

Asian toad
 Oriental Magpie-Robin
 Tiger
 Human

Bufo melanostictus
Copsychus saularis
Panthera tigris
Homo sapiens

Exercise

Short answer questions:

1. What is the significance of learning biology?
2. Write down the name of physical branches of biology?
3. Write down the name of applied branches of biology?
4. What is binomial nomenclature?
5. Mention the ranks of classification.

Essay type questions:

1. What are the necessities of classifying organisms?

Multiple choice questions:

1. In which branch of biology are insects discussed?
 - a. Entomology
 - b. Ecology
 - c. Endocrinology
 - d. Microbiology

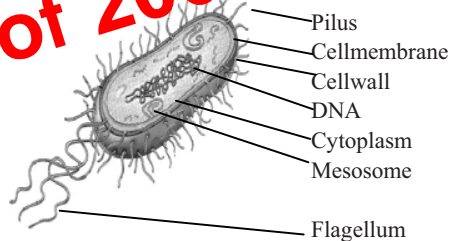
2. The aim of classification is-
 - i. to know about the sub-ranks of organism
 - ii. not possible to name the unicellular organism
 - iii. to present the knowledge in detail

Which one of the following is correct?

- a. i & iii
- b. i & ii
- c. ii & iii
- d. i, ii & iii

look at the stem and answer the question 3 & 4.

3. What is the name of the organism shown in the picture above?
 - a. Amoeba
 - b. Diatom
 - c. Paramecium
 - d. acterium
4. The characteristics of the organism shown in the picture of the stem are..
 - i. able to move
 - ii. unable to produce food
 - iii. nucleus is well-structured



Preview from Notesale.co.uk
 Page 14 of 206

Functions of the Main Organelles of Plant and Animal Cells

We will be familiar with some cell organelles, visible under an electron microscope.

a) **Cell wall:** Cell wall is the unique and outstanding feature of a plant cell. It is composed of inert materials. Chemical composition of a cell wall is much complex. Cellulose, hemicelluloses, lignin, pectin, suberin are the chemical components of a plant cell wall. But, bacterial cell wall is composed of protein and lipid. The primary cell wall is single layered. Secondary cell wall gradually develops through the compilation of different chemical substances secreted from protoplasm on the middle lamellum. At the time of development of secondary cell wall, some cavities are formed and they are called pits. Cell wall protects a cell from all external injuries. It gives a cell its rigidity. Cell wall retains the shape and size of a cell. For exchanging materials with the adjacent cell, plasmodesmata are formed in a cell wall. Cell wall controls the movement of water and minerals. There is no cell wall around an animal cell.

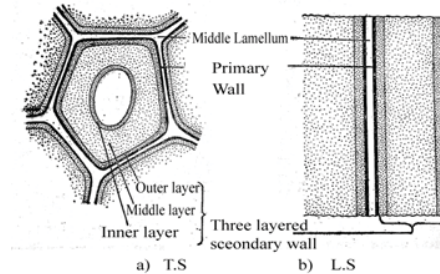


Figure: 2.2 Microscopic structure of cell wall

b) **Plasma lemma:** The double layered membrane around the protoplasm of a cell is called cell membrane or plasmalemma. In a plant cell, cell membrane is attached with the cell wall from the inner side of the cell. The double layered membrane is much flexible. The foldings of cell membrane are called microvilli. It is mainly composed of lipids and proteins. For its being selectively permeable, the membrane can control the movement of water and minerals through the process of osmosis, and separates a cell from its neighbouring cells.

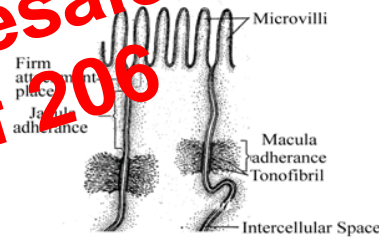


Figure: 2.3 Bilayered cell membrane

c) **Cytoplasmic organelles:** You have already studied what cytoplasm is at your previous classes. The semi-transparent, jel-like, semisolid substance in a cell is called protoplasm. All the contents surrounded by the cell membrane is protoplasm. Outside the nucleus, the harbouring jel-like substance is called cytoplasm. Many cell organelles are there in cytoplasm. They have different functions. Now, let us move on to the functions of organelles.

1. **Mitochondria:** Though first observations of mitochondria were made in 1840s, Richard Altman in 1894 established them as cell organelles, and in 1998 Carl Benda first coined the term 'mitochondria'. This important organelle plays a very important role in cellular respiration. It contains two membranes, and each membrane is composed of

shuttle proteins and other materials produced in a cell. Sometimes endoplasmic reticulum is stretched up to cytoplasmic membrane, and thus it is guessed that enzymes towards other cells and other substances produced inside the cell are transported by the endoplasmic reticulum. They also play a significant role in the development of mitochondria, vacuole etc. in a cell. Endoplasmic reticulum is found in both the plant and animal cells.

7. Centrosome: They are found in most animal cells, but they are rarely found in the cells of some lower plants. The centrioles in a centrosome develop astral rays, thus they play a significant role in constructing spindle apparatus. They also take part in forming different types of flagellum, and are mainly found in animal cells.

8. Cell vacuole: Large vacuole is prime feature of a plant cell. Its main function is to contain cell sap. Different types of substances such as inorganic salt, protein, carbohydrate, fat, organic acid, pigment, water etc. are found in a cell vacuole. No vacuole is generally found in any animal cell. If present in any animal cell, it usually is much smaller.

9. Lysosome: Lysosomes break down waste materials in a cell. The strong enzymes within them help do this task. Moreover, it protects cells by engulfing unexpectedly invaded microorganisms, viruses and bacteria. The membrane around lysosome protects the rest of the cell from degradative enzymes within lysosome. They are found in animal cells.



Figure: 2.8 Lysosome granules

10. Nucleus: The nucleus is a membrane bound prominent organelle found in the eukaryotic cells. It is roughly round or spherical in structure. Many plant cells and red blood cells lack nucleus. A nucleus houses the heredity information in it, and controls all the activities of a cell. A well structured nucleus has the following parts:

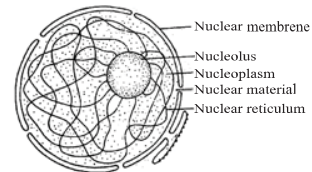


Figure: 2.9 A Nucleus

a) Nuclear membrane: The membrane that encloses the nucleus is called nuclear membrane. It is a double layered membrane, and composed of lipids and proteins. In this membrane, there are some channels called nucleopores. Substances get in and out of a nucleus through the pores. The membrane separates the contents of a nucleus from cytoplasm.

b) Nucleoplasm: The jell-like fluid enveloped by nuclear membrane is called nucleoplasm. It is similar to the cytoplasm of a cell. The viscous fluid contains nucleic acids, proteins, enzymes and some other substances dissolved in and mixed with it.

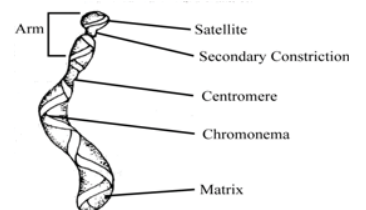


Figure: 2.10 A Chromosome

scleride cells are usually dead. The walls of the cells are pitted. In the cortex, fruits and seed shells of gymnosperm and dicot plants, sclerides are found. In the petioles of leaves, they may be present in cluster form associated with epidermis, xylem and phloem.

Activity: Drawing of three types of simple tissue;

Essentials: Poster papers, sign pens.

Draw the labeled diagrams of three types of tissue, and present the differences between them.

Complex tissue

The tissue composed of more than one type of cells is called complex tissue. They conduct water, minerals and prepared food, and this is why they are also called conducting tissue. They can be grouped into two types: xylem and phloem. Xylem and phloem form together the conducting structure of vascular bundle.

Xylem: There are two types of xylem: primary and secondary xylem. Xylem developed during primary growth from procambium is called primary xylem. Secondary xylem is the xylem grown during secondary growth from vascular cambium. Primary xylem comprises protoxylem and metaxylem. Metaxylem develops after the protoxylem but before the secondary growth. Protoxylem is distinguished by narrow vessel developed from smaller cells but metaxylem cells are usually large. Different xylem cells are the constituents of xylem, and they are tracheids, vessel, xylem parenchyma and xylem fibers.

a) **Tracheids:** Tracheids are elongated cells with slender and sharp ends. After lignification, their lumen may become narrower, and so in that case transportation of water occurs mainly through the lateral paired pits on their walls. Thickening of walls is of different types, such as, elliptical, spiral, scalariform, reticulate and pitted. Tracheids occur in ferns and gymnosperms, and also are present in the primary and secondary xylem of angiosperms. Its main function is to provide sap conduction-related organ with proper rigidity. Sometimes they also store food.

b) **Vessels:** Vessels are short, tube in structure connected end to end. Vessel cells develop a long tube when their terminal walls are dissolved. This is why for the ascending of sap, a narrow continuous channel is developed. In their early stage of development, though the

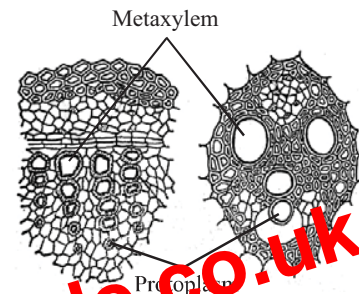


Figure: 2.12 A Vascular bundle

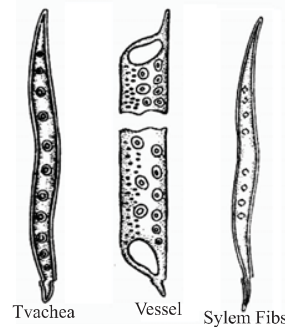


Figure: 2.13 Different types of xylem

Stages of mitosis: The cell division mitosis is a continuous process. During mitosis, karyokinesis is usually followed by cytokinesis. Karyokinesis and cytokinesis represent the division of nucleus and the division of cytoplasm respectively. Before the starting of the cell division, a cell has to prepare itself. This stage is called interphase. For the ease of description, the process mitosis can be divided into five stages. They are:

- (e) Prophase
- (e) Prometaphase
- (e) Metaphase
- (e) Anaphase
- (e) Telophase

(a) Prophase: This is the first stage of mitosis. At the onset of the stage, nucleus becomes little larger and chromatin fibers start condensing into short, thick and tightly coiled structures called chromosomes. At this stage, chromosome can be seen under compound microscope. Though every chromosome then divides into two sister chromatids, at the centromere each one remains together. As the chromosomes are still in a mess form, it is little tough to count the number of chromosome easily in a cell.

