

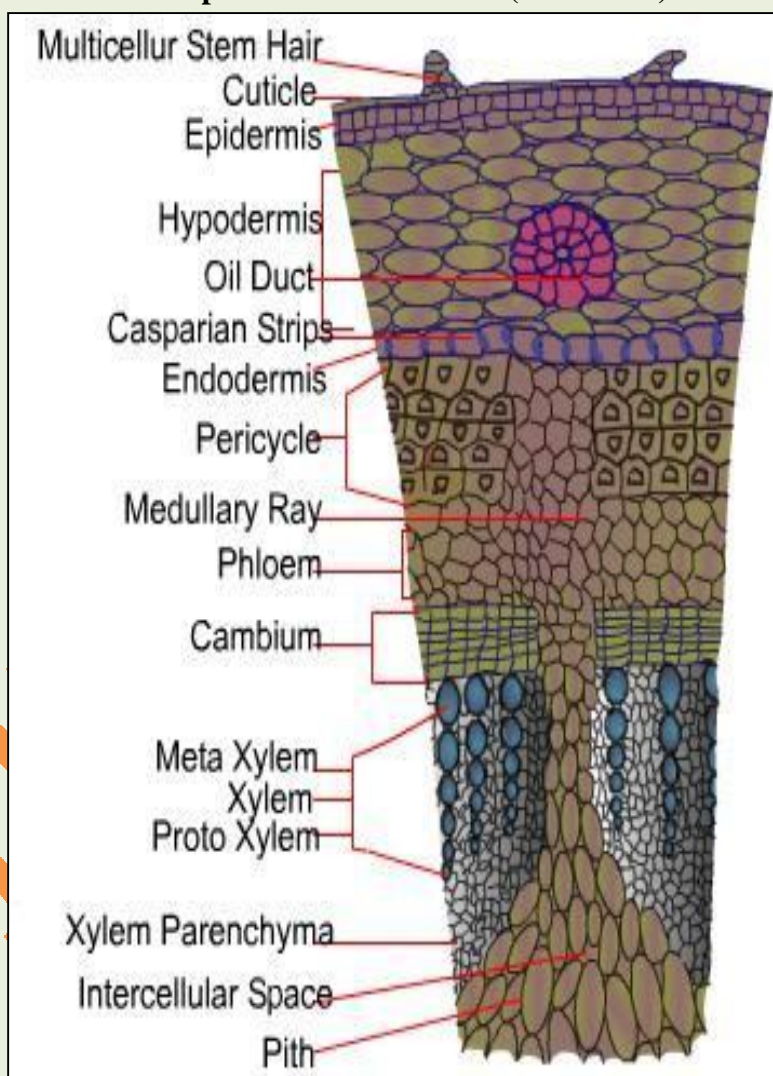


RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES
AP IIIT – BASAR
BIOLOGY PRACTICAL RECORD MANUAL - 2013-14

I. MAJOR EXPERIMENTS

1. Anatomy of a Typical Dicot Stem:-

Example: *Helianthus annuus* (Sunflower)



- ❖ A transverse section taken through the young stem of Sun-flower reveals the following details

- Epidermis
- Hypodermis
- Cortex
- Endodermis
- Stele
- Pericycle
- Medullary Rays
- Pith
- Vascular bundles
- Diagnostic Features of a Young Dicot Stem

Epidermis:

- ✚ Epidermis is the outermost covering of the stem.
- ✚ It is represented by a single layer of compactly arranged, barrel-shaped parenchyma cells.
- ✚ Intercellular spaces are absent.
- ✚ The cells are slightly thick walled.
- ✚ Epidermis shows the presence of numerous multicellular projections called trichomes. Externally, a thin transparent waxy covering called cuticle, which prevents excessive evaporation of water, surrounds the epidermis.
- ✚ The epidermis also contains numerous minute opening called stomata, which are mainly involved in transpiration.

Hypodermis:

- ✚ Hypodermis is a region lying immediately below the epidermis.
- ✚ It is represented by a few layers of collenchyma cells with angular thickenings.
- ✚ The cells are compactly arranged without any intercellular spaces.
- ✚ Hypodermis provides mechanical support and additional protection.

Cortex:

- Cortex is the major part of the stem represented by several layers of loosely arranged parenchyma cells.
- Intercellular spaces are prominent. Cortex is the major storage organ in the stem.

Endodermis:

- Endodermis is the innermost layer of cortex represented by compactly arranged barrel shaped cells, without any intercellular spaces.
- The endodermis is wavy in appearance.
- The cells are richly deposited with starch grains and hence, endodermis is commonly described as starch sheath.

Stele:

- Stele is the central cylinder of the stem, consisting of pericycle, medullary rays, pith and vascular bundles.

Pericycle:

- Pericycle is the outermost covering of the stele, which lies immediately below the endodermis.
- It is represented by a few layers of compactly arranged sclerenchyma cells.
- Above each vascular bundle, the pericycle forms a distinct cap-like structure known as bundle cap.

Medullary rays:

- Found in between the vascular bundles. They are meant for the storage of food.

Pith:

- Pith is the innermost part of the stem formed by a group of loosely arranged parenchyma cells.
- Intercellular spaces are prominent. The pith is also meant for storage of food.

Vascular bundles:

- They are eight in number, arranged in form of a broken ring. The vascular bundles are conjoint, collateral and open.
- Xylem is on the inner surface and phloem on the outer surface. Xylem is described as endarch.

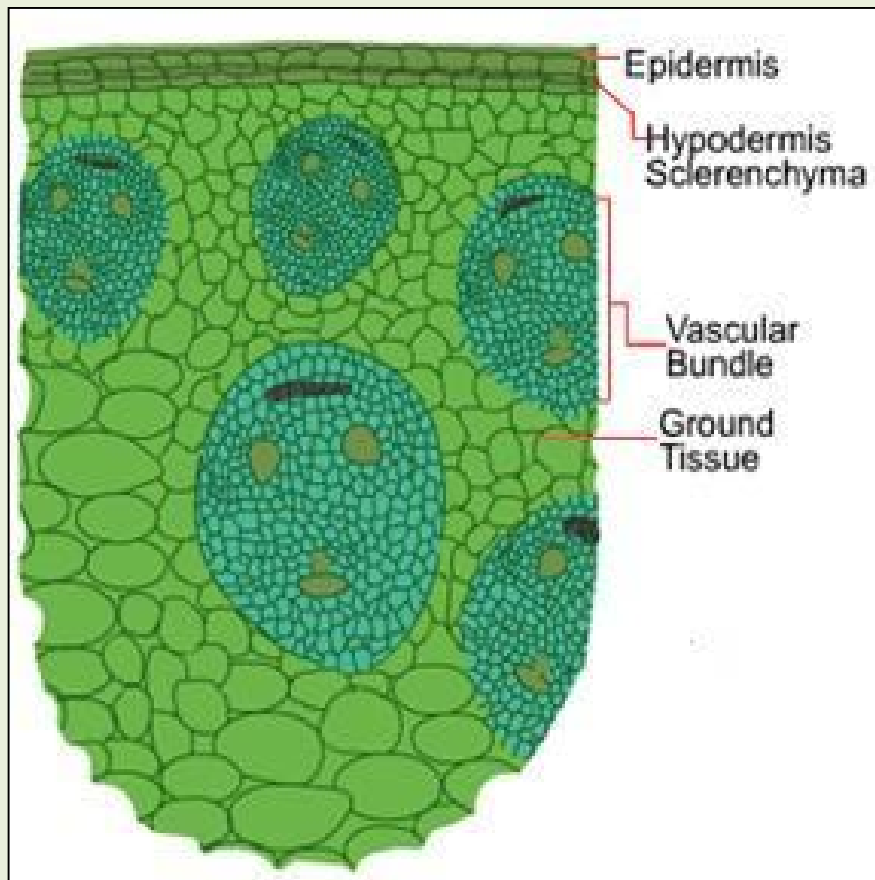
Diagnostic Features of a Young Dicot Stem:

Following are some of the diagnostic features of a young dicot stem

- ✚ Presence of cuticle and trichomes.
- ✚ Presence of stomata.
- ✚ Presence of a hypodermis made up of collenchyma.
- ✚ Presence of a wavy endodermis containing numerous starch grains.
- ✚ Presence of a bundle cap above each vascular bundle, formed by sclerenchyma.
- ✚ Presence of eight vascular bundles, arranged in the form of a broken ring.
- ✚ Presence of conjoint, collateral and open vascular bundles with an endarch xylem.

2. Anatomy of a Typical Monocot stem

Example: *Zea mays* (Maize)



A transverse section passing through the stem of Maize reveals the following details

- ❖ Epidermis
- ❖ Hypodermis
- ❖ Ground Tissue
- ❖ Vascular Bundles

Epidermis:

- ✚ Epidermis is the outermost covering of the stem represented by a single layer of compactly arranged, barrel-shaped parenchyma cells. Intercellular spaces are absent.
- ✚ Trichomes are absent.
- ✚ A cuticle is present.
- ✚ The epidermis contains numerous minute openings called stomata.

