

Aim :-

To determine the number of white blood cells (WBCs) in one's own blood sample.

Reference -

Thakare N. Vishnu practical book Human anatomy and physiology 11th edition November 2015
Nisali prakashan page no - 21 - 24.

Requirements :-

Hemocytometer containing Neubauer's counting chamber, WBC pipette, sterile needle (gauge no 24), microscope, coverslip, WBC diluting fluid, spirit.

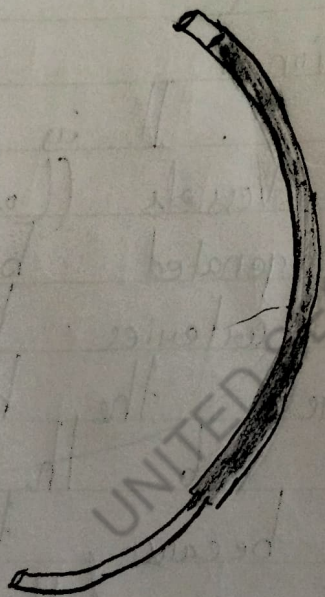
Principle :-

The use of acetic acid solution with blood causes haemolysis of RBCs and accentuates nuclei of white cells. The WBCs can then be easily counted. The number of WBC/mm³ of undiluted whole blood is calculated. Normal range of WBCs is 4500 - 10000/mm³ of blood.

Theory :-

The white blood cells (WBCs) are also called as leukocytes. They are nucleated, actively amoeboid and do not contain haemoglobin and originate purely from extra vascular tissues. They contain proteins and various enzymes. Life span of WBCs is less than that of RBCs.

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WBC pipette

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The types and subtypes of WBCs are given below

1. Granulocytes

A. Eosinophils

B. Basophils

C. Neutrophils

2. Agranulocytes

A. Lymphocytes

B. Monocytes

Composition of diluting fluid.

Glaucal acetic acid - 1%

Gentian violet - 0.3%

Distilled water - Q.S.

Procedure :-

1. Take clean and dry apparatus. Use sterilised needle either having 22 or 24 gauge number. prick the finger and allow blood drop to form on the fingertip spontaneously.

2. Take the pipette and suck the blood in to the WBC pipette up to the 0.5 mark only (indicated on WBC pipette in figure 5.1)

B. Wipe the tip of the pipette and maintain the blood level at the 0.5 mark by holding the pipette in a horizontal position.

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Calculation —

$$\text{Area of 4 WBC squares} = 4 \times 1 = 4 \text{ mm}^2$$

$$\text{Volume of WBC squares} = 4/10 \text{ mm}^3$$

(4/10 - 10 volumes of diluted blood in bulb contains 0.5 volume of blood and 9.5 volume of diluting fluid) hence, dilution is 1 in 20 (1:20).

$$\text{cell in } 4/10 \text{ mm}^3 \text{ volume of diluted blood} = X$$

$$\text{cells in } 1 \text{ mm}^3 \text{ volume of diluted blood} = \frac{10 \times X}{4}$$

$$\text{Cells in } 1 \text{ mm}^3 \text{ volume of diluted fluid} = \frac{10 \times X \times 20}{4}$$

$$= 50X$$

There fore,

$$\text{Total WBCs} = Y / \text{cu. mm of diluted blood.}$$

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1. Dip the pipette in to the diluting fluid below the surface of the liquid.
2. Suck the WBC diluting fluid up to 11 marks while the bulb is being filled, tap the pipette with a finger to knock the bead below the surface of fluid in the bulb to prevent any bubble formation.
3. Maintain the level of the mixture at 11 marks by closing the tip of pipette with the index finger during removal of pipette from diluting fluid.
4. Hold the pipette horizontally and close the both ends of the WBC pipette, then gently mix the contents of the bulb.
5. After mixing, put the pipette in the horizontal position to prevent any loss of its content until the cell count is completed.
6. Discard the first 2 drops of fluid from the pipette as it does not contain the cells.
7. Change the counted area of the counting chamber taking care to prevent flooding.
8. Count the number of cells.

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Results $\rightarrow$

The total white blood cells count of my own blood sample was found to be $\dots\dots\dots$ /cu mm of blood.