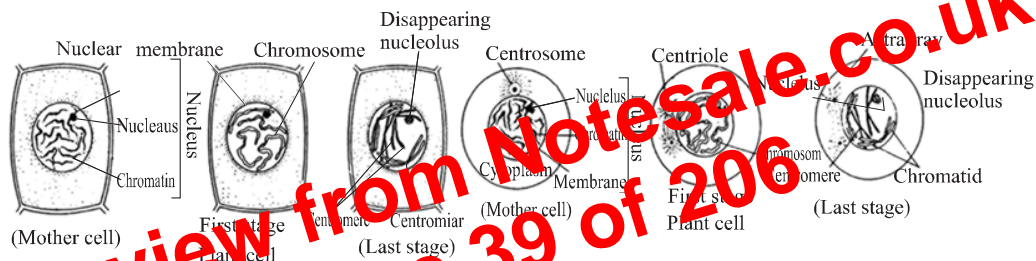


Figure: 3.2 Prophase

(b) Prometaphase: At the very early of the stage, spindle apparatus having two poles is developed in plant cells from fiber protein. The middle plane of the spindle apparatus is called equator. Spindle fibers are stretched from one pole to the other. They are called spindle fibers. At this stage kinetochores in centromeres of chromosomes get attached with some fibers of spindle apparatus. Kinetochores are protein structures assembled on centromeres and link the chromosomes with mitotic spindles. These fibers are generally called traction fibers. They are also called chromosomal fiber as chromosomes are attached with them. Chromosomes then start assembling on the equatorial plane. The nuclear membrane and nucleolus being disintegrated begin to

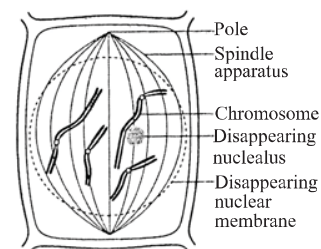


Figure: 3.3 Pro-metaphase

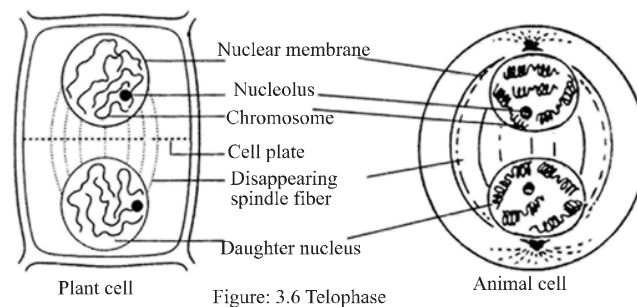


Figure: 3.6 Telophase

At the end of the stage telophase, some small parts from endoplasmic reticulum aggregate in the equatorial plane and collectively form the structure cell plate. Equal distribution of cytoplasmic organelles is accomplished. As a result, two identical daughter cells are developed. In case of an animal cell, a contractile ring on the plasma membrane at the equatorial plane pinches off the two nuclei.

Significance of mitosis

The significance of mitosis in the living body of organisms is immense. The balance in between the nucleus and cytoplasm of a cell in terms of volume and amount is maintained by the process of cell division mitosis. Through mitosis, the growth in the body multicellular organisms occurs. All the multicellular organisms start their life from a single cell zygote. The repeated division of this single cell produces innumerable cells and thus an organism grows to its complete level. As the number and nature of chromosome remain unchanged in the cells produced through mitosis, growth in organisms takes place systematically. Mitosis plays a role in maintenance of normal size, shape and volume of cells. Unicellular organisms reproduce through mitosis. Mitosis plays an important role in the vegetative reproduction of organisms and increasing the number of reproductive cells. Mitosis is essential in the body of living organisms to form new cells continuously for growth and healing of injuries. The life span of some cells is specific and they are, accordingly, replaced through the process of mitosis. As identical cells are produced through mitosis, qualitative features in the living world remain unchanged. Mitotic errors may result in abnormal mass of cells called tumours, with or without cancer cells.

Work: The teacher will group the students into some sets and will ask them to present separately different mitotic stages after drawing by themselves.

Meiosis: In this special process of cell division, four daughter cells are produced from an eukaryotic cell. Nucleus divides twice and chromosome divides once in this process, and number of chromosomes becomes half in the daughter cells than that of mother cell. As the number of chromosome decreases by half, the process of cell division is called reductional division.

iii. chromosomes divide once.

Which one of the following is correct?

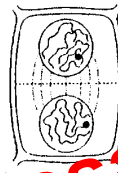
- a. i & ii
 b. ii & iii
 c. i & iii
 d. i, ii & iii
4. The division in the figure B is different form that of the figure A and so-
- a. the number of chromosomes remains the same in the daughter cells.
 b. the number of chromosomes increases.
 c. the abnormal cells are produced.
 d. the normal growth of the body occurs.

Creative question.

1.



Stage-A



Stage-B

- a. Where does amitosis take place?
 b. Write in detail why meiosis is called the reductional division.
 c. In the stem B what changes occur? Explain it.
 d. Explain what problems may emerge if the process expressed in the figures above does not accomplish properly.

Preview from Notesale.co.uk
 Page 44 of 206

Chapter Five

Food, Nutrition and Digestion

Living organisms live on food that means food is essential to live in. But the process of taking food is different in plants and animals. Different elements are necessary for plant's nutrition. In this chapter food, nutrition and digestion in human body and plant's nutrition are the subjects of discussion.



At the end of this chapter, we will be able to –

- Explain the necessity of essential elements for plant nutrition.
- Analyse the nutrition deficiency symptoms in plants.
- Describe main components of animal foods and its sources.
- Explain the ideal food pyramid
- Explain the principles of taking foods
- Explain the symptoms, remedy, and prevention of nutrition deficiency diseases.
- Explain kilo calorie and kilojoule
- Explain the amount of energy in nutrients and conversion of calorie and joule.
- Explain the importance of body mass index (BMI) and body mass ratio (BMR)
- Determine BMI and BMR.
- Determine the relation between BMR and energy spent.
- Determine BMI that differs according to the age and sex.
- Explain importance of exercise and rest for good health.
- Explain the necessity of using chemicals in preserving foods
- Analyse the effect of using excessive chemicals and colors on human body.
- Describe the organs of the alimentary canal along with accessory glands.
- Explain the functions of liver.
- Explain the functions of pancreas.
- Evaluate the role of enzymes in digestion.
- Explain different intestinal diseases, symptoms, remedy and prevention.
- Make a list taken in last seven days and compare with the balanced food.
- Draw a poster regarding the contribution of nutrition to healthy living to raise awareness among people.
- Draw the labeled diagram of alimentary canal.
- Be conscious myself and others of the family about intestinal diseases for healthy living.
- Be conscious myself and others about the contribution of nutrition to lead a healthy life.

rice etc are different forms of carbohydrates. According to the composition carbohydrates are of three types. Formation and composition of three types of carbohydrates are shown in the table given below. **(Table 10.2)**

Table 10.2: Classification of carbohydrates.

Carbohydrates	Composition	Example	Sources
Mono-saccharide	One molecule of glucose	Glucose	Honey, fruit juice.
Di-saccharide	Two molecule of glucose	Sucrose, lactose.	Sugar and milk.
Poly-saccharide	Many molecule of glucose	Carbohydrate, glycogen.	Rice, wheat, green leaf, vegetables.

Mainly we get carbohydrates from rice, wheat, potato. In raw form carbohydrates can not be easily digested. We take these foods as potato, rice, wheat (ata) after cooking. After taking carbohydrates is digested and turns into glucose. Disaccharides and polysaccharides turn into simple carbohydrates (glucose) by digestion and become ready for absorption. For human nutrition simple carbohydrates are very important. Human body can absorb only glucose.

Fats: Fat is an essential component of food. The component is composed of carbon, hydrogen and oxygen and its main function is to produce heat. It remains in the stomach for a long time, so we do not feel hungry. Fat is stored here in the skin. It is also stored in various organs, as – liver, brain and muscles. The essential fats are used during starvation. It contains two time calorie than carbohydrates and fats. Calorie is the measuring unit of energy in food.

