece or ocular lens.
7. **Rack and pinion:** The microscope has a rack and pinion attached either to body tube or the stage for bringing the object under focus.
8. **Adjustment screws:** There are two pairs of screws for moving the body tube in relation to stage, larger for coarse adjustment and smaller for fine adjustment. In fine adjustment the body tube or stages moves for extremely short distances. In coarse adjustment the body tube or stage can move up and distance. In coarse adjustment is meant for briefly objective lens at a proper distance from the object so as to form image of the same at the ocular end. Fine adjustment is required to obtain sharp image.
9. **Automatic Stop:** It is a small screw fitted at lower end or rack and pinion. It is meant for stopping the downward sliding of the body tube to prevent the damage of objective lens and the slide.

Optical Components:

1. **Diaphragm:** It is flitted just below the stage for regulating the amount of light failing on the object. Diaphragm is of two types, disc, and iris.
2. **Condenser:** It is attached below the diaphragm. Condenser can be moved up and down to focus light on the object.
3. **Reflector (Mirror):** It is attached just above the base. Both its surface bear mirrors, plane on one side and concave on other side. Plane side is used in strong light and concave side in weak light. Reflector directs the light on the object through the condenser and diaphragm system.
4. **Objective Lenses:** They are fitted over the nose piece. Objective lenses are of three types – low power (commonly 10X or 5X), high power (commonly 45X) and oil immersion (commonly 100X, can be more).
5. **Ocular Lens or Eye piece:** It is lens through which image of the microscopic object is observed. It also takes part in magnification. Depending upon magnification, the eye piece is of four types-5X, 10X, 15X, and 20 X.

Use and Care of Microscope:

- Always keep the microscope clean, dust free and covered. Clear space on the bench before getting the microscope from the cabinet.
- Grasp the microscope with two hands–one on the arm and the other under the base.
- When you remove the microscope from the cabinet, doit slowly and carefully.
- Remove the dust cover and store it in the scope cabinet.
- Verify that the MIRROR is set for minimum light. Concave mirror is used while using low power lens and the plane mirror is used while using high power or oil immersion lens. Adjust the mirror such that the maximum and even illumination is obtained.
- Lower the stage (or raise head) Check that the CONDENSER is flush with the stage and the iris diaphragm is open.
- Using the knurled nose ring, rotate and click the shortest.
- Load a slide, being sure it sits flat on the stage, held by the spring clip.
- While looking into the eyepieces, slowly turn the coarse knob, moving lens closer to stage. As soon as you see a hint of color, switch to the small, fine focus knob and focus the object. Close one eye at a time to compare images.

- Once the slide is perfectly focused and the image is centered on low power, use the knurled nose piece to click the next larger lens into place. DO NOT USE THE COARSE FOCUS KNOB after increasing magnification. Only use the fine focus knob to focus with a higher power lens.
- If you cannot find the image when you increase the magnification, go back to 4X, and start again.

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Experiment No. 2

Aim: To study the histology of Epithelial Tissue and Muscular Tissue

Epithelial Tissue: It is made up of one or more layers of cells that provide covering or lining of body and cavities. It is classified as

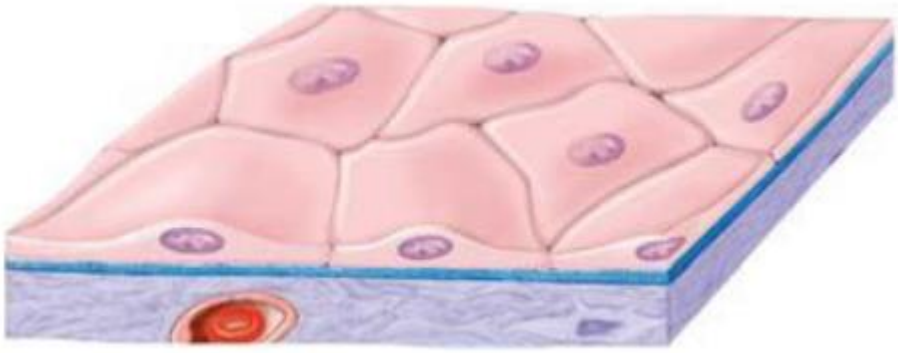
1) Simple Epithelium
2) Pseudo stratified Epithelium
3) Compound Epithelium

Simple epithelium tissue: -

Squamous epithelium: -It is made up of single layer. Nature of cells: Flat polygonal in surface view centrally located nucleus.

Location: - Lungs, Bowman's capsule, Henle's loop of kidney inner wall of blood vessels, smooth inner lining of heart, blood vessels, lymphatic vessels, lymph vessels as endothelium.

Functions: - Excretion, protection, secretion, absorption, filtration.



Cuboidal epithelium: - It's made up of single layer o cubical cells arranged on basement membrane.

Nature of Cells: - Cube like cells, polygonal in surface view and elongated Nucleus.

Location: - Stomach, small intestine, large intestine, Gall bladder.

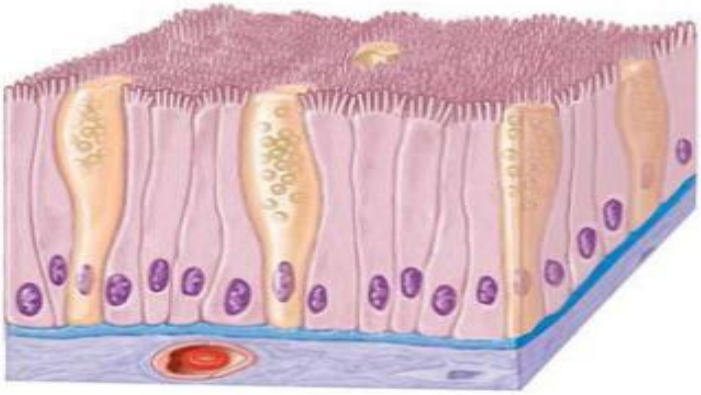
Functions: - Secretion, absorption.

Columnar epithelium: - Made up of single layer of pillar shaped cells.

Nature of Cells: - Elongated cells, polygonal in surface view and elongated nucleus.

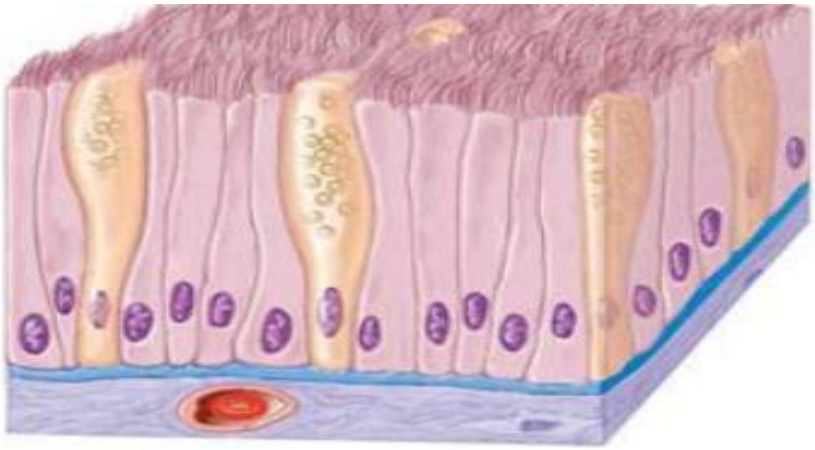
Location: - Stomach, small intestine, large intestine, Gall bladder.

Function: - Secretion, Absorption.



Ciliated epithelium: - It's made up of single layer. Nature of Cells: - The cells may be Cuboidal (or) columnar. The cells have hair like structures called cilia on its border (or) free surface area. The wave like movement of cilia propels the contents of the tube.

Location: - a) Cuboidal ciliated- urinary tubules. b) Columnar ciliated – Fallopian tube, Bronchioles.



Glandular epithelium: -It forms the lining of alveoli and portion of ducts in the glands. It's made up of cubical cells (or) short columnar cells (or) sometimes polyhedral cells.

Functions: -Secretion, lubrication, dilution of irritants.

Muscular Tissue:

The muscle tissue originates from embryonic mesoderm. Themuscle cell is called myocyte. They are of 3 types.

1) Skeletal Muscle.
2) Smooth Muscle.
3) Cardiac Muscle.

Skeletal Muscle:

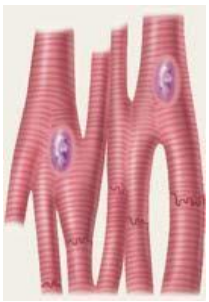
- It's also called striated muscle.
- Shapes cylindrical, Multinucleate.
- Striations (alternate light and dark bands) are present.
- Sarcoplasmic reticulum is well developed.
- It's voluntary in function and gets fatigue soon.
- Intercalated discs are absent.
- They are innervated by motor nerves.
- Blood supply is abundant.
- Location: - Limbs, biceps and body wall

Smooth Muscle:

- It's also called visceral and involuntary muscle.
- Shape-Spindle, uninucleate, nucleus at the centre striations isabsent.
- Sarcoplasmic reticulum is less developed.
- Involuntary in function and don't get fatigue soon.
- They contract slowly for a long time.
- They are innervated by ANS.

- **Location**: - Hollow visceral organs like GIT, blood vessels urinary bladder,biliary body, respiratory system etc.

Cardiac Muscle: -



- This tissue forms a 3-D network.
- Shape-short, cylindrical, and branched.
- Sarcoplasmic reticulum is less developed.
- Intercalated dieses are preset.
- Rhythmic contractions.
- Involuntary in function.
- Myofibrils are distinct with faint light and dark band.
- They are innervated by ANS

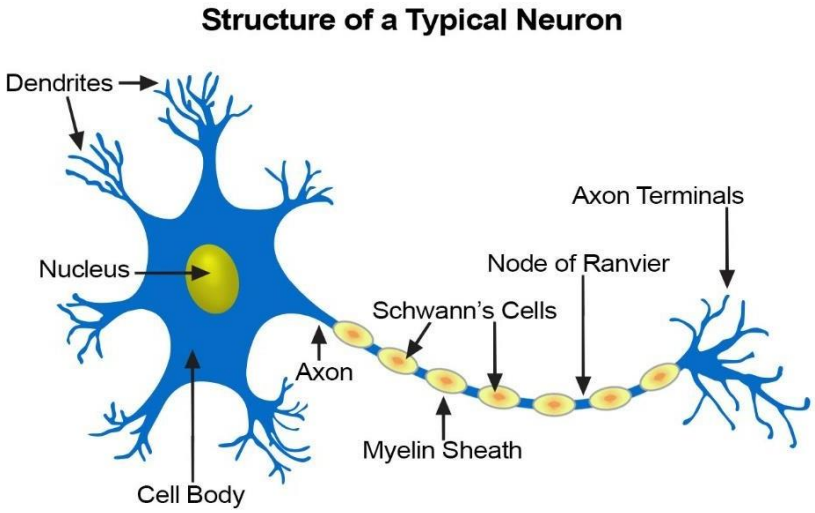
- **Location:** Heart
- Blood supply is abundant.

