



Vishwendu Vidya Prasarak Mandal 's
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C9A2_Study_of_pH

Aim: To determine the pH of soil with the help of litmus paper and pH paper.

Requirements: two beakers, glass rod, filter paper, samples of soil, red and blue litmus papers, pH paper and distilled water.

Theory: pH, term indicating the hydrogen ion concentration of a solution, a measure of the solution's acidity. The term (from French pouvoir hydrogène, "hydrogen power") is defined as the negative logarithm of the concentration of H⁺ ions (protons): $\text{pH} = -\log_{10}[\text{H}^+]$, where [H⁺] is the concentration of H⁺ ions in moles per litre. Because H⁺ ions associate with water molecules to form hydronium (H₃O⁺) ions (see Acids and Bases), pH is also often expressed in terms of the concentration of hydronium ions.

In pure water at 22° C (72° F), H₃O⁺ and hydroxyl (OH⁻) ions exist in equal quantities; the concentration of each is 0.107 moles/litre. Consequently, the pH of pure water is $-\log(0.107)$, which equals $\log 107$, or 7. If an acid is added to water, however, an excess of H₃O⁺ ions is formed; their concentration can range between 0.106 and 0.10 moles/litre, depending on the strength and amount of the acid. Therefore, acid solutions have a pH ranging from 6 (for a weak acid) to 1 (for a strong acid). Inversely, a basic solution has a low concentration of H₃O⁺ ions and an excess of OH⁻ ions, and the pH ranges from 8 (for a weak base) to 14 (for a strong base).

Application: -

Knowledge of pH helps to determine the specific soil conditions:- such as alkalinity, acidity, etc. The acidity or alkalinity of soil can be improved by using soil amendments.

Acid soils – addition of lime.

Alkaline soil – addition of gypsum

Determination of pH is applicable in food industry, chemical industry cosmetics etc. The pH of a solution is a measure of the hydrogen ion concentration in that solution. The pH scale is logarithmic, so a small change in pH represents a large change in hydrogen ion concentration. For example, the hydrogen ion concentration of gastric juices (pH of 1) is nearly 400 times greater than that of pure water (pH of 7).

Procedure: - 1) Take about 10 g of soil in a beaker. Add about 40 ml of distilled water to it and stir the soil well for about 10 to 15 min
2) Filter the solution through a filter paper and collect the filtrate in a clean beaker.
3) Dip a blue and red as well as pH paper successively in the solution and take them out when they develop some color.
4) Test the other samples of soil in the same manner. Record your observations.

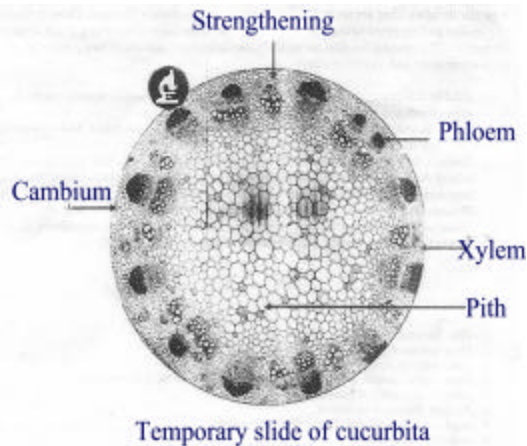


C9D1_Temporary_Slide_preparation

Aim : To prepare stained temporary slide of cucurbita stem for identification of tissues.

Requirement : Cucurbita stem, slide, watch glass, cover slip, microscope, glycerin, safranin.

Diagram



Theory:

Epidermis: It is a single layer made up of compactly arranged tubular cells. It often bears many long multicellular hair.

Cortex: It is differentiated into three zones.

- Hypodermis (below) : It is collenchymatous and it is resupplacted. Only in the ridges forming conspicuous patches.
- General Cortex: It is parenchymatous consists of two to three layers of cells. The cells are large and contain chloroplast.
- Endodermis: It is the inner most layer of cortex it is made up of barrel shaped cells, containing starch grains, hence it is also called as 'starch- sheath'.

Pericycle: It is four to five layer continuous band of thick walled cells. The cells are Sclerenchymatous.

Ground Tissues: It is made up of thin walled paranchymatous cells. It extends from just below the scleranchymatous pericycle to the center at pith. The vascular bundles are embedded in the Ground tissue.

Vascular bundles: They are ten in number arranged in two rows of five each. Those of the outer ring smaller and restricted below the ridges, and those of the inner ring are larger and opposite to the furrows. The vascular bundles are typically bicollateral and consists of two patches of phloem, strips of cambium and a patch of xylem.