Food, cooked with oil or ghee, makes the food good tasteful. At the same time it also increases the nutritional value. Such as : fried potato instead of boiled potato, luchi or porota in stead of roti are not only tasteful but also it contains more calorie. Some fats contain vitamin 'A', some contains vitamin 'E'.

According to the sources, fats are of two kinds. As – 1) Vegetable fat and 2) Animal fats.

1) Vegetables fat : Soyabean, mustard, nuts, sunflower and corn oils are used as vegetables oils. Soyabean oil is the best one.

2) Animal fats : Fats, ghee, dalda etc. are animal fats. Egg yolk contains fat but while part of the egg do not contain fat. Fats are insoluble in water. Fats floats water because it is a lighter than water. Daily requirement of healthy adult person needs 50-60 gm.



Figure: 5.2 Carbohydrates

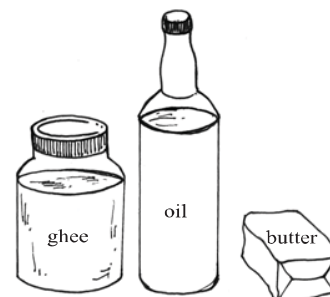


Figure: 5.3 Fats and oils

Vitamins: Very minute amount of vitamins is needed for health; even then its importance is unbounded. To grow and to remain healthy vitamin is absolutely necessary. Balanced diet contains different types of ingredients, so sufficient vitamins can be obtained from balanced diet. Absence of vitamins in regular diet may prolong or may cause long vitamin – deficiency diseases. Afterwards, it may cause severe harmful effects on the body and even death. Vitamins are of two types. As : 1) Fat soluble vitamins and 2) Water soluble vitamins. Vitamin ‘A’, ‘D’, ‘E’ and ‘K’ are soluble in water and vitamin B-complex and vitamin ‘C’ are soluble in water.

Vitamin ‘A’ is obtained from milk, butter, fats, eggs, carrot, mango, jack fruit, colored vegetables and mola, dehela fishes, yeast. Outer wall of cereal granules (e.g. rice wheat) red ata, germinated gram, peas, cauliflower, pea nut, beans, liver, heart, milk, ghees, meat, green vegetables etc are the sources of vitamin ‘B’. Vitamin ‘C’ is obtained from Guava, pomelo, star fruit, orange, cabbage, tomato, pineapple, green chilli, fresh vegetables etc. Milk, eggs, liver, dairy products, fish oil, edible oil etc are the sources of vitamin ‘D’. Vitamin ‘E’ and vitamin ‘K’ can be obtained from all the above mentioned foods.

Mineral salts or Minerals: Mineral salts are essential for body cells and body fluid. Human body contains mineral salts, such as: calcium, iron, sulphur, zinc, sodium, potassium, iodine etc. These ingredients do not exist as an element. These elements remain within the food and human body as a compound with other elements. Combines with others elements and forms various organic and inorganic salts. Mineral salts regulate body building and internal functions.

Mineral salts are the most essential elements in the formation of teeth, muscles, enzyme and hormones. It has a particular role in nerve impulses, muscle contraction, maintains water balance in body cells, handling of acid and base etc.

Milk, curd, posset, cheese, small fishes (mola-dhela), different pulses, green vegetables, ladies finger, red leaves, arum leaves etc are the sources of calcium. Liver, green vegetables, meal, yolk, arum leaves contain iron. Phosphorous is obtained from milk, fish, meat, nuts, pulses etc. Table salt, chips, salty food, cheese, nuts, pickles etc. contain sodium. Fish, meat, nuts, pulses, banana, potatoes, carrots, apples etc contain potassium. Fish, meat, table salts are the sources of chlorine. The sources of iodine are sea weeds, sea fish, meat and algae.

Water : Other name of water is life. For the existence of life the position of water is just after oxygen. Water is the most essential components for nutrition. Body building and internal functions can not continue without water. The function of water are of three types as :(1) Body formation (2) Control of internal functions and (3) Elimination of waste products.

(1) Body formation: Body formation and maintenance can not be possible without water. At least 45%-60% of body weight of human body consists of water.

from iron deficiency. Symptoms of this disease are, feeling weak headache, exhaustion, insomnia, loss of appetite, palpitation to sea dark etc.

To prevent from this disease taking of iron enriched food. Such as : kidney bean, liver, meat, eggs, peanut, vegetables, molasses etc is necessary. After ensuring the infection of worms in the intestine through tests, the patient needs to take worm destroying drugs. According to the need this disease can be prevented by using drugs which contain iron ingredients.

Work: Draw a poster regarding the contribution of nutrition to healthy living.

Energy in food ingredients

We know that food gives us nutrition and energy. But do we know what amount of food gives us what amount of energy? Is the elimination of energy from different nutrients same? Among the six nutrients only proteins, carbohydrates and fats can produce energy. But the other three ingredients can not produce energy.

You know, energy is of various types. Food ingredients emit heat energy. Unit of heat energy is calorie. The unit of measurement of heat energy is calorie. A calorie is defined as heat to raise one kilogram of water to one degree centigrade. Really it is kilocalorie. But generally nutritionist terms it as calorie.

Energy consumption depends on muscle contraction and relaxation. The more energy will be spent, the more the muscles will contract or expand. Muscles of our body help in movement and locomotion. We feel easy to do any work because of muscles. Such as : for moving, walking, running, sitting, etc. How much energy is spent to do this type of work?

Energy is required for the contraction and relaxation of muscles. So, the more the muscle will contract and relax, the more energy is consumed. The consumption of energy depends on work. So, is there any energy loss in the work, as : walking moving?

If we do not perform any work, only pass our time in living and sitting, still we need food, we feel hungry. We feel less energy is spent in resting time. How does it happen? At the time of taking rest our external organs, like-hand, legs do not work. But in our respiration, heart works as usual. The muscles, involved in these functions, still keep working. So all the muscles, involved in these functions, contract and relax to perform the work as a whole. So consumption of energy still goes on. This energy is called basic metabolic energy. How much energy is required for a person depends on three objects. (1) Basic metabolic rate (2) Type of daily physical labour and (3) Influence of food.

Joule :

Fish drying, salted Hilsha, pickle, ice preservation, fish sidol, prawn naptae etc are the customary means of food preservation. Modern methods canning and smoking (with the help of smoke) processes are used for preserving. Healthy, approved chemical substances are used to preserve food so that decomposing bacteria and fungal infection may not happen. Generally sodium nitrate, sodium chloride or table salt, calcium apernate, sulphur di-oxide, sodium-bisulphate, anti-oxidant e.g. BHA and BHT are used. These are approved chemicals. Harmful formalin, various kinds of colored substances should not be utilized, because it increases life risk.

Adulterant in food and use of colours

As clear environment is necessary to live in the beautiful world, similarly safe food stuff is essential. At present unethically used harmful and unhealthy chemical substances are used as adulterant and colored material and these are sold. As a result public health is now threatened. This risk of health disaster continues in course of time. Bangladeshi nation will be vanished just like the Romans. The Romans used water container made of lead. By any means, people, who drank that water, were affected by poisonous lead and cripple generation took birth. In Bangladesh various kinds of adulterants are mixed with the food. Commercial colors, antibiotic, chemical substances (e.g. sorbet, rabbit, insecticide, pesticide, formalin, heavy metal) are mentionable. The cattle, fishes, poultry animals etc, which are fed by the unapproved adulterant food are threatening to human life and health. These adulterant foods are injurious to health. Some harmful effects of health risk are mentioned. Commercial color that is used in textile for colouring, that is used in ice-cream, blended ice cream, candies, bostani, lawa etc. These types of foods gradually destroys liver function and that cause various diseases. Decomposing can not grow in the submerge fishes, fruits and other substances. So it looks fresh. In research it is found, that formalin forms a compound within cell of the fishes. After frequent washing it remains with the fish body. It enters within human body with the cooked food. These poisonous compounds are the cause of some complex disease symptom and even may occur some type of cancer.

Insecticides are used in the storage food and vegetables. Its effect remains for a certain period, before expiry date is over these substances should not marketable, because poisonous effect increases the suspicion of health risk. Infants are more affected. Poisonous insecticides produce an adverse effect on their growing cells. So infants suffer from various types of illness and their mental development is retarded. Chemical substances adulterant, used in food, are given in chart below-

Adulterant / poisonous chemical substances	Probable source	Remedy
1. Antibiotic	Used in fish and cattle food, stores in animals body.	Only approved drugs can be used.
2. Heavy metal	Used in fish & cattle food	Avoid to use inedible

(2) Chemical process: Chemical process is the second step of digestion. Enzyme in the digestive secretion helps to enhance chemical reaction. So the compounds break into simple soluble component. Besides, intra cellular reaction also depends on enzymes.

Alimentary system or alimentary canal: It is a canal running from the mouth to the anus. Parts of this canal may be narrow. The main parts of the canal are:

Mouth : mouth is the starting point of the alimentary canal. It is a transverse opening below the nostrils and bounded by lips.

Buccal cavity: Buccal cavity contains teeth and salivary glands. These organs help in digestion directly or indirectly. Teeth help to cut, grind and chew food into small pieces. The functions of tongue are to move food around the mouth for mastication and to taste. Saliva is the secretion of the salivary glands. These glands are located below the ear, at side of the jaws and below the tongue. Salivary juice secreted from the salivary glands contains mucin, it makes the food slippery and helps in swallowing of food. The secretion containing the enzymes named ptyalin and moltes takes part in digestion.

