THE COMPLETE General Science Notes (Biology) for Railway Exams

General Science - Biology

S.No	Contents	Page Number
1	Inventions and Discoveries	2
2	Food and its components	2
3	Vitamins	4
4	Diseases/disorders caused by deficiency of vitamins and minerals	6
5	Conservation of plants and animals	7
6	The fundamental unit of life	8
7	Tissue	12
8	Blood	16
9	Diversity in living organisms	19
10	Life processes	24
11	Control and coordination	31
12	How do organisms reproduce	34
13	List of human diseases caused by bacteria, virus, fungi, and protozoa	37
14	Plant diseases	38
15	Scientific names of plants, fruits and vegetables	39
16	Important branches of science	40
17	Biology one liners	41

INVENTIONS AND DISCOVERIES

Invention	Scientist
Bacteria	Leeuwenhoek
Blood group	Karl Landsteiner
Circulation of blood	William Harvey
Evolution	Charles Darwin
Insulin	Sir Frederick Grant Banting
Laws of heredity	Gregormendel
Penicillin	Alexander fleming
Rabies vaccine	Louis Pasteur
Stethoscope	René Laennec
Structure of DNA	James Watson & Francis Crick
Vaccine	Edward Jenner
Vitamins	Casimir Funk and Hopkins
Cell	Robert Hooke
Cell nucleus	Robert Brown
Polio vaccine	Jonas edward Salk
Smallpox vaccine	Edward Jenner
Plague vaccine	Waldemar Mordecai Haffkine
Homeopathy and allophathy	Samuel Hahnemann

FOOD AND ITS COMPONENTS

- **Food** is the basic necessity of life. Food is defined as any substance of either plant or animal origin consumed to provide nutritional support for an organism.
- It contains essential nutrients that provide energy, helps in normal growth and development, repair the worn out tissues and protect the body from diseases
- The main sources of our food are **plants and animals**
- **Animals** which eat **only plants** are called **herbivores**
- **Animals** which eat **only animals** are called **carnivores**

- Animals which eat **both plants as well as other animals** are called **Omnivores**
- **Bees** collect nectar (sweet juices) from flowers convert it into honey and store it in their hive
- The major nutrients in our food are carbohydrates, proteins, fats, vitamins and minerals. In addition food also contains **dietary fibres and water**.
- **Carbohydrates and fats** mainly provide energy to our body
- Foods containing fats and carbohydrates are also called **'energy giving foods'**.
- Proteins and minerals are needed for the growth and the maintenance of our body
- Our body needs **dietary fibres** and **water**. **Dietary fibres** are also known as **roughage**. Roughage is mainly provided by plant products in our foods. Whole grains and pulses, potatoes, fresh fruits and vegetables are main sources of roughage. Roughage does not provide any nutrient to our body, but is an essential component of our food

CARBOHYDRATES

- Carbohydrates are organic compounds composed of carbon, hydrogen and oxygen. Carbohydrate is an essential nutrient which provides the chief source of energy to the body.
- Glucose, sucrose, lactose, starch, cellulose are examples for carbohydrates.
- Sources of **carbohydrates are**
    - Sweet potato
    - Wheat
    - Rice
    - Potato
    - Sugarcane
    - Papaya
    - Melon
    - Mango
    - Maize

FATS

- Fat in the diet provides energy. They maintain cell structures and are involved in metabolic functions.
- Essential fatty acids cannot be synthesized in the body and are provided through diet. Essential fatty acids required in human nutrition are omega fatty acids.
- Sources of **fats are**
    - Groundnuts
    - Nuts
    - Eggs
    - Fish
    - Meat

PROTEINS

- Proteins are the essential nutrients and also the building blocks of the body. Foods proteins are often called 'body building foods'

- Proteins are made of amino acids.
- Proteins are needed for the growth and repair of our body.
- Sources of **proteins are**
    - Beans
    - Gram
    - Moong
    - Peas
    - Soyabeans
    - Paneer
    - Eggs
    - Meat

VITAMINS

- Vitamins help in protecting our body against diseases. Vitamins also help in keeping our eyes, bones, teeth and gums healthy
- Vitamins are generally categorized into **water soluble vitamins** and **fat soluble vitamins**
- Water Soluble Vitamins: **Vitamins C and B-Complex**
- Fat Soluble Vitamins: **Vitamin A, D, E and K**
- Vitamins help in protecting our body against diseases
- Some sources of **Vitamin A** are
    - Papaya
    - Carrot
    - Mango
    - Milk
    - Fish liver oil

- Some sources of **Vitamin B** are
    - Liver
    - Wheat
    - Rice
- Some sources of **Vitamin C** are
    - Orange
    - Tomato
    - Guava
    - Green Chilli
    - Lemon
    - Amla
    - kiwi
- Some sources of **Vitamin D** are
    - Fish

  - Liver
  - Egg
  - Mushrooms
- **Vitamin K** is found in Green leafy vegetables
- **Vitamin D** presence in sunlight
- **Vitamin C** gets easily **destroyed** by **heat** during **cooking**
- The vitamin which is generally excreted by **humans in urine** is **Vitamin C**
- Liver damage is caused due to the overdose of **Vitamin B3**
- Vitamin B6, B9 and B12 are essential for brain health and are also called as brain vitamins
- First **artificially synthesized** Vitamin is **Vitamin C**
- Vitamin helps **immunity of body** is **Vitamin C**
- **Vitamin B12** contain **cobalt**

VITAMIN AND CHEMICAL NAME

Vitamin	Chemical name
Vitamin A	Retinol
Vitamin B1	Thiamine
Vitamin B2	Riboflavine
Vitamin B5	Pantothenic Acid
Vitamin B6	Pyridoxine
Vitamin B3	Niacin or Nicotinic Acid
Vitamin B7	Biotin
Vitamin B9	Folic Acid
Vitamin B12	Cobalamin
Vitamin C	Ascorbic Acid
Vitamin D	Calciferol
Vitamin E	Tocopherol
Vitamin K	Phylloquinone

DISEASES/DISORDERS CAUSED BY DEFICIENCY OF VITAMINS AND MINERALS

- Deficiency of one or more nutrients in our food for a long time may cause certain diseases or disorders

Vitamins	Diseases/Disorders
Vitamin A	Night-blindness
Vitamin C	Scurvy
Vitamin D	Rickets, Osteomalacia
Vitamin E	Heart problems, Hemolysis and sterility, Reproductive Failure, Red Blood Cell Destruction, Peripheral Neuropathy
Vitamin K	Non clotting of blood, haemorrhage
Vitamin B1	Beriberi
Vitamin B2	Ariboflavinosis
Vitamin B3	Pellagra
Vitamin B5	Paresthesia, Acne
Vitamin B6	Pink eye, Epilepsy, Depression and confusion, microcytic anemia
Vitamin B7	Growth & Neurological Disorders in Infants, hallucination,dermatitis
Vitamin B9	Macrocytic Anaemia, Deficiency during pregnancy is associated with birth defects
Vitamin B12	MacrocyticAnaemia, Memory Loss, Pernicious Anaemia
Calcium	Bone and tooth decay
Iodine	Goiter
Iron	Anaemia
Potassium	High Blood Pressure, Respiratory Depression, Paralysis, Arrhythmia
Protein	Kwashiorkor

Protein and Energy	Marasmus

CONSERVATION OF PLANTS AND ANIMALS

- Deforestation means clearing of forests and using that land for other purposes
- Deforestation increases the temperature and pollution level on the earth. It increases the level of carbon dioxide in the atmosphere. Ground water level also gets lowered
- Wildlife sanctuary, national park and biosphere reserve are names given to the areas meant for conservation and preservation of forest and wild animals
- Satpura National Park is the first Reserve Forest of India. The finest Indian teak is found in this forest
- Biodiversity refers to the variety of living organisms in a specific area.
- Plants and animals of a particular area are known as the flora and fauna of that area.
- **Endemic species** are those species of **plants and animals** which are **found** exclusively in a **particular area**. They are not naturally found anywhere else. A particular type of animal or plant may be endemic to a zone, a state or a country
- Migration is the phenomenon of movement of a species from its own habitat to some other habitat for a particular time period every year for a specific purpose like breeding
- Reforestation is the restocking of destroyed forests by planting new trees
- An **ecosystem** is made of all the plants, animals and microorganisms in an area along with non-living components such as climate, soil, river deltas etc.
- **Project Tiger** was launched by the government to protect the tigers in the country. **Launched in 1973**
- **Project Elephant** was launched in 1992 by the Ministry of Environment and Forests, Government of India
- **Chipko Movement** is primarily a forest conservation movement. The word 'Chipko' means 'to stick' or 'to hug'. Sunderlal Bahuguna was the founder of this movement. It was started in 1970s with the aim of protecting and conserving trees and preserving forest from being destroyed.