Experiment No. 3

Aim: Microscopic study of muscular and nervous tissue

Nervous Tissue:

1. Nerve cells are called Neurons**.**
2. It's structural and functional unit of nervous system.
3. cell body (Cyton) consists of neuroplasm, nucleus, mitochondria and Golgi bodies.



The cell process is two types:

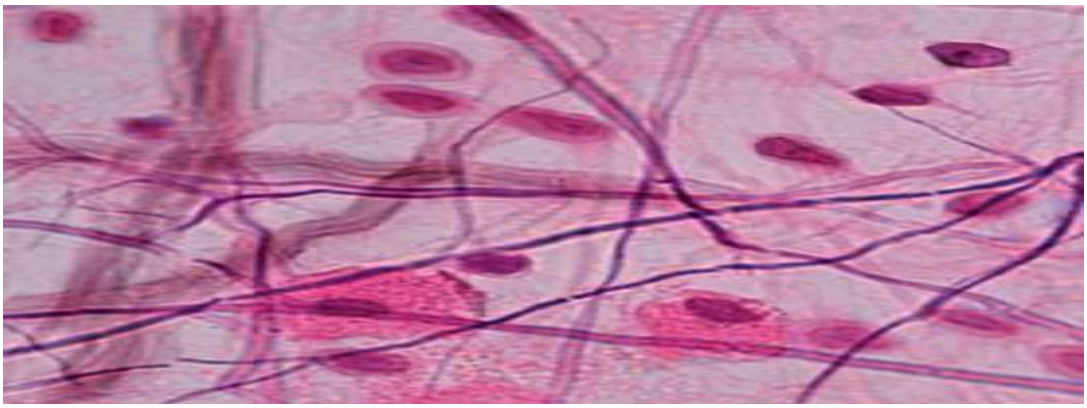
1. **Dendron's (Dendrites):-**These are much branched process for receiving impulses.
2. **Axon:** - A single long cylindrical process for conducting impulses away from cyton.
   - The nerve fibres are of two types i.e., Myelinated and Non-Myelinated.
   - The Myelinated nerve fibre has nodes of Ranvier which helps in rapid transmission of nerve impulses.
   - The neurilemma consists of Schwann's cells which produce myelin sheath around the neurons.
3. Neuroglia: - It is supporting and packing cells found in brain, spinal cord and Ganglia

Functions: - To receive, discharge and transmit impulses.Co-ordination and integration of the various activities of the body.

Connective Tissue:

It's developed from mesoderm. They are of many types.

a) Areolar Tissue: - Transparent jelly like matrix is found. It contains various of cells like fibroblasts, histocytes, basophiles cells, plasmacells, most cells, pigment cells, mowlytes.



Two type's fibres are present:

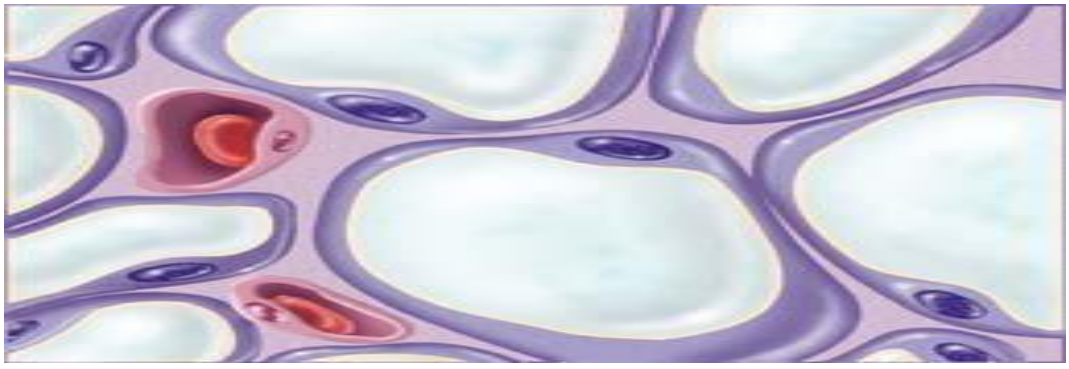
White fibre-Fine, wary flexible and un branched made up of collager proteins.

Yellow fibre- They are thick, straight, flexible, elastic and branchedmade up of elastic protein.

Function:- It connects the skin with muscle, blood vessels andnerves with the surrounding tissue, serve as packing material.

b) Adipose tissue: - It's made up of large round (or) oval flat cells containing fat droplets and fat globules. It's of 2 types.

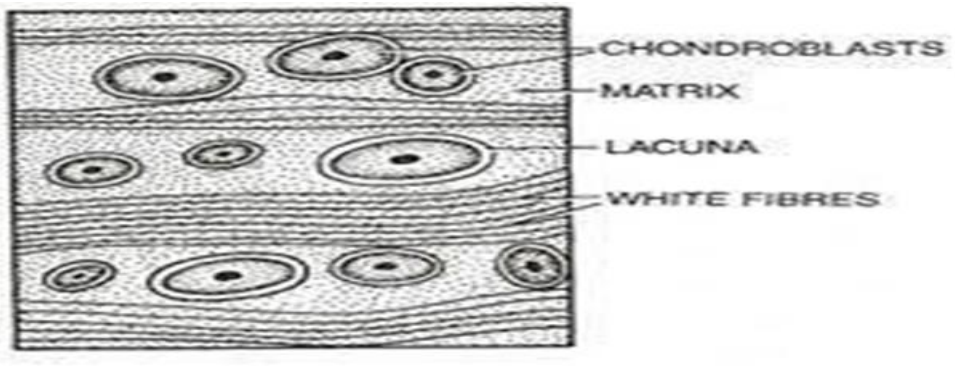
(i) White adipose tissue (ii) Brown adipose tissue. Matrixcontains fibroblasts, macrophages and fibres.



Location: - Sub-Cutaneous areas, mesentery.

Function: -Stores energy in the form of fat, gives shape to the limbsand Body. Regulation of body Temperature.

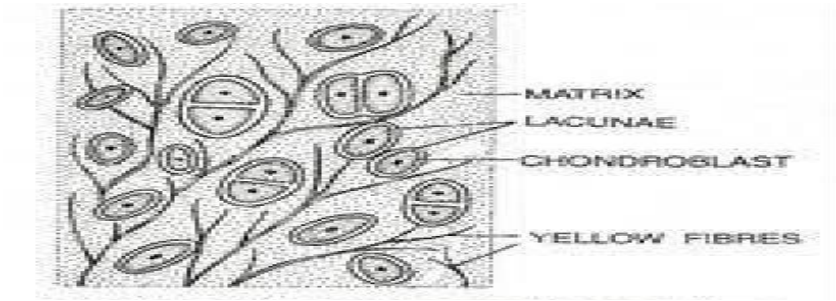
c) White fibrous tissue: - It consists of white collagen fibres. The tissue is tough and vinelastic due to presence of protections called collagen.



Location: - It forms tendons, ligaments, articular capsule, capsuleetc.,

d) Yellow elastic tissue: -It's a type of proper connective tissue.

- Fibres are straight, flexible, elastic and occur single and madeup of elastic protein.
- They are thicker, branched, and yellow in color.

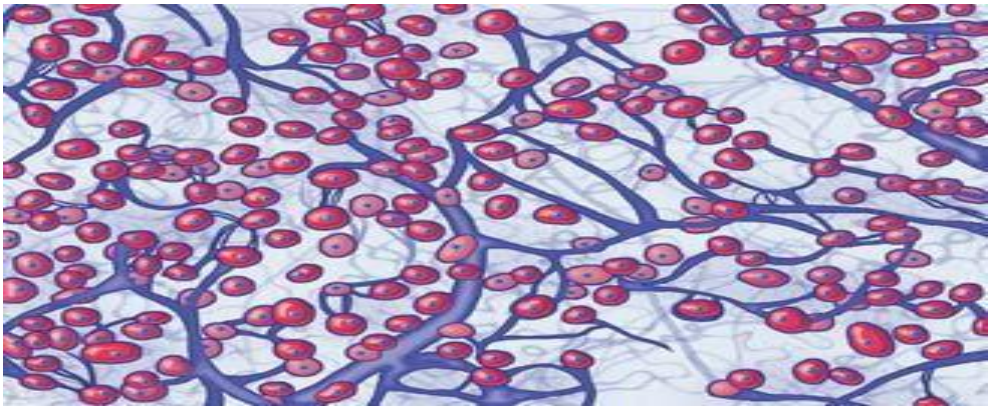


Location: - Lungs, walls of blood vessels, bronchioles, etc.

Function: - Provides strength, movement of organs and also in expiration.

e) Reticular tissue: - It consists of reticular cells and reticular fibres.

- Reticular fibres are thinner than white fibres and branched.
- It's a member of reticular endothelial systems made up ofreticular prote



Experiment No. 4

Aim: Identification of axial bones.

Skeletal System:

The skeletal system includes all of the bones and joints in the body. Each bone is a complex living organ that is made up of many cells, protein fibers, and minerals.

Components of Human Skeleton:

Bones: Bone is a tough and rigid form of connective tissue. It is the weight bearing organ of human body and it is responsible for almost all strength of human skeleton.

Cartilages: Cartilage is also a form of connective tissue but is not as tough and rigid as bone. The main difference in the cartilage and bone is the mineralization factor. Bones are highly mineralized with calcium salts while cartilages are not.

Joints: Joints are important components of human skeleton because they make the human skeleton mobile. A joint occurs between "two or more bones", "bone and cartilage" and "cartilage and cartilage."