Tooth: Teeth are the hardest part of the body. An adult has 16 in each half of the jaws. Milk teeth appear first in childhood and are replaced by the permanent teeth up to the age of 18 years.

Permanent teeth are of four types. Such as :-

(a) Incisor : Incisors are used in cutting and biting food.

(b) Canine: Canines are used for grasping.

(c) Premolar : These teeth are specialized for crushing and grinding.

(d) Molar : These teeth are used in crushing, grinding. There are two teeth at the extreme end of the jaw which are called molar. Each half of the jaw bears 2 incisors, 1 canine, 2 premolars and 3 molars.

Structure of a teeth: The tooth typically consists of three parts. As :-

(1) Crown: The part above the gum.

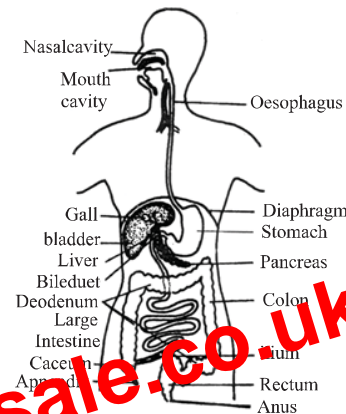


Figure: 5.6 Digestive system of man

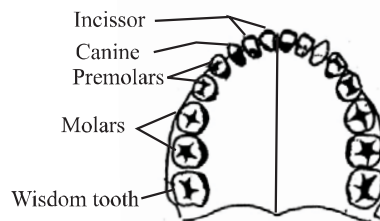


Figure: 5.7 various types of teeth

Exercise

Short answer question

1. What are the mineral nutrients of plants?
2. How many essential mineral nutrients do plants use?
3. What is food pyramid?
4. What is the reason of Anemia?
5. Why does night blindness occur?

Essay type questions:

1. Describe the structure of a tooth with diagram.
2. What are the characteristics of balanced diet?

Multiple choice question

1. Which of the following nutrients does serve a plant as a macronutrient?

a. Zinc	b. Iron
c. Boron	d. Potassium
2. Chlorosis is caused by...
 - i. nitrogen deficiency
 - ii. sulfur deficiency
 - iii. iron deficiency

Which one of the following is correct?

- | | |
|-------------|----------------|
| a. i & ii | b. i & ii |
| c. ii & iii | d. i, ii & iii |

Read the stem and answer the question number 3 and 4.

Five year old Sanjana can see all the writings in the book. But at night she can not see the writings clearly.

3. Which vitamin deficiency Sanjana has?

a) vitamin 'A'	b) vitamin 'B'
c) vitamin 'C'	d) vitamin 'D'
4. To prevent from this disease which vitamin Sanjana has to take?

i) liver	ii) carrot	iii) Mola fish
----------	------------	----------------

Which one is correct?

- | | |
|---------------|------------------|
| a) i and ii | b) i and iii |
| c) ii and iii | d) i, ii and iii |

amount of water being evaporated is lost through the cuticle. The process is called cuticular transpiration.

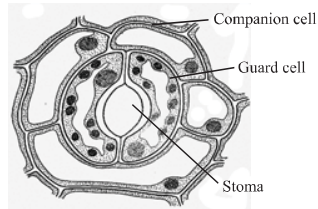


Figure: 6.2 A stoma

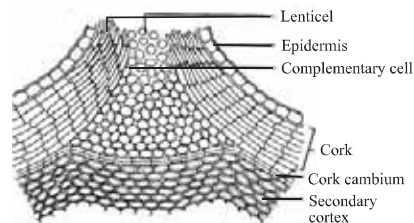


Figure: 6.3 A Lenticel

3) Lenticular transpiration: After the occurrence of the secondary growth in plants, the airy aggregation of cells that functions as a pore called lenticel is developed on the rapture bark of some plants. The cells aggregated around a lenticel are loosely fitted and water from inside can be lost through it. This is called lenticular transpiration.

Through transpiration, as excess water is escaped being evaporated, a suction force being developed causes the root to absorb water. The process depends on many factors. They are roughly grouped into two: a) external factors and b) internal factors.

a) External factors: The factors which affect the process transpiration from outside of the plant body are called external factors, such as,

1) Temperature: The rate of transpiration fluctuate with the changes of temperature. Water can easily be vapourized at high temperature and thus the process transpiration is accelerated. Water holding capacity of air in the atmosphere increases if the temperature goes up. As a result, transpiration proceeds speedily. If the temperature goes down, the rate of transpiration eventually declines.

2) Relative humidity: The proportionate ratio of the amount of water vapour in the air of the atmosphere and the amount of water vapour that the air can hold at a given temperature is its relative humidity. In an area, the air may be dry in spite of having high water vapour because the air may have a high water vapour holding capacity. Conversely, in spite of the presence of low amount of water vapour in atmosphere, the atmosphere may be humid for the low water vapour holding capacity of the air. When relative humidity is low, air remains unsaturated, and can retain more water vapour. If the relative humidity is high, the air being saturated loses its water vapour holding capacity. So, when relative humidity is low, the rate of transpiration increases and when high, the rate of transpiration declines.

3) Light: In presence of light, stomata get opened, and so the rate of transpiration increases. In dark, the process is ceased because of the stomata being closed. With the fluctuation of light, the openings of the stomata also change. Light affects the process transpiration by increasing the temperature of the plant.

Functions of blood : Blood is an important ingredients. Blood performs different functions. Such as –

- 1) **Oxygen transport :** Red blood corpuscles transports oxygen as oxyhaemoglobin to the cells.
- 2) **Removal of carbon dioxide:** Due to the chemical reaction occurs in the tissue carbon di-oxide is produced. Carbon di-oxide is transported in the form of sodium bi-carbonate dissolved in the plasma. It carries carbon di-oxide from the tissue to lung and is then expelled during expiration.
- 3) **Transportation of digested food:** It provides plasma, glucose, aminoacid, fat granules in the cell.
- 4) **Balancing of temperature condition:** Heat produced in the body tissues, especially in the muscles and liver and distributes it throughout the body and there by maintaining the uniform body temperature.
- 5) **Elimination of waste products:** Blood carries all the waste products and eliminates these as urea, uric acid and carbon di-oxide.
- 6) **Hormone transport:** Hormone is a chemical substance which is produced in the ductless glands. It mixes with the blood directly and is circulated to the different organs of the body according to its need. It helps in different important biological process.
- 7) **Prevention of Diseases:** Some types of white blood cells attack and engulf germs by the process of phagocytes, thus prevents the body from the attack of germs. It increases the resistance power against diseases by producing antibody and antigen.
- 8) **Blood clotting:** If there is wound in any part of the body the clotting of blood heals the wound, preventing excess loss of blood.

Blood group: Blood is necessary for a declining or dying patient. His or her blood group is the you frequently watch the type of advertisement in television what is blood group? Why is the blood group to be known? Through numerous experiments, examination and researches concerning blood group it is proved that in different persons red blood corpuscles contain A and B antigen and plasma has a and b antibodies. Blood can be classified into different groups depending upon the presence of these antigens and antibodies. This is called blood group. Scientist karl Landsteiner in 1701 for the first time classified and named human blood and placed it into A, B, AB and O four groups. The blood group of a person remains same and unchanged throughout the whole life. Types antigens and antibodies in different blood group is shown in the table below-

Blood group	Antigen (in red blood corpuscles or cells)	Antibodies (in plasma)
A	A	b
B	B	a
AB	A,B	No antibodies
O	Neither	a, b

systolic condition is high. Relaxation of the heart is called diastole. The pressure during the diastole condition is called the diastolic pressure. The pressure in the artery during diastole condition is called the diastolic condition when blood pressure is less. Blood pressure can be measured with the help of sphygmomanometer. By observing systolic and diastolic pressure with the help of this machine blood pressure is determined.

The systolic and diastolic blood pressure of a normal healthy man is 100-150 mm and 65-90 mm of the height of mercury respectively.

Ideal blood pressure: According to the physician a normal adult man's blood pressure is generally near about 120/80. This indicates two digits. That indicates two ranges one for higher and the next one for lower. The blood pressure in the arteries is the highest during systolic blood pressure ranging from 120 or slight less than that. The blood pressure in the arteries decreases during diastole. This is diastolic blood pressure ranging from 80 or slight less than that. In between the time of two heart beats this pressure is created. The difference between the two pressures in the arteries are called pulse pressure. The normal rate of the pulse, therefore the heart beat rate is about 70 beat per minute in an adult at rest. Normally pulse rate is measured in the radial artery at the wrist. It can be measured by the blood pressure machine on sphygmomanometer.

High blood pressure or Hypertension: High blood pressure is considered as the silent killer disease. According to World Health Organization report within 2020 stroke, coronary artery diseases will be the number one life threatening disease. In the south Asian countries it will break out as an epidemic disease. One of the main causes of heart disease and stroke is high blood pressure.

What is hypertension?

When the heart pumps blood into the arteries, the blood pressure against the wall of the blood vessels is called blood pressure. When blood pressure rises above the normal pressure then it is considered as high blood pressure. A normal adult person possesses the systolic pressure 120 and diastolic pressure 80 or below it is considered as desired measure. When systolic and diastolic pressures rise more than the normal pressure, this is called high blood pressure or hypertension.