- Xylem: It is present in the centre and consists of all the elements – Vessels, tracheids, xylem fibers and xylem parenchyma.
- Tracheids and fibers are few but xylem parenchyma cells are abundant. **Metaxylem vessels** are larger and situated towards the outer side. **Protoxylem vessels** are towards the inner side.
- Cambium: The cells of the cambium are thin-walled, rectangular and arranged in radial rows. The outer cambium is many layered and flat while the inner cambium is few layered and curved.
- Phloem: On the extreme ends of the vascular bundle the phloem occurs in two patches. Towards the periphery the outer phloem and towards the pith the inner phloem. Each stand of consists of sieve tubes, companion cells and phloem parenchyma.

Procedure:

- Take thin transverse sections of stem.
- Place sections in water taken in water glass.
- Clean stems sections properly with brush.
- Place one/two sections on slide. Stain them properly with safranin for 5 minutes.
- After staining, drain of excess strain.
- Put drop of glycerin on section.
- Place cover slip on it and observe slide under microscope.

Inference:

T.S of cucurbita stem is wavy in outline having 5 distinct ridges and furrows and large hallow cavity in central region.& It shows above structure from periphery to center.

spirogyra spirogyra is a green algae. It is slimy to touch. It is grows on rocks in ponds and streams.

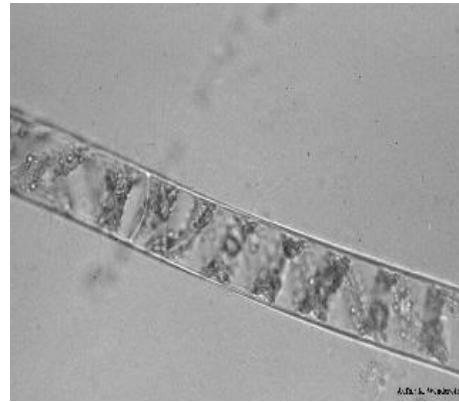
It is often known by common name pond-scum. It is single celled, it is cylendrical in shape, the cells are placed end to end forming a filament, that resembles a strand.

Aim - To prepare temporary slide of spirogyra and mucor.

Requirement: Spirogyra and Mucor specimen, slide, watch glass, cover slip, needles, dropper, blotting paper, microscope.

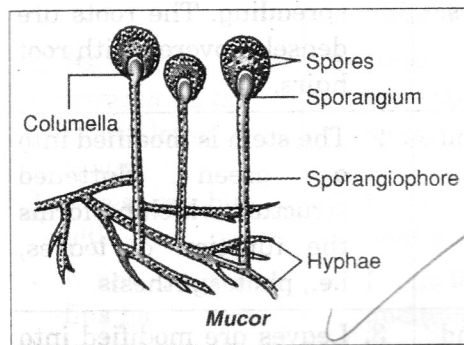
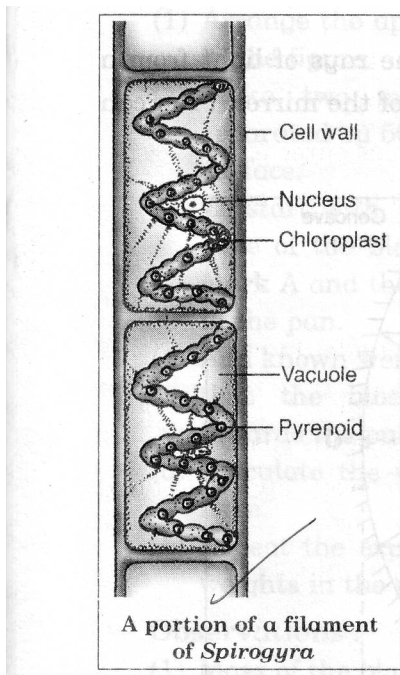
Spirogyra- It is green algae. It is slimy to touch. It grows on rocks in ponds and streams. It is often known by common name pond-scum. It is single celled and cylindrical in shape. The cells are placed end to end forming a filament that resembles a strand ribbon like. Chloroplast is present in cell which contains chlorophyll. Cells may be one celled, multicelled, colonial or filamentous. It reproduces both sexually as well as asexually. The chloroplast contains a number of spherical bodies, called pyrenoids. Each cell is bounded by distinct wall, called cell wall.

Mucor- It is saprophytic fungus. It is commonly grows on damp, moist places, decay and dead materials. It has branched hyphae. The plant body of mucor is made up of many fine thread-like structures called hyphae. The hyphae are without cross walls. The sporangia are borne on erect hyphae, called sporangiophores. The sporangium contains a dome-shaped structure inside called columella and a number of asexual reproductive bodies called spores. When sporangium becomes mature it bursts and spores disperse every where. These spores once again germinate and develop a fresh. Mucor is non septate, filamentous, multinucleated and coenocytic.



Procedure-

1. Take a small bit of material and place it in the centre of the slide.
2. With the help of fine needle tease the material to separate the filaments.
3. Add a drop of water and then put a cover slip over the filament in such a way that no air bubble enter in.
4. Remove the extra water from the slides of the cover slip with a blotting paper. Observe the slide prepared under the compound microscope.