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Aim :-

To study the female reproductive system.

Reference :-

Thakare N. Vishnu practical book Human anatomy and physiology 2nd edition november 2015 Nirali prakashan page no. 147-150.

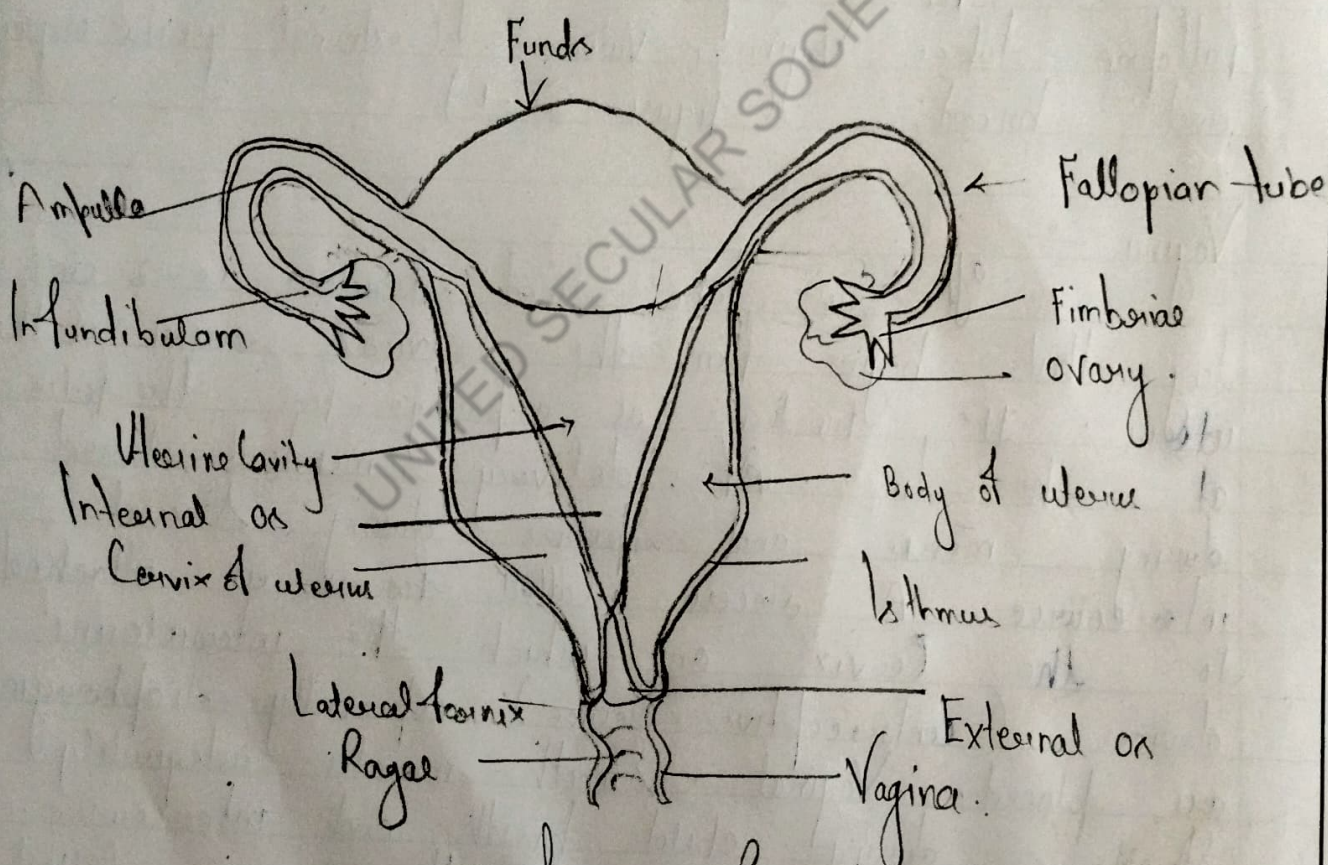
Theory :-

Female reproductive system consists of ovaries fallopian tubes, Vagina, Vulva (external genital organs) and breasts (figure 36.1)

Vagina :-

It is tube lined structure 10-12 cm long that begins from the Cervical region of the uterus. It functions as a passage for the fetus at the time of delivery, menstrual blood during menses and Sperm during sexual intercourse. A mass called clitoris is attached to the Cervix on which the intrauterine devices (contraceptive device) especially diaphragm are placed. Vaginal smooth muscles adequately stretch during child birth and intercourse. The superficial layer of the Vagina, called the adventitia is composed of connective tissue. At the vaginal orifice, there is a thin membrane called hymen, forming border of the orifice.