ENDANGERED SPECIES

- **Endangered species** are those which are facing the **danger of extinction.**
- It is reported that nearly 132 species of plants and animals are critically endangered in India. Snow leopard, Bengal tiger, Asiatic lion, Purple frog and Indian giant squirrel are some of the endangered animals in India.
- **Red Data Book** contains a record of **endangered species.** Red Data Book is maintained internationally by International Union for Conservation of Nature. India also maintains Red Data Book for plants and animals found in India

WILDLIFE SANCTUARY

- Areas where animals are protected from any disturbance to them and their habitat
- Wildlife Sanctuaries provide protection and suitable living conditions to wild animals.
- People living in wildlife sanctuaries are allowed to do certain activities such as grazing by their livestock, collecting medicinal plants, firewood, etc.
- Controlled interference like tourist activity is also allowed.

NATIONAL PARK

- Areas reserved for wild life where they can freely use the habitats and natural resources
- Human activities such as grazing, poaching, hunting, capturing of animals, collection of firewood, medicinal plants, etc. are not allowed

BIOSPHERE RESERVE

- Large areas of protected land for conservation of wild life, plant and animal resources and traditional life of the tribals living in the area
- The biosphere reserves help to maintain the biodiversity and culture of that area.

THE FUNDAMENTAL UNIT OF LIFE

- All organisms are made of smaller parts called organs. Organs are made of still smaller parts. The smallest living part of an organism is a cell
- **Cells were first** observed in **cork** by **Robert Hooke** in 1665.
- Cells **without well organised nucleus**, i.e. lacking nuclear membrane, are called **prokaryotic cells**. Examples are bacteria and blue green algae
- The cells which **have definite nucleus** with a nuclear membrane are designated as **eukaryote**. All organisms other than bacteria and blue green algae are called **eukaryotes**
- The smallest cell is 0.1 to 0.5 micrometre in **bacteria**. The largest cell measuring 170 mm ×130 mm is the egg of an **ostrich**
- The number of cells present in different organisms may vary. Organisms may be either unicellular (single cell) or multicellular. Organisms such as Bacteria, Amoeba, Chlamydomonas, and Yeast are unicellular. On the other hand, organisms such as Spirogyra, Mango, and Human beings are multicellular. (i.e) made up of a few hundreds to millions of cells
- Plant cells have two unique components such as cell wall and chloroplasts compared to animal cells.
- The cell has three main parts: (i) the cell membrane, (ii) cytoplasm which contains smaller components called organelles, and (iii) the nucleus.

CELL MEMBRANES

- This is the outermost covering of the cell that separates the contents of the cell from its external environment. The plasma membrane allows or permits the entry and exit of some materials in and out of the cell
- Compounds called proteins and phospholipids make up most of the cell membrance
- The proteins are found around the holes and help move molecules in and out of the wall

CELL WALL

- Plant cells in addition to the plasma membrane have another rigid outer covering called the cell wall. The cell wall lies outside the plasma membrane
- The plant cell wall is mainly composed of cellulose. Cellulose is a complex substance and provides structural strength to plants

- Cell wall **absent** in **animal cell**

NUCLEUS

- The cell nucleus acts like the brain of the cell. It help control the eating ,movement and reproduction
- Nucleus is separated from the cytoplasm by a membrane called the **nuclear membrane**
- The nucleus contains chromosomes which are visible as rod-shaped structures only when the cell is about to divide
- **Chromosomes** are composed of **DNA and protein**
- Chromosomes contain information for inheritance of characters from parents to next generation in the form of DNA (Deoxyribonucleic Acid) molecules
- Functional segments of DNA are called genes
- Gene is a unit of inheritance in living organisms
- **Chromosomes** are usually found in **pairs**
- Human beings probably have **46 chromosomes(23 pair)**
- Peas have 12, a dog has 78 chromosomes
- The nucleus plays a central role in cellular reproduction the process by which a single cell divides and forms two new cells
- Organisms, whose cells lack a nuclear membrane, are called prokaryotic. Organisms with cells having a nuclear membrane are called eukaryote

CYTOPLASM

- It is the jelly-like substance present between the cell membrane and the nucleus
- Various other components or organelles of cells are present in the cytoplasm
- The cytoplasm is the fluid content inside the plasma membrane. It also contains many specialised cell organelles. Each of these organelles performs a specific function for the cell
- Important examples of cell organelles are endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria and plastids. They are important because they carry out some very crucial functions in cells.

ENDOPLASMIC RETICULUM

- It is a network of tulsular membranes connected at one end to the nucleus and on the other to the plasma membranes
- The ER membrane is similar in structure to the plasma membrane. There are two types of ER– rough endoplasmic reticulum (RER) and smooth endoplasmic reticulum (SER)
- The **ribosomes** which are present in all active cells are the sites of **protein manufacture**
- The **manufactured proteins** are then sent to various places in the cell depending on need, using the **endoplasmic reticulum**

GOLGI APPARATUS

- The material synthesized near the ER is packaged and dispatched to various targets inside and outside the cell through the Golgi apparatus. Its functions include the storage, modification and packaging of products in vesicles
- The **Golgi apparatus** is also involved in the **formation of lysosomes**

LYSOSOMES

- **Lysosomes** are a kind of waste **disposal system** of the cell. These help to keep the cell clean by digesting any foreign material as well as worn-out cell organelles.
- Foreign materials entering the cell such as bacteria or food as well as old organelles end up in the lysosomes which break complex substances into simpler substances.
- When the cell gets damaged lysosomes may burst and the enzymes digest their own cell. Therefore lysosomes are also known as the **'suicide bags'** of a cell.

MITOCHONDRIA

- **Mitochondria** are known as the **powerhouses** of the cell
- Mitochondria have two membrane coverings. The outer membrane is porous while the inner membrane is deeply folded. These folds increase surface area for ATP generating chemical reactions
- The energy required for various chemical activities needed for life is released by mitochondria in the form of **ATP (Adenosine triphopshate)** molecules. ATP is known as the energy currency of the cell. The body uses energy stored in ATP for making new chemical compounds and for mechanical work.
- Mitochondria are absent in bacteria and the red blood cells of mammals and higher animal
- Mitochondria are strange organelles in the sense that they have their **own DNA and ribosomes.** Therefore, mitochondria are able to **make some of their own proteins**.

PLASTIDS

- Plastids are **present only** in **plant cells**
- There are two types of plastids – **chromoplasts (coloured plastids)** and **leucoplasts (white or colourless plastids)**
- Chromoplasts containing the pigment chlorophyll are known as chloroplasts.
- Chloroplasts are important for photosynthesis in plants. Chloroplasts also contain various yellow or orange pigments in addition to chlorophyll
- Chromoplast impart colour to flowers and fruits
- Leucoplasts are primarily organelles in which materials such as starch, oils and protein granules are stored
- The primary function of **leucoplasts** is **storage**
- The internal organisation of the Chloroplast consists of numerous membrane layers embedded in a material called the stroma. These are similar to mitochondria in external structure
- Like the mitochondria, plastids also have their own DNA and ribosomes.

