

1. BLOOD GROUPING

Aim: Determination of blood group of the given human blood sample.

Principle: All human individuals can be placed into one of the four major groups. A, B, AB and O. A person having antigen A belongs to group A; having antigen B belongs to group B; having both antigens A and B belongs to group AB; and O person having neither antigen A nor antigen B, belongs to group O. The Rh “D” antigen is another important aspect in determining the blood type. The term Positive or negative refers to either the presence or absence of the Rh D antigen. Group A individuals do not have anti-A antibody and group B individuals do not have anti B antibody. Accordingly group AB individuals do not have either anti-A or anti-B antibodies, where as group O individuals have both anti-A or anti-B antibodies. Anti Rh D antibody is not usually a naturally occurring antibody as the anti-A and anti-B antibodies. The ABO blood grouping procedure is based on the principle of agglutination or clumping. The blood of the patient is reacted with known antibodies (anti-A, anti-B and anti-D separately) and the agglutination reaction is observed.

Reagents required: anti- A sera, anti-B sera and anti-D sera.

Materials required: Microscopic slide, Wax pencil, needle, cotton, 70% alcohol, tooth picks.

Procedure:

- ❖ Take a microscopic slide, clean and dry it.
- ❖ Place one drop of the corresponding anti serum (anti A, anti B and anti D)
- ❖ Prick the tip of the finger with sterile needle and place one drop of blood into each drop of the anti serum.
- ❖ Use a tooth pick to mix the blood and the anti serum and stir gently.
- ❖ Watch the sample for agglutinations.
- ❖ The agglutinations will appear as the grainy clumps of RBC suspended in the clear solution –Rh is slower to agglutinate; so do not give up too soon.

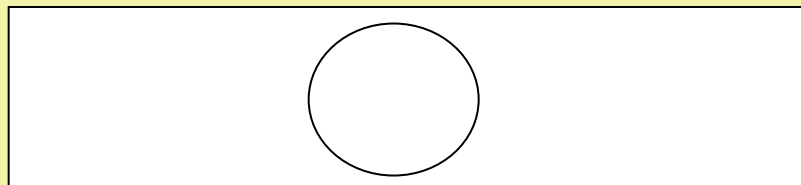
Interpretation and results: Depending on the result, determine the give human blood type. The given table is useful in determining the blood type.

Results:

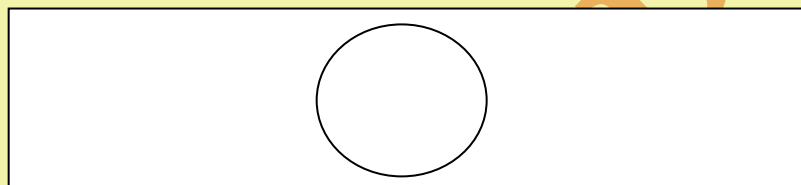
Type of blood group	Antigen	Anti body
A	A	a
B	B	b
AB	A and B	No antibody
O	No antigen	A b

OBSERVATIONS:

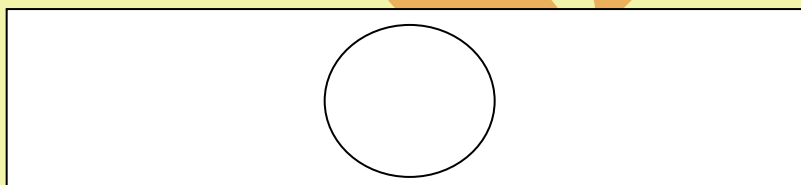
Anti sera- A



Anti sera – B



Anti sera-D



DETERMINATION OF BLOOD GROUP (Type):

Agglutination with anti sera- A	Agglutination with anti sera- B	Agglutination with anti sera- D	Blood group (type)
YES	NO	YES	A^{+Ve}
YES	NO	NO	A^{-Ve}
NO	YES	YES	B^{+Ve}
NO	YES	NO	B^{-Ve}
YES	YES	YES	AB^{+Ve}
YES	YES	NO	AB^{-Ve}
NO	NO	YES	O^{+Ve}
NO	NO	NO	O^{-Ve}

Demonstration of osmosis by potato osmoscope experiment

Aim: To demonstrate osmosis

Principle: plant cells absorb water by osmosis. Osmosis is the movement of solvent molecules through Semipermeable membrane. The movement of water from outside into the cells is called endosmosis. The movement of water from the cells to the outside is called exosmosis.