Divisions of human skeleton:

Axial skeleton-The axial skeleton (80bones) is formed by the vertebral column (32–34bones; the number of the vertebrae differs from human to human as the lower 2 parts, sacral and coccygeal bone may vary in length), a part of the rib cage (12 pairs of ribs and the sternum), and the skull (22 bones and 7 associated bones).

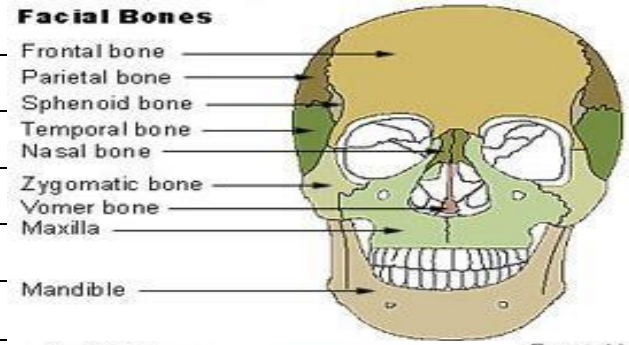
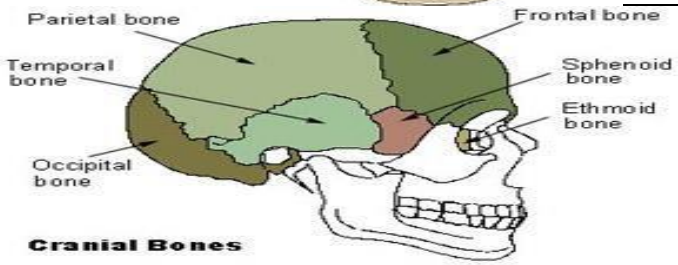
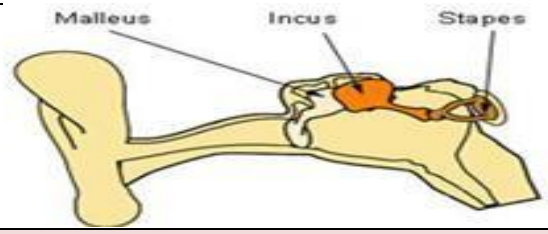
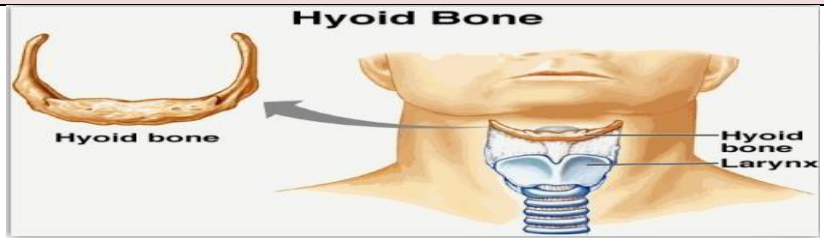
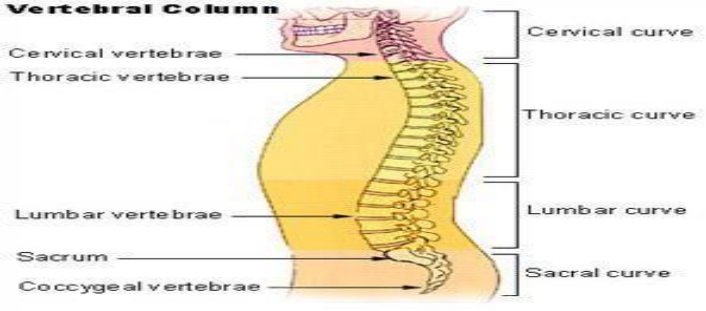
Appendicular skeleton - The appendicular skeleton (126 bones) is formed by the pectoral girdles, the upper limbs, the pelvic gird leorpelvis, and the lower limbs. Their functions are to make locomotion possible and to protect the major organs of digestion, excretion, and reproduction.

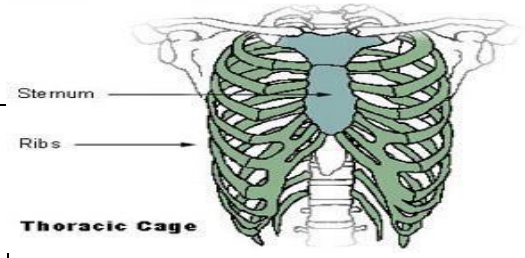
Functions of bone and skeletal system:

1) **Support:** The skeletal system is the structural framework of the body as well as for muscles and skin.
2) **Protection:** The skeletons protect the internal organs from any kind of external injury.
3) **Movement:** The skeletal system along with the muscular system and central nervous system helps the locomotion of the body as well as the purposeful movement of the body parts.
4) **Blood cell formation:** The blood cells are formed in the red bone marrow (connective tissue) within certain bones from the pluripotent stem cells.
5) **Triglyceride storage:** Triglycerides are stored as chemical energy reserve in the yellow bone marrow, present in the bone.
6) Bones provide attachment points to the muscles for smooth performing their activities like movements, contraction and relaxation of muscles.
7) Axial skeleton of thorax assists in breathing

8) Teeth help to disintegrate the foods.
9) Mineral homeostasis: Bone is the reservoir of calcium (Ca^{++}). 99% of body calcium is stored in the bone and released in the plasma when required.

AXIAL SKELETON (80BONES)

Sl. NO.	BONES	NUMBERS	DIAGRAM
1	Parietal	2	
2	Temporal	2	
3	Frontal	1	
4	Occipital	1	
5	Ethmoid	1	
6	Sphenoid	1	
1	Maxilla	2	
2	Zygomatic	2	
3	Mandible	1	
4	Nasal	2	
5	Platine	2	
6	Inferior nasal concha	2	
7	Lacrimal	2	
8	Vomer	1	
1	Malleus	2	
2	Incus	2	
3	Stapes	2	
	HYOID (1)		
1	Hyoid	1	
	VERTEBRAL COLUMN (26)		
1	Cervical vertebrae	7	
2	Thoracic vertebrae	12	
3	Lumbar vertebrae	5	
4	Sacrum	1	
5	Coccyx	1	

THORACIC CAGE (25)			
1	Sternum	1	
2	Ribs	24	
Total axial bones		80	

The table below lists the location and function of the major bones of the axial skeleton:

Bone(s)	Location	Function	Major grouping of axial skeleton
Cranium	Head	Supports facial structures, encloses, and protects the brain, provides muscle attachments for Chewing and moving the head	Skull
Mandible	Lower jaw	Permits chewing	Skull
Vertebrae	Spine	Permit mechanical stability for the body and Protect the spinal cord	Vertebral column
Ribs	Chest wall	Provide protection for the organs of the upper body	Thoracic cage
Sternum	Center of the chest	Provides attachment for many (not all) ribs	Thoracic cage

The skeletal system in an adult body is made up of 206 individual bones. These bones are arranged into two major divisions: the axial skeleton and the appendicular skeleton. The axial skeleton runs along the body's midline axis and is made up of 80 bones in the following regions: Skull, Hyoid, Auditory ossicles. Ribs, Sternum, Vertebral column

Skull:

- The skull is composed of 22 bones that are fused together except for the mandible.
- The bones of the superior portion of the skull are known as the cranium and protect the brain from damage.
- Thebonesoftheinferiorandanteriorportionoftheskullareknownasfacialbonesand support the eyes, nose, and mouth.

Hyoid Andauditory Ossicles:

- The hyoid is a small, U-shaped bone found just inferior to the mandible. The hyoid is theonlyboneinthebodythatdoesnotformajointwithanyotherbone—itisafloating bone.
- Thehyoid'sfunctionistohelpholdthetracheaopenandtoformabonyconnectionfor the tongue muscles.
- The malleus, incus, and stapes—known collectively as the auditory ossicles—are the smallest bones in the body.
- Found in a small cavity inside of the temporal bone, they serve to transmit and amplify sound from the eardrum to the inner ear.

Vertebrae:

Twenty-six vertebrae form the vertebral column of the human body.

- Cervical(neck)-7vertebrae
- Thoracic (chest)-12vertebrae
- Lumbar (lower back) -5vertebrae
- Sacrum-1 vertebra
- Coccyx(tailbone)-1 vertebra
- With the exception of the singular sacrum and coccyx, each vertebra is named for the first letter of its region and its position along the superior-inferior axis.

Ribs And Sternum:

The sternum, or breastbone, is a thin, knife-shaped bone located along the midline of the anterior side of the thoracic region of the skeleton. The sternum connects to the ribs by thin bands of cartilage called the costal cartilage.

There are12 pairs of ribs that together with the sternum form the rib cage of the thoracic region. The first seven ribs are known as "true ribs" because they connect the thoracic vertebrae directly to the sternum through their own band of costal cartilage. Ribs 8, 9, and10 allconnecttothesternumthroughcartilagethatisconnectedtothecartilage of the seventh rib, so we consider these to be "false ribs." Ribs 11 and 12 are also false ribs, but a real so considered to be "floating ribs" because they do not have any cartilage attachment to the sternum at all.