Causes of Hypertension and its risk:

There is strong probability of hypertension for those whose parents have got this disease. Besides this those, who suffer from tension or smoking habit, have the probability of hypertension. Increase in body weight, intake of excessive salt and fatty diet and history of diabetes and cholesterol of family members are the causes of this disease. Eclamsia at the time of child birth is the cause of hypertension.

Diagnosis: Blood pressure can be examined with the help of pressure measuring apparatus called sphygmomanometer. Before measuring blood pressure the patient

should take rest. Blood pressure should be measured at least two times at the interval of 1 or 2 minutes.

Symptoms and signs of Hypertension: Headache, primary symptom is ache at the back of the head, vertigo, shoulder pain, palpitation, and weakness. Sometimes bleeding from nose, sleeplessness or insomnia, easily tiredness after little exertion.

Work : Learn the skill of measuring blood pressure and write your friends blood pressure in the table given below.

Name of the student	Blood pressure systole/diastole.	Remarks

The blood pressure may vary more or less due to health, age, activities and disease, To prevent blood pressure certain rules should be followed, such as:- decreasing of body weight of those who are over weight, taking less amount of fatty food, use less salt in food etc. If the pressure is very high, consult a doctor and take medicine regularly.

Cholesterol :

Cholesterol is a compound hydro carbon cholesterol. It is an important component in the cells of higher animal. Cholesterol circulates with blood lipoprotein. It is made of three types of lipoprotein. It is called LDL (low density lipoprotein) many persons describe it as a bad cholesterol. Generally there is 70% LDL in our blood. This amount may vary person to person. Usually HDL (high density lipoprotein) is called good protein. According to the specialist's view HDL decreases the risk of heart disease. HDL does the quiet opposite work of LDL in growth.

The third type of cholesterol is triglyceride. It remains within our food and as fat in our body. That's why it exists in plasma. Blood fat exists as a compound which is formed by the combination of triglyceride and cholesterol. Triglyceride is produced from animal fats and carbohydrates in food. Range of cholesterol in blood that is shown in the table below.

Types of cholesterol	Male m mol/L.	Female m mol/L
LDL	1.68-4.53	1.68-4.53
HDL	0.90-1.45	0.90-1.68
Triglyceride	0.45-1.81	0.40-1.53

Food contains huge amount of cholesterol. Such as- Butter, Prawn, Oyster, Liver of cattle, egg especially egg yolk etc.

Problems of high cholesterol in blood : Different health problems are created for the presence of high cholesterol. By the formation of arteriosclerosis the passage of artery becomes narrow, so the space for blood flowing decreases. It increases the possibility of

particularly coronary heart disease patient is increasing in Bangladesh. Oxygen and digested food products are carried by the blood stream to all cells of the body from heart. There are mainly three blood vessels of the heart itself to carry out its activity properly and to gain the strength of the muscles.

These are called coronary artery. Sometimes there is deposition of lipid that forms blockage in the wall of these arteries which creates obstacle in the flow of blood stream. So it causes life threatening heart disease. Now adays not 40-60 years old persons are attacked with heart disease but also in many cases 18 years old young men are attacked with this disease.

The main causes of this disease are over weight, taking of unhealthy diet, example:- oil enriched food (Biriani, Tehari etc.) fast food. (Berger, Beef or chicken patties etc.) leading lazy life, lack of physical exercise causes this disease. After all depression, emotional strain, anxiety, sadness increase the risk of this disease of any age.

Symptoms of the diseases : Symptoms of heart attack are feeling severe chest pain, particularly pain in mid chest that does not decrease by taking antacid. The pain spreads from the left side to all over chest. Pain also spreads towards neck and left hand. The patient complains that he or she feels pressure on the chest and sweats.

Remedy: Do not ignore the situation, do E.C.G as early as possible consult the doctor and render treatment, coronary heart disease is a dangerous heart disease.

- To keep free from this disease, some rules should be followed so that the blood pressure can be controlled.
- Avoid smoking, take regular exercise like walking.
- Change food habit, eating sufficient amount of fruits and vegetables.
- Avoid fatty diet, fried, spicy and fast food.

Measures to keep the heart sound / healthy: Through rhythmic contraction and relaxation, the cardiac muscles control the circulation of blood within the body from a particular stage of the embryonic condition till the last moment of death. For life and death role of heart is very important. exact life style and selection of food is the necessary to keep the heart healthy. Different kinds of fats or oils obstructs in its task, cholesterol creates obstacle in blood vessels that is injurious to health.

For alcoholism and addiction increase heart beat than its normal amount. So the addicted person get mental pleasure and peace for a while, but it causes serious harm to the heart. Poisoning due to smoking and nicotine of tobacco (Jordha) damages not only the other organs but also the heart. One can be sound in body by proper selection of food. Avoiding fatty diet, Such as- oils, fats, excess carbohydrate and taking balanced diet, regular exercise and walking can make a person healthy.

Rheumatic fever: Rheumatic fever is the result of a streptococcus infection such as inflammation of trachea, scarlet fever, tonsillitis or middle ear infection. The initial attack of the disease usually occurs in childhood and may affect many parts of the body especially the heart. If the rheumatic heart disease does develop, it sometimes injures the heart muscle and its valves. So heart can not pump adequate blood and flow of blood within the body decreases.

Sometimes it is difficult for a doctor to diagnose rheumatic fever. Later increasing severity of disease, weight loss, anemia, exhaustion, poor appetite, pallor etc indicate the presence of the disease. Later pain in the joint, which may even become red and swelling is seen. If the disease is detected or identified in early stage, penicillin may be used to prevent it. Many physicians recommend penicillin be given regularly to children who have rheumatic fever until they reach adulthood.

Exercise

Short answer questions

1. What is transpiration?
2. What is diffusion?
3. How many kinds of blood cells are there and what are their uses?
4. What are the functions of artery?
5. What do you mean by blood pressure?

Essay type questions

1. Describe the measures of keeping the heart healthy / sound.
2. Describe the process of absorbing water with diagram.

Multiple choice questions:

1. What is the name of the heart covering membrane?
 - a) Epicardium
 - b) Miocardium
 - c) Pericardium
 - d) Endocardium
2. Arafat saw some swelled raisins at the time of eating a food (payesh) made of rice, milk and sugar. In this case, what is the cause of the swelling of these raisins?
 - a. diffusion
 - b. absorption
 - c. osmosis
 - d. imbibition

Observe the stem given below and answer questions 3 and 4.

Name	Blood group
Rafin	A
Tamim	B

Remedy : It includes –

- Continue treatment according to the advice of physician.
- Treatment of the disease is a lengthy process, treatment should continue till the complete cure is achieved.

According to the physician's instruction: Follow the rules strictly to prevent the disease.

- Patients with tuberculosis should be isolated or sent to a sanatorium for effective and complete treatment.
- Keep the used material of the patient separately.
- Patient's cough and sputum should be buried in the soil.
- Proper treatment and nutritious adequate diet should be arranged without consulting the physician's medicine should not be stopped.

Prevention :

- To get rid of this disease, all children should be vaccinated by B.C.G. The baby should be vaccinated within one year after birth. But to vaccinate the newborn baby is safer. At present there is an arrangement of vaccination in different health centres of the country.

5. Tumour and cancer: All of us are acquainted with the word tumour and cancer. These are the results of irregular cell division. In mitosis cell division a cell divides into two and two cells divide into four cells and the process continues. But here the process remains controlled. If this control is lost due to any reason, cell division continues in an irregular way. This results in the formation of tumour.

Formation of cancer cells is also the result of uncontrolled irregular cell division. It has been revealed through research that various types of papilloma virus are responsible in the development of cancer cells. Two genes E₆ and E₇ of the virus produce a chemical substance that displaces the two protein molecules which control cell division. As a result the controlling factor of cell division is eliminated and tumour is formed. Sometimes these two genes amalgamate with those of host cell and stop the functions of protein molecules that control increase of cell. Thus develop cancer cells or in other words cancer.

Cancer is a dangerous disease. Cancer develops in liver, lung, brain, breast and skin that is almost all organs of the body.

6. Lung Cancer: Among the various types of cancer lung cancer is extensive and terribly prevalent. In our country it is the leading cause of male cancer death. Smoking is considered one of the causes of lung cancer.

Introduction of human skeleton:

For the construction of a house at first a structural frame work is essential. Skeleton is the frame work of our body. The human skeleton is composed of in combination of long, small, flat, unequal 206 bones. It gives the definite shape to the body and protects the internal organs, such as : heart, lungs, stomach, intestine, brain etc. Without strong bony structure a fixed shape is not possible. All bones and other associated parts together constitute the skeleton which consists of bones and cartilages. Bone joints are connected together with the various parts of skeleton and assists in movement. Bones are remaining attached with the voluntary muscles that helps movement of different organs. The skeletal system is composed of bones, cartilages, ligaments, tendons, bone joints and muscles.