Requirements: Potato tuber, glass petri dish or beaker, distilled water, salt or sugar solution, pin, scalpel, blade.

Procedure: Take 5 ml of water in the beaker and small quantity of sugar to prepare high concentrated solution. Take fresh potato tuber.

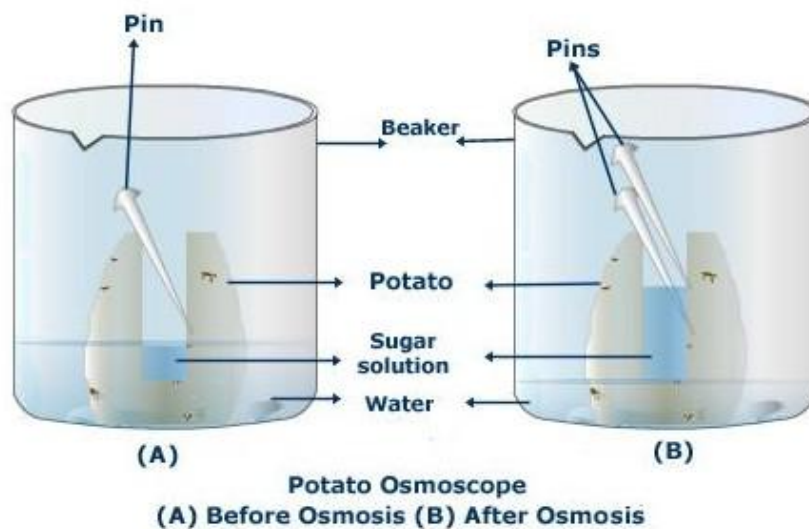
- Peel off the skin of a large sized potato with a scalpel.
- Cut its one end to make the base flat.
- Make a hollow cavity in the potato almost up to the bottom.
- Add sugar solution into the cavity and mark the level by inserting a pin in the wall of the cavity of the tuber.
- Place the potato in the beaker containing water.

Leave the entire set up undisturbed for about 1-2 hours.

Observation and Inference: After some time it could be observed that the trough in the potato tuber becomes completely filled. The initial sugar solution in the trough acts as high concentrated solution. Water molecules from the cells of the tuber surrounding the trough move outside into the trough due to plasmolysis thus raising the level of the solution. In turn the cell sap becomes more concentrated due to loss of water from it.

Consequently the solvent molecules from the external distilled water enter into the cells due to endosmosis. Thus a continuous osmotic gradient is established between external distilled water, the cell sap and from there into the sugar solution in the trough.

- This experiment demonstrates that living cells of potato act as differentially permeable membrane.
- Water molecules from a region of their higher concentration (water in the beaker) move into a region of their lower concentration (sugar solution in potato cavity) through the differentially permeable cell membrane of the potato cells.



Demonstration of release of O_2 during photosynthesis by hydrilla plant

Aim:

To demonstrate the release of oxygen during photosynthesis.