VACUOLES

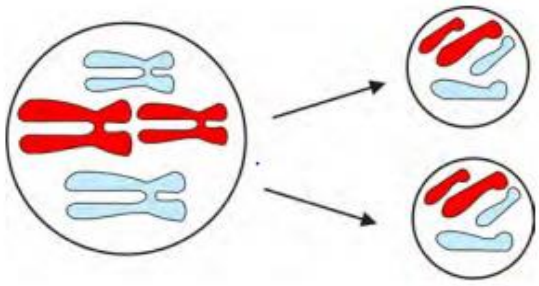
- Vacuoles are storage sacs for solid or liquid contents
- Vacuoles are small sized in animal cells while plant cells have very large vacuoles
- Most mature plant cells have a large central vacuole that helps to maintain the turgidity of the cell and stores important substances including wastes
- In plant cells vacuoles are full of cell sap and provide turgidity and rigidity to the cell. Many substances of importance in the life of the plant cell are stored in vacuoles. These include amino acids, sugars, various organic acids and some proteins. In single-celled organisms like Amoeba, the food vacuole contains the food items that the Amoeba has consumed. In some unicellular organisms, specialised vacuoles also play important roles in expelling excess water and some wastes from the cell.

CELL DIVISION

- New cells are formed in organisms in order to grow, to replace old, dead and injured cells, and to form gametes required for reproduction. The process by which new cells are made is called cell division.
- There are two main types of cell division are mitosis and meiosis

MITOSIS

- The process of cell division by which most of the cells divide for growth is called mitosis.Each cell called mother cell divides to form two identical daughter cells.
- The daughter cells have the same number of chromosomes as mother cell. It helps in growth and repair of tissues in organisms

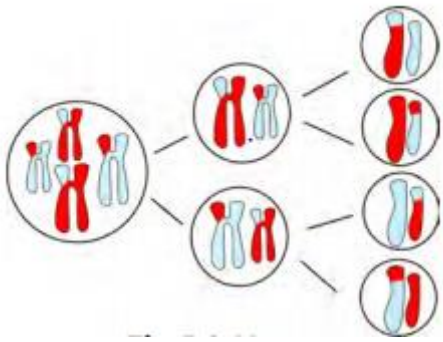


SIGNIFICANCE OF MITOSIS

- This equational division results in the production of diploid daughter cells (2n) with equal distribution of genetic material (DNA).
- In multicellular organisms growth, organ development and increase in body size are accomplished through the process of mitosis.
- Mitosis helps in repair of damaged and wounded tissues by renewal of the lost cells

MEIOSIS

- Cell divides by meiosis it produces four new cells instead of just two. The new cells only have half the number of chromosomes than that of the mother cells



SIGNIFICANCE OF MEIOSIS

- The constant number of chromosomes in a given species is maintained by meiotic division.
- Genetic valiation is produced due to crossing over within the species which is transmitted from one generation to next generation.

TISSUE

- A group of cells that are similar in structure and/or work together to achieve a particular function forms a tissue.
- The study of tissue is known as histology

PLANT TISSUE

- Plants are composed of three major organ groups roots, stems and leaves. These are comprised of tissue working together for a common function
- Plant tissues are of two main types – **meristematic** and **permanent**
- **Meristematic tissue** is the dividing tissue present in the growing regions of the plant
- **Permanent tissues** are derived from **meristematic tissue** once they lose the ability to divide. They are **classified as simple and complex tissues**
- Parenchyma, collenchyma and sclerenchyma are three types of simple tissues.
- Xylem and phloem are types of complex tissues

MERISTEMATIC TISSUE

- The growth of plants occurs only in certain specific regions. This is because the dividing tissue, also known as meristematic tissue.
- Meristems are actively dividing tissues of the plant, that are responsible for primary (elongation) and secondary (thickness) growth of the plant.
- Depending on the region where they are present, meristematic tissues are classified as apical, lateral and intercalary.

Apical meristem

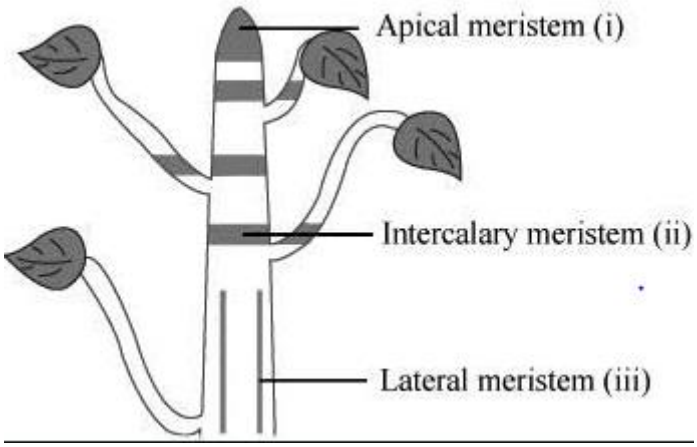
- Apical meristem is present at the growing tips of stems and roots and increases the length of the stem and the root. This is also called primary growth

Intercalary meristem

- It is located in between permanent tissues
- Intercalary meristem seen in some plants is located near the node

Lateral meristem

- This consists of cells which mainly divide in one place and cause the organ to increase in diameter and growth. It occurs beneath the bark of the tree in the form of cork cambium and in form of vascular cambium .



PERMANENT TISSUE

- Plant tissue are characterized and classified according to their structure and function.
- These tissues can be simple consisting of single cell type. They can also be complex consisting of more than one cell type

SIMPLE PERMANENT TISSUES

- Simple tissues are homogeneous tissues composed of structurally and functionally similar cells.
- Simple permanent tissue types are
  1. Parenchyma
  2. Collenchyma
  3. Sclerenchyma

PARENCHYMA

- Parenchyma are simple permanent tissues composed of living cells.
- It occurs in all soft parts of plants like cortea of roots and is meant for storage of food and provides turgidity to softer parts of plants
- The parenchyma stores food
- In potato, parenchyma vacuoles are filled with starch. In apple, parenchyma stores sugar

- Certain parenchymatous tissues contain chloroplast and and performs photosynthesis, and then it is called chlorenchyma
- In aquatic plants, large air cavities are present in parenchyma to help them float. Such a parenchyma type is called aerenchyma
- The outermost protective layer of plants is made up of specially modified parenchyma. These cells are without intercellular spaces

COLLENCHYMA

- Collenchyma is a living tissue found beneath the epidermis.
- Collenchyma allows bending of various parts of a plant like tendrils and stems of climbers without breaking. It also provides mechanical support.
- It occurs in hypodermis of stem and petiole and around veins
- Generally it is absent in root, leaves and monocot stems

SCLERENCHYMA

- Sclerenchyma consists of thick walled cells which are often lignified. Sclerenchyma cells are dead and do not possess living protoplasts at maturity. Sclerenchyma cells are grouped into fibres and sclereids
- Sclerenchyma is the tissue which makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. The cells of this tissue are dead

COMPLEX PERMANENT TISSUE

- Complex tissues are made of more than one type of cells. All these cells coordinate to perform a common function.
- Xylem and phloem are examples of such complex tissues.

XYLEM

- Xylem performs the function of conduct of water and minerals upwards from the roots to the stem and leaves
- Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres
- Tracheids and vessels have thick walls, and many are dead cells when mature. Tracheids and vessels are tubular structures. This allows them to transport water and minerals vertically.
- **Xylem fibres:** These cells are elongated, lignified and pointed at both the ends. Xylem fibres provide mechanical support to the plant
- **Xylem parenchyma:** These are living and thin walled cells. The main function of xylem parenchyma is to store starch and fatty substances.

PHLOEM

- Phloem transports food from leaves to other parts of the plant.
- Phloem is made up of five types of cells: sieve cells, sieve tubes, companion cells, phloem fibres and the phloem parenchyma
- Except phloem fibres, other phloem cells are living cells

- **Phloem parenchyma**: The phloem parenchyma are living cells which have cytoplasm and nucleus. Their function is to store food materials.

ANIMAL TISSUES

- The structure of animal tissue is directly related to its function. Tissue is groups of cells with a basic structure and function
- Blood and muscles are both examples of tissues found in our body.
- On the basis of the functions they perform we can think of different types of animal tissues, such as epithelial tissue, connective tissue, muscular tissue and nervous tissue.
- Blood is a type of connective tissue, and muscle forms muscular tissue.