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Female Reproductive system.

That get erupured during intercourse.

Vulva →

It includes the following structures - mons pubis : It is anterior to the urethral and vaginal openings and is composed of adipose tissue, covered with skin and pubic hair.

Labia majora : These are two folds extending from mons pubis to the perineum. It is made up of adipose tissue, sebaceous glands, and sweat glands with pubic hair.

Clitoris : -

It is located anterior to the labia minora. It is a cylindrical mass of erectile tissue. The stimulation of clitoris produces sexual excitement in female.

Vestibule →

It is the space between the labia minora. Three labia or vaginal lips, folds of skin on either side of the vaginal opening and is surrounded by labia majora and is occupied by the vaginal orifice, the hymen and the urethral orifice. This tissue helps to narrow the vaginal orifice during sexual intercourse which puts pressure on the penis. Within the urethral and vaginal orifice are the paraurethral mucus secretion and

and parathyroid gland respectively

Breasts (Mammary glands):

This gland is responsible for synthesis and excretion of milk under the influence of hormone viz. prolactin and oxytocin. Each breast has nipple. behind which are present the lactiferous ducts and sebaceous glands. pigmented area around the nipple is the areola. The breast is supported by suspensory ligaments.

Ovaries: These are two in number which produce sex hormone (estrogen and progesterone) and the ova. Each ovary lies in the shallow cavity on the lateral wall of the pelvis attached to uterus by broad ligament called as mesovarium.

Fallopian tube: These are two in number, lying one on each lateral side of fundus of the uterus. Each tube measures about 10 cm long. These tubes are responsible for transport of ovum towards the uterus. The funnel shaped region of fallopian tube is known as infundibulum.

Uterus: uterus is present between the bladder and rectum. It is the site for implantation of fertilized ovum, development of the embryo and foetus and also a passage for menstrual bleeding. It is a pear shaped organ having 7.5 to 8 cm long, 5 cm wide and 2.5 cm thick having fundus, body and cervix.

pathological Significance.

Dysmenorrhea: pain during menstruation occurs due to tumour, formation of ovarian cysts, pelvic inflammatory disorders, pelvic inflammatory disease :-

Bacterial infection of pelvic organ (uterus, uterine tube, ovaries) characterised by pelvic tenderness, lower back pain, abdominal pain etc.

Vulvovaginal candidiasis: It is characterised by itching, thick yellowish vaginal discharge, pain, and commonly occurs due to fungal infection with *Candida albicans*.

polycystic ovarian syndrome (PCOS):

This syndrome is characterised by oligomenorrhoea, anovulation, infertility, hirsutism and obesity in young female with enlarged and cystic ovaries.

Dysfunctional uterine bleeding :-

Excessive bleeding during or in between menstrual periods without a causative uterine lesion. It occurs commonly in association with anovulatory cycle i.e.

Endometriosis: It is a condition in which cells from the lining of the endometrial layer grow outside the uterine cavity and is characterised by symptoms such as bleeding.