Principle:

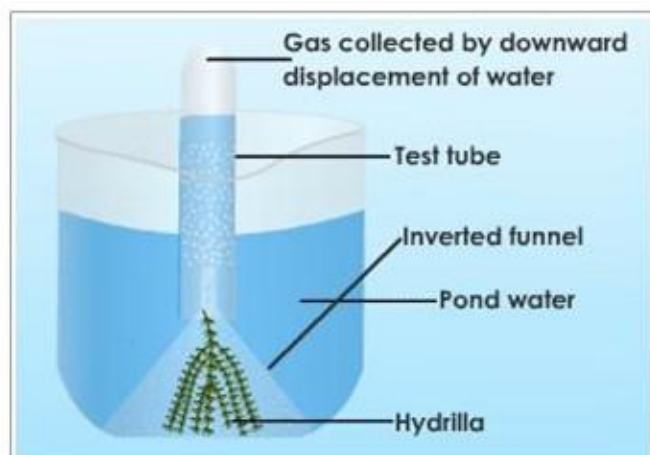
In sunlight, Hydrilla carries out photosynthesis. During this process, carbondioxide is taken in and oxygen is released. Hence, oxygen is liberated.

Requirement:

Beaker, funnel, test tube, Hydrilla plant.

Procedure:

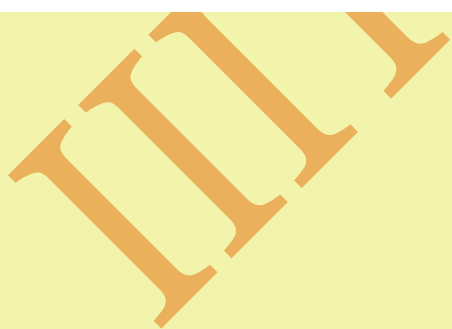
Take a few fresh Hydrilla plants in a glass beaker filled with water. Invert a large size funnel over the plants. Over the end of the funnel invert a test tube filled with water. Keep the entire apparatus in sunlight. Observe the apparatus.



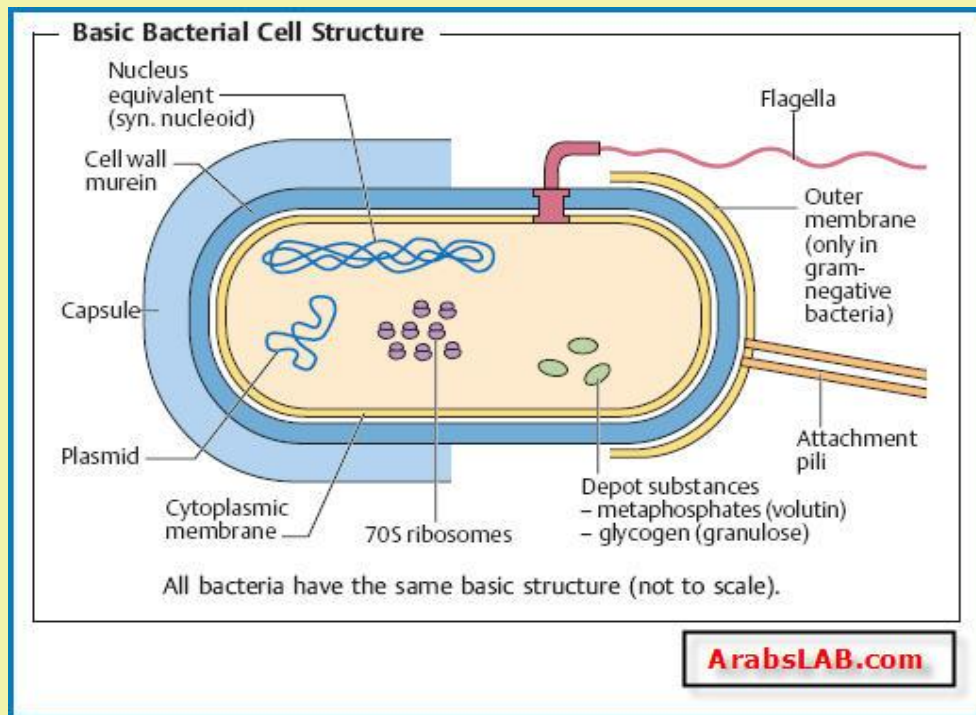
Observation and inference:

After some time you will observe some gas bubbles rising in the test tube. These bubbles get collected in the test tube. When the test tube is full with gas, remove it carefully by placing your thumb to close the end. Now bring a glowing splinter near the test tube or insert it deep into the test tube. It starts burning vigorously. This is because the gas which is collected by the downward displacement of water is oxygen.