EPITHELIAL TISSUE

- The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. . It also forms a barrier to keep different body systems separate.
- Epithelial tissue cells are tightly packed and form a continuous sheet.
- Anything entering or leaving the body must cross at least one layer of epithelium. As a result, the permeability of the cells of various epithelia plays an important role in regulating the exchange of materials between the body and the external environment and also between different parts of the body.
- Depending on shape and function, epithelial tissue is classified as squamous, cuboidal, columnar, ciliated and glandular

CONNECTIVE TISSUE

- It is one of the most abundant and widely distributed tissue. It provides structural frame work and gives support to different tissues forming organs. It prevents the organs from getting displaced by body movements.
- **Blood** is a type of **connective tissue.**
- Blood has a fluid (liquid) matrix called plasma in which red blood corpuscles (RBCs) white blood corpuscles (WBCs) and platelets are suspended. The plasma contains proteins, salts and hormones
- Blood flows and transports gases, digested food, hormones and waste materials to different parts of the body.
- Lymph is a colourless fluid filtered out of the blood capillaries. It consists of plasma and white blood cells. It mainly helps in the exchange of materials between blood and tissue fluids
- **Bone** is another example of a **connective tissue**
- It is a strong and nonflexible tissue
- Bone cells are embedded in a hard matrix that is composed of calcium and phosphorus compounds
- Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves and in the bone marrow. It fills the space inside the organs, supports internal organs and helps in repair of tissues
- Two bones can be connected to each other by another type of connective tissue called the **ligament.** This tissue is very elastic. It has considerable strength.

- **Tendons** connect muscles to bones and are another type of connective tissue. Tendons are fibrous tissue with great strength but limited flexibility
- Another type of **connective tissue cartilage**, has widely spaced cells. Cartilage smoothens bone surfaces at joints and is also present in the nose, ear, trachea and larynx. We can fold the cartilage of the ears
- **Adipose tissue:** Its occurrence is below is below skin, between internal organs and in the yellow bone marrow. Its main function is to storage of fat and to conserve heat.

MUSCULAR TISSUE

- Striated, unstriated and cardiac are three types of muscle tissues
- Muscular tissue consists of elongated cells, also called muscle fibres. This tissue is responsible for movement in our body
- **Skeletal muscle:** These muscles are attached to the bones and are responsible for the body movements and are called skeletal muscles.
- Muscles present in our limbs move when we want them to, and stop when we so decide. Such muscles are called voluntary muscles. These muscles are also called skeletal muscles as they are mostly attached to bones and help in body movement
- **Smooth muscle**: These muscles are spindle shaped with broad middle part and tapering ends. There is a single centrally located nucleus. These fibrils do not bear any stripes or striations and hence are called non-striated. They are not under the control of our will and so are called involuntary muscles.
- The movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements. Smooth muscles or involuntary muscles control such Movements. They are also found in the iris of the eye in ureters and in the bronchi of the lungs
- **Cardiac muscle:** It occurs only in the heart. The contraction and relaxation of the heart muscles help to pump the blood and distribute it to the various parts of the body

NERVOUS TISSUE

- Nervous tissue is made of neurons that receive and conduct impulses.
- The signal that passes along the nerve fibre is called a nerve impulse. Nerve impulses allow us to move our muscles when we want to. The functional combination of nerve and muscle tissue is fundamental to most animals. This combination enables animals to move rapidly in response to stimuli
- The brain, spinal cord and nerves are all composed of the nervous tissue. The cells of this tissue are called nerve cells or neurons. A neuron consists of a cell body with a nucleus and cytoplasm

BLOOD

- **Blood pH** value is **7.4**.so it is considered a **base in nature**
- Blood is fluid **connective tissue**

- Quantity of blood in the human body is 7% of the total weight
- There is an average of 5-6 litres of blood in human body.
- Blood also fights against infection and regulates temperature
- Blood consists of two parts .They are **plasma and blood corpuscles**
- The human groups was discovered by **Karl Landsteine**
- O- is called as the Universal Donor
- AB+ is called as the Universal Receiver
- Blood group A has antigen A and no antibody
- Blood group B has antigen B and no antibody
- Blood group AB has both antigen A and antigen B
- Blood group O has both A and B antibody
- **Heparin** is an anticoagulant that prevents the formation of **blood clots**
- Blood flows and carries various substances from one part of the body to the other. For example, it carries oxygen and food to all cells. It also collects wastes from all parts of the body and carries them to the liver and kidney for disposal

PLASMA

- Plasma is a liquid part of blood. It constitutes 60 percent part of the blood
- Plasma carries water, salts and enzymes
- Its main function is transport of nutrients, hormones, and proteins to the parts of the body that need it
- Fibrinogen and protein is extracted out of plasma the remaining plasma is called serum

BLOOD CORPUSCLES

- It constitutes 40 percent part of the blood
- Three parts of blood corpuscles are
  1. Red blood cell or erythrocyte
  2. White blood cell or Leucocytes
  3. Platelets or Thrombocytes

RED BLOOD CELL OR ERYTHROCYTES

- It is formed in bone marrow
- Nucleus absent in RBC
- RBC destruction takes place in spleen so it called Graveyard of RBC
- Life span of RBC is 20 to 120 days
- It contains hemoglobin. Due to presence of hemoglobin the colour of blood is red
- The iron compound of haematin is found in hemoglobin
- Function of RBC is to carry oxygen to all cells of the body and bring back the carbon dioxide
- Anemia disease is caused due to the deficiency of hemoglobin

WHITE BLOOD CELL OR LEUCOCYTES

- Nucleus present in WBC
- It is formed in bone marrow, Lymph node and sometimes in liver and spleen
- Life span of WBC is 2 to 3 days
- The ratio of RBC and WBC is 600:1
- White cells are the primary defense against infection. WBC is essential for good health
- Leukemia causes due to increasing WBC
- Leukopenia causes due to decreases WBC

PLATELETS OR THROMBOCYTES

- Platelets found only in blood of human and other mammals
- It is formed in bone marrow
- Nucleus absent in platelets
- Role of platelets is to help in clotting of blood
- There are about 2,50,000 – 4,00,000 platelets / cubic mm of blood.
- Life span of platelets is 8–10 days
- Thrombocytopenia: Decrease in the number of thrombocytes

BLOOD VESSELS

- Blood vessels are a network of branched tubes that transport blood. There are three types of blood vessels namely arteries, veins and capillaries

Arteries

- They are thick and elastic vessels that carry blood away from the heart to various organs of the body. All arteries carry oxygenated blood except the **pulmonary artery** which carry **deoxygenated blood** from the heart (right ventricle) to the lungs.

Veins

- Veins are thin and non-elastic vessels that transport blood to the heart from the different organs. All veins carry deoxygenated blood except the pulmonary vein which carry oxygenated blood from the lungs to the heart.

Capillaries

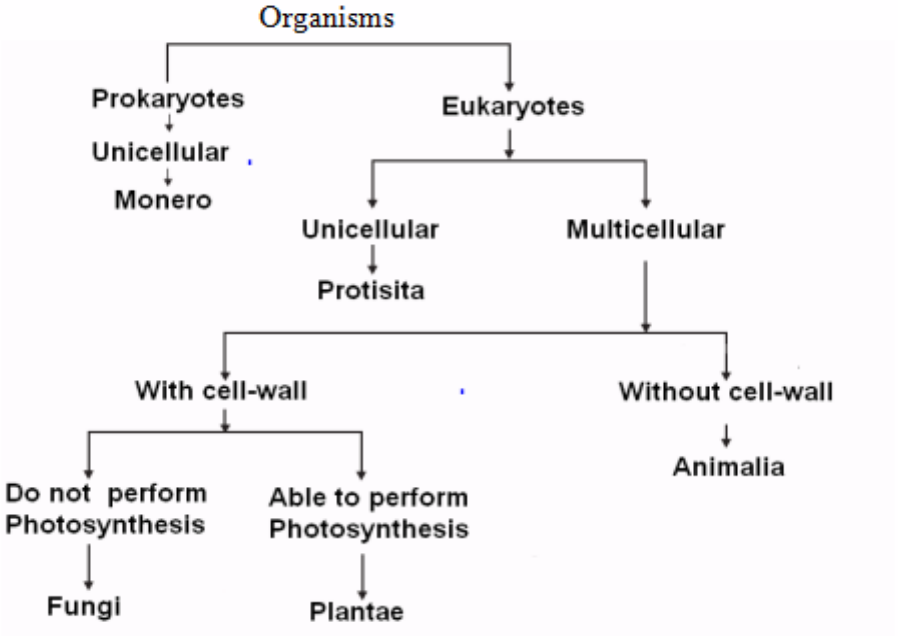
- Capillaries are narrow tubes formed by branching of arterioles which then unite to form the venules and veins. They are about 8 µm in diameter. Capillaries are formed of single layer of endothelial cells.