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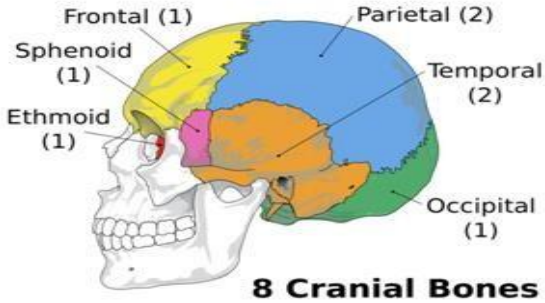
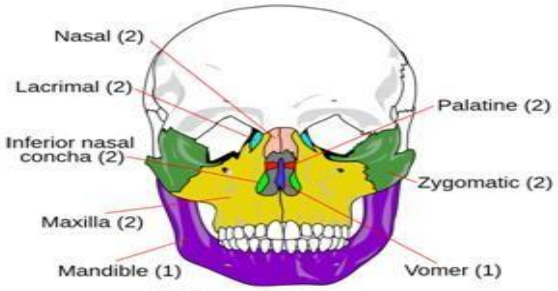
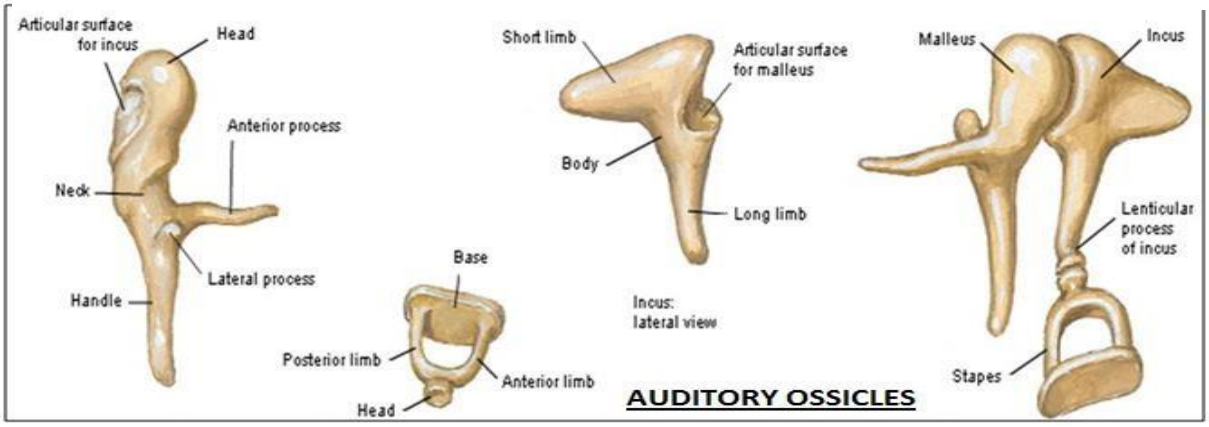
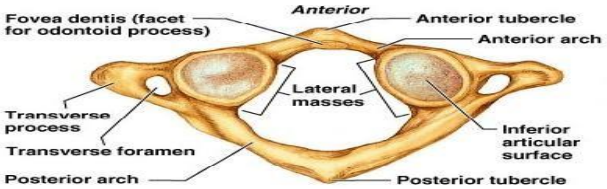


8 Cranial Bones



14 Facial Bones





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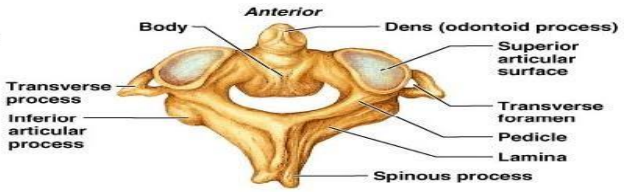

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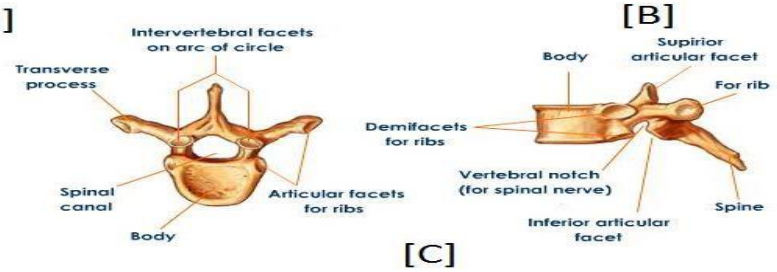

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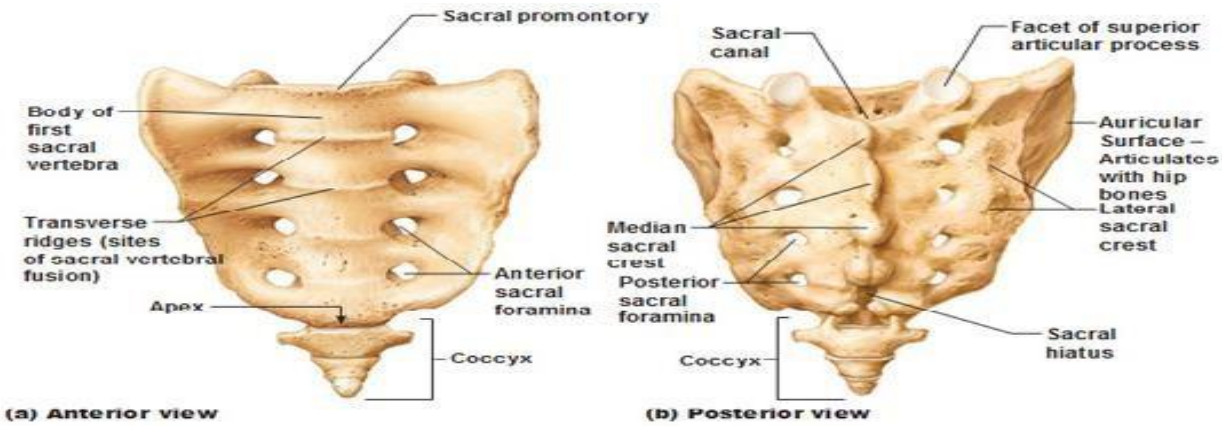

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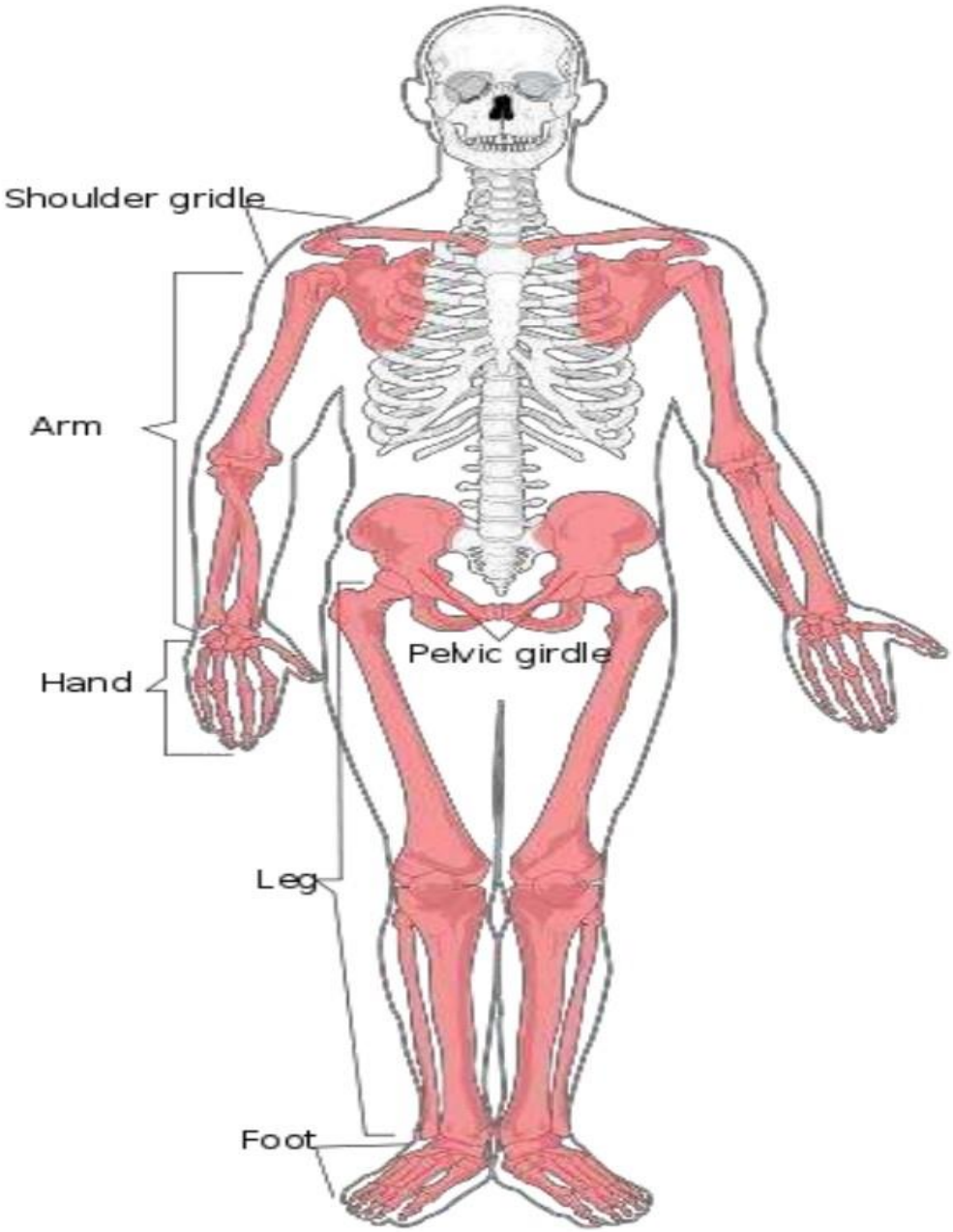
EXPERIMENT- 5

Aim: Identification of appendicular bones

THE APPENDICULAR SKELETON



The **appendicular skeleton** consists of bones of two upper limbs and two lower limbs.

1. **The upper limb:** It consists of bones of shoulder, upper arm, fore arm, wrist and fingers.

   Clavicles and scapula form the pectoral or shoulder girdle.

   Humerus is the bone of the upper arm.

   Ulna and radius are two parallel bones of the fore-arm.

   There are eight **carpals or wrist bones.**

   They are followed by **five metacarpal** bones.

   There are **fourteen phalanges.** Metacarpal bones are the bones of the palm.

2. **The Lower limb:**

   The bones forming the lower limb are

   - **The hip bones,**
   - **Femur (the thigh bone),**
   - **Patella (The Knee-Cap),**
   - **Tibia (the skin bone),**
   - **Fibula (the splint bone),**
   - **Tarsals (the ankle bones),**
   - **Metatarsals (the instep bones) and**
   - **Phalanges (the bones of toes)**

The Femur: It is the thigh bone which resembles somewhat with the humerus of the upper arm. Femur is the longest and the strongest bone of the body.

The Appendicular Skeleton

• **Pectoral girdle** attaches the upper limbs to the trunk.

• **Pelvic girdle** attaches the lower limbs to the trunk.

• Upper and lower limbs differ in function – share the same structural plan.