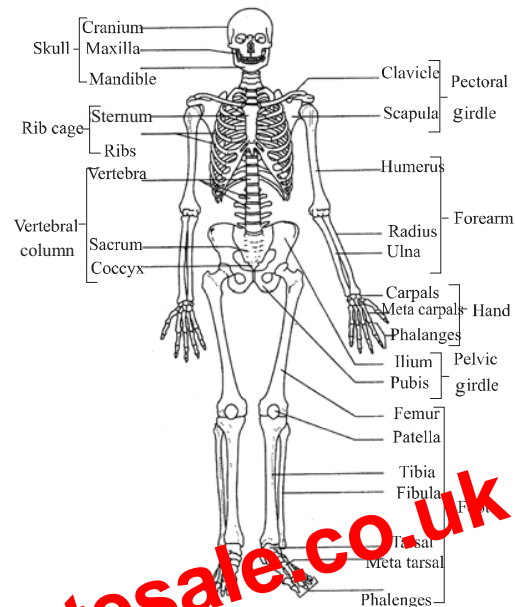


Figure: 9.1 Human skeleton

Human skeleton is divided into parts, as- (1) Exoskeleton and (2) Endoskeleton

(1) **Exoskeleton** : The parts of the skeleton which is outside the body e.g. it includes nail, hair etc.

(2) **Endoskeleton** : The skeleton of man means endoskeleton which can not be seen from outside. The endoskeleton mainly composed of cartilages and bones.

Role of skeleton in firmness and locomotion:

Functions of skeleton: The skeleton does the following functions such as :

(a) Structure and firmness of the body- The skeleton forms the hard structure of the body and gives a definite shape to the body. It joins lower organs with the upper organs.

(b) Protection – Skull protects brain, spinal cord within the vertebral column or backbone, lungs and heart within the thorax. Muscles remain attached with the skeleton and skeletal muscles involved in carrying the weight of the body.

(c) Movement and Locomotion: Hands, legs, shoulder or pectoral girdle and pelvic or hip girdle help in movement. Muscular system has an important role in this act. Due to the attachment of muscles with the bones we can move the bones and we can move.

(d) Production of red blood cells- Bone marrow produces the red blood cells.

Cause : This disease develops due to the deficiency of mineral salt particularly of calcium. After reaching the menopause stage the density and thickness of bones decline in female, bones become brittle.

Symptoms :

- thickness decrease,
- muscle strength reduces,
- feel back pain,
- pain in bones.

Diagnosis : The disease can be diagnosed by examining the density of the bone with the help of density measuring equipment. At the preliminary stage of the disease the symptoms are not noticed. Suddenly hip bones or any other bone fractures even or minor shock.

Remedy:

- Elderly people about 50 years should take 1200 milligram calcium.
- Take skimmed milk and other diary products.
- Taking orange juice, green vegetables, Soya product and calcium enriched food.

Prevention:

- Taking food of vitamin – ‘D’ and calcium enriched
- Regular exercise.
- Take balance diet.

Arthritis : Arthritis is a type of rheumatic disease. Prolong suffering with rheumatic fever and are not treated properly may have the possibility of being attacked with this disease. Mostly the elders suffer from this disease. In case younger's joint pain may be symptoms of any other disease. Such as : Rheumatic fever or tuberculosis.

Symptoms:

- Inflammation and pain in bone joints.
- Stiffen bone joint.
- Get pain in articular movement.
- Joint swelling.

Remedy : The disease is not fully cured in elders. But the following measures may relieve the disease to some extent.

- To avoid hard labour.
- Take a short nap at day time, it gives a good result.

is reflected obliquely on one side of coleoptiles, it turns towards the source of light, but in darkness it grows erectly. By performing experiments, scientists became assured of that kind of chemical substance at the top of the coleoptiles which is responsible for that type of movement. The name of the substance is auxin. After the application of auxin, root grows from grafted buds, prevents the premature shed of fruits. In plant cell movement of auxin happens downwards. The rate of osmosis and respiration is increased on the effect of auxin. It also plays a role in producing fruits without seeds.

Gibberellin: The causal organism of Bakanae disease of rice is a kind of fungus, which causes an over growth of the rice plant. An organic substance can be extracted from it by which the overgrowth of rice plant occurs. The substance is gibberellin. Most of the gibberellins are found in mature seeds but they are also traced in seedling, cotyledons and meristematic regions of the leaves. Elongation of internodes are influenced by the phytohormone. So the plants grow excessively in length. If this hormone is applied to a stunted plant, it grows more in length than a normal plant. It plays effective roles in blooming flowers, in shortening the period of dormancy in seeds and in germination.

Cytokinin : The phytohormone or plant hormone is found in fruits, cereals and vale of green coconut. It is also found in the roots of some plants. They generally stimulate the process of cell division being mixed in different concentrations with oxygen. Besides, the hormone also plays roles in the growth of cell, development of organ or plant parts, breaking the dormancy of seeds and organs and in delaying the aging process. At the time of cell division cytokinesis occurs in a cell because of the effect of cytokinin.

Ethylene: This hormone is a gaseous substance. It helps the fruit to be ripened. This hormone is also found in fruits, flowers, seeds, leaves and roots. Ethylene breaks the dormancy in seeds and buds, and helps seedling to grow much in length. It also plays roles in the growth of seedling, stem and triggers the initiation of growing flower and fruits. Ethylene accelerates the shedding of leaf, flower and fruit.

Uses of hormones: Auxin and other artificial hormones help in growing roots in graft tissue. A kind of auxin named Indole acetic acid improves the effectiveness of cambium. As a result a kind of uncontrolled cell clusters are developed and the injuries are healed up. By applying auxin, the shedding of fruits is delayed. Auxin and gibberellin are used in producing fruits without seeds.

Growth

The effect of light and temperature on the development of different organs of plant is remarkable. Through different synthesizing methods, formation of distinct elements causes the development of new organs. According to the opinion of some scientists, in presence of light, the hormone auxin becomes inactive and so in the dark days,

path. After collecting the food ants stop to secrete feromen, that evaporate easily that influence / indicate other ants not to go again. Some insects can search its on own counter part of own species. Some insects secrete foraman in the air, so that its counter part can be attracted from 2-4 kilometer distance. You may have seen to destroy insects by using feromen. Because of feromen harmful insects are trapped and sink in water. This process is very environment friendly to control the harmful insects.

Influence of nerves : Different organs take part in several works, such as : walking, sitting, talking, thinking, laughing, crying, learn the lesson by heart etc. To regulate these organs properly coordination and integration are necessary. The system, through which the animal responds to stimuli, maintains connections of various organs, co-ordinates various activities, physiological process and maintains relations with the environment, is called the nervous system To perform different activities in our whole body needs co-ordination of million of cells.

For the activities of different organs co-ordination is needed, nervous system has an important role to do it. All the works of the body are performed by receiving stimuli from the environment and producing response. The outer side of the world is the external environment and the inner side of the body is the internal environment. Stimulus in the external environment is light, a sight, a taste and a touch. These create stimulation at the tip of the sensory nerves of ear, nose, tongue and skin. Internal stimulants are heat, pressure and various chemical substances. Some nerve impulses originate inside the central nervous. Any stimulus can create stimulation to the sensory and motor nerves. Impulses which pass along sensory neuron fibres to the brain. The brain receives impulses from the sensory organs and then sends off the decision through the motor nerves to the glands and muscles, causing them to function according.

Including nervous system uses some specific chemical substances named hormones takes part in co-ordination. But these are under controlled by brain. At first there was an idea that is a stimulating substance. But afterwards it is found that all hormones are not stimulating in function, but some are inhibitor. Very small amount of hormones are required to control particular physiological function. They act as stimulant or inhibitor and control many bodily functions, such as : development, growth, functions of various tissues. The influence of hormones on behavior of an individual, nature, transmission of impulses is very important. Blood carries them from the place of origin to the distance places where they stimulates certain cells or organs respond to them. So they are termed as chemical messengers.

Nervous system co-ordinates in different organs and system, maintains a relation with the environment by responding impulse. Main function of the nervous system to carry impulse to the different parts of the body, co-ordinates various activities of the organs and maintains a relation with the environment.

Cerebrum is the higher organ which receives nerve impulse and sends response (nerve impulse) to the various organs of the body. Sensory centre is cerebrum in movement of the body that is for every work. The conscious activities, e.g. speech, vision, hearing, intelligence, memory, thinking, will and activities voluntary muscular are controlled by cerebrum. It also helps to take the decision and responding against stimulation.

b) Mid brain or Mesencephalon : The upper part of the hind brain is mid brain or mesencephalon. It is a bridge between fore brain and hind brain. There is a cylindrical part that is located at the back part of mid brain is pons. It forms a connection cerebellum and medulla oblongata. Its functions is to co-ordinate the activities of various muscles and balance.

c) Hind brain or Rhombencephalon : It consists of cerebellum, pons and medulla oblongata.

Cerebellum: Cerebellum is localated at the back part of pons. It is divided into right and left lobes. Its exterior part is composed of grey matter and the inner part with white matter. Cerebellum controls the muscle stretch, co-ordinates in movement, balance, control the voluntary activities of voluntary muscles. As : jumping and running.

Pons : The pons is a bridge of white fibres, that is located in between the medulla oblongata and mid brain.

Medulla oblongata : It is the most posterior part of the brain. The front part is connected with pens and spinal cord behind.

There are 12 pairs of cranial nerves extending from the cerebrum and medulla oblongata and within which pairs of nerves originate from medulla oblongata. These nerves control the functions of heart, lung, pharynx, swallowing of food, Motor nerves are associated with important functions, as : hearing, balancing.