C9A3_Double_Decomposition

Aim: To study double decomposition in following six reactions.

1. $CuSO_4 + NaOH$
2. $NaCl + Ba(NO_3)_2$
3. $MgCl_2 + AgNO_3$
4. $Pb(NO_3)_2 + KI$
5. $NaCl + AgNO_3$
6. $CuSO_4 + NH_4OH$

Requirements:

Test tube stand, Test tube, Solution of $CuSO_4$, $NaOH$, $NaCl$, $Ba(NO_3)_2$, $MgCl_2$, $AgNO_3$, $Pb(NO_3)_2$, KI , NH_4OH

Theory: Decomposition:

- A single compound breaks down into its component parts or simpler compounds.
- Basic form: $AX \rightarrow A + X$

Examples of decomposition reactions:

1. Metallic carbonates, when heated, form metallic oxides and $CO_2(g)$.
 $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
2. Most metallic hydroxides, when heated, decompose into metallic oxides and water.
 $Ca(OH)_2(s) \rightarrow CaO(s) + H_2O(g)$
3. Metallic chlorates, when heated, decompose into metallic chlorides and oxygen.
 $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$
4. Some acids, when heated, decompose into nonmetallic oxides and water.
 $H_2SO_4 \rightarrow H_2O(l) + SO_3(g)$
5. Some oxides, when heated, decompose.
 $2HgO(s) \rightarrow 2Hg(l) + O_2(g)$
6. Some decomposition reactions are produced by electricity.
 $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$
 $2NaCl(l) \rightarrow 2Na(s) + Cl_2(g)$

In a "test tube" you would see a single material coming apart into more than one new material.

A chemical reaction when the constituents of **two compounds**, mutually exchange their positions, forming two new compounds, is a **double decomposition** reaction. e.g.; when potassium iodide solution is added to lead nitrate solution potassium nitrate & yellow precipitate of lead iodide are formed.



Procedure:

- 1) Take about 1-2 ml of $CuSO_4$ solution in a test tube. Add about 1-2 ml of $NaOH$ solution to it. Shake the test tube and observe the changes.
- 2) Take about 1-2 ml of $NaCl$ solution in a test tube. Add about 1-2 ml of $Ba(NO_3)_2$ solution to it. Shake the test tube and observe the changes.
- 3) Take about 1-2 ml of $MgCl_2$ solution in a test tube. Add about 1-2 ml of $AgNO_3$ solution to it. Shake the test tube and observe the changes.
- 4) Take about 1-2 ml of $Pb(NO_3)_2$ solution in a test tube. Add about 1-2 ml of KI solution to it. Shake the test tube and observe the changes.
- 5) Take about 1-2 ml of $NaCl$ solution in a test tube. Add about 1-2 ml of $AgNO_3$ solution to it. Shake the test tube and observe the changes.
- 6) Take about 1-2 ml of $CuSO_4$ solution in a test tube. Add about 1-2 ml of NH_4OH solution to it. Shake the test tube and observe the changes.



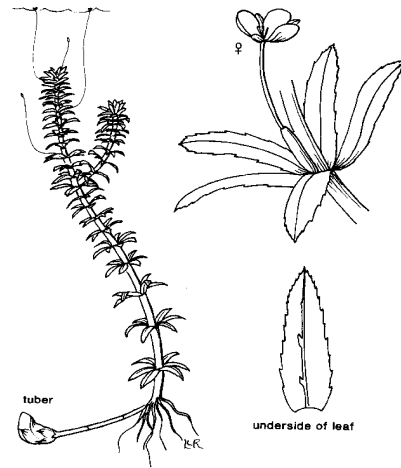
C9B11_Adaptation

The structural and functional modification that occur in an organism to adjust itself to the environment in which it lives is called adaptation.

Types of Adaptation in plants-

1. Hydrophytes (eg. Hydrilla)

1. Roots are poorly developed. They are unbranched and lack root hairs
2. The stem is soft and spongy
3. Leaves are thin small and dissected having two layers of cell.
4. Leaves and stem prepare food by the process of photosynthesis.