The Pectoral Girdle- Consists of the clavicle and the scapula

• Pectoral girdles do not quite encircle the body completely

• Medial end of each clavicle articulates with the manubrium and first rib

• Laterally – the ends of the clavicles join the scapulae

Scapulae do not join each other or the axial skeleton

• Provides attachment for many muscles that move the upper limb
• Girdle is very light and upper limbs are mobile
• Only clavicle articulates with the axial skeleton
• Socket of the shoulder joint (glenoid cavity) is shallow
• Good for flexibility – bad for stability

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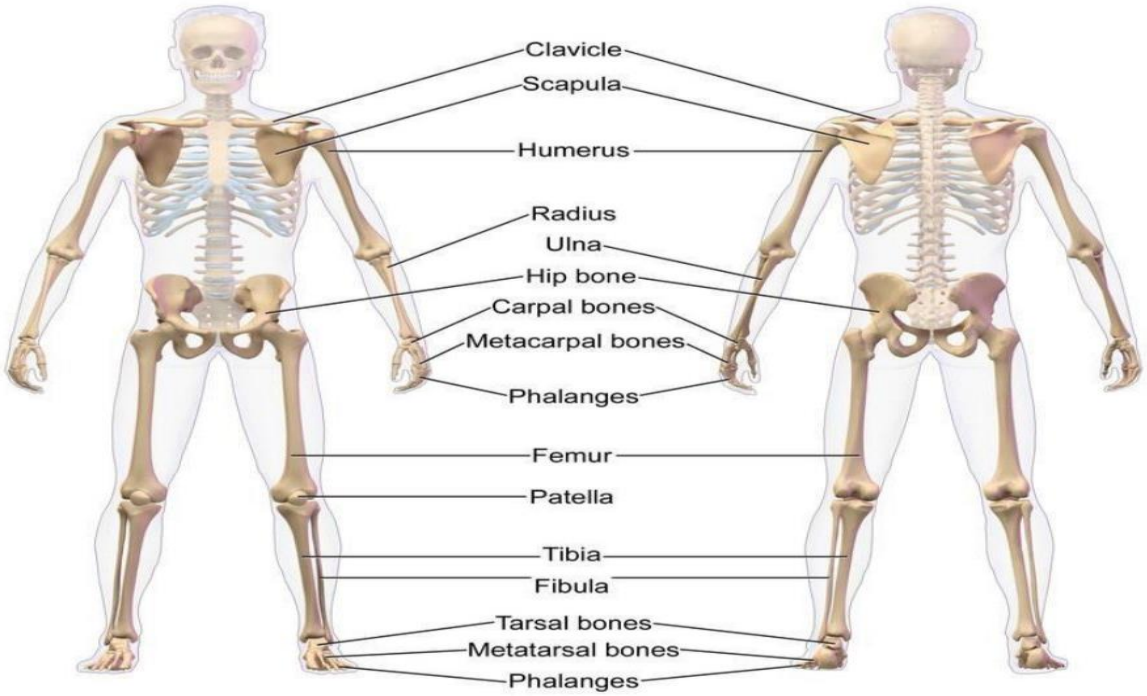

The Appendicular Skeleton

Articulated Pectoral Girdle Clavicles

• Extend horizontally across the superior thorax
• Sternal end articulates with the manubrium
• Acromial end articulates with scapula
• Provide attachment for muscles

Scapulae

• Lie on the dorsal surface of the rib cage
• Located between ribs 2-7
• Have three borders
• Superior, medial (vertebral), and lateral (axillary)
• Have three angles
• Lateral, superior, and inferior

Forearm

• Radius and ulna articulate with each other
• At the proximal and distal radioulnar joints • Interconnected by a ligament – the interosseous membrane
• In anatomical position, the radius is lateral and the ulna is medial

Ulna

• Main bone responsible for forming the elbow joint with the humerus
• Hinge joint allows forearm to bend on arm
• Distal end is separated from carpals by fibrocartilage
• Plays little to no role in hand movement

Radius

• Superior surface of the head of the radius articulates with the capitulum
• Medially – the head of the radius articulates with the radial notch of the ulna • Contributes heavily to the wrist joint
• Distal radius articulates with carpal bones
• When radius moves, the hand moves with it

Hand

• Includes the following bones

• Carpus – wrist

- Forms the true wrist – the proximal region of the hand
- Gliding movements occur between carpals

• Composed of eight marble-sized bones

- Metacarpals – palm
- Phalanges – fingers

Pelvic Girdle

• Attaches lower limbs to the spine

• Supports visceral organs

• Attaches to the axial skeleton by strong ligaments

• Acetabulum is a deep cup that holds the head of the femur

• Lower limbs have less freedom of movement

• Are more stable than the arm

- Consists of paired hip bones (coxal bones)
- Hip bones unite anteriorly with each other
- Articulates posteriorly with the sacrum

Bony Pelvis

• A deep, basin-like structure

• Formed by coxal bones, sacrum, and coccyx

True and False Pelvis • Bony pelvis is divided into two regions

• False (greater) pelvis – bounded by alae of the iliac bones

• True (lesser) pelvis – inferior to pelvic brim

• Forms a bowl containing the pelvic organs

Pelvic Structures and Child bearing

• Major differences between male and female pelvis

• Female pelvis is adapted for childbearing

• Pelvis is lighter, wider, and shallower than in the male

• Provides more room in the true pelvis

Thigh

• The region of the lower limb between the hip and the knee

• Femur – the single bone of the thigh

• Longest and strongest bone of the body

• Ball-shaped head articulates with the acetabulum

Patella

• Triangular sesamoid bone

• Imbedded in the tendon that secures the quadriceps muscles

• Protects the knee anteriorly

• Improves leverage of the thigh muscles across the knee

The Foot

• Foot is composed of: Tarsus, metatarsus, and the phalanges

• Important functions

• Supports body weight

• Acts as a lever to propel body forward when walking

• Segmentation makes foot pliable and adapted to uneven ground

Tarsus

• Makes up the posterior half of the foot

• Contains seven bones called tarsals

• Body weight is primarily borne by the talus and calcaneus

Metatarsus

• Consists of five small long bones called metatarsals

• Numbered 1–5 beginning with the hallux (great toe)

• First metatarsal supports body weight

Phalanges of the Toes

• 14 phalanges of the toes

• Smaller and less nimble than those of the fingers

• Structure and arrangement are similar to phalanges of fingers

• Except for the great toe, each toe has three phalanges: Proximal, middle & distal

Arches of the Foot

• Foot has three important arches

• Medial and lateral longitudinal arch

• Transverse arch

• Arches are maintained by:

  • Interlocking shapes of tarsals

  • Ligaments and tendons

Disorders of the Appendicular Skeleton

• Bone fractures

• Hip dysplasia – head of the femur slips out of acetabulum

• Clubfoot – soles of the feet turn medially

The Appendicular Skeleton throughout Life

• Growth of the appendicular skeleton

-Increases height -Changes body proportions

-Upper-lower body ratio changes with age

-At birth head and trunk are 1.5 times as long as lower limbs

-Lower limbs grow faster than the trunk

-Upper-lower body ratio of 1 to 1 by about age 10

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EXPERIMENT NO- 6

Aim: Introduction to Haemocytometry.

Theory:

The counting of cells (Red blood corpuscles or White blood cells) in blood using haemocytometer set is called haemocytometry. The numbers of cells in blood are too many and the size of cell is too small. The cells will appear in clusters if seen through microscope. This difficulty is partly overcome by diluting blood to a known degree.

Haemocytometer set which is used for counting the number of cells in blood consist of

(1) Dilution pipettes,

(2) Counting chamber (named as Thomas or Neubauer's counting chamber), and

(3) Special coverslip (also known as Thomas coverslip).

The dilution pipette: -

It consists of four parts – the long stem, the bulb, the short stem and the sucker. The long stem has a uniform capillary bore extending from a well ground conical tip and merging in the bulb. The long stem is divided into 10 equal parts from the tip to the mark '1' just near the bulb. The fifth division is heavily marked and labelled as 0.5. This part is to measure exact amount of blood taken for counting. The fluid in this part does not take part in dilution and hence this quantity must be deducted while calculating the dilution factor.

The **bulb** is the part where dilution of blood takes place. It consists of white or red bead which helps in uniform mixing of blood with dilution fluid. The bulb ends in a **short stem** which have the mark '11' (in WBC pipette) or 101' (in RBC pipette). The short stem also consists of a uniform capillary bore. The sucker is fitted to the end of short stem. The sucker is a rubber or polythene tube. At the end of the tube there is the plastic mouth piece.

The differentiating points of the RBC and WBC dilution pipettes have been illustrated in fig.

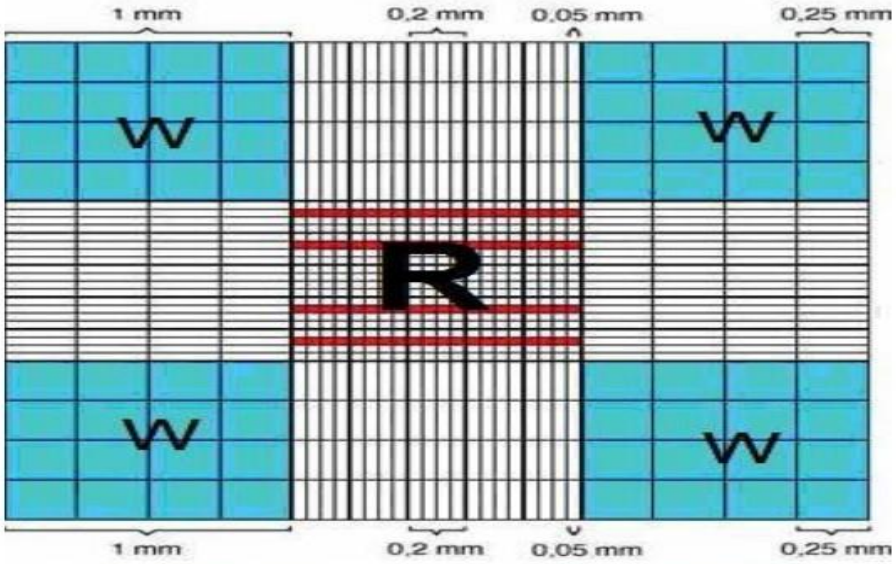
The counting chamber: -

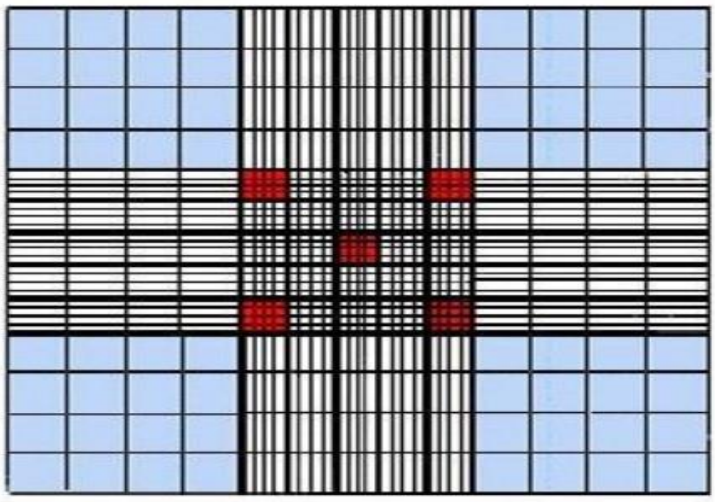
It is a single piece thick glass slide having two counting areas in the central part. The two counting areas are separated from each other and the other part of the slide by an 'H' shaped groove.