This experiment shows that oxygen is evolved during photosynthesis.

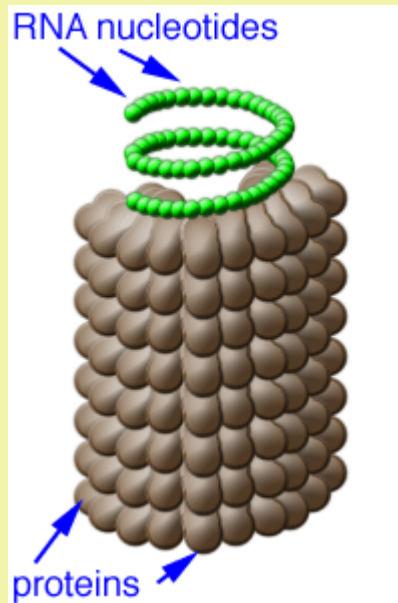


1. BACTERIA



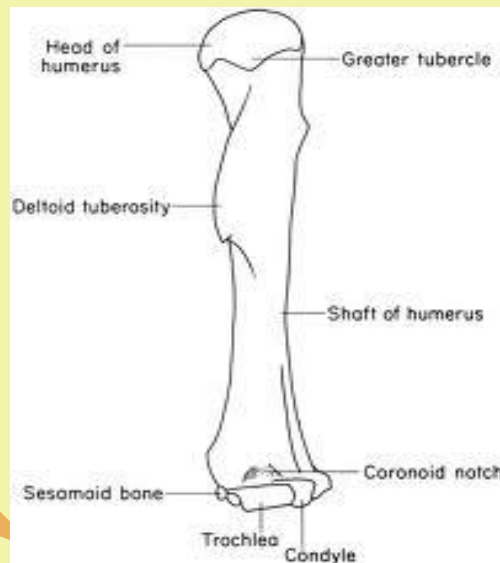
- ❖ Found everywhere, in all possible habitats.
- ❖ These are basically unicellular.
- ❖ The bacterial cell is delineated by a rigid cell wall. The cell wall is made of lipopolysaccharides and murein (peptidoglycan).
- ❖ Bacteria is devoid of any nucleus, nucleolus or nuclear membrane. The genetic materials are localized within a discrete region called the nucleoid. The nucleoid is not separated from the cytoplasm.
- ❖ The DNA is mostly circular in nature and is not associated histone proteins.
- ❖ None of the membrane bound cell organelle are present like the golgi bodies, endoplasmic reticulum, mitochondria, chloroplast etc. this makes the interior of the cell morphologically simple compared to other eukaryotic (modern) cell types.
- ❖ The ribosomes are found scattered within the cytoplasm and are mostly of 70s type.
- ❖ A bacterium may possess more than one flagella (locomotive organ).