Hypodermis:

- ✚ Hypodermis is a region that lies immediately below the epidermis.
- ✚ It is represented by a few layers of compactly arranged sclerenchyma cells.

Ground Tissue:

- ✚ Ground tissue is a major component of the stem.
- ✚ It is undifferentiated. The ground tissue is represented by several layers of loosely arranged parenchyma cells enclosing prominent intercellular spaces.
- ✚ The ground tissue is meant for storage of food.

Vascular Bundles:

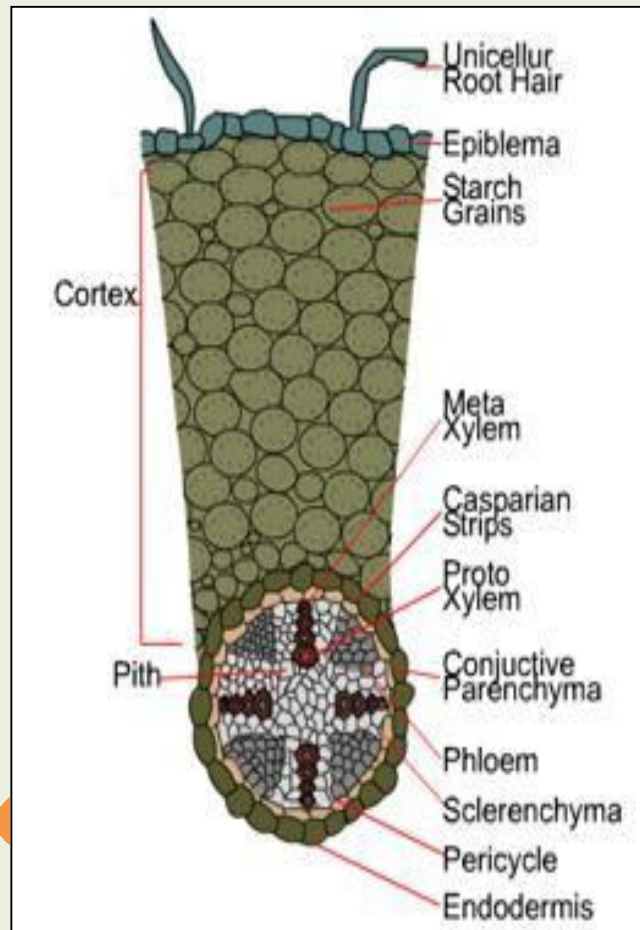
- ✚ They are found irregularly scattered in the ground tissue.
- ✚ Towards the periphery, the bundles are smaller in size while towards the centre, they are larger in size.
- ✚ The smaller bundles are younger, while the larger ones are older. Hence, the arrangement is described as centrifugal.
- ✚ Each vascular bundle has a covering called bundle sheath formed by a single layer of sclerenchyma cells.
- ✚ The vascular bundle encloses both xylem and phloem.
- ✚ Xylem is found towards the inner surface and phloem towards the outer surface.
- ✚ Cambium is absent.
- ✚ Hence the vascular bundles are described as conjoint, collateral and closed.
- ✚ In the xylem, there are two metaxylem and two protoxylem vessels arranged in 'the shape of 'Y'.
- ✚ The lower protoxylem vessel is non functional and remains as a water filled cavity called lisigenous cavity or protoxylem cavity.
- ✚ Xylem is described as endarch.
- ✚ In the phloem, only sieve tubes, companion cells and phloem fibres are present.
- ✚ Phloem parenchyma is absent.

Diagnostic features of Monocot stem anatomy:

- ✓ Absence of trichomes.
- ✓ Presence of stomata.
- ✓ Presence of a hypodermis made up of sclerenchyma.
- ✓ Presence of undifferentiated ground tissue.
- ✓ Presence of numerous vascular bundles irregularly scattered with centrifugal arrangement.
- ✓ Vascular bundles are conjoint, collateral & closed with endarch xylem.
- ✓ Presence of only two protoxylem & two metaxylem vessels in each bundle.
- ✓ Presence of a lysigenous cavity.
- ✓ Absence of phloem parenchyma.
- ✓ Presence of a bundle sheath made up of sclerenchyma.

3. Anatomy of a Typical Dicot Root:-

Example: **Sunflower**



A transverse section passing through the root of Sunflower reveals the following details.

- Epiblema
- Cortex
- Endodermis
- Stele
- Pericycle
- Conjunctive Tissue
- Vascular Bundles
- Pith
- Diagnostic Features of a Dicot Root

Epiblema:

- ❖ Epiblema is the outermost covering of the root formed by single layer of compactly arranged, barrel-shaped, parenchyma cells.
- ❖ The cells are characteristically thin-walled since they are involved in absorption of water.
- ❖ A cuticle and stomata are absent. Some of the epiblema cells are produced into long unicellular projections called root hairs.
- ❖ Hence, the epiblema is also known as piliferous layer.

Cortex:

- ❖ Cortex is a major component of the ground tissue of root.
- ❖ It is represented by several layers of loosely arranged parenchyma cells. Intercellular spaces are prominent.
- ❖ The cortex is mainly meant for storage of water.
- ❖ The cells also allow a free movement of water into the xylem vessels.

Endodermis:

- It is the innermost layer of cortex formed by compactly arranged barrel-shaped cells.
- Some of the cells in the endodermis are thin-walled and are known as passage cells.
- The passage cells allow water to pass into the xylem vessels.
- The remaining cells in the endodermis are characterized by the presence of thickening on their radial walls.
- These thickenings are known as casparian thickenings. They are formed by the deposition of a waxy substance called suberin.
- The casperian thickenings play an important role in creating and maintaining a physical force called root pressure.

Stele:

- Stele consists of pericycle, conjunctive tissue and vascular bundles.

Pericycle:

- Pericycle is a region that lies immediately below the endodermis. It is represented by a single layer of parenchyma cells.

Conjunctive tissue:

- Conjunctive tissue is represented by a group of radially arranged parenchyma cells found in between the vascular bundles.
- The cells are specialized for storage of water.

Vascular bundles:

- Vascular bundles are described as radial and tetrarch.
- There are four bundles each of xylem and phloem occurring alternately. Xylem is described as exarch.

Pith:

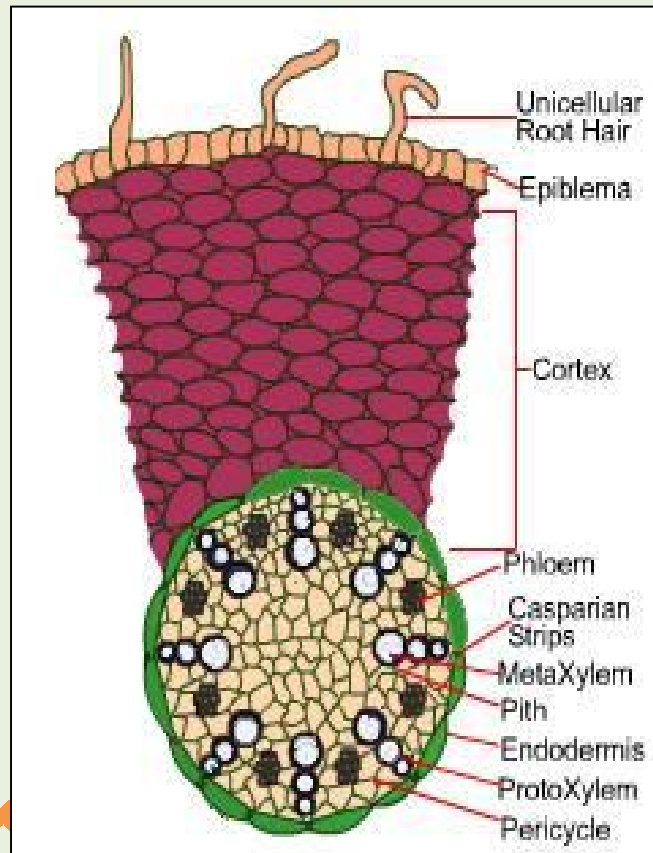
- Pith is absent in the older root.

Diagnostic features:

- ✚ Presence of thin walled cells in the epiblema.
- ✚ Absence of cuticle, and stomata.
- ✚ Presence of unicellular root hairs.
- ✚ Absence of hypodermis.
- ✚ Presence of passage cells and casparian thickenings in the endodermis.
- ✚ Presence of uniseriate pericycle made up of parenchyma.
- ✚ Presence of conjunctive tissue.

4. Anatomy of a Typical Monocot Root:-

Example : Maize (*Zea mays*)



A transverse section passing through the Maize root reveals the following details.