On the either side of these areas are the platforms which are raised by 0.1 mm above the counting areas. On these platforms rests special coverslip – Thomas coverslip.

The ruling areas of chamber are the sharp contrast of bright lines against the darker metallised background. A thin semi-transparent layer of the metal has been deposited on the glass counting areas and the lines are ruled out through the metal surface. Just as one cannot see the stars during the day, the ruling cannot be seen if bright light is focused on the chamber. To adjust the chamber one must partially close the diaphragm of the microscope.

The total ruling area of each side is 3 mm in length and 3 mm in breadth. It is divided into nine equal squares of 1 sq. mm area (Fig.). The boundary lines of these squares





are triple linings. Four squares of the corners are used for WBC counting while the central square is for RBC counting.

Each WBC square is further divided into 16 equal squares by single lining. The area of each square is ¼ x ¼ = 1/16 sq. mm. Each RBC square is divided by triple lines into 25 equal small RBC squares, and each of these 25 small RBC squares are further divided into 16 smallest squares by single lining. Thus whole central square is divided into 400 smallest squares, the area of each is 1/20 x 1/20 sq. mm.

The dilution fluids:

Various dilution fluids are used in haemocytometry but the basic criteria for preparing the dilution fluid is that it should be isotonic to blood plasma. The composition of dilution fluid depends on other requirements such as staining, fixation etc. Table 1 and 2 give the most commonly used dilution fluids for RBC and WBC count with the importance of each constituent.

Table 1 (Hayem's RBC dilution fluid)		
Substance	**Amount**	**Purpose**
Sodium chloride (NaCI)	1.0 gm.	Provides isotonicity, Prevents haemolysis
Sodium sulphate (Na2SO4)	5.5 gm.	Provides isotonicity, Prevents rouleax formation
Mercuric chloride(HgCI2)	0.5 gm.	Causes fixation of the cells, Prevents bacterial growth
Water (H2O)	Up to 100 ml	Diluent
Table 1 (Turk's WBC dilution fluid)		
Substance	**Amount**	**Purpose**
Glacial acetic acid	2.0 ml	Destroys RBCs
Gentian or Methyl violet (1%)	1.0 ml	Stains nuclei of WBCs
Water (H2O)	Up to 100 ml	Diluent

SOME USEFUL HINTS:

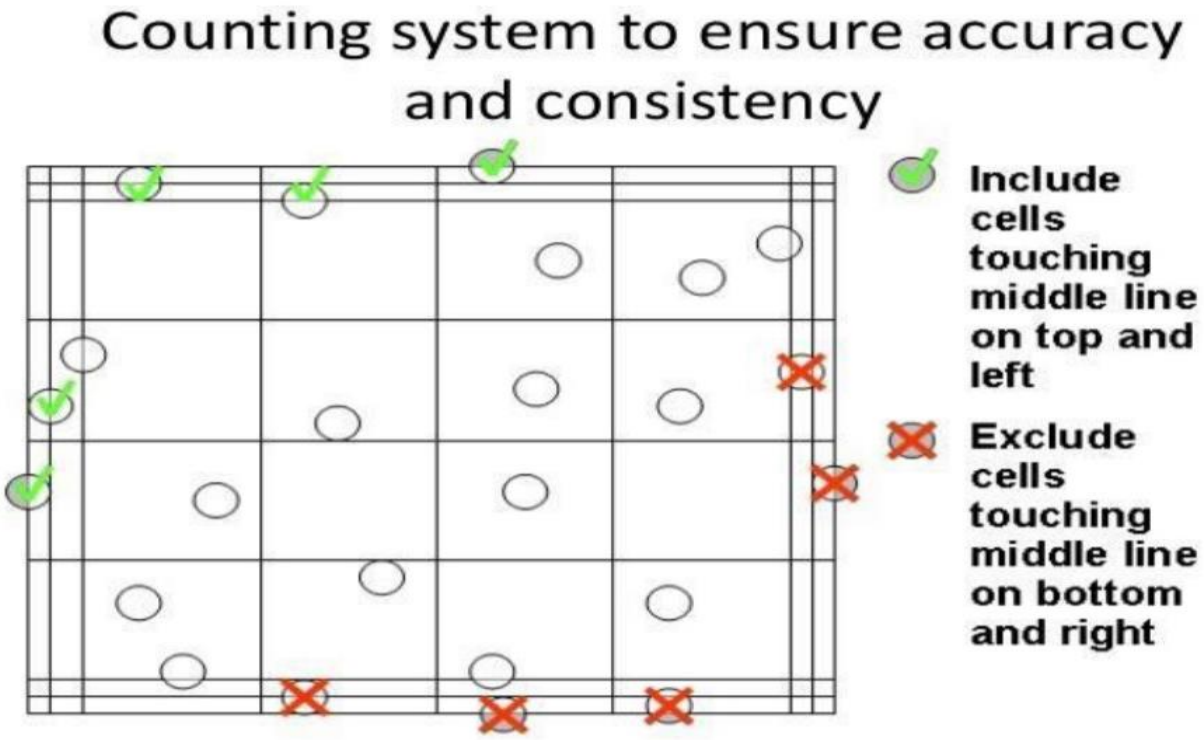
(1) Always clean and adjust the counting chamber, coverslip, microscope and the pipettes before pricking the finger for blood collection.
(2) Suck the blood and the dilution fluid slowly, uniformly and exactly to the mark. After sucking the blood up to the required mark, remove the extra amount of blood from the tip of the pipette by cotton gently and carefully.
(3) A knot may be given to the sucker tube after sucking the dilution fluid upto the particular mark. The care should be taken that fluid does not come out from either end. One end may be closed by putting finger at the tip of stem while putting knot.

(4) Never forget to discard a few drops of fluid in the stem of the pipette because it does not contain blood.

(5) The fluid should not enter into the grooves of slide. It it happens, due to capillary action, it will draw cells thus giving error in counting. It is advisable to form a drop at the tip of pipette and the drop should simply touch the slide. The fluid will spread automatically due to capillary action.

(6) The cells must be allowed to settle for a period of 2-3 minutes before starting the actual count. For counting the number of cells, prepare a table consisting of columns and enter the number of cells in each column.

(7) The cells touching two boundaries (preferably left and top) are to be counted while cells touching other two boundaries (right and the bottom) not to be counted. (Fig.)



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EXPERIMENT-7

AIM- To determine the number of White blood cells present in a blood sample.

REQUIREMENTS: Microscope, lancet needle, Ethanol, Cotton swabs, Glass slides, Neubauer chamber, WBC Pipette, WBC Diluting fluid (Turk's Fluid)

COMPOSITION (Turk's WBC dilution fluid)		
Substance	**Amount**	**Purpose**
Glacial acetic acid	2.0 ml	Destroys RBCs
Gentian or Methyl violet (1%)	1.0 ml	Stains nuclei of WBCs
Water (H2O)	Up to 100 ml	Diluent

PRINCIPLE

• Since the normal WBC count runs into thousands, the count is made possible by diluting the sample of blood before counting and subsequently multiplying the count by the dilution factor

• The dilution employed is 1:20.

PROCEDURE

• Take WBC diluting fluid (Turk's Fluid) in a watch glass

• After pricking finger, suck the second drop of blood into the WBC pipette exactly up to 0.5 mark and dilute it with WBC diluting fluid by sucking the fluid up to 11mark (dilution 1 in 20)

• Gently rotate the pipette at least 3-4 minutes in the palm of the hand to ensure the proper mixing of the blood an the fluid.

• Discard first few drops of WBC fluid in the stem of the pipette, charge the counting chamber (a small drop of fluid is allowed to form at the tip of the pipette and gently brought into contact with the edge of the cover slip that is already placed on the chamber) and allow time for settling of the cells

• Under low power objective, identify and check the distribution of WBCs in the 4 corner squares. Recharge the chamber if distribution is not uniform (WBCs are seen as regular nucleated, rounded bodies with a clear refractivity around them) www.indiandentalacademy.com

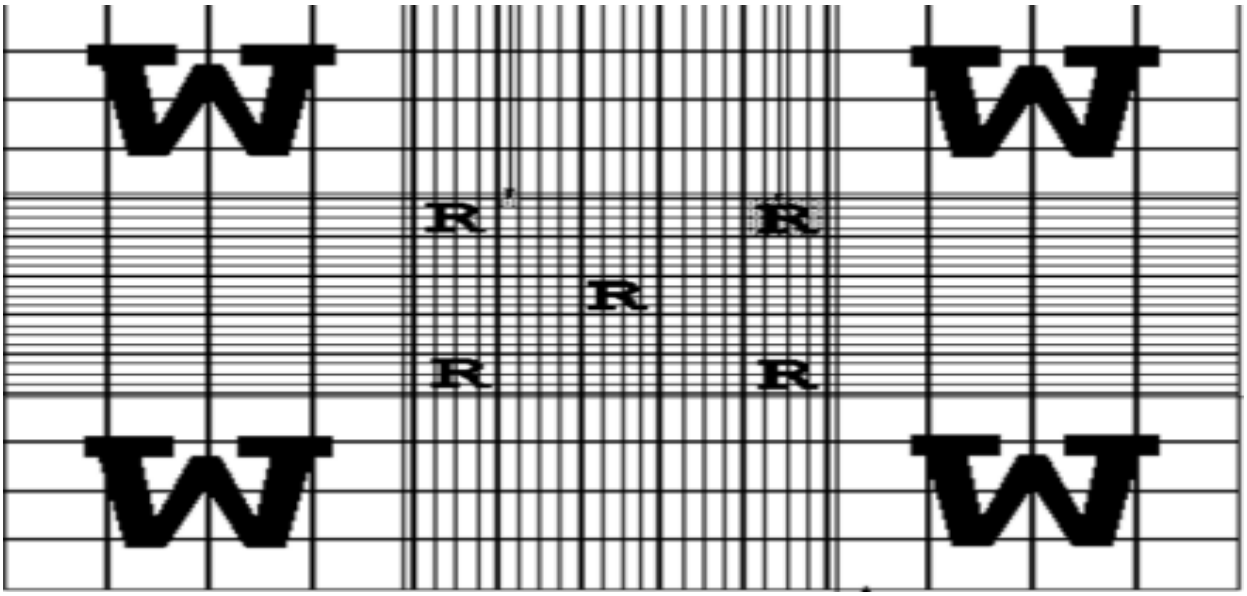
• Count the number of WBCs in each WBC square preferably under low power objective.