2. VIRUS (Tobacco Mosaic Virus (TMV))



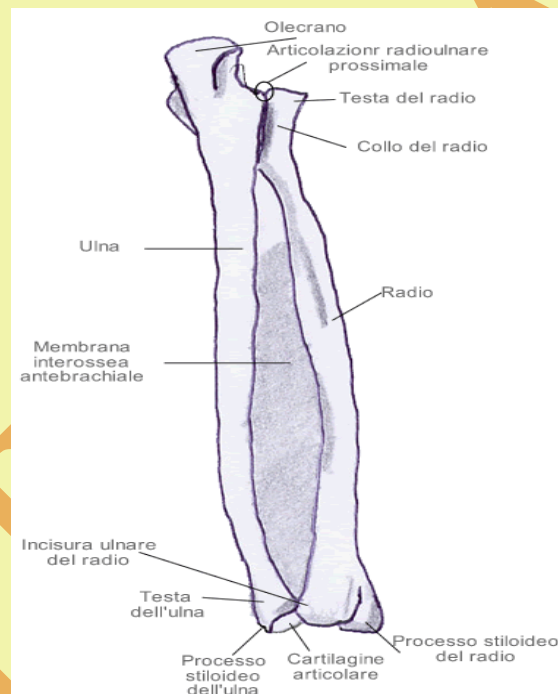
- ❖ **Tobacco Mosaic Virus (TMV)** is a positive-sense single stranded RNA virus .
- ❖ TMV was the first virus to be discovered.
- ❖ tobacco mosaic virus has a rod-like appearance.
- ❖ Its capsid is made from 2130 molecules of coat protein (see image to the left) and one molecule of genomic single strand RNA 6400 bases long.
- ❖ The coat protein self-assembles into the rod like helical structure (16.3 proteins per helix turn) around the RNA which forms a hairpin loop structure.
- ❖ The protein monomer consists of 158 amino acids which are assembled into four main alpha-helices, which are joined by a prominent loop proximal to the axis of the virion.
- ❖ Virions are ~300 nm in length and ~18 nm in diameter.
- ❖ The RNA is located at a radius of ~6 nm and is protected from the action of cellular enzymes by the coat protein.
- ❖ There are three RNA nucleotides per protein monomer.

1.HUMERUS BONE



-) It is stout rod like bone of upper arm
- 2) It bears a large rounded head articulating with glenoid cavity of scapula
- 3) Humerus bears a slight deltoid ridge on the anterior side
- 4) Anterior (or) coracoid fossa is smaller while posterior (or) olecranon fossa is larger.
- 5) Distal end of it is pulley like called trochlea.
- 6) A perforation is present in fossa known as supra trochlear foramen.

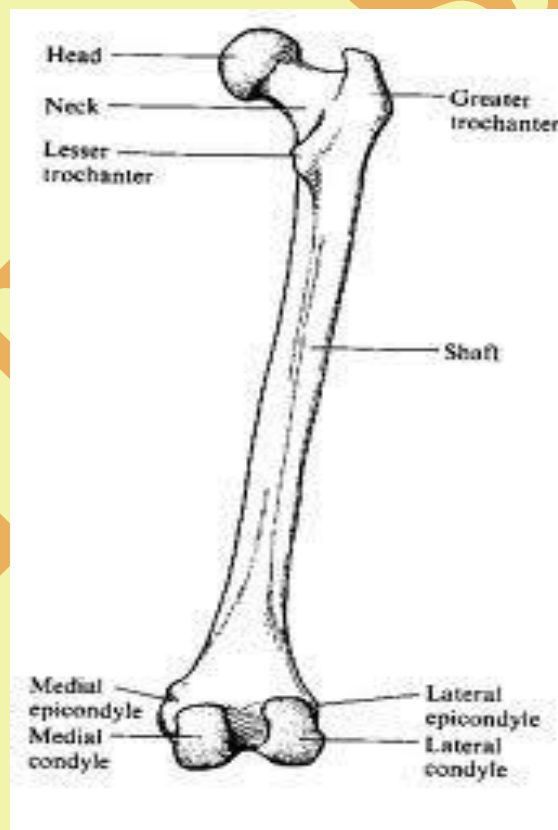
RADIO – ULNA



Forearm contain two separate bones radius and ulna.

- 2) Radius is small and curved
- 3) Distally the two bones bear epiphysis and articulate with carpals.
- 4) Radius lies in front of ulna, but distally on its inner side.
- 5) Ulna has a deep sigmoid notch for trochlea of humerus.