12 pairs of cranial nerves originate from the brain and spread in different regions. as : mouth cavity or buccal cavity, tongue, eye, nose, ear. The nerves are sensory or motor or mixed in nature.

Spinal cord : Spinal cord originates from the posterior part of medulla and leaves the skull through the foramen magnum and extends upto the lumbar vertebra. It is protected by vertebral column. Spinal cord is composed of grey matter and white matter. But their position is quiet opposite to the brain. That is white matter at the outer part and grey matter at the inner part. 31 pairs of nerves originate from the spinal cord and passes through the hole located in between the vertebrae. These are the nerves of neck, shoulder, chest, back, hand and legs. These nerves are mixed in nature. The nervous system helps in receiving

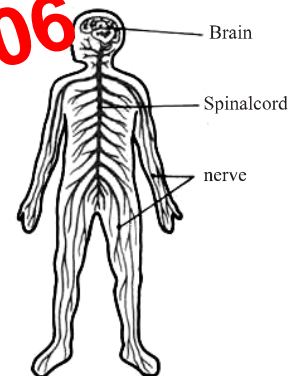


Figure: 10.3 Human nervous system

Chapter Eleven

Reproduction

Reproduction is one of characteristics of an organism. Organisms give rise to other organisms of the same kind in life time and then continues its generation. The process of reproduction may be of various types. Diversified reproductive processes are being observed. Human reproduction are to be discussed in this chapter.



At the end of the chapter, you will be able to,

- Explain the concept and significance of reproduction in organisms.
- Describe the functions of a flower as a reproductive organ.
- Explain the sexual reproduction in plant with the life cycle of flowering plants.
- Explain the asexual and sexual reproduction of animal.
- Explain the nature of reproduction.
- Make differences between the external and internal reproduction.
- Explain the steps of human reproduction.
- Describe the role of hormones in reproduction.
- Explain the development of embryo.
- Explain the mode of transmission, prevention and remedy of AIDS in human body.
- Explain the preventive measures of AIDS to develop awareness.
- Can raw the poster and leaflet for the prevention of AIDS.
- Show sympathy towards AIDS patient.

groups, it is called diadelphous and when in many groups, it is called polydelphous, such as cotton tree (*Salmaalial malabarica*). When anthers are united into a single group, it is called syngensious. The state of being of the stamen free attachment to corolla, the androecium, then be called epipetalous, such as in *Datura*.

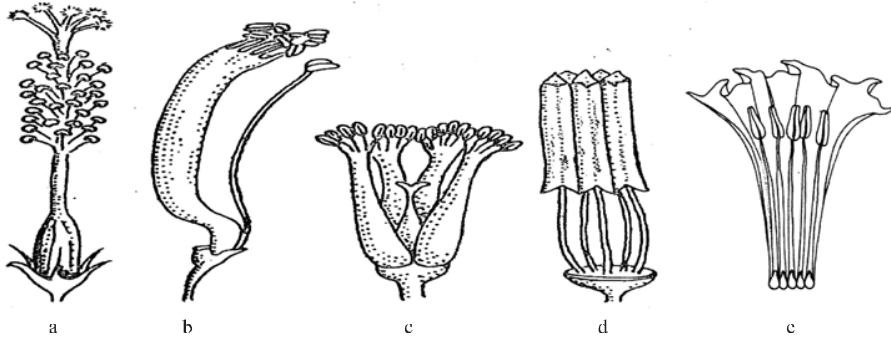


Fig: 11.2 Different types of stamen: a. Monodelphous b. Diadelphous, c. Polydelphous d. Syngensious e. Epipetalous

Gynoecium: The portion of gynoecium is at the centre of a flower. It is the another essential whorl of a flower. A gynoecium may be structured with one or more carpel. A carpel has three parts, such as ovary, style and stigma. When a gynoecium is formed with many more carpels and is completely merged with each other, then it is called, syncarpous and when they are separated, it is called poly carpous.

One or more ovules are there in a flower in accordance with some orders arranged inside of an ovary. Within the ovule, female reproductive cell, ovum is produced. This ovum like an androecium directly gets involved in the process of reproduction.

Work 1: Observation of different whorls of a flower.
Essentials: a flower, or a leafy twigs, and blotting paper.

Work 2 : Separating the ovary from a flower, collect a transverse section with a blade and place them aesthetically on the piece of blotting paper. Write down the names of object that you have seen.

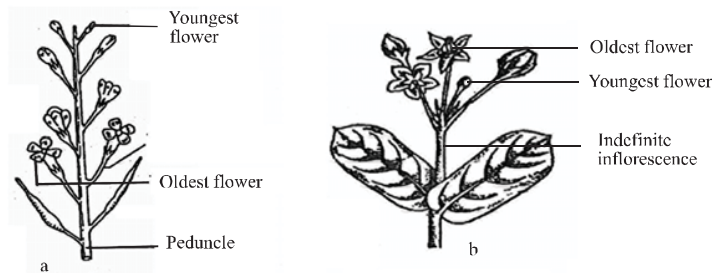


Figure: 11.3 a. Definite inflorescenc b. Indefinite inflorescence

Inflorescence: All of you have seen clusters of flower arranged in a small branch of a tree, following some special orders of arrangement is called inflorescence. Along with

Development of new sporophyte:

A zygote is the first cell of a sporophyte. Two cells are produced after its first division. At the same time, flourishing of endosperm is also ignited. A zygote divides transversely. The cell towards the micropyle is called the basal cell and the cell towards the centre of the embryo sac is called the apical cell. The division of these two cells continues side by side. Gradually, the apical cell turns into embryo. The suspensor also gets developed concurrently. Cotyledon, radicle and plumule are developed one after another and the secondary nuclei start to make the endosperm. The cells in an endosperm are triploid that means they possess three sets of chromosome (3n). At maturity, the ovule with the endosperm and embryo turns into a seed. As the seed germinates, a complete sporophyte is developed.

So it has been found that sporophyte and gametophyte, two states run in a repeating way one after another through the life cycle of a flowering plant.

Origin of fruits: When we think about fruits in our mind appear the images of mango, jackfruit, lichi, banana, grape, apple, guava, sofeda etc. appear in our mind. Bottle gourd, gourd, Jingga, pointed gourd are also fruits. As they are not eaten green, they are called vegetables. In fact, they are all fruits. The process of the formation of fruits begins just immediately after the completion of fertilization. Fertilization ignites stimulation in ovary to make the way of developing fruits steadily and ultimately, ovules are turned into seeds. The ovary after fertilization with the different parts of it turns into a nice structure called fruits. If only the ovary turns into a fruit, it is called true fruit. Mango and Jackfruits can be the examples of true fruit. When along with the ovary, other parts of a flower get mature, this type of fruit is called false fruit. Apples, Chalisa are the examples of false fruit. All the true and false fruits are grouped into three categories: fleshy fruit, aggregate fruit and compound fruit.

Animal Reproduction: Reproduction is of two types in animal kingdom. (1) Asexual reproduction and (2) Sexual reproduction.

(1) Asexual reproduction : Asexual reproduction happens in lower animals. Asexual reproduction occurs in different ways. Such as – budding, binary fission, fragmentation etc.

(2) Sexual reproduction : The process through which two animals of opposite sex (male and female) compete their reproduction by means of producing male and female gametes, fertilizes and produce offspring is called reproduction.

Fertilization : Fertilization is necessary for sexual reproduction. It is a universal biological process. Sexual reproduction takes place by producing dissimilar gamete that is male. Fertilization occurs by the fusion of that is called fertilization. During sexual reproduction active sperm penetrates into the ovum and the two nucleus fuse together. The cell is formed by the fusion of nucleus is zygote. It requires sometime for fertilization. Each of the sperm and ovum contains haploid number of chromosome it

than 2.5 million people are infected by AIDS germ. Almost 40% of the infected persons are female. According to world health organization this disease is spreading about 164 countries. AIDS disease is caused in human body by the attack of one kind of virus named HIV – Human Immune Deficiency virus. This virus destroys white blood cells causes obstacle in antibody formation, that results the gradual shortage white blood cell and antibody. In human body this virus can remain dormant for a long time. It destroys the victims immune system. It destroys the defence or immune system. Because till today there is no effective medicine discovered to regain the immune system completely. So the ultimate fate is death.

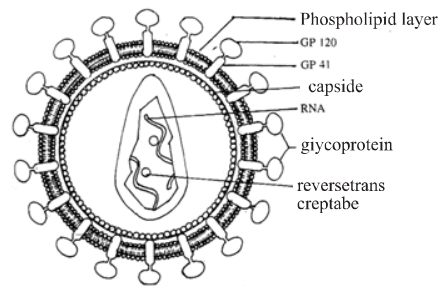


Fig. 11.14 Structure of HIV

Causes of AIDS : A healthy person can be infected by this life threatening disease are as follows such as –

1. Sexual relation or physical relation with infected males and females. Transfusion of blood is necessary such as – blood loss due to accident, excessive bleeding at the time of child birth, anemia, thalassemia, cancer etc. Transfusion of blood from an HIV infected person to a healthy person may transmit the disease.
2. A new born body of HIV infected parents may be infected. A baby may be infected from HIV infected mother during breast feeding.
3. The disease may transmit to a healthy person Such as – Sharing of infection needles, syringe or other/surgical operation related instruments etc.
4. Transplantation of HIV infected organ or tissue in the body of healthy person.