- Epiblema
- Cortex
- Endodermis
- Stele
- Pericycle
- Conjunctive tissue
- Pith
- Vascular bundles

Diagnostic Features of a Monocot Root

Epiblema:

- Epiblema is the outermost covering of the root formed by a single layer of compactly arranged, barrel-shaped parenchyma cells.
- The cells are characteristically thin-walled since they are involved in absorption of water.
- Cuticle and stomata are absent.
- Some of the epiblema cells are produced into long unicellular projections called root hairs.
- Hence, epiblema is also known as piliferous layer.

Cortex:

- Cortex is a major component of the ground tissue of root. It is represented by several layers of loosely arranged parenchyma cells.
- Intercellular spaces are prominent. The cortex is mainly meant for storage of water.
- The cells also allow a free movement of water into the xylem vessels.

Endodermis:

- It is the innermost layer of cortex formed by compactly arranged barrel-shaped cells.
- Some of the cells in the endodermis are thin-walled and are known as passage cells.
- The passage cells allow water to pass into the xylem vessels.
- The remaining cells in the endodermis are characterized by the presence of thickening on their radial walls.
- These thickenings are known as casparian thickenings. They are formed by the deposition of a waxy substance called suberin.
- The casparian thickenings play an important role in creating and maintaining a physical force called root pressure.

Stele:

- Stele is the central cylinder of the root consisting of pericycle, conjunctive tissue, pith and vascular bundles.

Pericycle:

- ❖ Pericycle is the outermost covering of the stele represented by a single layer of parenchyma cells.

Conjunctive tissue:

- ✚ It is represented by loosely arranged parenchyma cells found in between the vascular bundles.
- ✚ The cells are specialized for storage of water.

Pith

- ✚ Pith is the innermost region of the root representing the central axis. It is composed of few loosely arranged parenchyma cells.

Vascular bundles:

- ✚ Vascular bundles are radial in arrangement. There are eight bundles each of xylem and phloem. Hence, the condition is described as polyarch. Xylem is described as exarch.

Diagnostic features:

- ✚ Presence of thin walled cells in the epiblema.
- ✚ Absence of cuticle and stomata.
- ✚ Presence of unicellular root hairs.
- ✚ Presence of passage cells and casparian thickenings in the endodermis.
- ✚ Presence of parenchyma cells in the pericycle.
- ✚ Presence of conjunctive tissue.
- ✚ Presence of a distinct pith.
- ✚ Presence of radial vascular bundles with polyarch condition and an exarch xylem.

5. SOLANACEACE FAMILY

Division: Angiospermae

Class: Dicotyledonae

Sub Class: Gamopetalae

Series: Bicarpellatae

Order: Tubiflorae

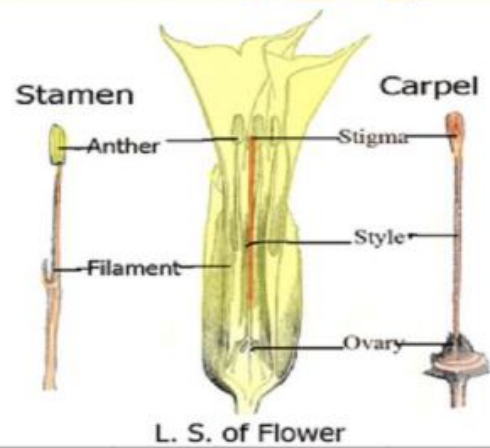
Family: Solanaceae

Genus : *Datura*

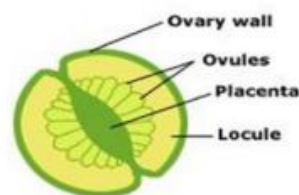
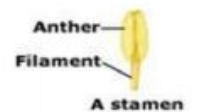
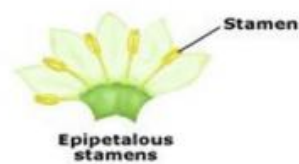
Species: *metel*

Stamen

Carpel



Floral formula - $\oplus \frac{\text{♂}}{\text{♀}} K_{(5)} \overset{\curvearrowright}{C}_{(5)} A_5 G_{(2)}$



Solanaceae is commonly called as '**Brinjal family**'. It includes about 90 genera and 2000 species. Members have a cosmopolitan distribution. There are around 60 species found in India.

Habit: Mostly annual herbs (*Solanum nigrum*), undershrubs (*Solanum melongena*). Some are shrubs (*Solanum torvum*) rarely trees (*Solanum grandiflorum*) and climbers (*Solanum seaforthianum*).

Root: Taproot, branched.

DIET BASAR

Stem: Herbaceous or woody, branched, often with prickles.

Leaves: Simple, alternate, sometimes pinnately divided into unequal lobes, exstipulate.

Inflorescence: Cymose. Often solitary cyme.

Flower: Ebracteate, actinomorphic, bisexual, pedicellate, heterochlamydeous, hypogynous.

Calyx: Sepals 5, gamosepalous, persistent (in the fruit condition also) valvate aestivation.

Corolla: Petals 5, gamopetalous, rotate or companulate or bilabiate (*Schizanthus*) or infundibuliform (*Datura*). Twisted or valvate aestivation.

Androecium: Stamens 5, epipetalous.

Gynoecium: Bicarpellary, syncarpous, bilocular or tetralocular due to pseudoseptum. Many ovules on axile placentation. Ovary superior, Obliquely placed.

Fruit: Berry or capsule.

Seed: Endospermi

Identification Characters:

- ✚ Simple leaves with reticulate venation.
- ✚ Actinomorphic and hypogynous flowers.
- ✚ Solitary flower
- ✚ Gamopetalous corolla
- ✚ Twisted aestivation in petals.
- ✚ Superior ovary with obliquely placed carpels.
- ✚ Swollen axile placentation.

II. MINOR EXPERIMENTS (PHYSIOLOGY EXPERIMENTS)

1. Test for the presence of starch in given sample

Aim: To test the presence of starch in food items.

Iodine test: Specific for starch

Principle: When the starch molecules boiled along with water starch molecules form dispersion surfaces having affinity for iodine molecules, iodine molecules when added to the sample they get adsorbed on starch grains producing intense blue colour.

Reagent: Iodine solution(2 grams of Iodine dissolved in 6% KI)

1% starch solution (Dissolve 1 gm of starch in 100 ml of boiling water.)

Procedure: Take 2 ml of food extract /or 2 ml of starch solution in a test tube and add a few drops of iodine solution to it. Note the change in color. If blue black develops then starch is present. Color due to adsorption.

Result: Among the four sample that is a, b, c and d. I found the presence of starch in the sample b.

2. Observation of test for the presence of proteins (BIURET TEST):

Principle: The test indicates the presence of peptide linkages (CO-NH) in proteins. The CO-NH groups in polypeptides chains form complex colour compounds with cupric hydroxide ($\text{Cu}(\text{OH})_2$). Which is formed by the action of NaOH on CuSO_4 .

Reagents: 40% Sodium Hydroxide (NaOH)

1% Copper Sulphate (CuSO_4)

Procedure: In 3 ml of sample solution add 3 ml of 40% NaOH. To this mixture add few drops of 1% CuSO_4

Observation: Purple violet or pink colour develops.

Inference: (Co-NH) linkages are present.

Result: Among the give four samples i.e., a,b,c and I found the presence of the proteins in sample C.

3. Test for the presence of Fats. (SUDAN IV TEST):

Principle: When Sudan IV is added to the fat emulsion, it produces coloration as a result of dispersion.

Reagent: Sudan IV dye (commercially available) take 3 ml of water in a test tube and add 2ml of sample (vegetable oil) and shake the contents vigorously in to the emulsion add few drops of sudan IV. Allow the test tube to stand for few minutes in order to get complete dispersion of the dye.

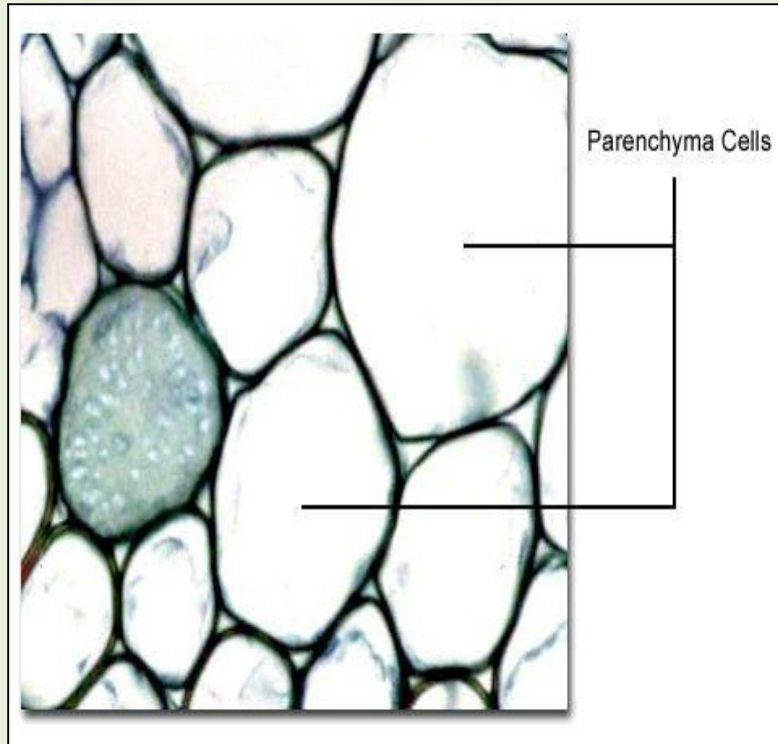
Observation and inference: A dark red color developed indicates the presence of fats.