2. Xerophytes (eg. Opuntia)



1. Roots are highly developed. They are shallow, but laterally extensively spreading. The roots are densely covered with root hairs.
2. The stem is modified into a green flattened structure which perform the function of leaves that is photosynthesis.
3. Leaves are modified into spines to reduce the rate of transpiration

3. Mesophytes (eg. Hibiscus)

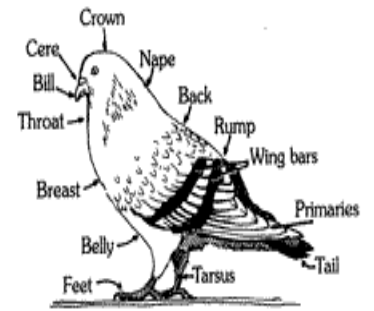
1. These plants grow in soils where there is moderate water supply and sufficient aeration and nutrition.
2. Roots are well developed. Adventitious root system is present .
3. The stem is solid and hard.
4. Leaves are simple



Types of Adaptation in animals-

1. Aerial (eg. birds)

1. These vertebrates are completely adapted to aerial mode of life.
2. They are warm-blooded animals.
3. Their body is stream-lined to lower the air resistance during flight.
4. Their fore-limbs are modified into wings, digits are clawed and covered with scales.
5. Exoskeleton is in the form of feathers.
6. Neck is present between head and trunk, beak is also present.
7. It respire by lungs

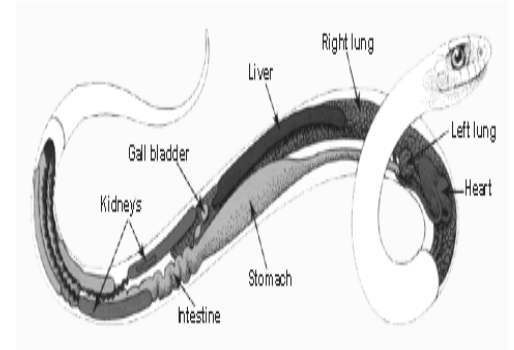


2. Amphibians (e.g. Frog)

1. These are cold-blooded freshwater and terrestrial animals. The development stages require water; while adults may be terrestrial Therefore they are called amphibians.
2. Limbs are two pairs in number and digits are without claws. Exoskeleton is absent, the skin is mostly smooth and always moist for respiration.
3. External ear is absent but ear drum is present.
4. Neck is absent but eyes are protruding and provided with eyelids.

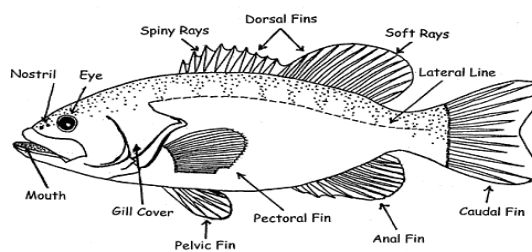
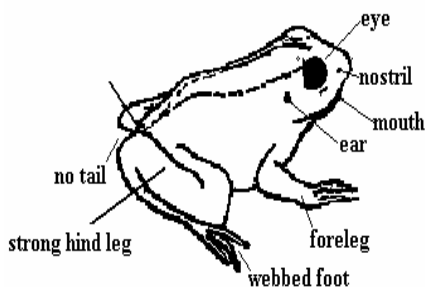
3. Terrestrial (e.g. Snake)

1. Reptiles are the first vertebrates that became fully terrestrial in the course of evolution.
2. They are cold-blooded animals.
3. Due to underdeveloped limbs their body is not lifted clear off the ground during locomotion, hence they appear to crawl on the ground.
4. Their skin is dry and bears scales or bony plates
5. Neck is present between the head and the trunk.
6. External ear is absent.
7. Digits are provided with claws.



4. Aquatic (e.g. Fish)

1. Its body is boat shape narrow at the both ends.
2. These are cold-blooded, aquatic animals found in freshwater or seawater.
3. Body is stream-lined to minimize the resistance of water.
4. Paired or unpaired fins are present for swimming, the tail-fin being useful in changing the direction while swimming (as rudder)
5. Their exoskeleton is in the form of scales while endoskeleton may be cartilaginous or bony.
6. Respiration takes places by gills and eyes are without eye-lids.





C9L1_Reproduction

Reproduction is one of the most important characteristic of living organisms. It involves the transmission of genetic material from one generation to the next. Reproduction is responsible for an increase in number of the individuals of that species and it plays an important role in the evolution of species.

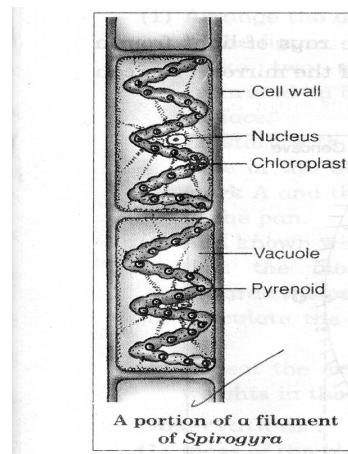
There are two types of reproduction Asexual and Sexual.

Asexual reproduction: Production of the offspring by a single individual without the involvement of gametes is called an asexual reproduction. The types of asexual reproduction are Fission (Binary and Multiple) Budding, Parthenogenesis Fragmentation, Spore formation, Vegetative propagation.

It is a simple process involving amitotic or mitotic divisions. It involves only a single parent which may produce a large number of offsprings. The offsprings are genetically identical to their parents in all the respects, as there is no parental recombination or crossing over. It takes place even in unfavourable conditions and helps the species to survive even in extremes of environmental conditions. It is very quick method of reproduction due to involvement of a single parent.