FUNCTIONS OF BLOOD

- Transport of respiratory gases (Oxygen and CO2).
- Transport of digested food materials to the different body cells.
- Transport of hormones.
- Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and also helps in regulation of pH and body temperature.
- It maintains proper water balance in the body

DIVERSITY IN LIVING ORGANISMS

- Classification helps us in exploring the diversity of life forms.
- The major characteristics considered for classifying all organisms into five major kingdoms are:
  1. Whether they are made of prokaryotic or eukaryotic cells
  2. Whether the cells are living singly or organised into multi-cellular and thus complex organisms
  3. Whether the cells have a cell-wall and whether they prepare their own food.
- All living organisms are divided on the above bases into five kingdoms, namely Monera, Protista, Fungi, Plantae and Animalia.
- The classification of life forms is related to their evolution.
- Plantae and Animalia are further divided into subdivisions on the basis of increasing complexity of body organisation.
- The binomial nomenclature makes for a uniform way of identification of the vast diversity of life around us.
- The binomial nomenclature is made up of two words – a generic name and a specific name
- The system of scientific naming or nomenclature we use today was introduced by **Carolus Linnaeus**
- **Carolus Linnaeus** called as father of taxonomy



The five kingdom classification

MONERA

- Prokaryotic (organisms do not have a defined nucleus), Unicellular.
- These organisms do not have a defined nucleus or organelles, nor do any of them show multi cellular body designs.
- The mode of nutrition of organisms in this group can be either by synthesising their own food (autotrophic) or getting it from the environment (heterotrophic).
- Some of them have cell walls while some do not
- This group includes bacteria (heterotrophic), blue-green algae or cyanobacteria(autotrophic), and mycoplasma

PROTISTA

- This group includes unicellular eukaryotic organisms
- Their mode of nutrition can be autotrophic or heterotrophic
- Examples are unicellular algae, diatoms and protozoans(Paramecium, Amoeba, Euglena)

FUNGI

- These are heterotrophic eukaryotic organisms
- Mostly multicellular but sometimes unicellular
- They have cell walls made of a tough complex sugar called chitin
- Source of food is
    - **Saprophytes** these organisms use decaying material for food
    - They are called **parasites**-organisms live inside body of other living organism to have food and can be disease causing
- Examples are yeasts, molds and mushrooms.

PLANTAE

- These are multicellular eukaryotes with cell walls
- They are autotrophs and use chlorophyll for photosynthesis
- They have cell wall
- Classification among plants depends on whether the plant body has well differentiated, distinct parts. Body is differentiated into leaves, stems, roots, flower, etc.
- There are two types of vascular tissues present in the plants: Xylem helps the transport of water. Phloem helps the transport of food.
- Reproduction through seeds or spores:
    - Phanerogamae: Plants with seeds are called phanerogamae .Contains embryo with stored food and they are multicellular.
    - Cryptogamae: Plants with spores are called cryptogamae .Contains only naked embryo and they are generally unicellular.Those with hidden reproductive organs
- Plants are divided into five groups: Thallophytes, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms

THALLOPHYTA

- Plants that do not have well-differentiated body design fall in this group
- The plants in this group are commonly called algae
- No vascular tissue present and reproduce through sores
- These plants are predominantly aquatic
- Examples are Spirogyra, Ulothrix, Cladophora, Ulva and Char

BRYOPHYTA

- These are called the amphibians of the plant kingdom
- The plant body is commonly differentiated to form stem and leaf-like structures.
- There is no specialized tissue for the conduction of water and other substances from one part of the plant body to another
- Examples are moss (Funaria) and Marchantia

PTERIDOPHYTA

- The plant body is differentiated into roots, stem and leaves
- Vascular tissues present.

GYMNOSPERMS

- The plants of this group bear naked seeds without fruits or flowers
- Usually perennial, evergreen and woody
- Examples are pines and deodar

ANGIOSPERMS

- These are also called flowering plants
- The seeds develop inside an ovary which is modified to become a fruit
- Plant embryos in seeds have structures called cotyledons. Cotyledons are called ‘seed leaves’ because in many instances they emerge and become green when the seed germinates
- The angiosperms are divided into two groups on the basis of the number of cotyledons present in the seed
- Plants with seeds having a single cotyledon are called monocotyledonous or monocots
- Plants with seeds having two cotyledons are called dicots

ANIMALIA

- These include all organisms which are multicellular eukaryotes without cell walls.
- They are heterotrophs.
- Animals are divided into ten groups: Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Protochordata and Vertebrata

PORIFERA

- The word Porifera means organisms with holes. These are non-motile animals attached to some solid support. There are holes or 'pores', all over the body. These lead to a canal system that helps in circulating water throughout the body to bring in food and oxygen
- These animals are covered with a hard outside layer or skeleton. The body design involves very minimal differentiation and division into tissues
- Examples:Euplectella, Sycon, Spongilla

COELENTERATA

- Coelenterates are aquatic organisms, mostly marine and few fresh water forms.
- Hydra ,Jellyfish and sea anemones are common examples

NEMATODA

- The nematode body is also bilaterally symmetrical and triploblastic. However, the body is cylindrical rather than flattened. There are tissues, but no real organs, although a sort of body cavity or a pseudocoelom, is present.
- Some **examples** are Ascaris, Wuchereria

PLATYHELMINTHES

- The body is bilaterally symmetrical, meaning that the left and the right halves of the body have the same design
- Some examples are free-living animals like planarians, or parasitic animals like liver flukes

ANNELIDA

- Annelid animals are also bilaterally symmetrical and triploblastic, but in addition they have a true body cavity
- These animals are found in a variety of habitats– fresh water, marine water as well as land.
- Earthworms and leeches are familiar examples

MOLLUSCA

- In the animals of this group, there is bilateral symmetry.
- They have an open circulatory system and kidney-like organs for excretion. There is a foot that is used for moving around.
- **Examples** are snails and mussels

ARTHROPODA

- This is probably the largest group of animals.
- These animals are bilaterally symmetrical and segmented. There is an open circulatory system, and so the blood does not flow in welldefined blood vessels. The coelomic cavity is blood-filled. They have jointed legs (the word 'arthropod' means 'jointed legs').
- Some familiar examples are prawns, butterflies, houseflies, spiders, scorpions and crabs

PROTOCHORDATA

- These animals are bilaterally symmetrical, triploblastic and have a coelom

- Protochordates are marine animals.
- Examples are Balanoglossus, Herdmania and Amphioxus

VERTEBRATA

- These animals have a true vertebral column and internal skeleton, allowing a completely different distribution of muscle attachment points to be used for movement.
- Vertebrates are bilaterally symmetrical, triploblastic, coelomic and segmented, with complex differentiation of body tissues and organs
- Vertebrates are grouped into six classes.
  1. Cyclostomata
  2. Pisces
  3. Amphibia
  4. Reptilia
  5. Aves
  6. Mammalia

CYCLOSTOMATA

- Cyclostomes are jawless vertebrates. They are characterised by having an elongated eel-like body, circular mouth, slimy skin and are scaleless
- Petromyzon (Lamprey) and Myxine (Hagfish) are **examples**.

PISCES

- These are **fish**. They are exclusively aquatic animals. Their skin is covered with scales/ plates. They **obtain oxygen dissolved in water** by using **gills**.
- They are **cold-blooded** and their **hearts** have only **two chambers**, unlike the four that humans have. They lay eggs.