Results: Among the given four samples i.e., a, b, c, and d I found the presence of fats in sample d.

V. SPOTTERS:

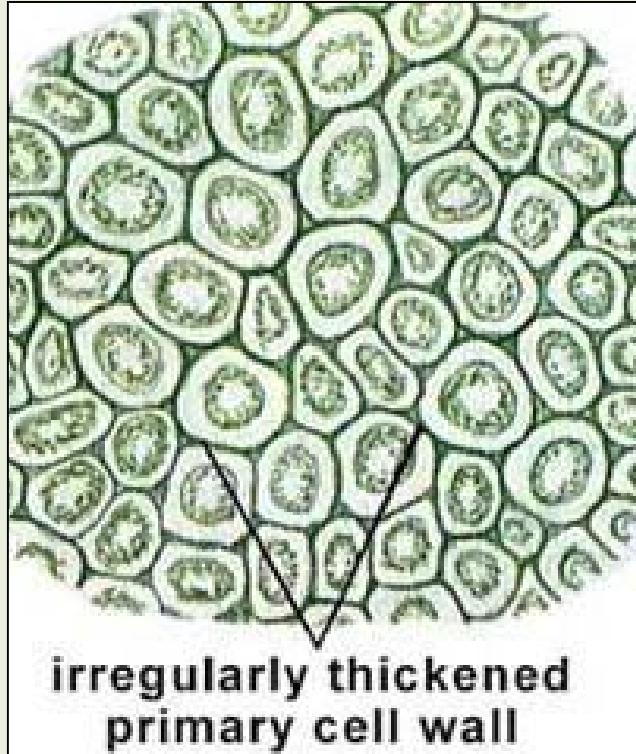
A. PLANT SLIDES :

1. PARENCHYMA:



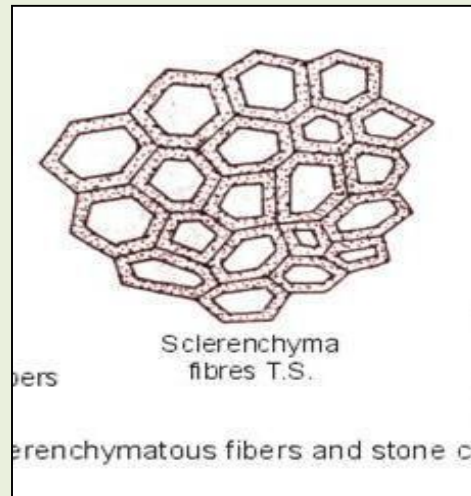
2. It is known as fundamental tissue.
3. The cells are isodiametric, spherical or oval.
4. Cell walls are thin and made up of cellulose, hemicellulose and pectin.
5. Cells are living and protoplasm is vacuolated and a distinct nucleus present.
6. Intercellular spaces are present.

2. COLLENCHYMA:



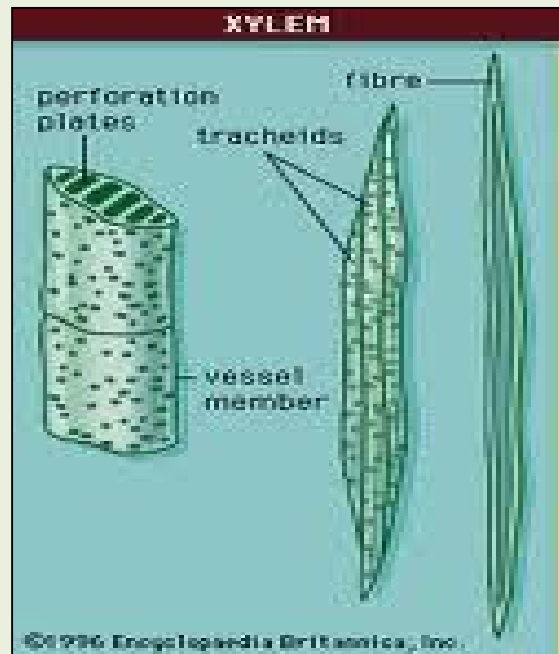
1. It is a simple mechanical tissue.
2. Cells are polygonal, round or cylindrical.
3. Cells are living and protoplasm is vacuolated.
4. Cell walls are thickened, especially at the corners due to accumulation of cellulose and pectin.
5. Intercellular spaces are absent.
6. The cell wall is rich in cellulose, pectin and contains 60% of water.

3. SCLERENCHYMA:



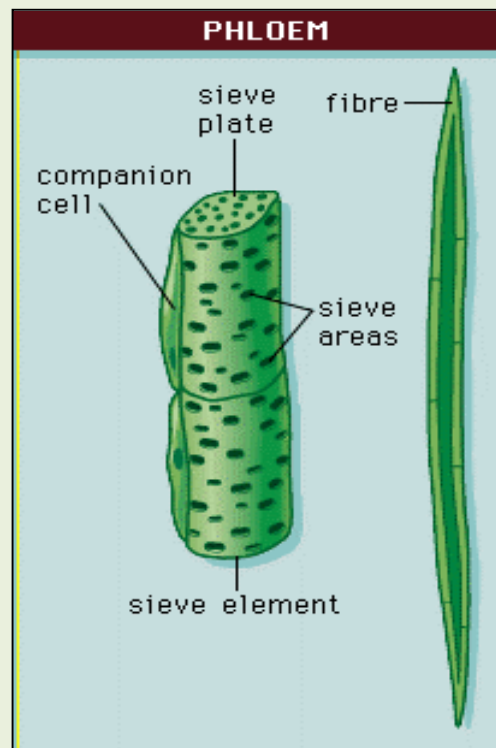
1. It is simple mechanical tissue.
2. The cells are hexagonal in outline.
3. Cells are devoid of protoplasm hence dead.
4. Lumen is reduced.
5. Intercellular spaces are absent.
6. Sclerenchyma is composed of files and sclerids.

4. XYLEM:



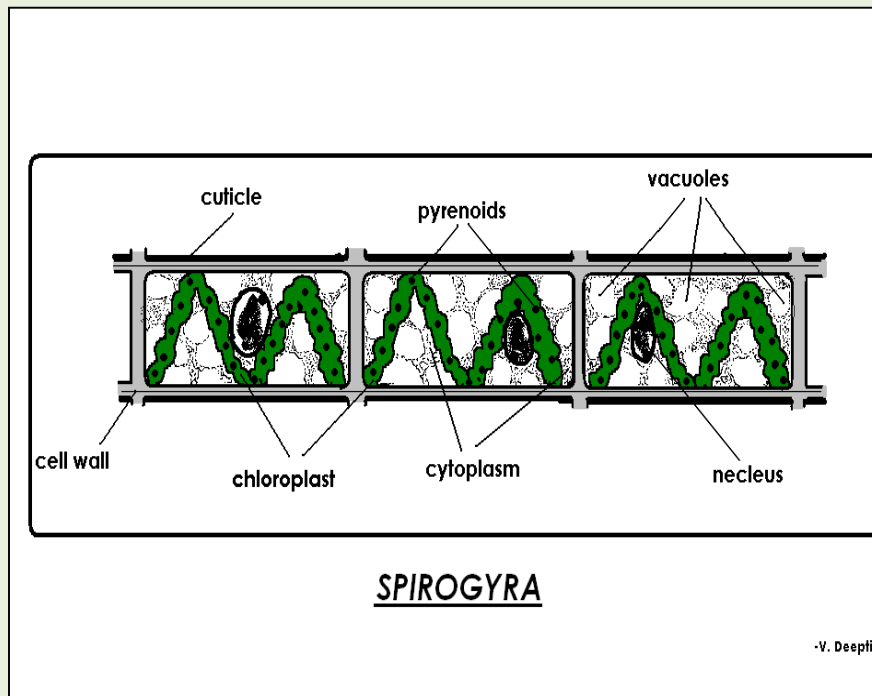
1. Xylem is the complex tissue that conducts water and mineral salts from the root to aerial parts of plant body.
2. Xylem is composed of tracheary elements, xylem fibres, xylem parenchyma. Tracheary elements and xylem fibres are dead where as xylem parenchyma is living.
3. Tracheids are elongated cells with broad middle part and sharp tapering ends. The cell walls are lignified . These are chief elements of conduction in pteridophytes and gymnosperms.
4. Vessels are wide, cylindrical with lignified walls. These are chief elements of conduction in angiosperms.
5. Xylem fibres give mechanical support to the vascular bundles.
6. Xylem parenchyma is thin walled with vacuolated and nucleated cytoplasm. They are useful for the storage of food reserves in the form of starch or fat.