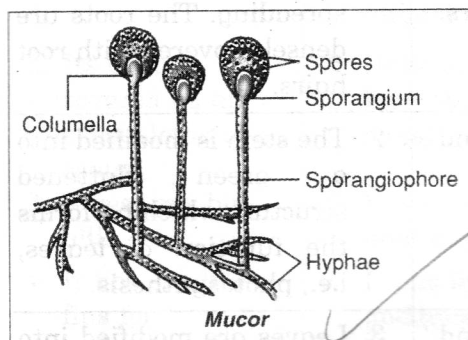
Spirogyra-Spirogyra is reproduced by fragmentation method. In this broken pieces of spirogyra are known fragments. Each fragment grows into new individuals in a favourable condition.

Spirogyra, conjugative and vegetative forms



The sexual phenomenon of conjugation also occurs; cells of two strands lying side by side are joined by the outgrowth of conjugation tubes. Rarely, cells of the same strand join end to end, and the contents of one cell passes into and fuses with the contents of the other. The resulting fused cell (zygote) is surrounded by a thick wall and overwinters while the vegetative filaments die.

Mucor: Mucor is reproduced by the spore formation method. Sporangia contains the spore they are spore producing structures. The uni or multi cellular spores are produced during favourable conditions sporangium ruptures and spores are released they germinate on suitable substratum to produce new individuals. All fungal structures are, therefore, made of hyphae or portions of hyphae; for example, a mucor visibly consisting of a stem supporting a cap with gills on the underside-is constructed entirely of microscopic filaments intricately associated and interwoven. The mushroom is the fruiting body of the mycelium and bears the spores; the main body of the fungus is underground and consists of a huge network of hyphae—the mycelium—spread over a very large area, often several metres (yards) in diameter. This mycelium obtains food from organic matter in the soil and grows outward, just below the surface, in a circular fashion. In certain species the hyphal branches at the edge of the mycelium become organized at intervals into elaborate tissues that develop above ground into mushrooms.



Sexual reproduction : sexual reproduction is the production of offspring from the diploid zygote formed by the fusion of two haploid gametes. Since there is a fusion of maternal and parents gametes, there is crossing over and random genetic recombinations to produce a large number of variations. The variations coupled with heredity form the raw material for the organic evolution. Natural selection acts on the raw material. The stronger ones survive and weaker ones perish off. Thus, the species goes on improving. This prevents extinction of the species.

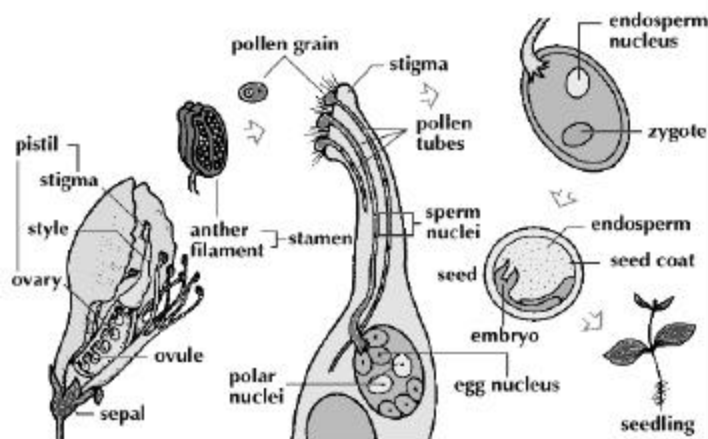
Reproduction in flowering plant (Hibiscus)

Different whorls of flower are calyx, corolla, androecium (male), gynoecium (female). Androecium and gynoecium are the reproductive whorls of the flower when both are present it is said bisexual flower, when only one whorl is present it is said unisexual

Pollination is an act of transfer of pollen from anther to the stigma of carpel. Wind, water, birds, and insects bring about pollination. The pollen germinates on the stigma and produces an elongated, tubular outgrowth called pollen tube that grows through the length of style. The pollen tube carries two male gametes and they are released in the ovule. One of the male gametes unite with the egg to form zygote. This process of union of male and female gametes is called fertilization. Zygote then develops into an embryo. As a result ovule develops into seed and ovary develops into fruit. Reproduction in flowering plants begins with pollination, the transfer of pollen from anther to stigma on the same flower or to the stigma of another flower on the same plant (self-pollination), or from anther on one plant to the stigma of another plant (cross-pollination).