AMPHIBIA

- These animals differ from the fish in the lack of scales, in having mucus glands in the skin, and a three-chambered heart. **Respiration** is through either **gills or lungs**.
- They lay eggs. These animals are found both in water and on land. Frogs, toads and salamanders are some examples
- Frogs, toads and salamanders are some **examples**

REPTILIA

- These animals are cold-blooded, have scales and breathe through lungs. While most of them have a **three-chambered heart**, **crocodiles** have **four heart chambers**
- They lay eggs with tough coverings and do not need to lay their eggs in water, unlike amphibians. Snakes, turtles, lizards and crocodiles fall in this category

AVES

- These are warm-blooded animals and have a four-chambered heart. They lay eggs
- They **breathe** through **lungs**. All birds fall in this category

MAMMALIA

- Mammals are warm-blooded animals with four-chambered hearts. They have mammary glands for the production of milk to nourish their young.
- Their skin has hairs as well as sweat and oil glands.
- Mammalia: Human, Cat, Whale, Rat, Bat

CLASSIFICATION AND EVOLUTION

- All living things are identified and categorized on the basis of their body design in form and function
- The classification of life forms will be closely related to their evolution
- Charles Darwin first described this idea of evolution in 1859 in his book "The Origin of Species"

HEREDITY AND EVOLUTION

- Transmission of character from one generation to next generation is called heredity
- The of Genetics was coined by W.Wattson
- Gregar mental was the first gave the idea of heredity based on his experiment. He is also known as father of Genetics
- Mental chosen pea plant for his experiment
- Human have 23 pair of chromosomes in which 22 pair are autosomes one pair is sex chromosomes
- In human male sex chromosome is XY and female sex chromosome is XX

LIFE PROCESSES

- Maintenance of life requires processes like nutrition, respiration, transport of Materials within the body and excretion of waste products

AUTOTROPHIC NUTRITION

- Carbon and energy requirements of the **autotrophic organism** are fulfilled by **photosynthesis**
- Autotrophs take in substances from the outside and convert them into stored forms of energy
- The carbohydrates which are not used immediately are stored in the form of starch, which serves as the internal energy reserve to be used as and when required by the plant
- Carbon dioxide and water is converted into carbohydrates in the presence of sunlight and chlorophyll. Carbohydrates are utilized for providing energy to the plant

NUTRITION IN PLANT

- All organisms need food and utilize it to get energy for growth and maintenance of their body
- **Green plants** synthesize food for themselves by the process of **photosynthesis**. They are **autotrophs**.
- A few plants and all animals are dependent on others for their nutrition and are called heterotrophs
- Heterotrophic organisms include animals and fungi
- Plants use simple chemical substances like carbon dioxide, water and minerals for the synthesis of food.

- **Chlorophyll, water, carbon dioxide and sunlight** are the essential requirements for photosynthesis.
- Complex chemical substances such as carbohydrates are the products of photosynthesis.
- **Solar energy** is absorbed by the **chlorophylls** present in **leaves/plants.**
- **Oxygen** is produced **during photosynthesis.**
- **Oxygen released** in photosynthesis is utilised by living organisms for their survival
- **Many fungi derive nutrition** from **dead and decaying matter**. They are **saprotrophs**
- Plants like Cuscutaare parasites. They take food from the host plant. Cascutta does not contain chlorophyll
- **Algae** can prepare their own **food** by **photosynthesis**. They contain **chlorophyll** which gives them the **green colour**
- Green plants are **green** because they contain a **chlorophyll**
- Metal constituent of **chlorophyll** is **Magnesium**

PHOTOSYNTHESIS

- Photosynthesis is the process by which plants some bacteria and some protistans use the energy from sunlight to produce sugar which cellular respiration converts into ATP the fuel used by all living things. The conversion of solar energy into usable chemical energy is associated with the actions of the green pigment chlorophyll. The following events occur during this process
- The following events occur during Photosynthesis
  1. Absorption of light energy by chlorophyll.
  2. Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen
  3. Reduction of carbon dioxide to carbohydrates.

$$6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \underset{\text{(Glucose)}}{C_6H_{12}O_6} + 6O_2 + 6H_2O$$

- Six molecules of water plus six molecules of carbon dioxide produce one molecule of sugar plus six molecules of oxygen
- Desert plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day
- **Leaves are the food factories of plants**
- Carbon dioxide from air is taken in through the tiny pores present on the surface of leaves. These pores are surrounded by guard cells. Such pores are called stomata
- Likewise oxygen produced during photosynthesis can only pass out of the leaf through the opened stomata
- Unfortunately for the plant while these gases are moving between the inside and outside of the leaf a great deal water is also lost
- **Rate of photosynthesis** is take place **maximum in red and blue light and photosynthesis** doesn't takes **place in green light**

- Chlorophyll the green pigment common to all photosynthetic cell absorbs all wavelengths of visible light except green which it reflects to be detected by our eyes
- Water used in photosynthesis is taken up from the soil by the roots in terrestrial plants. Other materials like nitrogen, phosphorus, iron and magnesium are taken up from the soil
- Plant transport systems will move energy stores from leaves and raw materials from roots
- The **xylem** moves **water** and **minerals** obtained from the **soil**
- **Phloem transports** products of photosynthesis from the leaves where they are synthesized to other parts of the plant

HETEROTROPHIC NUTRITION

- A **few plants and all animals are dependent on others** for their **nutrition** and are called **heterotrophs**
- The form of nutrition differs depending on the type and availability of food material as well as how it is obtained by the organism
- Some organisms break-down the food material outside the body and then absorb it. Examples are fungi like bread moulds, yeast and mushrooms
- Parasites derive nutrition from plants or animals without killing them. This is called parasitic nutritive strategy. This parasitic nutritive strategy is used by a wide variety of organisms like cuscuta (amar-bel), ticks, lice, leeches and tape-worms.
- Animal nutrition includes nutrient requirement, mode of intake of food and its utilisation in the body
- The breakdown of complex components of food into simpler substances is called digestion
- The mode of taking food into the body varies in different organisms. Bees and humming-birds suck the nectar of plants, infants of human and many other animals feed on mother's milk

NUTRITION IN HUMAN BEINGS

- We take in food through the mouth digest and utilise it.
- The food passes through a continuous canal which begins at the **buccal cavity** and ends at the **anus**
- The canal can be divided into various compartments. These parts together form the alimentary canal (digestive tract):
    1. The buccal cavity.
    2. Foodpipe or oesophagus
    3. Stomach
    4. Small intestine
    5. Large intestine ending in the rectum
    6. The anus
- The inner walls of the stomach and the small intestine, and the various glands associated with the canal such as salivary glands
- The **liver** and the **pancreas** secrete **digestive juices**
- The digestive tract and the associated glands together constitute the digestive system.

THE MOUTH AND BUCCAL CAVITY

- Food is taken into the body through the mouth. The process of taking food into the body is called ingestion
- Our mouth has the salivary glands which secrete **saliva**. . The **saliva contains an enzyme called salivary amylase** that breaks down **starch which is a complex molecule to give simple sugar**. The food is mixed thoroughly with saliva and moved around the mouth while chewing by the muscular tongue.

THE FOODPIPE/OESOPHAGUS

- The swallowed food passes into the foodpipe or oesophagus
- Food is pushed down by movement of the wall of the foodpipe

THE STOMACH

- The digestion in stomach is taken care of by the gastric glands present in the wall of the stomach. These release **hydrochloric acid** a protein digesting enzyme called **pepsin** and **mucus**
- The hydrochloric acid creates an acidic medium which facilitates the action of the enzyme pepsin
- The mucus protects the inner lining of the stomach from the action of the acid under normal conditions
- The acid kills many bacteria that enter along with the food and makes the medium in the stomach acidic and helps the digestive juices to act
- The **digestive juices** break down the **proteins** into simpler substances
- The exit of food from the stomach is regulated by a sphincter muscle which releases it in small amounts into the small intestine

THE SMALL INTESTINE

- The small intestine is highly coiled and is about 7.5 metres long
- The length of the small intestine differs in various animals depending on the food they eat.
- **Herbivores** eating grass need a longer small intestine to allow the cellulose to be digested.
- Meat is easier to digest hence carnivores like tigers have a shorter small intestine.
- **Liver secretes bile juice that is stored in a sac called the gall bladder.** The bile plays an important role in the digestion of fats
- **The pancreas secretes pancreatic juice** which contains enzymes like **trypsin** for digesting proteins and lipase for breaking down emulsified fats
- The walls of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the proteins to amino acids
- The **villi are richly supplied with blood** vessels which take the absorbed food to each and every cell of the body