• Count the WBCs in 4 corner WBC squares and enter your observations in the corresponding squares.

Calculation

Count the number (N) of cells in 4 large squares located at the four corners of the chamber. The size 4 large squares in which "N" numbers of cells are found is: 1x1x1/10x4= 4/10 mm3 Where 1mm:- is the sideline of the large square 1/10 :- is the depth of the counting chamber between cover slip and the ruling 4:- is the number of large squares used to count

The total numbers of cells in 1mm3 are = Nx10/4 (before dilution of the sample) The actual total numbers of cells after dilution should be= Nx10/4x20=Nx50



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EXPERIMENT- 8

AIM: To find out the number of Red blood cells in one cubic millimeter of blood

REQUIREMENTS: Microscope, lancet needle, Ethanol, Cotton swabs, Glass slides, Neubauer chamber, RBC Pipette, RBC Diluting fluid (Hayem's Fluid).

Table 1 (Hayem's RBC dilution fluid)		
Substance	**Amount**	**Purpose**
Sodium chloride (NaCI)	1.0 gm.	Provides isotonicity, Prevents haemolysis
Sodium sulphate (Na2SO4)	5.5 gm.	Provides isotonicity, Prevents rouleax formation
Mercuric chloride(HgCI2)	0.5 gm.	Causes fixation of the cells, Prevents bacterial growth
Water (H2O)	Up to 100 ml	Diluent

PRINCIPLE:

The number of RBC in a known volume of diluted blood is counted and the number of cells in one cmm of undiluted blood is calculated from this.

APPARATUS:

- Hemocytometer, RBC diluting fluid, compound microscope, sterile lancet,watchglass, cotton, rectified spirit
- HAEMOCYTOMETER: This includes a counting chamber, a special cover slip,and RBC diluting pipette and a WBC diluting pipette.
- The improved Neu-Bauer's double counting chamber:

This is a thick rectangular glass with a polished transverse bar in the centre, separated from the rest of the slide by two parallel grooves on either side. The polished bar is divided into two equal platforms by a groove in the middle resulting in 'H' shaped depression (moats). The surface of the platforms is 1/10 mm below the surface of the rest of the slide. So if a cover glass is placed over the

surface of the counting chamber, the under surface of the coverglass remains 1/10 mm above the polished surface of the platform. The counting area is in the form of a central ruled area on the polished surface of each platform. It is a square of 3 mm side, divided into 9 equal squares of 1 mm side. Of these, the four corner squares are used for WBC counting. Each WBC square of 1 mm side is again divided into sixteen smaller squares each of 1/4mm side. The central 1 mm square is divided into 25 equal small squares of 1/5mm side, by means of triple lines of which the 4 corner ones and the central one are used for RBC counting. Each of these squares is subdivided into 16 smallest squares each of 1/20mm side.

Procedure:

Clean and dry the counting chamber and put on the special cover slip provided. Focus under the high power objective and identify the RBC counting area. Clean the RBC pipette first with distilled water, then with absolute alcohol and finally with ether and keep it dry. Take a small quantity of diluting fluid in a watch glass and keep aside. Clean the finger tip using rectified spirit and make a deep prick with a sterile lancet, so that blood comes out freely without squeezing. Wipe off the first drop which may contain tissue fluid also. Allow a good sized blood drop to form hanging drop and keep the pointed tip of the pipette touching the drop. Suck in blood up to the 0.5 mark carefully, without any air bubble. Excess blood at the tip of the pipette is removed using a bloating paper or piece of cotton. Immediately, diluting fluid from the watch glass is sucked in up to the 101 mark without any air bubble by keeping the pipette in vertical position. Then thoroughly mix the blood and diluting fluid in the pipette by gently rolling the pipette held horizontally between the palms and keep aside. Mixing takes place only in the bulb of the pipette. The column of diluting fluid contained in the stem of the pipette does not enter into the dilution (i.e. 101-1 = 100). So that the blood sucked upto 0.5 mark will have a dilution of 0.5 in 100 or 1 in 200. Now take out the counting chamber for charging discard first few drops from the pipette, as the stem contains only diluting fluid. Bring one small drop of diluted blood at the tip of the pipette, to the edge of the cover slip on the counting chamber at an angle of about 450 The fluid enters by capillary action under the cover slip and fills the counting chamber. Both areas are filled.

Focus the RBC counting area under high power. Keep the counting chamber undisturbed about 3 minutes for the cells to settle down in the counting area, and start counting. At least 5 squares, each having 16 smallest squares (preferably 4 corner and 1 central) should be counted to obtain a

satisfactory average and a better dispersal value. While counting each small square, cells touching the top and left margin of each square should be omitted and cells touching bottom and right margin of each square should be counted. Draw a chart of the counting squares in the record and enter the number of cells in each square and when counted.

Calculation:

Let the number of cells counted in (5x16) 80 smallest squares be “N”

Number of cells in 1 smallest square is N/80

Side of 1 square = 1/20mm

Area of 1 square = 1/400mm2Depth of fluid film in counting chamber is 1/10mm

Volume of diluted blood in 1 square=1/400x1/10=1/4000mm3

Number of cells in 1/4000mm3 diluted blood = N

80 Numberof cells in 1 mm3 of diluted blood N 80x1/4000= Nx4000 80

The dilution factor is 1 in 200

(Total diluted volume in bulb of the pipette is 100 parts, out of which 0.5 is blood. So dilution is 0.5 in 100)

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EXPERIMENT- 9

Aim: To determine the bleeding time of a patient.

Theory:

The time required for complete stopping of blood flow from the punctured blood vessels called the bleeding time. Normally it is 1-3 minutes for a normal human's blood. Normal clotting time and bleeding time values differ because bleeding time is the time for stopping bleeding by the formation of fibrin network on the surface of punctured skin; that is it is the surface phenomenon. But the clotting time is the time for clotting the whole blood, collected in the capillary tube; therefore it is a volume phenomenon. For this reason clotting time is more than the bleeding time, when determining by conventional methods.

Clinical significance

It plays a significant role

i) To study the haemorrhagic disorders.

ii) To study the coagulation defects

iii) To have an idea about the platelets count of the patient. Bleeding time is prolonged in few Disorders like: vascular lesions, platelet defect, severe liver disease, uremia and anti-coagulant Drug administration.

Materials: Sterilized needle, filter paper, cotton, spirit, and stop watch.

Procedure (Duke's method)

Finger of a subject is sterilized with spirit and pricked with sterilized needle. Time of pricking is noted. Take the stain of the punctured point on a filter paper on 30 second and keep taking stain of blood in 20 second intervals until the bleeding stops. The time of no stain has come is noted properly; it is the bleeding time of the subject.

Precaution

Following precautions should be enforced

i) Needle should be sterilized.

ii) A fain stain of blood should not be avoided.

iii) Time should be noted properly.

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EXPERIMENT- 10

AIM: To determine the clotting time of a subject.

Requirements: Fine capillary glass tubes of about 10 mm length, cotton, rectified spirit, lancet, stop watch.

Procedure:

Capillary tube method: (Wright's method)

Under sterile precautions make a sufficiently deep prick in the finger tip. Note the time When bleeding starts (start the stop watch). Touch the blood drop at the finger tip using one end of the capillary tube kept tilted downwards. The tube gets easily filled by capillary action. After about two minutes start snapping off small lengths of the tube, at intervals of 15 seconds, each time noting whether the fibrin thread is formed between the snapped ends. Note the time (stop the stop watch) when the fibrin thread is first seen.

Discussion:

Clotting time is the interval between the moment when bleeding starts and the moment when the fibrin thread is first seen. Normal value is 3to 10 minutes. Bleeding time and clotting time are not the same. Bleeding time depends on the integrity of platelets and vessel walls, whereas clotting time depends on the availability of coagulation factors. In coagulation disorders like haemophilia, clotting time is prolonged but bleeding time remains normal. Clotting time is also prolonged in conditions like vitamin K deficiency, liver diseases, disseminated intravascular coagulation, over dosage of anticoagulants etc.

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EXPERIMENT- 11

AIM: To determine the hemoglobin content in 20µl of blood sample.

PRINCIPLE: A hemoprotein composed of globin and heme that gives red blood cells their characteristic color; function primarily to transport oxygen from the lungs to the body tissues. The red blood cells are broken down with hydrochloric acid to get the hemoglobin into a solution. The free hemoglobin is exposed for a while to form hemin crystals. The solution is diluted to compare with a standard colour.

MATERIALS: Hemometer, Single mark pipette, Distilled water, Needle, Spirit, Cotton, HCl.