HOW FLOWERING PLANTS REPRODUCE

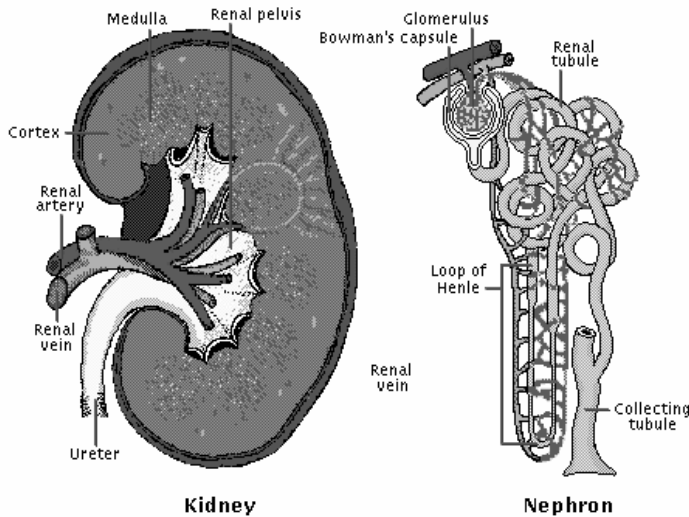




C9BI2_Permanent_slides

Aim- To study the permanent slides of kidney, ovary and skin.

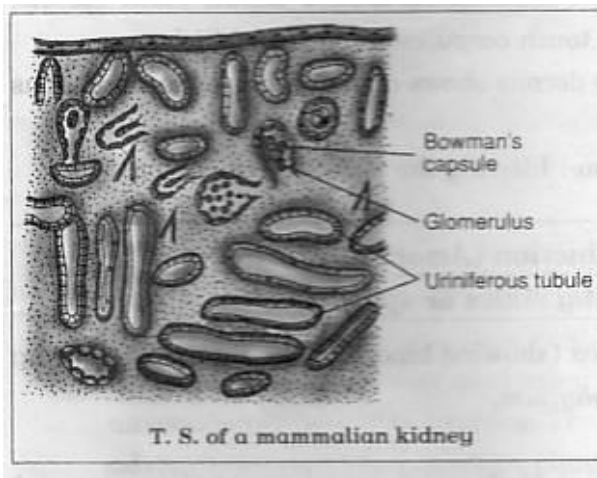
Kidney



Approximately one million nephrons (*right*) compose each bean-shaped kidney (*left*). The filtration unit of the nephron, called the glomerulus, regulates the concentration within the body of important substances such as potassium, calcium, and hydrogen, and removes substances not produced by the body such as drugs and food additives. Kidneys are situated one on each side of the spine, and are embedded in fatty tissue. They are bean-shaped, possessing a convex outer border and a concave inner border. The inner border presents an indentation, the hilum, at which the blood vessels enter and leave. In front is the renal vein carrying blood from the kidney; behind it lies the renal artery carrying blood to the kidney. Most posterior is the ureter, a tube that conveys urine to the bladder. The hilum arises from a deeper indentation, the sinus of the kidney, in which the ureter dilates to form a small sac, the renal pelvis. The kidney also embodies glomeruli, aggregations or loops of capillaries enclosed within thin

envelopes of endothelial lining called Bowman's capsules, located at the blind ends of the renal tubules.

T.S.of kidney



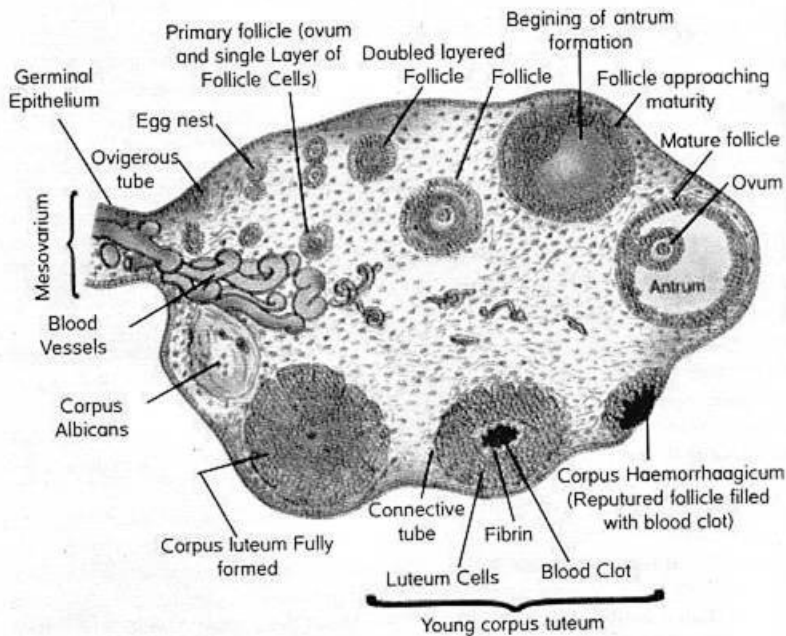
1. The kidney in T.S. shows a number of uriniferous tubules cut in different planes .