LARGE INTESTINE

- The **large intestine** is wider and shorter than small intestine. It is about **1.5 metre** in length
- Its function is to **absorb water** and some **salts** from the undigested food material

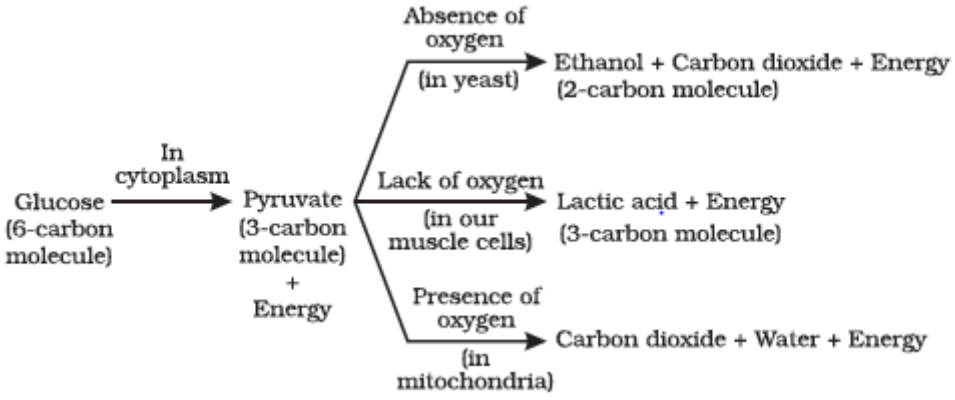
- The rest of the material is removed from the body via the anus. The exit of this waste material is regulated by the anal sphincter

DIGESTION IN GRASSEATING ANIMALS

- The grazing animals like cows, buffaloes and deer are known as **ruminants**. They quickly ingest swallow their leafy food and store it in the rumen. Later the food returns to the mouth and the animal chews it peacefully
- The grass is rich in cellulosea type of carbohydrate. In ruminants like cattle, deer, etc., bacteria present in rumen helps in digestion of cellulose
- Amoeba ingests its food with the help of its false feet or pseudopodia. The food is digested in the food vacuole

RESPIRATION

- Respiration is essential for survival of living organisms. It releases energy from the food
- Each cell of an organism performs certain functions such as nutrition, transport, excretion and reproduction. To perform these functions the cell needs energy
- All living organisms respire to get energy from food.
- In the cell, the food (glucose) is broken down into carbon dioxide and water using oxygen. When breakdown of glucose occurs with the use of oxygen it is called aerobic respiration.
- **Food can be broken down without using oxygen. This is called anaerobic respiration**
- Break down of glucose a six carbon molecule into a three-carbon molecule called pyruvate. This process takes place in the cytoplasm
- Breakdown of pyruvate using oxygen takes place in the mitochondria.



- Organisms such as **yeast** that can survive in the **absence of air**. They are called **anaerobes**. They respires **anaerobically** and during this process yield alcohol. Because they used to make wine and beer
- Our muscle cells can also respire an aerobically but only for a short time when there is a temporary deficiency of oxygen. During heavy exercise, fast running, cycling, walking form any hours or heavy weight lifting, the demand for energy is high
- Hot water bath or massage improves circulation of blood As a result the supply of oxygen to the muscle cells increases

- The energy released during cellular respiration is immediately used to synthesise a molecule called ATP which is used to fuel all other activities in the cell. In these processes, ATP is broken down giving rise to a fixed amount of energy which can drive the endothermic reactions taking place in the cell
- Respiration may be aerobic or anaerobic. **Aerobic respiration** makes more energy available to the organism.

BREATHING

- In human beings air is taken into the body through the nostrils. The air passing through the nostrils is filtered by fine hairs that line the passage
- Rings of cartilage are present in the throat. These ensure that the air passage does not collapse
- The taking in of air rich in oxygen into the body is called inhalation and giving out of air rich in carbon dioxide is known as exhalation
- During inhalation our lungs expand and then come back to the original state as the air moves out during exhalation
- In earthworm the exchange of gases occurs through the moist skin. In **fishes** it takes place through **gills** and in **insects through the tracheae.**
- In a plant the roots take in air present in the soil. Leaves have tiny pores called stomata through which they exchange gases. The breakdown of glucose in the plant cells is similar to that in other living beings.
- Terrestrial animals can breathe the oxygen in the atmosphere but animals that live in water need to use the oxygen dissolved in water
- The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms
- In human beings, the respiratory pigment is haemoglobin which has a very high affinity for oxygen. This pigment is present in the red blood corpuscles

TRANSPORTATION

TRANSPORTATION IN HUMAN BEINGS

- Blood is the fluid which flows in blood vessels
- It transports substances like digested food from the small intestine to the other parts of the body. It carries oxygen from the lungs to the cells of the body. It also transports waste for removal from the body
- One type of cells are the red blood cells (RBC) which contain a red pigment called haemoglobin. Haemoglobin binds with oxygen and transports it to all the parts of the body and ultimately to all the cells.
- The blood also has white blood cells (WBC) which fight against germs that may enter our body
- The clot is formed because of the presence of another type of cells in the blood called platelets

HEART

- The heart is an organ which beat continuously to act as a pump for the transport of blood
- The human heart is four chambered
- The two upper chambers are called the atria and the two lower chambers are called the ventricles

- The carbon dioxide rich blood has to reach the lungs for the carbon dioxide to be removed, and the oxygenated blood from the lungs has to be brought back to the heart. This oxygen rich blood is then pumped to the rest of the body
- The separation of the right side and the left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing
- Arteries carry oxygen-rich blood from the heart to all parts of the body. Blood emerges from the heart under high pressure .the arteries have thick, elastic walls
- Veins are the vessels which carry carbon dioxide-rich blood from all parts of the body back to the heart. They do not need thick walls because the blood is no longer under pressure
- The force that blood exerts against the wall of a vessel is called blood pressure.
- The normal systolic pressure is about **120 mm of Hg** and diastolic pressure is **80 mm of Hg**
- Amphibians or many reptiles have **three-chambered hearts**
- Fishes have only two chambers to their hearts
- The human heart has **four chambers.** Two atria and two ventricles
- **Pulmonary veins** transport oxygenated blood to the heart from the lungs.
- **Pulmonary arteries** move deoxygenated blood from the heart to the lungs
- **Lymph** carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood.

TRANSPORTATION IN PLANTS

- **Plant transport systems** will move **energy stores from leaves** and **raw materials from roots**. These two pathways are constructed as independently organised conducting tubes. One, **the xylem moves water and minerals obtained from the soil**. The other, **phloem transports products of photosynthesis from the leaves** where they are synthesised to other parts of the plan
- A lot of water is lost by plants in the form of vapour through stomata during transpiration

EXCRETION

- The biological process involved in the removal of these harmful metabolic wastes from the body is called excretion
- The parts involved in excretion form the excretory system

EXCRETION IN HUMAN BEINGS

- The excretory system of human beings includes a pair **of kidneys, a pair of ureters, a urinary bladder and a urethra**
- Urine produced in the kidneys passes through the ureters into the urinary bladder where it is stored until it is released through the urethra
- In human beings excretory products in the form of soluble nitrogen compounds are removed by the nephrons in the kidneys.

- The purpose of making **urine** is to filter out **waste products from the blood**. Nitrogenous waste such as urea or uric acid are removed from blood in the kidneys
- An adult human being normally passes about 1–1.8 L of urine in 24 hours. The urine consists of 95% water, 2.5% urea and 2.5% other waste products
- The **nephron** is **functional unit** of the **kidney**

EXCRETION IN PLANTS

- Plants use a variety of techniques to get rid of waste material. For example, waste material may be stored in the cell-vacuoles or as gum and resin, removed in the falling leaves, or excreted into the surrounding soil.

CONTROL AND COORDINATION

- Control and coordination are the functions of the nervous system and hormones in our bodies.
- The responses of the nervous system can be classified as reflex action, voluntary action or involuntary action.