Results :-

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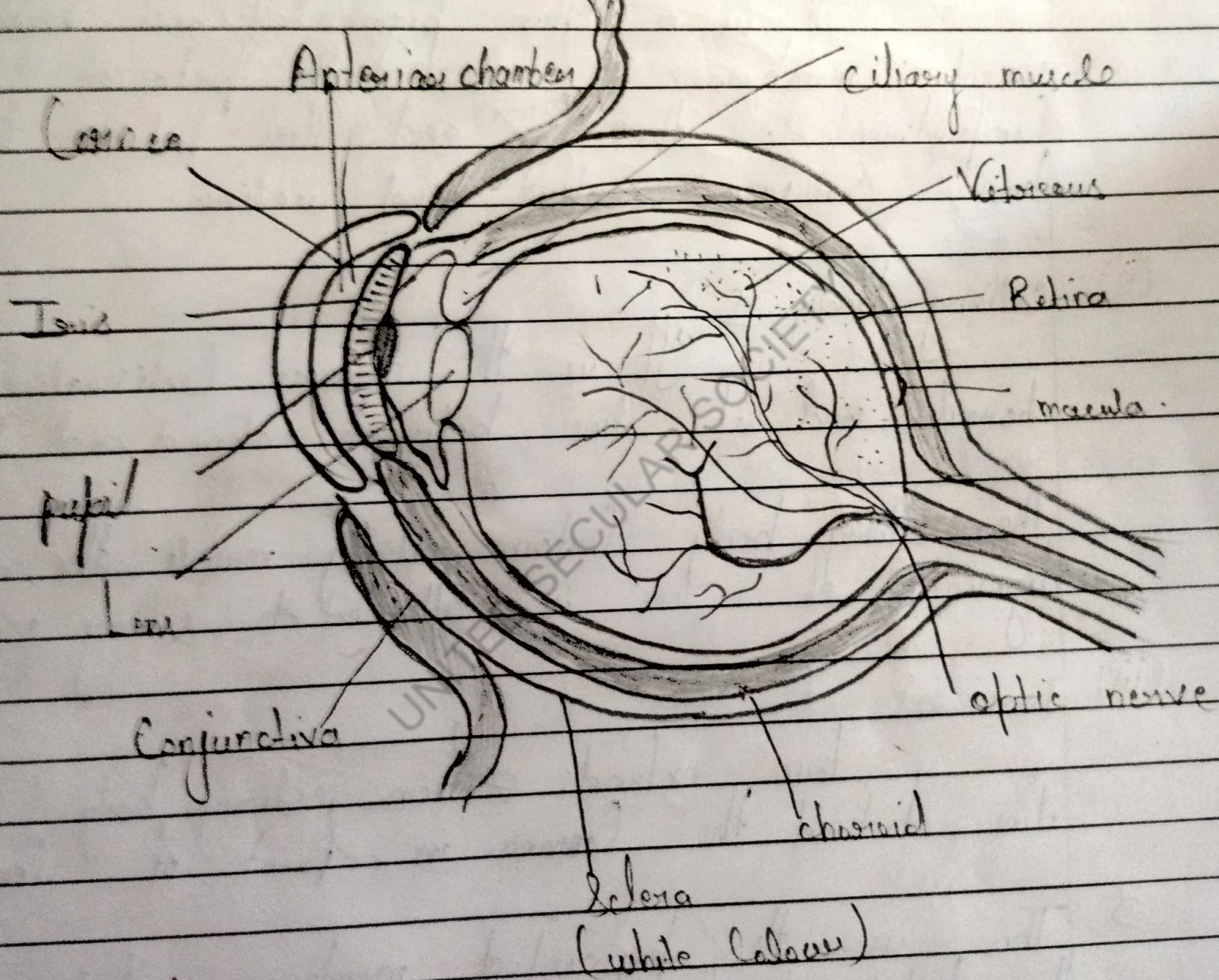
To study the Human eye.

Reference :-

Tharane N. Vishnu practical book of Human anatomy and physiology published by Nizali prakashan 11th edition page no. 151-153.

Theory :-

The eye is a special organ for the sense of sight. It is located in the orbital cavity. It is spherical in shape and 2.5 cm in diameter. The eye ball measures about 2.5 cm diameter. The orbit of the eye is formed by different bones which protect the eye ball. Anatomically, the wall of the eye ball is divided into 3 layers. Outer layer is a fibrous coat consisting of Sclera and Cornea. The middle layer is a Vascular coat consisting of choroid, ciliary body and iris. The inner layer known as retina consists of nervous tissue (figure 37.1).



1. Sclera :

The white region of eye is made up of Collagen Fibers and fibroblast. The fibrous tissue of Sclera maintains the shape of the eye and also provides site for attachment to the extrinsic muscles of the eye.

2. Cornea :

It is 0.5 - 1.0 cm thick, made up of epithelium, it functions in transmission light toward retina as well as provides effective barrier against bacterial invasion.