5. PHLOEM:



1. Phloem is a complex tissue that conducts organic solutes from the leaves to other parts of plant body.
2. Phloem is made of sieve elements, companion cells, phloem fibres and phloem parenchyma. Phloem fibres are dead whereas others are living.
3. Sieve cells are elongated, broad at the middle with narrow close ends. They are useful for conduction of organic solutes in pteridophytes and gymnosperms.
4. Sieve tubes are wide, long, cylindrical with vacuolated protoplast. They are chief elements of conduction in angiosperms.
5. Specialized parenchyma cells that are associated with sieve tube members are called companion cells. They are found in angiosperms.
6. Sclerenchymatous fibres found in phloem are called phloem fibres. They provide mechanical strength.
7. Parenchyma cells with vacuolated cytoplasm present in phloem are called phloem parenchyma. They are concerned with storage of starch and fats.

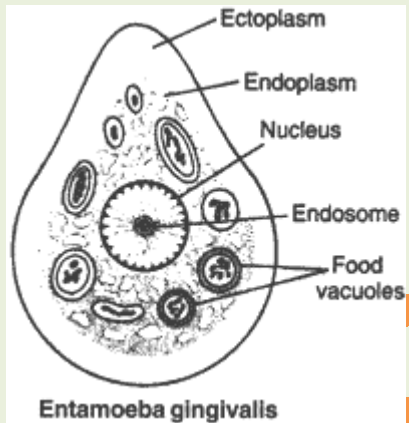
6.SPIROGYRA:



1. The plant body is haploid, multicellular, uniseriate and unbranched filament.
2. The green vegetative cells are cylindrical and longer than their breadth.
3. The cellwall is thin and has two layers. The outer layers is with pectin and inner layer is with cellulose.
4. The cytoplasm lies peripherally around a central large vacuole.
5. In each cell 1-16 ribbon shaped chloroplast are present, arranged in spiral manner so the name spirogyra was given.
6. Each chloroplast has a number of pyrenoids which are equidistantly located along the mid axial line.
7. A single nucleus is suspected in the central vacuole by cytoplasmic threads.

ANIMAL SLIDES:

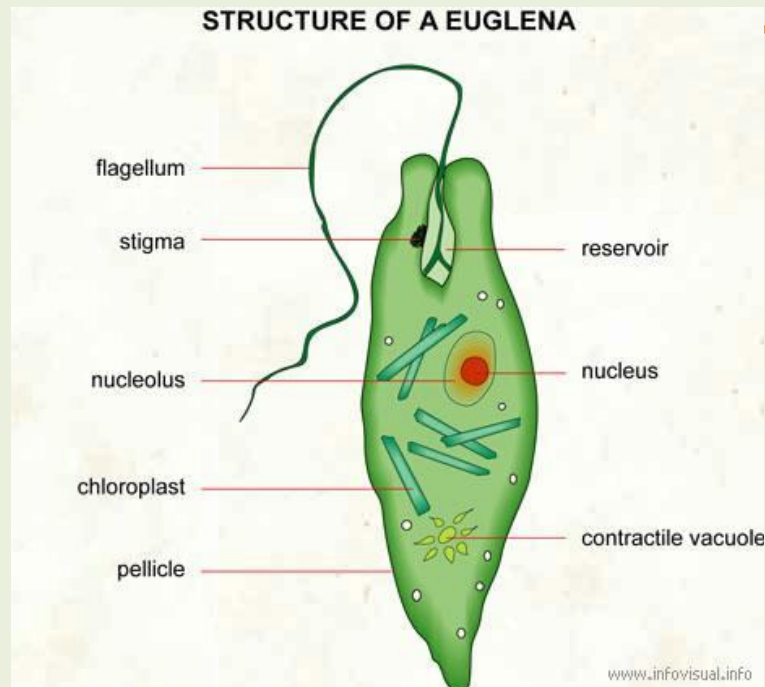
1. ENTAMOEBA HISTOLYTICA:



- 1) *Entamoeba* cells are small, with a single nucleus and typically a single lobos pseudopodia taking the form of a clear anterior bulge.
- 2) *Entamoeba histolytica* is the pathogen responsible for 'amoebiasis
- 3) The trophozoite (feeding-dividing form) is approximately 10-20 μm in diameter and feeds primarily on bacteria.
- 4) It divides by simple binary fission to form two smaller daughter cells.
- 5) these can have one, four or eight nuclei and are variable in size; these characteristics help in species identification.

2. EUGLENA

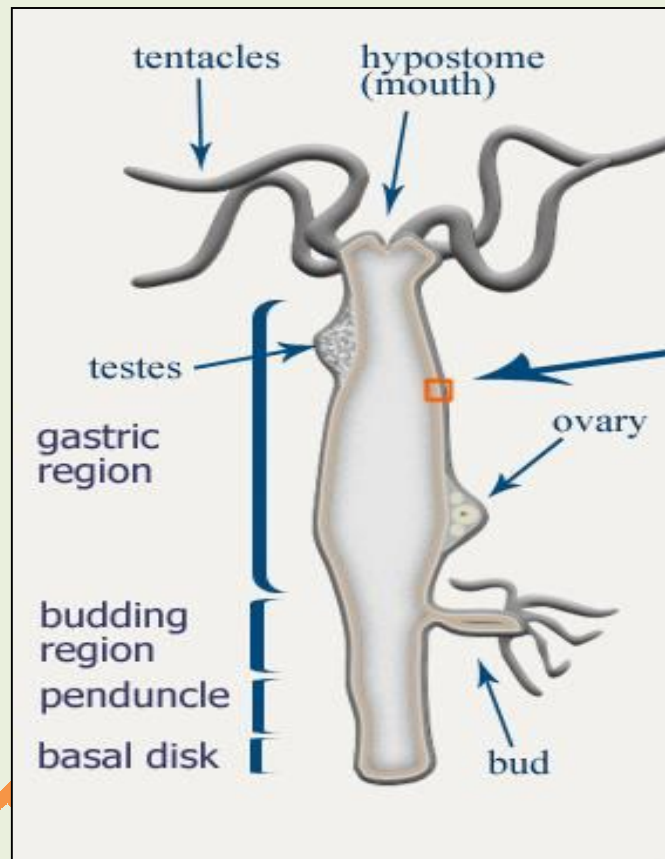
Phylum: Protozoa
Class :Phytomastigophora.



- 1) The organism is minute with spindle shape.
- 2) It is covered by thin pellicle.
- 3) Anterior end is blunt, and posterior end pointed.
- 4) At the anterior end a cytoplasm is present.
- 5) A long flagellum arises from the base of reservoir.
- 6) In the wall of reservoir a stigma is present.

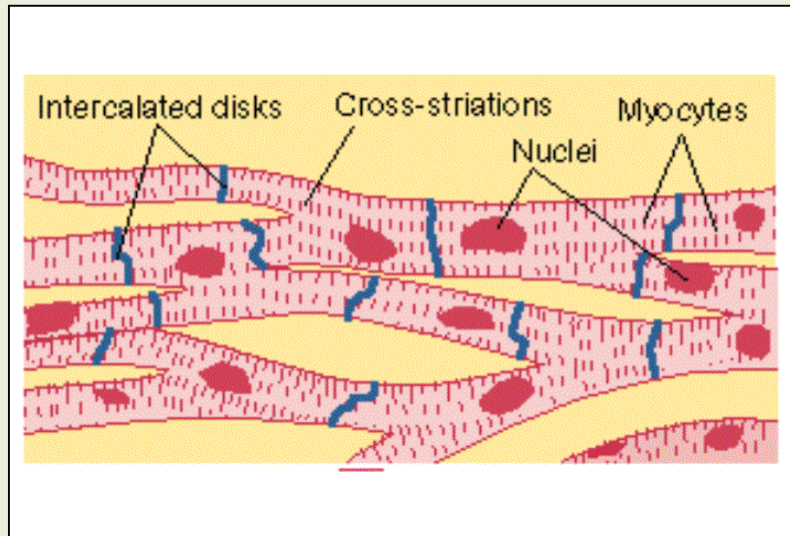
3. HYDRA :

Phylum : Cnidaria
Class : Hydrozoa



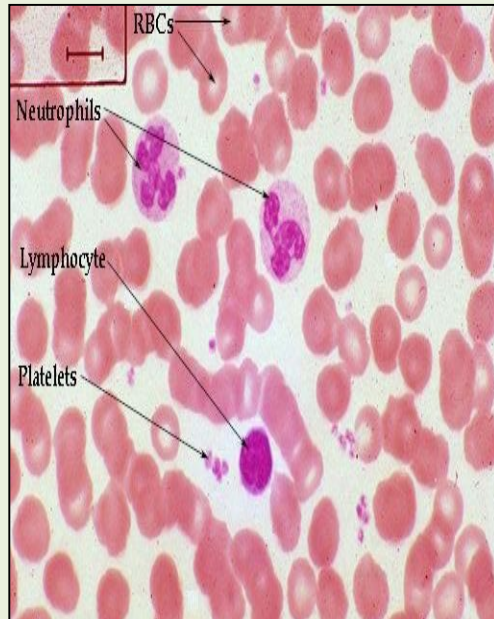
1. Found in fresh water
2. It is a solitary, normally fixed to the substratum with the help of basal disc but still capable of moving from one place to other.
3. Body is elongated, hollow and tabular.
4. Mouth is present distally on the hypostome.
5. Short, slender, 6-10 contractile tentacles are present around the mouth, which serve for food capturing, ingestion and for defense.
6. Buds are present toward its basal disc which later gets detached as a new small hydra.
7. Testis are present close to hypostome, while ovaries are present near the basal disc.