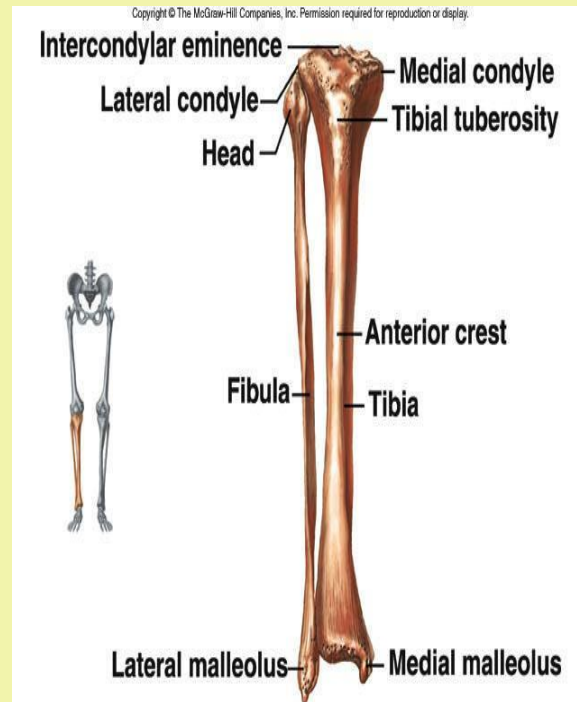
FEMUR



It is bone of thigh region

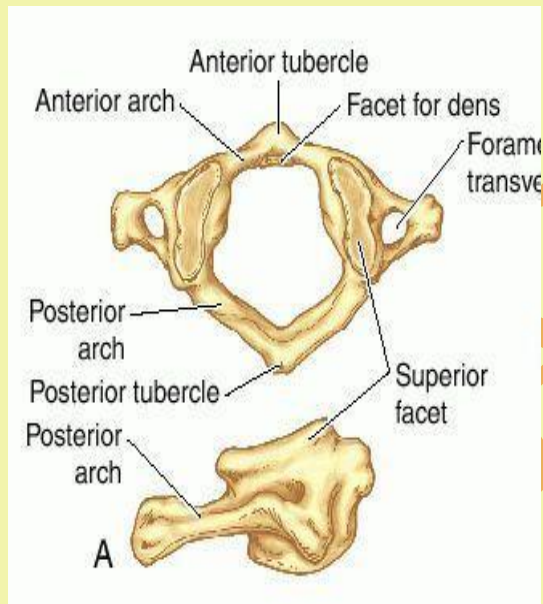
- 2) It has a long cylindrical shaft with expanded extremities.
- 3) Proximally it bears rounded head for articulating with acetabulum of pelvic girdle.
- 4) Distally femur bears a pulley like structure made of two condyles.

TIBIO-FIBULA



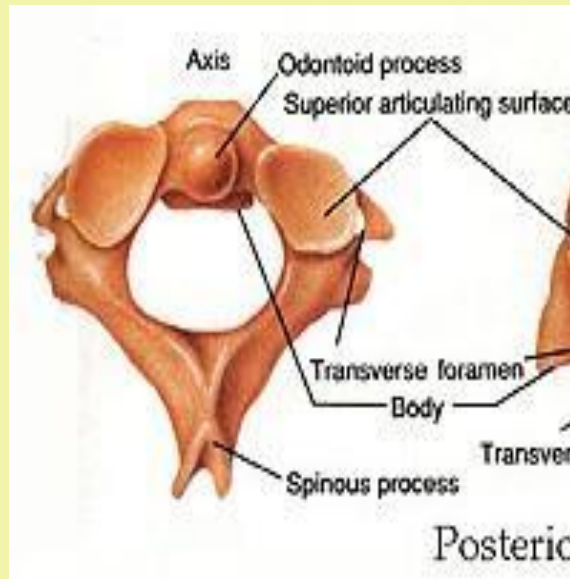
- 1) Shank contain two bones called tibia and fibula
- 2) Tibia is stout and fibula is slender
- 3) Tibia and fibula are free proximally but fused distally.
- 4) Fibula lies on the post axial side

ATLAS:



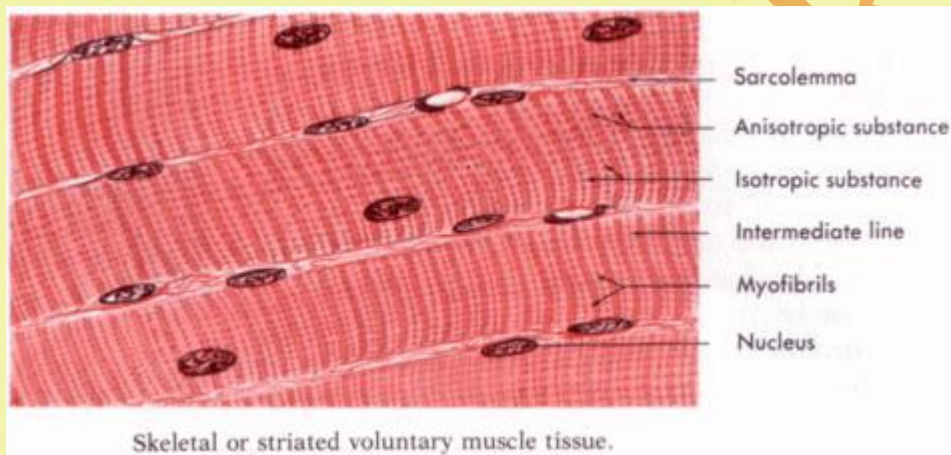
- 1) It is bony circle, like signet ring formed particularly by neural arch.
- 2) Centrum, zygapophysial joint absent
- 3) Rudimentary neural spine is present
- 4) Anteriorly, atlas bear a pair of large occipital condyles of skull.
- 5) Atlas bear a small mid ventral facet for odontoid process of axis.
- 6) Transverse process are broad and horizontal

AXIS:



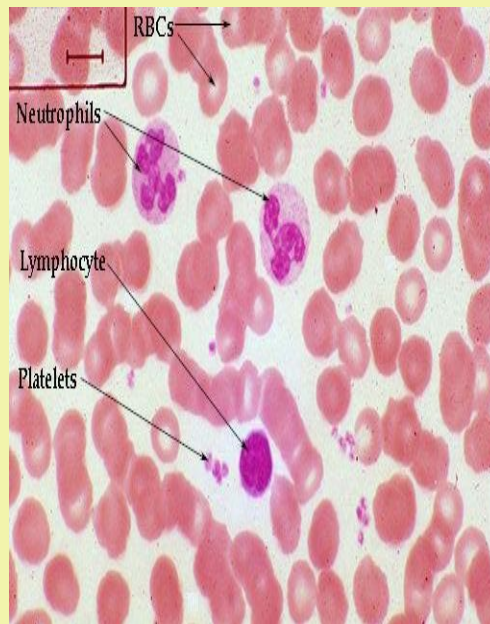
- 1) Second cervical vertebrae is called axis.
- 2) Laterally flatten and elongated antero-posteriorly.
- 3) Prezygapophysis absent but a pair of post zygapophysis are present.
- 4) Anteriorly centrum bear a long pointed, peg like odontoid process.

STRIATED MUSCLE:



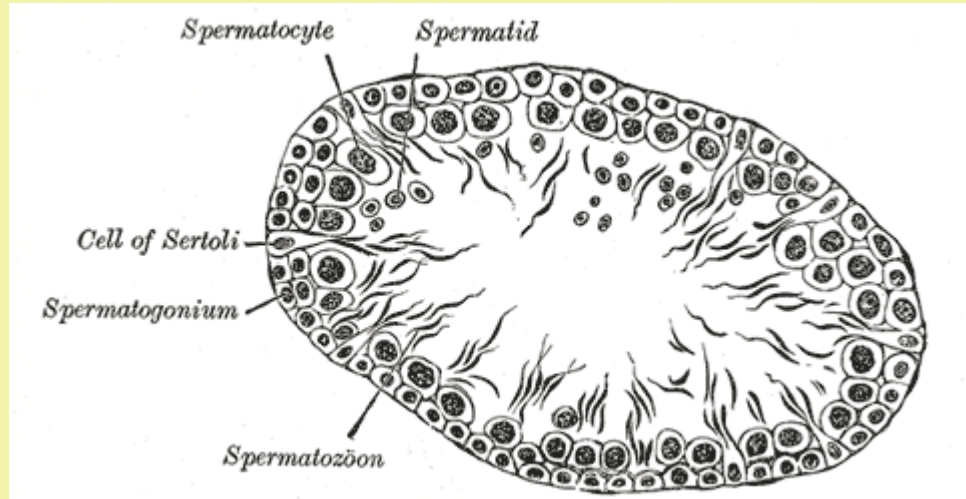
- 1) Striated muscle cells are elongated and cylindrical.
- 2) These are multinucleated the nuclei are relatively long and lie in the peripheral cytoplasm close to the cell membrane the sarcolemma.
- 3) The cells have alternating transverse dark and light bands along its length.
- 4) In the sarcoplasm of each cell are present many fine threads called myofibrils running along the length of the cell.

BLOOD SMEAR:



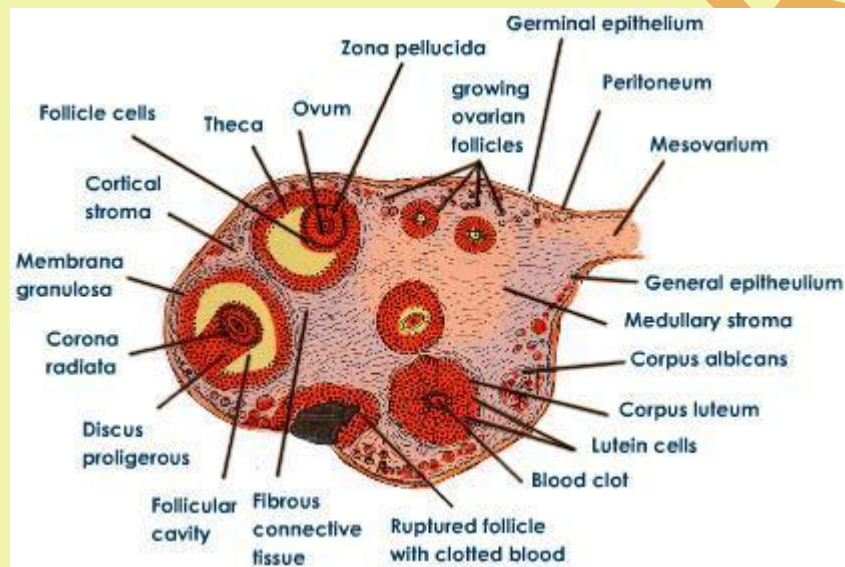
1. Blood is made up of colorless fluid called plasma in which float blood cells known as corpuscles.
2. Corpuscles are two types.
3. They are red blood corpuscles (RBC), white blood corpuscles (WBC)
4. The RBC in mammals are round, biconcave and non - nucleated .
5. WBC are colorless and nucleated cells. They are of 5 types Basophils, Eosinophils, Neutrophils, Lymphocytes and Monocytes.

T.S. of Testis:



- 1) The section contains a large number of Seminiferous tubules connected by connective tissue and blood vessels.
- 2) Seminiferous tubule is lined by germinal epithelium.
- 3) Germinal epithelium produces sperms.
- 4) Sperms at different stages of development are seen.
- 5) In between seminiferous tubules Leydig cells are present.
- 6) They secrete testosterone hormone.

T.S . of Ovary.



- 1) The outer layer is made by connective tissue and blood vessels.
- 2) The inner lining is germinal epithelium.
- 3) In the germinal epithelium ova are present at different stages of development.
- 4) Ovum shows a nucleus towards animal pole and cytoplasm with yolk towards vegetal pole.