3. Choroid :

It is situated posterior to the Sclera and is very vascular, deep chocolate brown in colour. Light enters the eye through activating the nerve ending in the retina and finally absorbed by choroid.

4. Ciliary body :

presents anteriorly to the choroid. Consists of the non-striated muscle fibers. epithelial cells and contains ciliary process. Secretion from epithelial cells forms aqueous humor.

The size of pupil changes due to contraction and relaxation of ciliary muscles under postsynaptic stimulation and oculomotor nerve.

5. The iris:

It is anterior to ciliary body, between the Cornea, and lens, consists of Circular and radial smooth muscles. At the centre of the iris is the pupil; the size of the pupil changes during contraction of Circular muscle and radial muscle. Circular muscle has parasympathetic innervations and upon activation it contracts (meiosis) and the size of pupil reduces; this is observed in bright light. In bright, the sympathetic nerve innervates the radial muscle and its activation leads to relaxation of radial muscle (mydriasis).

6. Lens:

It is a Circular - biconvex transparent body. The suspensory ligaments of the ciliary body hold the lens enclosed within the Capsule. It is elastic in nature and lies posterior to the pupil.

7. Retina : It lines in the inner surface of the choroid and is composed of nerve cells fibers. They acts as rods and cones and are activated depending upon the intensity of light passing in to the eye. The Vitreous humour in the eye ball cavity, posterior to the lens, helps in maintaining intraocular pressure to support the retina against choroid.

physiology of Vision :-

photo-receptors and photo pigments - stimulation/activation of the photo receptors takes place when the image of the object is focused on retina thereby transferring light to bipolar cells. The rhodopsin of rods and other pigments of cones are responsible for colour vision.

Optic tract :

It is the pathway posterior to the optic chiasma. The tract consists of nasal fibers of retina. The tract goes back sides to meet lateral geniculate in to the Cerebrum.

Lateral geniculate Situated posterior and lower to the thalamus and is the relay centre for Visual information received from the retina of the eye. It collects information from the ascending retinal ganglion cells through the optic tract and from the reticular activating system and then neurons send their axons via optic radiation.

pathological significance :-

Cataract: It is the clouding of the lens inside the eye which leads to decrease in vision. It is the most common cause of blindness and is conventionally treated with surgery.

Glaucoma:

It is a group of ocular disorders with multi-factorial etiology, characteristic with increase in intraocular pressure - associated optic neuropathy that results in impairment in vision.

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Cycloplegia →

off is paralysis of the ciliary muscle of the eye resulting in loss of accommodation.

Results :-

Aim :-

To Study the human ear.

Reference :-

Thakare N. Vishnu practical book of Human anatomy and physiology published by Nisadi prakashan. II nd edition 2015 page no. 154 - 156.

Theory :-

Ear is the organ of hearing. The Cranial nerve (8th Cranial nerve) carries sensation of hearing towards the Cerebral Cortex which is a region for the integration and interpretation of information.

Ear is divided into 3 regions.

External Ear :-

Collects sound waves and transmits towards middle ear.

Middle ear: Middle Ear also called as tympanic ear, which conveys sound vibrations to the oval window.

Internal Ear :-

Receives and interprets the sound for hearing and equilibrium.