6.CARDIAC MUSCLE:



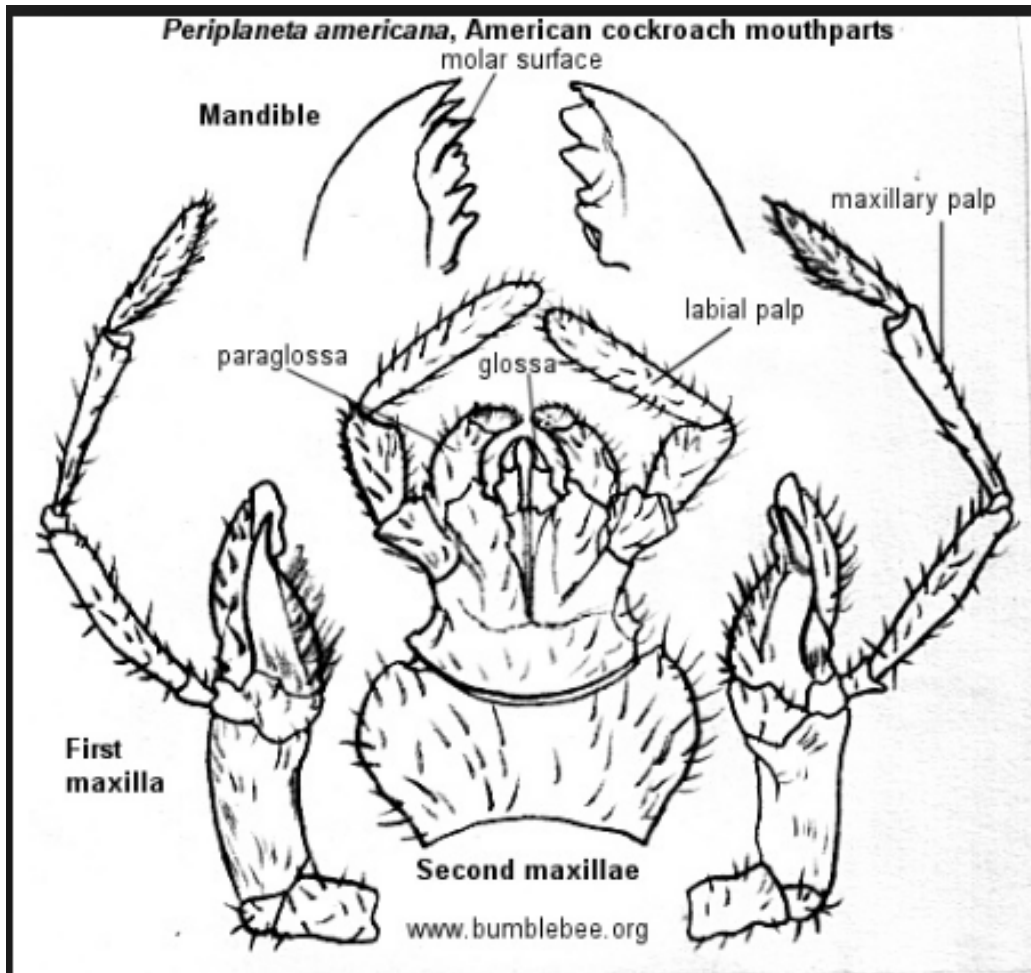
- 1) These muscle fibres are showing striations.
- 2) These fibres are short and branched.
- 3) In these fibres intercalated discs are present
- 4) These muscles are highly vascular
- 5) The nuclei are centrally located.

7.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.

COCKROACH MOUTH PARTS



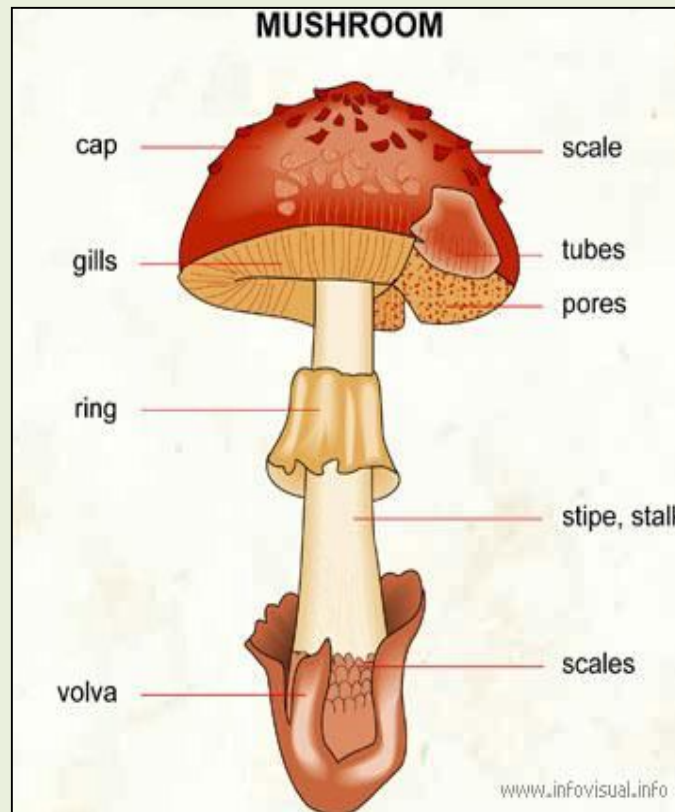
Phylum : Arthropoda

Class : Insecta

1. Cockroach belongs to Arthropoda phylum.
2. Mouth parts are biting and chewing type
3. Labium is the upper lip
4. Hypopharynx is comparable to tongue
5. 2 mandibles possess serrated edge which are comparable to teeth
6. Maxilla consists of cardo, stipes as maxillary palps

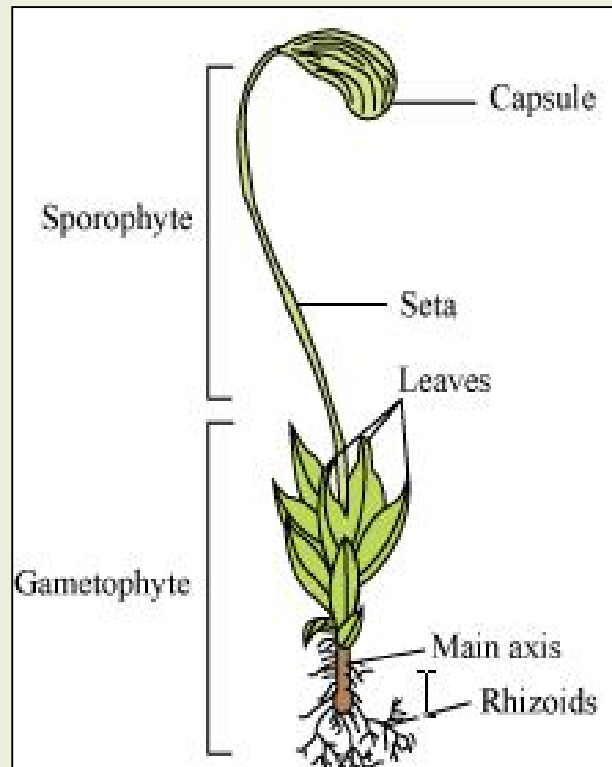
PLANT SPECIMANS:

1. MUSHROOM:



- 1.. The mushroom is composed of an underground part which is called mycelium and an above ground, often edible part that is the reproductive organ.
2. The part which is present above the ground is called cap. It is differently shaped and colored
3. Gill is the fertile spore producing part of mushroom which is present under the cap.
4. Spores are microscopic seeds acting as reproductive agents.
5. An axis called the stem supports the mushroom cap.