PROCEDURE:

1. Take 1/10 HCl in the Hb tube upto the lowest mark '2'.
2. Prick the finger with needle and collect 20µl of blood sample with single mark pipette.
3. Place the Hb tube on working table for five minutes for the formation of hemin crystals.
4. Place the Hb tube in the compater/hemometer and add drop by drop of distilled water into it until the colour of the solution in the Hb tube coincides with the glass plates of the compater.
5. If the colour coincides with the glass plates of the compater, observe the reading in the Hb tube. The percentage of Hb can be calculated from the reading.

DATA ANALYSIS:

Hb content in grams X 100 / 14.5

NORMAL VALUES:

Males = 14 to 18 grams

Females = 13 to 14 grams

Children = 10 to 13 grams

RESULT: The hemoglobin content present in 20µl of blood sample is ----

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EXPERIMENT- 12

AIM: To determine the Blood group type of blood sample

ABO blood group system, the classification of human blood based on the inherited properties of red blood cells (erythrocytes) as determined by the presence or absence of the antigens A and B, which are carried on the surface of the red cells. Persons may thus have type A, type B, type O, or type AB blood. The A, B, and O blood groups were first identified by Austrian immunologist Karl Landsteiner in 1901. See blood group.

Blood containing red cells with type A antigen on their surface has in its serum (fluid) antibodies against type B red cells. If, in transfusion, type B blood is injected into persons with type A blood, the red cells in the injected blood will be destroyed by the antibodies in the recipient's blood. In the same way, type A red cells will be destroyed by anti-A antibodies in type B blood. Type O blood can be injected into persons with type A, B, or O blood unless there is incompatibility with respect to some other blood group system also present. Persons with type AB blood can receive type A, B, or O blood.

The ABO and Rh groups in transfusion

system	recipient type	donor red cell type	donor plasma type
ABO	A	A* or O	A or AB
ABO	B	B or O	B or AB
ABO	O	O only	O, A, B, or AB
ABO	AB	AB*, A*, B, or O	AB
Rh	positive	positive or negative	positive or negative
Rh	negative	negative or positive**, ***	negative or positive**

*Not if the patient's serum contains anti-A1 (antibody to common type A red cell in subgroup A patients).
**Not if the patient is a female less than 45 years old (childbearing possible), unless life-threatening hemorrhage is present and transfusion of Rh-positive blood is lifesaving.
***Not if the patient's serum contains anti-D (antibody to positive red cells), except under unusual medical circumstances.

Blood group O is the most common blood type throughout the world, particularly among peoples of South and Central America. Type B is prevalent in Asia, especially in northern India. Type A also

is common all over the world; the highest frequency is among the Blackfoot Indians of Montana and in the Sami people of northern Scandinavia.

The ABO antigens are developed well before birth and remain throughout life. Children acquire ABO antibodies passively from their mother before birth, but by three months of age infants are making their own; it is believed that the stimulus for such antibody formation is from contact with ABO-like antigenic substances in nature. ABO incompatibility, in which the antigens of a mother and her fetus are different enough to cause an immune reaction, occurs in a small number of pregnancies. Rarely, ABO incompatibility may give rise to erythroblastosis fetalis (hemolytic disease of the newborn), a type of anemia in which the red blood cells of the fetus are destroyed by the maternal immune system. This situation occurs most often when a mother is type O and her fetus is either type A or type B.

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EXPERIMENT 13

Aim: To report ESR of your blood.

Erythrocyte Sedimentation Rate (ESR)

The ESR is the rate at which erythrocytes settle down or produce a millimetre of clear plasma at the top of a vertical column in an hour. In this procedure, the blood is mixed with anticoagulant and is allowed to stand in a vertical tube.

There are two commonly used methods for calculating the ESR that are:

1) Westergren's Method: This tube should be opened at both ends and labelled in mm up to the 20mm mark.

2) Wintrobe's Method: This tube should be opened at the top and closed at the bottom and labelled in mm up to the 100mm mark.

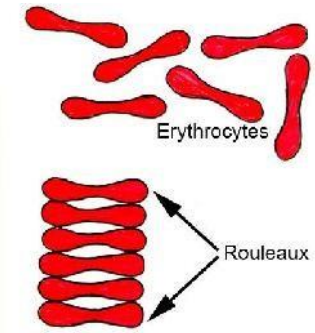
The ESR can be used to diagnose a wide range of illnesses and physiological problems.

Increased Sedimentation

Tuberculosis, cancer, rheumatic fever anaemia, menstruation, pregnancy and Lukaemia.

Decreased ESR

Congestive heart failure, polycythaemia, congenital diseases.



Procedure

1) Anticoagulant solution (1/5 of blood), ie, oxalate or citrate should be taken in a clean dry vial

2) Then two ce of blood should be extracted out by vein puncture

3) The blood should be mixed properly with anticoagulant solution.

4) Then the blood should be sucked into Westergren tube upto 200 mark.

5) It should be placed in the stand.

6) The Westergern tube should be held vertically in the stand.

7) The reading should be note after one hour.

Normal Range:

Average values in healthy men are: <15mm/hr; in healthy females, they are somewhat higher: <20mm.

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EXPERIMENT 14

Aim: Determination of heart rate and pulse rate.

Requirement: Stopwatch

Theory:

The pulse is the surge of blood that is pushed through the arteries when the heart beats. The pulse rate is how many times one can feel a pulse every minute. The pulse rate is a vital sign that can tell a lot about a victim's medical condition.

The pulse rate changes with exercise, so healthcare providers like to compare resting pulse rates, which should always be between 60-90 beats per minute. Extremely fast pulses -- more than 150 beats per minute -- or slow pulses of less than 50 per minute can indicate problems with the heart. An extremely slow pulse combined with dizziness can indicate shock and help identify internal bleeding. Pulse is examined to diagnose the conditions of heart, arteries and blood pressure. Besides the pulse rate, other indicators of how a person is doing come from the regularity and strength of the pulse.

The pulse is often confused with the heart rate but refers instead to how many times per minute the arteries expand and contract in response to the pumping action of the heart. Taking the pulse is, therefore, a direct measure of heart rate.

Fast facts about pulse:

- As the heart pumps, the arteries expand and contract. This is the pulse.
- The pulse is easiest to find on the wrist or neck.
- A healthy pulse is between 60 and 100 beats per minute (bpm).

What is the pulse?

The pulse is the expansion of the arteries. This expansion is caused by an increase in blood pressure pushing against the elastic walls of the arteries each time the heart beats. These expansions rise and fall in time with the heart as it pumps the blood and then rests as it refills. The pulsations are felt at certain points on the body where larger arteries run closer to the skin. Most common places are radial, carotid, brachial, and femoral arteries.

This is the pulse running through one of the carotid arteries. These are the main arteries that run from the heart to the head.

- Pulse rate above the normal is called as **Tachycardia**
- Decrease in pulse rate than normal is called as **Bradycardia.**

NOTE: Many things-such as anxiety, pain and fever-can raise the patient's pulse (heart rate) and certain medications such as beta blockers or digoxin can lower it; all of these reasons should be considered when assessing and recording the patient's pulse. If you are taking repeat measurements of the same patient, try to measure the pulse under the same conditions each time.

Steps to Determine the Pulse Rate

1. Stay Safe.
2. Locate the pulse.
3. Count the beats.
4. Calculate the pulse rate.

Procedure:

1. Locate the radial artery at the own wrist level.
2. Palpate the radial artery by pressing them with finger against the underlying bones (the pulse will be felt).
3. Record the pulse for 1 minute.
4. Take three readings at the interval of 5 minutes and calculate the mean pulse rate.

A normal pulse is regular and strong. Pulse rates (number of beats per minute) change with age and can vary between individuals of the same age.

Normal pulse rate range, by age:

Age	Pulse rate (beats per minute)
New born (resting)	100- 180
Infant (resting)	80- 150
Child 2- 6 years	75- 120
Child 6- 12 years	70- 110
Adolescent- adult	60- 90

Tips

1.Never use your thumb to take a pulse. In most people, there is a pulse in the thumb that can interfere with the one you're trying to feel in the patient, and thumbs aren't as sensitive as the other fingers.

2.The rate of the pulse is only part of the story. The quality of the pulse is also important. When taking a pulse rate, make a note of the strength of the pulse and whether it is regular or erratic. An irregular or weak pulse can tell medical providers important information about a patient's condition.

3. The pulse in the wrist is called the radial pulse, but pulses can also be felt in the neck, upper arm, groin, ankle and foot.

Observation Table:

SI. No.	Observation No.	Pulse rate (pulse/min)
1	1st Reading	
2	2nd Reading	
3	3rd Reading	
4	Mean	

Result:

Conclusion:

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EXPERIMENT- 15

Definition of Blood Pressure

Arterial blood pressure is the force exerted by the blood on the wall of a blood vessel as the heart pumps (contracts) and relaxes. Systolic blood pressure is the degree of force when the heart is pumping (contracting). The diastolic blood pressure is the degree of force when the hearts relaxed.

Method of Measuring Arterial Blood Pressure

In the measurement procedure a cuff is wrapped around a person's arm with an inflatable rubber bag inside the cuff centered over the brachial artery. Enough air pressure is pumped into the cuff to close the artery. Air pressure is then released by opening the thumb valve. When the pressure in the cuff is equal to the pressure on the artery, the artery opens and the blood begins to return to the part of the artery that was closed.

As the blood returns to the artery, pulse sounds begin. These sounds can be heard through a stethoscope placed over the brachial pulse point. The sounds continue for a time while the cuff is deflated slowly, eventually becoming too faint to hear.

The cuff is connected by tubing to a manometer, which shows the amount of pressure on the artery. When the first pulse sounds are heard, the reading on the manometer measures the systolic blood pressure. The last sound heard is the diastolic blood pressure. In children, the muffling of sound or fourth sound is often used as the diastolic blood pressure rather than the disappearance of sound.

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)	and/or	DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

Vision and Mission of the Institution

Vision

The East Point College of Pharmacy aspires to be a globally acclaimed institution, **recognized** for **excellence in** pharmaceutical education, research and nurturing students for **holistic development.**

Mission

M1 Create pharmacy graduates through **quality education**

M2 Promote innovation, **creativity**, and excellence **in teaching**, learning, and **research**

M3 **Inspire** integrity, teamwork, critical thinking**, personal** development, and ethics in **students** and lay **the** foundation for lifelong learning

M4 **Serve** the **healthcare, technological, scientific**, and **economic** needs of then **society**.