External Ear :-

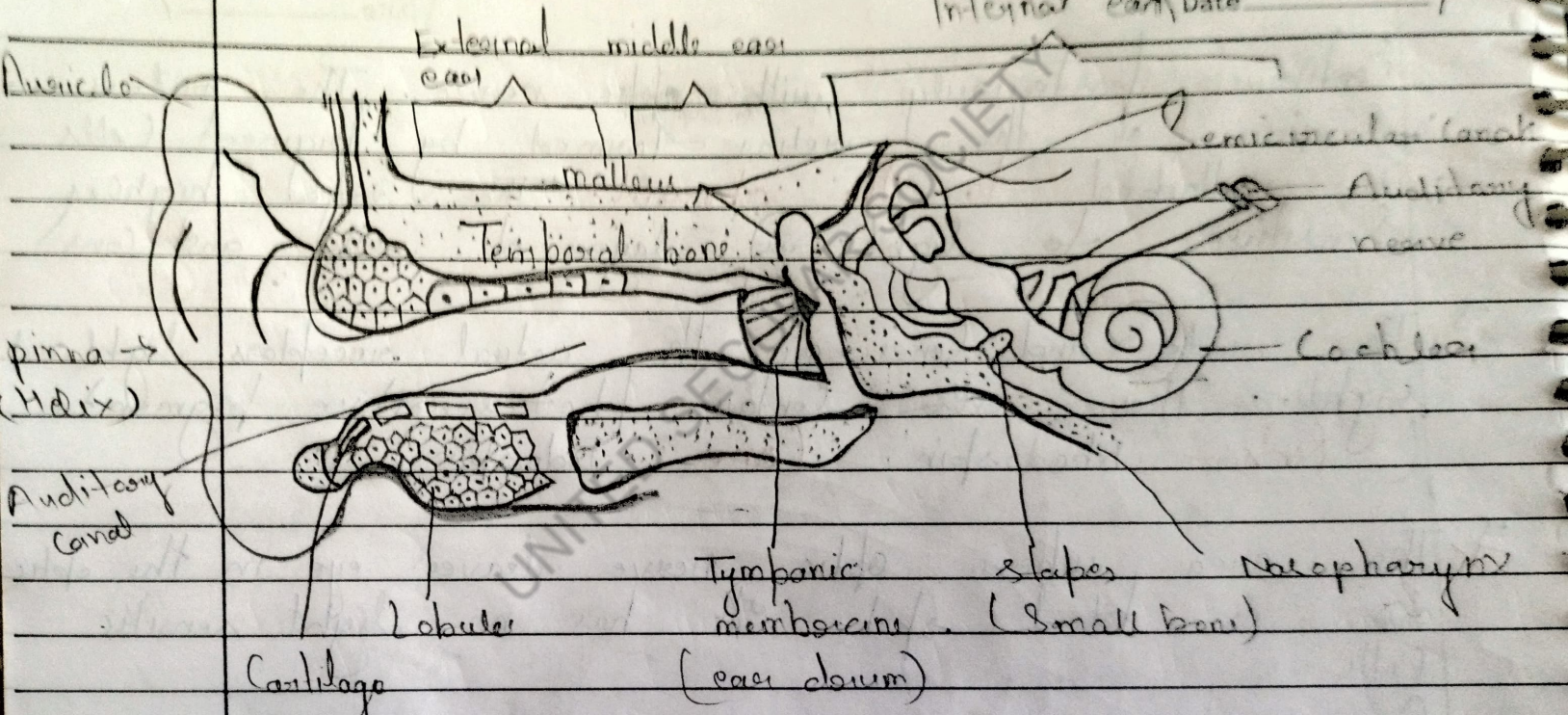
Consists of the following parts.

pinna OR Auricle :-

It is the expanded part, made up of fibroblastic cartilage covered with skin. The expanded outer edge is known as helix and lower most part is the lobule. Ligaments and muscle attach the pinna to the head.

External auditory Canal: -

It is an irregular shaped long about 2.5 cm in length which lies in the temporal bone and leads from auricle to the ear drum. It is divided into cartilaginous and osseous part. Cartilaginous part is about $\frac{1}{3}$ rd of auditory and contains ceruminous glands which secrete wax called cerumen that helps to trap the entry of unwanted particles into the ear.



Middle ear :-

It is small and filled with air and is known as tympanic cavity. The middle ear contains a chain of three small bones called auditory ossicles of which one end is connected to the ear drum and other end to fenestra Vestibuli. Auditory ossicles also contains malleus, incus and stapes (figure 201).

Internal Ear :-

Internal ear is bony and in the form of a membranous labyrinth. The space between two labyrinths contain perilymph fluid, whereas, membranous labyrinth contains endolymph fluid. The bony labyrinth is divided into 3 parts.

Vestibule - is an expanded part of the middle of ear contains fenestra Vestibule and cochlea.