Symptoms and signs of AIDS : Signs and symptoms of the disease are exposed after 6 months of entering the germs of the disease with the body of healthy person. Before it can not be comprehend that infected person is the carrier of this disease. The symptoms are –

- Rapid loss of body weight.
- Fever for more than one month for unknown reason.
- Dry cough for prolonged period.
- Pain in armpit, neck and face become rough.
- Puffiness and swelling of some organs. Such as : face, eyelid, nose etc.
- Itching in the whole body.

Prevention AIDS : You have learned earlier about this disease. Let us examine whether we can remember it.

- What is the necessity to prevent AIDS.
 - Can it be possible to abstain or avoid the causes that spread the infection of the disease.
- Write the measures of prevention on the black board and make a summary of it.

Work : Form a group of 5 students, draw a poster / leaflet regarding the preventive measures of AIDS.

Exercise

Short answer question

1. Why human is called unisexual animal?
2. What is uterus? What is its functions?
3. What is placenta? What are the function of placenta?
4. What measures should be taken to prevent AIDS.
5. Explain the function of hormones in reproduction.

Essay type question

1. Why is a flower called the reproductive organ?
2. Describe the causes, symptoms and remedy of AIDS.

Multiple choice question

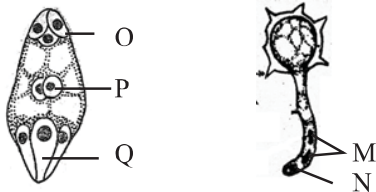
1. In which flower, stamens are diadelphous that is filaments of stamens are united in two bundles?

a. Chinese hibiscus	b. Pea
c. Cotton tree or shimul	d. Sunflower
2. The air pollinated flower is ..
 - i. large in size.
 - ii. with undivided stigma.
 - iii. without nectar glands

Which one is correct?

- | | |
|-------------|----------------|
| a. i & ii | b. i & ii |
| c. ii & iii | d. i, ii & iii |

Look at the stem and answer the question 3 and 4:



3. Which one of the stem turns into a seed?

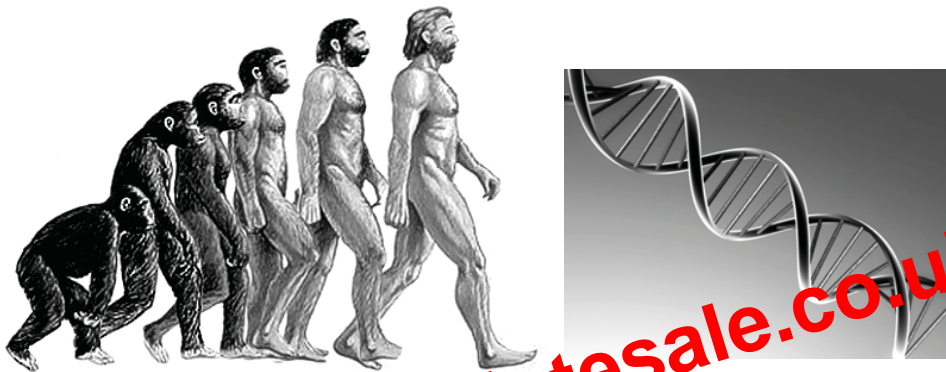
a. N	b. O
c. P	d. Q
4. Which one does play a role in producing endosperm?

a. M & Q	b. M & P
c. M & N	d. N & P

Chapter Twelve

Heredity in organisms and evolution

Structural and behavioural traits from both the parent, mother and father, are passed to the offspring generation after generation. We will learn from this chapter how traits from both the parents are transmitted to the offspring. Moreover, we will be able to know that there exist classes are in the living world, and being emerged from the ancestors through the way of evolution, organisms express their visible form of present existence.



At the end of this chapter, we will be able to

- Explain the concept of heredity.
- Describe the experiment containing the behavioural materials obtained through genetic crosses.
- Explain the passing of the behavioural characteristics from generation to generation.
- Explain the necessity of heredity.
- Explain the replication of DNA.
- Describe the roles of DNA in transferring heredity materials.
- Explain the necessity of DNA test.
- Explain the role of a male in determining the gender of an offspring.
- Explain the causes and results of genetic disorders.
- Explain the natural selection theory in evolution.
- Describe the natural selection theory of evolution.
- Explain the significance of evolution in the survival of species.
- Determine the differences between the similar and dissimilar features of mother and father.
- Conceive the roles of DNA test in our life.

environment. It is also essential to organise people for the protection of environment. Plantation should not be limited only in a weekly or monthly programme. For cutting a tree, two trees should immediately be planted. Before setting any industry and mills in any locality, their adverse effects on the environment should be first taken into consideration and safe disposal of industrial waste should also be ensure. Urbanisation should be well planned. Massive plantation should be carried out side by side with the rapid urbanisation. Instead of wood, solar energy should be used as fuel. Excessive use of chemical fertilizers and pesticides damage the normal quality of soil and degrades beneficial microorganisms, terrestrial worms and insects, aquatic and terrestrial ecosystems. So the use of bio-fertilizers should be increased. Use of chemical fertilizers and pesticides should be minimized. Excessive population in different ways causes serious desolation on the environment. Population should be controlled and communities of well-educated people should be developed. Public awareness should be raised about negative impacts of environment and to control the environmental pollution. Mass media should play a prime role in this regard. The emission of greenhouse gases, carbon dioxide, methane, nitrous oxide should immediately be reduced. To control the soil erosion in coastal areas, massive plantation must be accomplished. This way soil erosion will be controlled and the tornado and cyclone will be resisted as well. Normal flow of water should be conserved by dredging river and water bodies. This way salinity and water logging will be removed and the aquatic ecosystems will remain in a normal state. It is essential to conserve the biodiversity for the sustenance of healthy environment and with this view all the plant and animal species, which are on the verge of extinction from nature, should be conserved by special processes. Measures should be taken to control the pollution of air, water, soil and sound. International and national principles and guidelines should strictly be followed.

Work: Find out what the causes are of polluting the environmental components in your locality and prepare a report on it.

Exercise

Short answer question

1. What is symbiosis? Explain it.
2. What is a plankton?
3. What is a parasitic food chain?
4. What is antibiosis?
5. What is mutualism?

Essay type question

1. The balance of environment is restored through the interaction and interdependence of different organisms. Explain it.

Some microbes improve the colour, flavour, nutrition of different crops through their effect on them. This technology is used for producing fermented foods in different industries. Besides there are certain microbes turn certain carbohydrates into alcohol through fermentation. By applying the knowledge of biotechnology, enzymes, extracted from microbes, are being used in different industries such as dairy industries, detergent industries and carbohydrate industries. For enhancing the quantity and quality of different medicines, this technology is applied. By using different microbes, energy is produced from biomass and 60% rich methane gas.

Daily waste matters, industrial discharges are being degraded by microbes for the improvement of environment. Rapid afforestation is done by producing large number of saplings of different plants through tissue culture. If bio diversity of any area is destroyed, it has a serious bad effect on the environment of that area. So biotechnology is being used for preservation of biodiversity. For example efforts are being made for rapid propagation of almost extinct plants through tissue culture in order to maintain ecological balance. Different microbes specially bacteria is being used for extracting different elements from the minerals. For example different bacteria are being used for extracting copper and uranium. Some bacteria keep the environment free from pollution by degrading oil and hydrocarbon from the environment. At present for controlling different pests and insecticides, organic pest control system is being used instead of different chemicals. In organic pest control system different microbes are being used with the help of bio technology which plays an important role in preserving the environment.

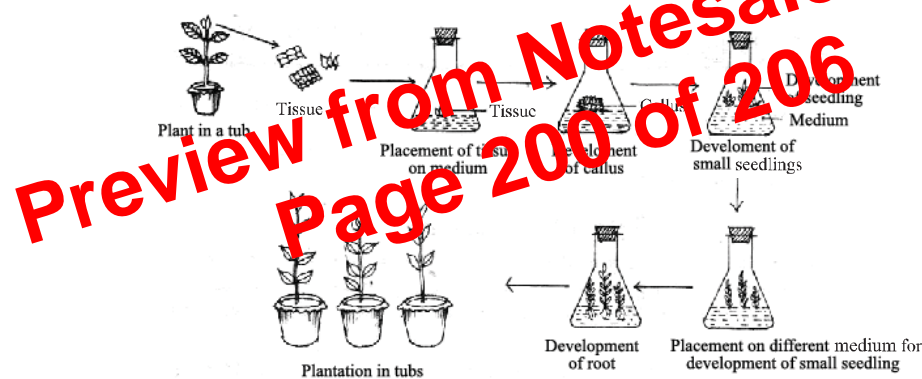


Figure: 14.1 Consecutive steps of tissue culture

Tissue culture: Generally, one or a group of cells of the same type is called tissue. The process of growing a tissue on a nourishing and sterilized medium is tissue culture. Tissue culture is comparatively a new branch of botany. In plant tissue culture, any separate part or part of a part like pollen, apical or lateral bud, node, root is cultured on or in any nourishing and sterilized medium. All the elements for the nutrition and growth of tissue are supplied with the sterilized medium. The part of a plant, being separate with the view of using it in tissue culture, is called 'explants'.

Steps of tissue culture

1. **Selection of mother plant:** The healthy, disease resistant plant with high quality is selected for plant tissue culture.