2. Those uriniferous tubules that are cut longitudinally appear tubular and those that are cut transversely appear circular.

3. Glomeruli (singular-glomerulus) enclosed by hollow cup-shaped structures called Bowman' capsule are distinctly seen.

Function: The renal tubules secrete other salts and waste products from the blood into the urine. The kidneys are also important in maintaining a balance of fluid and salt and a normal degree of acidity. When disorders upset these delicate balances, the kidneys act to restore them by excreting more or less water, salt, and hydrogen ions. The kidneys help maintain normal blood pressure by secreting the hormone renin and elaborate a hormone that stimulates the production of red blood cells.

T.S. OF OVARY



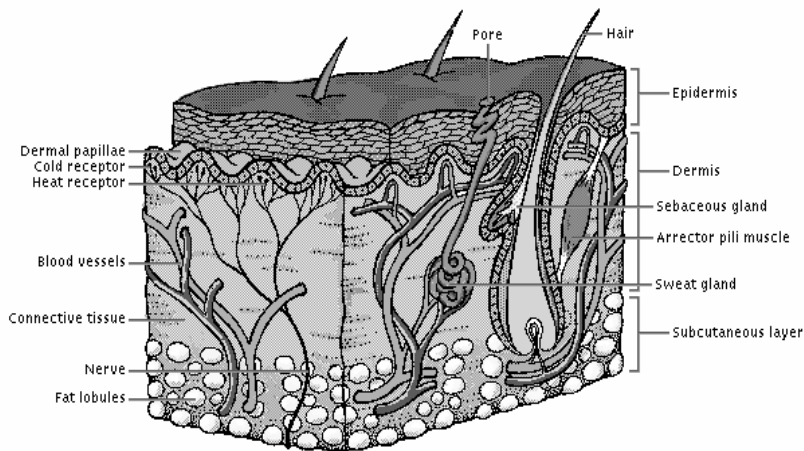
1. The ovaries are female reproductive organs situated on the lateral sides of the kidney.
2. The outermost layer is thin forming germinal epithelial. The germinal epithelial is bounded by connective tissue called 'tunica albuginea'.
3. The ovary and stroma is made up of connective tissue fibroblast, collagen fibres, nerves and blood vessels.
4. In the stroma there are graafian follicles which are under various stages of development. Mature graafian folliculi consist of an ovum which is surrounded by a group of follicular cells and fluid filled cavity called 'antrum'.
5. Follicle ruptures and releases ovum. The cells of ruptured follicle get rearranged and forms corpus luteum.
6. Ovary produces the hormone oestrogen and progesterone which control secondary sexual characters, reproductive cycles and pregnancies.

Skin- skin is protective organ covering the external surface of the body and merging, without break, at the various body openings with the mucous membranes of the alimentary and other cavities.

The skin forms a protective barrier against the action of physical, chemical, and bacterial agents on the deeper tissues and contains the special organs for the various sensations commonly grouped as the sense of touch, temperature, and pain. Through the activity of its sweat glands and blood vessels, it is important in maintaining body temperature. One square inch (6.5 sq cm) of skin contains up to 4.5 m (15 ft) of blood vessels which have as one of their functions the regulation of body temperature.

Observation

(1) The skin in V.S. shows two distinct parts, viz., epidermis and dermis.



- (2) The epidermis is made up of stratified epithelium showing many cells arranged in the form of layers.
- (3) The innermost layers of epidermis is called Malpighian layer.
- (4) The dermis lies just below the epidermis showing connective tissue, blood vessels, nerves, sweat glands, sebaceous glands, touch corpuscles and hair follicle.



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C9BI3_Medicinal_plants

Aim- Identification and uses of medicinal plants.

Aloe vera (Aloe, Korphad, Korakanda)

A small herb, with smooth pale green, fleshy leaves, convex below with thorny prickles at the margins found on the coasts of Mumbai, Gujarat, and Madras.



Aloe vera is used on a regular basis shows real promise in the fight against AIDS, and the virus has become undetectable in some patients who used it on a regular basis, due to its immune system stimulant. It also seems to help prevent opportunistic infections in cases of HIV and AIDS. It appears to help cancer patients (including lung cancer) by activating the white blood cells and promoting growth of non-cancerous cells. Aloe vera has cancer fighting properties. If it is taken orally it appears useful to work on heartburn, arthritis and rheumatism pain and asthma, and studies have shown that it has an effect on lowering blood sugar levels in diabetics. Other situations in which it appears to work when taken internally include congestion, intestinal worms, indigestion, stomach ulcers, colitis, hemorrhoids, liver problems such as cirrhosis and hepatitis, kidney infections, urinary tract infections, prostate problems, and as a general detoxifier. Lastly, many people who take aloe internally report just feeling better overall, which is in and of itself something of an attestation to its remarkable properties.