2.FUNARIA:



Kingdom: Plantae
Division: Bryophyta
Class: Bryopsida
Family: Funariaceae
Genus : Funaria

1. The gametophyte has a slender stem, green leaves and rhizoids .
2. Stem is slender, upright, green and branched.
3. Leaves are small, ovate, sessile with acute tip and entire margin.
4. Sporophyte is erect consisting of foot, seta and capsule.
5. Foot is small conical structure, buried in apical part of female.
6. Seta is long, slender stalk like portion.
7. Capsule is pear shaped body ending with a lid.



Kingdom: Plantae
Division : Pteridophyta
Class : Pteropsida
Family : Pteridaceae
Genus : Pteris



1. The plant body is diploid saprophyte which is dominant stage.
2. The stem is an underground rhizome. It is covered with brown scales.
3. Leaves (Fronds) are large and macrophyllous the arise acropetally.
4. The petiole are covered at the base with flattened scales and sometimes brown hairs called ramenta.
5. The rachis bears numerous sessile, lanceolate (broad at the base and gradually tapering towards the apex) leaflets or pinnae on either side.
6. The young leaves are coiled like a watch spring and this condition is called circinate veneration.

CYCAS:

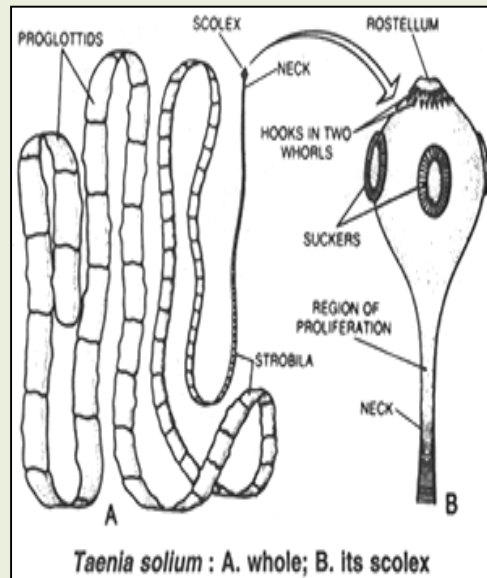


Kingdom: Plantae
Division : Cycadophyta
Class : Cycadopsida
Family : Cycadaceae
Genus : Cycas

1. Mega sporophylls are the female reproductive structure of Cycas
2. They are arranged at the tip of the stem, but they are not arranged in cones.
3. The mega sporophylls are leaf like structures.
4. Each mega sporophyll differentiated into lower petiole, middle ovule bearing region and upper sterile region.
5. Each mega sporophyll bears 1-5 pairs of ovules.
6. Cycas ovules are largest in plant kingdom.

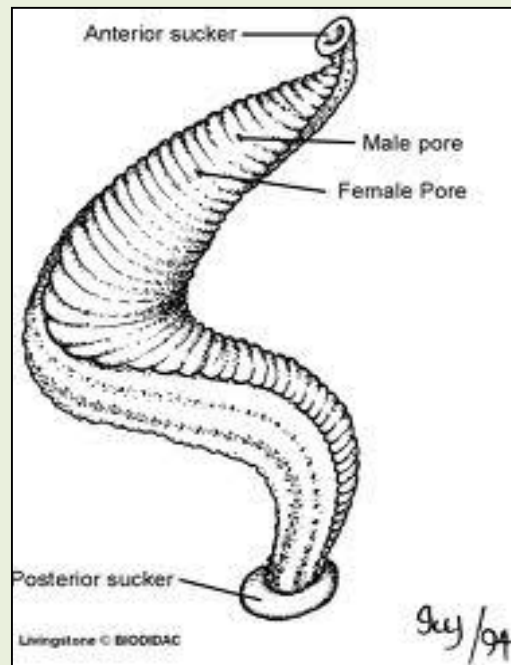
ANIMAL SPECIAMS:

1.TAENIA SOLIUM:



- 1) Body is elongated, flattened and ribbon like and differentiated into scolex, neck and strobila commonly called as pork tape worm found in the small intestine of man.
- 2) Body is divided into many segments or proglatids.
- 3) Anterior end is distinct, formed by scolex which bears rostrellum and suckers.
- 4) Rostrellum bears hooks.'
- 5) The scolex bears 4 suckers.
- 6) Each proglatid is hermaphrodite.
- 7) It causes taeniasis.

2.LEECH



Phylum: Annelida

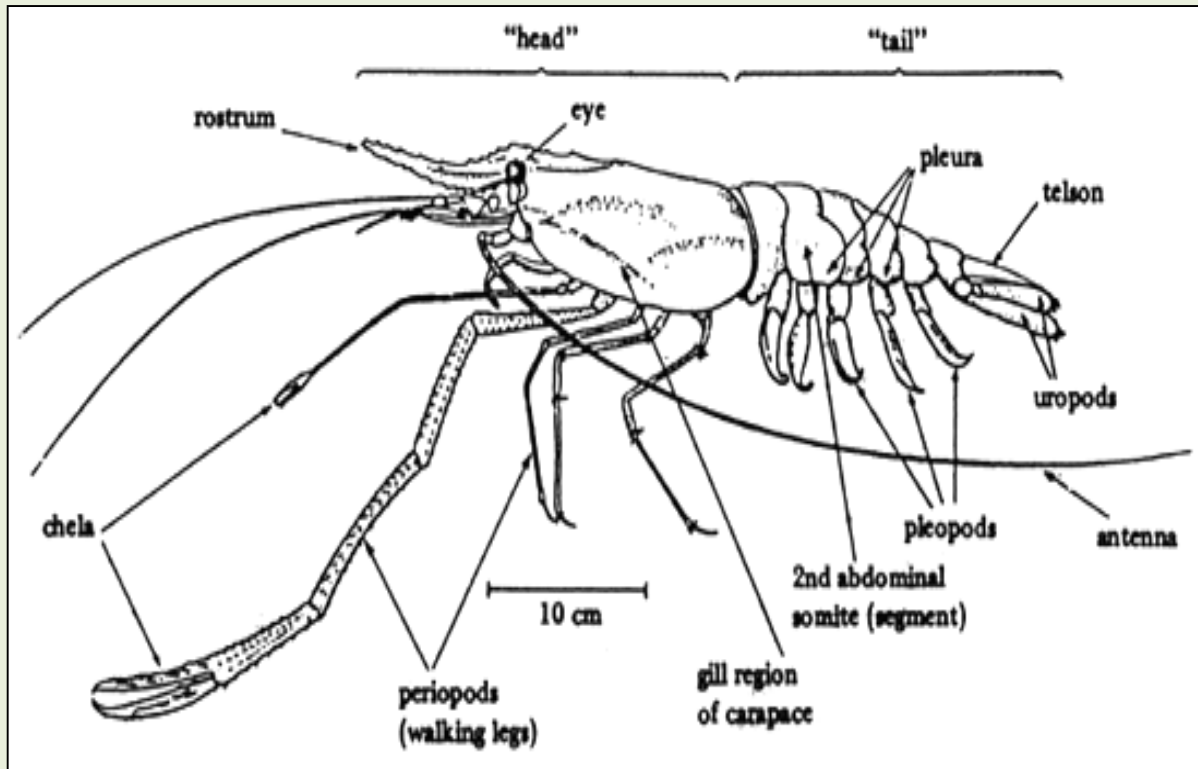
Sub Class: Hirudinea

- 1) Commonly called as cattle leech found in fresh water ponds, rivers and pools.
- 2) Leeches have an elongated dorso-ventrally flattened body.
- 3) The dorsal side is a bit convex in shape and ventral side flat.
- 4) Body of leech is divided metamerically into segments called annuli
- 5) At the two ends of the body of leech there are strong suckers, anterior sucker and posterior sucker.
- 6) Both the suckers are primarily useful for locomotion.
- 7) Posterior sucker is formed by the fusion of last seven segments.