The Cochlea - is snail shaped organ having broad base and apex. The three canals are continuous with the Vestibule. The membranous labyrinth in the vestibules consists of sac called utricle and

Sacculi which are connected by small ducts. At one end of each semicircular canal is a swollen enlargement called the ampulla. The vestibular branch of the Vestibulocochlear nerve (8th Cranial nerve) consists of ampullary, utricular and saccular nerves. Cell bodies of the sensory neurons are located in vestibular ganglia. Auditory nerve goes posteriorly through Temporal bone and reaches the hearing area of the Cerebral Cortex.

physiology of hearing :-

The auricle or pinna collects the sound waves and transmits them in to the external auditory canal, where it strikes the ear drum. Because of the change in the pressure of air, the ear drum vibrates. The central area of the ear drum connects to malleus, which also vibrates. These vibrations are transferred to incus and in turn to stapes. As the stapes vibrates the membrane of oval window is pushed in and out. The oval window vibrates about 20 times more vigorously than the

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can drum because of transmission of small vibration oscillates over a larger surface area. The movement of oval window sets up fluid pressure waves in the perilymph of the cochlea.

pathological significance :-

Deafness: hearing impairment, or hearing loss is a partial or total inability to hear.

Otitis: Inflammation of ear due to infection.

Results :-

Aim :-

To study the Human skin.

Reference :-

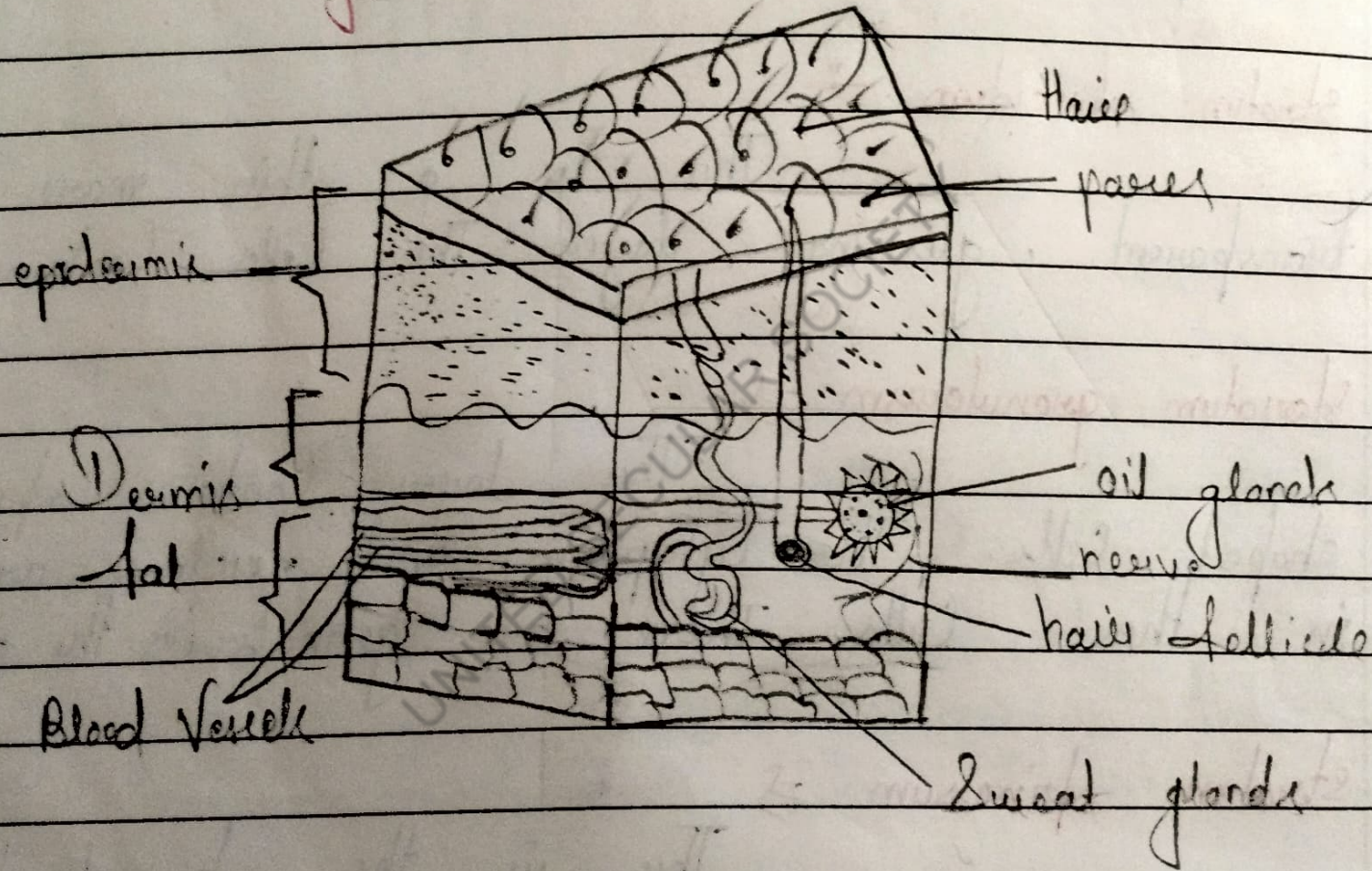
Thakore N. Vishnu practical book of Human anatomy and physiology published by Nirali prakashan - 11th edition 2015 page no. 151-159.