Azadirachta indica (Neem) Family Meliaceae

It is a much branched shrub with simple opposite leaves, flowers are white in colour. Various parts of the neem tree have been used as traditional Ayurvedic medicine in India. Neem oil and the bark and leaf extracts have been therapeutically used as folk medicine to control leprosy, intestinal helminthiasis, respiratory disorders, constipation and also as a general health promoter. Its use for the treatment of rheumatism, chronic syphilitic sores and indolent ulcer has also been evident. Neem oil finds use to control various skin infections. Bark, leaf, root, flower and fruit together cure itching, skin ulcers, burning sensations. Leaf extract is used to cure leprosy, eye problem, intestinal worms, skin ulcers and act as a pesticide. Bark is used to cure fever. Flower is used in a bile suppression and elimination of intestinal worms. Fruit is used to remove intestinal worm and in urinary disorder. Twig extract is used in cough, asthma, piles and diabetes. Gum is used in scabies, wounds, ulcers and skin diseases. Seed is used in Leprosy and intestinal worms.



Curcuma longa (Turmeric, Haldi)

Family : Gingeraceae

It is a small herb, leaves are simple. It is a modification of underground stem.

This improves the body's ability to digest fats. For chronic digestive weakness and/or congestion turmeric is recommended. Turmeric is consumed it is beneficial to both the digestive system and the liver. It is useful to treat liver conditions such as hepatitis, cirrhosis, and jaundice. Turmeric is used for the treatment of skin cancer or pre-cancerous skin conditions. Both topical and internal uses are beneficial. Turmeric may be helpful in preventing the blockage of arteries that can gradually cause a heart attack or stroke in one of two ways. Turmeric makes cholesterol levels low and inhibited the oxidation of LDL (bad cholesterol). Oxidized LDL deposits in the walls of blood vessels and contributes to the formation of atherosclerotic plaque. Turmeric may also prevent platelet build up along the walls of an injured blood vessel. Platelets collecting at the site of a damaged blood vessel cause blood clots to form and blockage of the artery as well. Turmeric is useful as an external antibiotic in preventing bacterial infection in wounds. "Turmeric gives the energy of the Divine Mother and grants prosperity of health. Turmeric is effectual for purification of the chakras, as well as purifying the path of the subtle body."

Ocimum Sanctum (holy basil, Tulas)

Family : Labiatae.

It is a small herb it is annual, much branched with opposite leaves flower purplish in colour fruit small with yellowish or reddish seed.

Tulsi- The leaves of basil are specific for many fevers. During the rainy season, when malaria and dengue fever are widely prevalent, tender leaves, boiled with tea, act as preventive against these diseases. In case of acute fevers, a decoction of the leaves boiled with powdered cardamom in half a liter of water and mixed with sugar and milk brings down the temperature. The juice of tulsi leaves can be used to bring down fever. Tulsi is an important constituent of many Ayurvedic cough syrups and expectorants. It helps to mobilize mucus in bronchitis and asthma. Chewing tulsi leaves relieves cold and flu. Water boiled with basil leaves can be taken as drink in case of sore throat. This water can also be used as a gargle. The herb is useful in the treatment of respiratory system disorder. A decoction of the leaves, with honey and ginger is an effective remedy for bronchitis, asthma, influenza, cough and cold. A decoction of the leaves, cloves and common salt also gives immediate relief in case of influenza. They should be boiled in half a liter of water till only half the water is left and add then taken. Basil has strengthening effect on the kidney. In case of renal stone the juice of basil leaves and honey, if taken regularly for 6 months it will expel them via the urinary tract. Basil has a beneficial effect in cardiac disease and the weakness resulting from them. It reduces the level of blood cholesterol. Basil leaves are regarded as an 'adaptogen' or anti-stress agent several common elements. The leaves are quite effective for the ulcer and infections in the mouth. A few leaves chewed will cure these conditions.

Adhatoda zeylanica (A.Vasica) (Malbar nut tree, Adulsa) :

Family : Acanthaceae

It is a much branched shrub with simple opposite, elliptic leaves and white flower in axillary spike type of inflorescence. It grows all over the plains of India and in lower Himalayan ranges.

The leaves contain an alkaloid vaccine and an essential oil, The plant has following uses.

1. The leaf juice, syrup or decoction is used as an expectorant. It softens the thick sputum and facilitates its coming out and thus gives quick relief in cough, cold, bronchitis and asthma.
2. The leaf is also used in the treatment of diarrhea and dysentery.
3. The leaf juice and a sweet preparation of flower (gulkand) are very useful in the treatment of tuberculosis.
4. A poultice of its leaves can be applied with beneficial result on very fresh wounds. Rheumatic joints and inflammatory swellings.
5. The leaf decoction is used in the treatment of scabies, and other skin disease, as well as in the treatment of leprosy, piles etc.
6. The decoction of root bark, stem bark, leaves, flower and fruits is used in the removal of intestinal worms.