3.PRAWN:

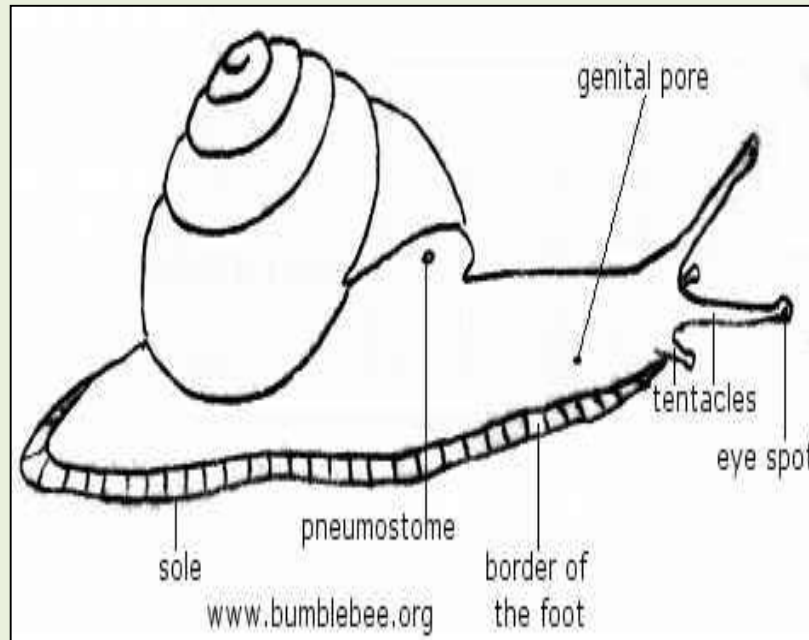
Phylum : Arthropoda

Sub Phylum : Crustacea



- 1) It is commonly known as fresh water prawn.
- 2) Body is elongated, more or less spindle shaped, slightly tapering at the posterior end .
- 3) It is bilaterally symmetrical.
- 4) Body is divisible into two regions normally cephalothorax.
- 5) Head and thorax compressed and is formed by six segments.
- 6) At the end of the abdomen there is a conical tail piece or telson.
- 7) Each segment of the abdomen bears one pair of appendages which is useful for swimming.

4.SNAIL:

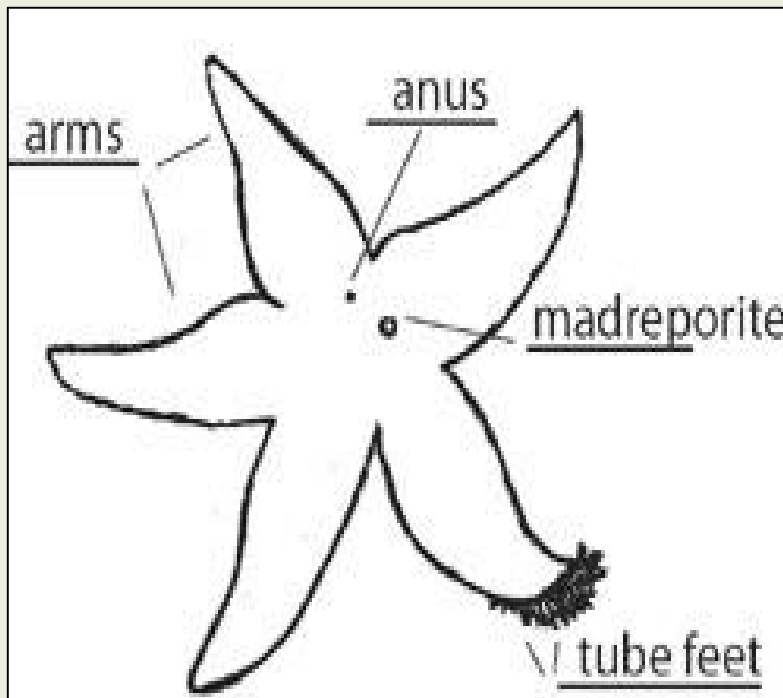


Phylum: Mollusca

Class : Gastropoda

- 1) It is commonly called as pond snail.
- 2) It also called apple snail.
- 3) It is fresh water in habitat.
- 4) Body is enclosed in a hard shell which is madeup of calcium carbonate.
- 5) The shell is made of a single valve.
- 6) The shell is in the form of an elongated cone which is hollow and spirally coiled around a central axis called columella.
- 7) The last whorl is the largest in which the body of the animal will be present .
- 8) Hence it is called as body whorl.

5.STAR FISH



Phylum: Echinodermata

Class : Stelleroidae

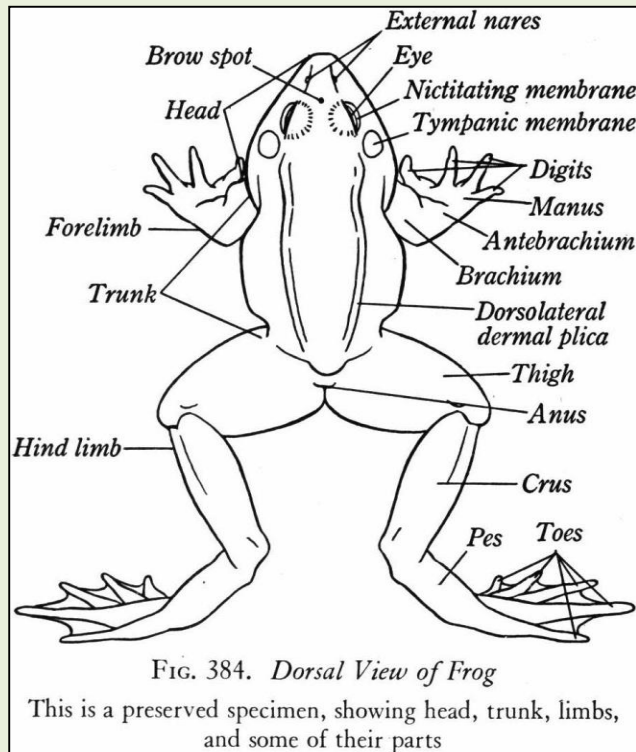
- 1) Asterias are commonly called as star fish or sea stars.
- 2) Asterias has a five pointed star shaped body.
- 3) It has a central disc from which arise five arms
- 4) Body of asterias has an oral and aboral surface.
- 5) Body surface is covered by calcareous ossicles and spines.
- 6) Anus is present on the aboral side in the central disc.
- 7) Madreporite is a sieve-like porous plate present on the aboral surface.
- 8) Tube feet are present and they are helpful in locomotion.

6. FROG

Phylum: Chordate

Class : Amphibia

Order : Anura

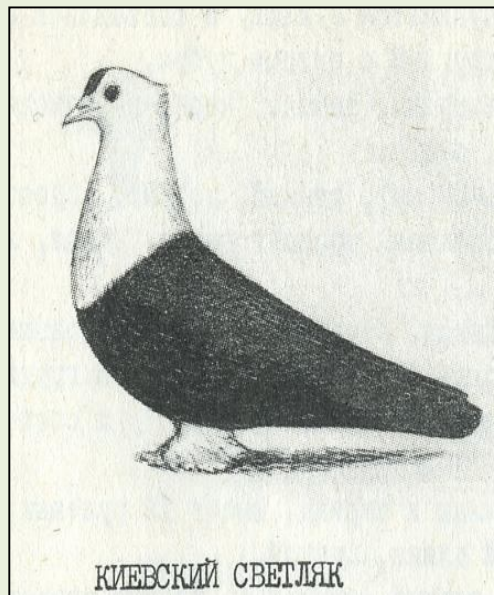


- 1) **Frogs** are a diverse and largely carnivorous
- 2) The body plan of an adult frog is generally characterized by a stout body, protruding eyes, cleft tongue, limbs folded underneath and the absence of a tail.
- 3) They have a tympanum on each side of the head which is involved in hearing.
- 4) There are no teeth in the lower jaw and frogs usually swallow their food whole.
- 5) A frog's skin is protective, has a respiratory function.
- 6) They are Oviparous (laying eggs).

7. PIGEON:

Phylum : Chordata

Class : Aves

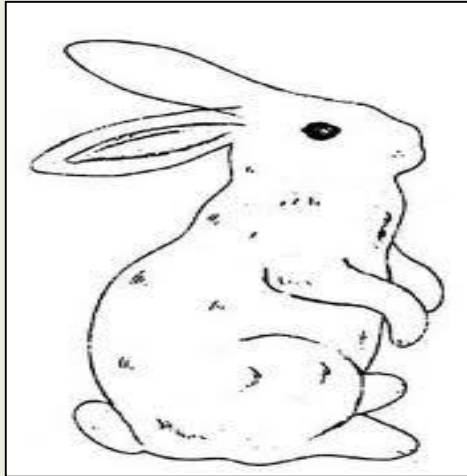


1. It is commonly called as “ Kabutar”
2. The body of the pigeon is divided into head, neck, trunk and tail.
3. Body is covered by feathers.
4. A small, stout pointed beak without teeth is present.
5. The forelimbs are modified into wings useful for flight.
6. Hind limbs are provided with three forwardly directed and one backwardly directed digits.
7. Eyes are provided with upper and lower lids and there is also a semi transparent nictitating membrane.
8. The tail region is stumpy and short.

9. RABBIT:

Phylum : Chordata

Class : Mammalia



1. It is fossorial animal found living in the burrows in the ground in the form of tunnels.
2. Body is divisible into head, neck, trunk and tail.
3. The body is covered by a hairy coat of fur.
4. It is a swift runner runs rapidly for some distance.
5. A short, brushy tail is present.
6. Pinnae (external ears) are long flexible.
7. Eyes with movable eyelids with a few eye – lashes.
8. On the ventral side between the thorax and abdomen are situated four pairs of teats or nipples on which mammary glands open to outside. They are vestigial in male.

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INT BASAR