Theory :-

Skin is part of the integumentary system which helps in protection and temperature regulation. It is also known as Cutaneous membrane or outer covering of body with surface area of about $1.5-2 \text{ m}^2$ and consists of glands, hairs and various cells. Skin has two important layers i.e. epidermis and dermis (figure 27.1).

Epidermis :-

It is the superficial layer of the skin, made up of stratified keratinized squamous epithelium which varies in thickness in different part of the body. Blood vessels and nerve endings are absent in the epidermis although for supply of oxygen and nutrients deeper layer are bathed in the interstitial



fluid of the dermis.

The Keratinocytes, melanocytes, Langerhans and Merkel cells are the important cells found in the epidermis. Keratinocytes produce a protein called as Keratin which helps in protection from heat, chemicals and micro-organisms.

Melanocytes are cells which produce a pigment known as melanin which gives a characteristic colour to the skin and protect skin from UV light. Langerhans cells originate from the bone marrow, migrate towards the epidermis and prevent the entry of micro-organisms into the skin.

Stratum basale is made up of cuboidal columnar Keratinocytes, which form a tough protein keratin which helps in protection from injury to deeper layers. Stratum spinosum superficial to Stratum basale gives strength and flexibility to the skin. Stratum granulosum, a middle portion of epidermis is made up of 3-5 flattened Keratinocytes, the Keratinocytes acts water repellent sealant, prevent loss and entry of water and foreign materials.

Dermis :-

It is a tough, elastic layer made up of dense, irregular connective tissue - collagen fibres. The different cells found in the dermis are fibroblasts, macrophages, adipocytes along with blood vessels, nerves, glands, and hair follicles. Dermis is divided into papillary and reticular region. The papillary region is made up of collagen and elastic fibres, and perceives the sensation of pain, warmth, cold, tickling and itching, whereas, reticular region consists of fibroblasts, macrophages, and adipocytes. The network like arrangement of collagen fibres helps the skin resist stretching. Collagen and elastic fibres provides the skin with strength, flexibility and ability to stretch.

Sweat glands :-

These are distributed throughout the skin, predominantly found in the palms of hands, soles of feet, axillary and groin regions. Tiny pores of sweat gland secrete clear, watery fluid, due to decomposition of bacteria it has unpleasant smell.

Hair :-

These are present on the skin surface except on the palms and soles of feet. Hair is divided into shaft (above the skin) and root (portion that penetrates into the dermis and up to the subcutaneous layer). Hair follicles are the part surrounding the root and made up of epithelial root sheath. The onion shaped structure at the base of each hair follicle is known as bulb, which contains a nipple shaped projection called papilla, made up of areolar connective tissue and blood vessels responsible for nourishment for hair follicles.

Sebaceous glands :-

These are found in the skin of the scalp, face, axilla and groin region. They secrete sebum into hair follicles and this keeps the hair soft with shiny appearance and protects infection against bacteria and fungi. Sebum also prevents drying and cracking of the skin.

During puberty, there is excessive secretion of sebaceous glands rendering the skin prone to the effects of excessive moisture.

Functions of the Skin :-

1. provide protection against micro-organisms and UV light.
2. Regulate body temperature by maintaining homeostasis.
3. Synthesis of Vitamin D through exposure to UV light.
4. prevent dehydration due to moisturizing action.

Results :-