ANIMALS – NERVOUS SYSTEM

- Nervous tissue is made up of an organized network of nerve cells or neurons and is specialized for conducting information via electrical impulses from one part of the body to another
- The responses of the nervous system can be classified as reflex action, voluntary action or involuntary action
- The nervous system gets information from our sense organs and acts through our muscles
- The nervous system is made up of nervous tissues. It is formed of three distinct components namely the neurons, neuroglia and nerve fibres.
- Nervous system controls and coordinates the activities of our body.
- Nervous tissue is made up of an organised network of nerve cells or neurons, and is specialised for conducting information via electrical impulses from one part of the body to another
- Neuron is the structural and functional unit of the cell and has three parts- cyton, dendrites and axon
- A receptor is a cell or group of cells that receives the stimuli. An effector is a part of the body which can respond to a stimulus according to the instructions from the brain or the spinal cord.

HUMAN BRAIN

- The brain and spinal cord constitute the central nervous system. They receive information from all parts of the body and integrate it.
- The brain is broadly divided into three regions: forebrain, midbrain and hindbrain.
- The **forebrain** mainly consists of cerebrum. The midbrain does not have any further divisions. The hindbrain consists of three centres called pons, cerebellum and medulla.
- The **fore-brain** is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialised for hearing, smell, sight and so on
- Cerebrum is the largest portion forming nearly two-third of the brain.

- **Cerebrum** holds your memories, allows you to plan, enables you to imagine and think.
- The sensation of feeling full is because of a centre associated with hunger, which is in a separate part of the fore-brain
- Many of these involuntary actions are controlled by the mid-brain and hind-brain.
- All the involuntary actions including blood pressure, salivation and vomiting are controlled by the **medulla** in the hind-brain
- **Midbrain** connects the forebrain to the hindbrain
- **Thalamas** present in cerebral medulla is a major conducting centre for sensory and motor signaling. It act as a relay centre
- **Hypothalamus** lies at the base of the thalamus. **Hypothalamus** controls sleep and wake cycle of the body. It also controls the urges for eating and drinking. It control involuntary functions like hunger, sexual desire anger, fear, thirst.
- Think about activities like walking in a straight line, riding a bicycle, picking up a pencil. These are possible due to a part of the hind-brain called the **cerebellum**.
- **Cerebellum** is responsible for precision of voluntary actions and maintaining the posture and balance of the body.
- **Pons** is a bridge of nerve fibre that connects the lobes of cerebellum. It relay signals between the cerebellum, spinal cord, midbrain and cerebrum. It controls respiration and sleep cycle
- Spinal cord is lower part of brain which control reflex center
- Spinal cord originates from medulla
- A delicate organ like the brain, which is so important for a variety of activities, needs to be carefully protected. For this, the body is designed so that the brain sits inside a bony box

COORDINATION IN PLANTS

- Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles.
- Coordination is the ability to use different parts of the plant together, smoothly and efficiently. In plants, coordination is due to the result of a chemical system, wherein plant hormones have a major role.
- The control and coordination system in plants is done by plant hormones. They affect the growth of a plant in one or the other aspect. The growth of a plant is divided in three stages:
  1. Cell division
  2. Cell enlargement
  3. Cell differentiation
- Plant hormone not only controls these stages of plant growth but also promotion of breaking of dormancy, falling of leaves, fruit growth, ripening of fruits, ageing of plants etc

PLANT HORMONES

- Chemical coordination is seen in both plants and animals.
- There are five major classes of plant hormones. They are:
  1. Auxins

2. Cytokinins
3. Gibberellins
4. Abscisic Acid (ABA)
5. Ethylene

- **Growing plants** detect light a hormone called auxin synthesized at the shoot tip helps the **cells** to grow **longer**.
- Gibberellins are the most abundantly found plant hormones .Gibberellins example of plant hormones like auxins help in the **growth** of the **stem**

Cytokinins

- **Cytokinins** promote cell division and it is natural then that they are present in greater concentration in areas of rapid cell division such as in fruits and seeds. Cytokinin is found abundantly in liquid endosperm of coconut.
- Cytokinin also causes cell enlargement.

Ethylene

- **Ethylene** is a gaseous plant hormone. It is a growth inhibitor.
- It is mainly concerned with maturation and ripening of fruits. Maximum synthesis of ethylene occurs during ripening of fruits like apples, bananas and melons
- It is used ripening of fruits

Abscisic acid

- **Abscisic acid** (ABA) is a growth inhibitor which regulates abscission and dormancy. It increases tolerance of plants to various kinds of stress. So, it is also called as stress hormone. It is found in the chloroplast of plants.

HORMONES IN ANIMALS

- **Adrenaline hormone** is secreted from the **adrenal glands**
- Adrenaline is secreted directly into the blood and carried to different parts of the body. The target organs or the specific tissues on which it acts include the heart
- **Iodine** is necessary for the **thyroid gland** to make **thyroxin hormone.** Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth
- In case iodine is deficient in our diet, there is a possibility that we might suffer from goitre. One of the symptoms in this disease is a swollen neck.
- **Growth hormone** is one of the hormones secreted by the **pituitary**. As its name indicates, growth hormone regulates growth and development of the body. If there is a deficiency of this hormone in childhood it leads to dwarfism
- **Insulin** is a hormone which is produced by the **pancreas** and helps in regulating **blood sugar levels**. If it is not secreted in proper amounts, the sugar level in the blood rises causing. It **leads to diabetes.**
- Testosterone hormone secreted in males and oestrogen in females
- **Important hormones and their functions**

S.No	Hormone	Endocrine Gland	Functions

1	Growth hormone	Pituitary gland	Stimulates growth in all organs
2	Thyroxin	Thyroid gland	Regulates metabolism for body growth
3	Insulin	Pancreas	Regulates blood sugar level
4	Testosterone	Testes	Male sex hormone
5	Oestrogen	Ovaries	Development of female sex organs, regulates menstrual cycle, etc
6	Adrenaline	Adrenal gland	
7	Releasing Harmones		Stimulates pituitary gland to release hormones

Note:

- The pituitary gland regulates and controls other endocrine glands and so is called as the "Master gland"
- The adrenal glands are located above each kidney. They are also called supra renal glands

HOW DO ORGANISMS REPRODUCE

- Reproduction, unlike other life processes, is not essential to maintain the life of an individual organism.
- Reproduction involves creation of a DNA copy and additional cellular apparatus by the cell involved in the process.
- Various organisms use different modes of reproduction depending on their body design
- There are two modes by which animals reproduce.
  - (i) Sexual reproduction, and
  - (ii) Asexual reproduction

ASEXUAL REPRODUCTION

- Unicellular organisms cell division or fission leads to the creation of new individuals Example for **fission is Amoeba**
- Formation of a daughter individual from a small projection, the bud, arising on the parent body is called budding. Asexual reproduction takes place through **budding** in **yeast**
- Organisms such as hydra can regenerate if they are broken into pieces. They can also give out buds which mature into new individuals. In Hydra a bud develops as an outgrowth due to repeated cell division at one specific site.
- In algae breaking of the filament into many fragments is called **fragmentation**. Each fragment at least have one cell. Example is **spirogyra**
- **Vegetative propagation**: The vegetative part of plant (root, stem, leaf or bud) gets detached from the parent body and grows into an independent daughter plant. Roots, stems and leaves of some plants develop into new plants through vegetative propagation.

- The individual is cut or broken up into many pieces many of these pieces grow into separate individuals. For example simple animals **like Hydra and Planaria** can be cut into any number of pieces and each piece grows into a complete organism. This is known as **regeneration**
- Asexual reproduction occurs by spore formation. This is the most common method of asexual reproduction in **fungi and bacterias**

SEXUAL REPRODUCTION

- Sexual reproduction involves two individuals for the creation of a new individual.
- Sexual reproduction involves the fusion of male and female gametes
- The sexual mode of reproduction incorporates such a process of combining DNA from two different individuals during reproduction
- DNA copying mechanisms creates variations which are useful for ensuring the survival of the species. Modes of sexual reproduction allow for greater variation to be generated.

SEXUAL REPRODUCTION IN FLOWERING PLANTS

- **Flower** is the **reproductive** part of a **plant**. The reproductive parts of **angiosperms** are located in the **flower**
- **Stamens** and **pistil** are the reproductive parts of a flower which contain the germ-cells
- **Stamen** is the male reproductive part and it produces pollen grains that are yellowish in colour.
- **Pistil** is present in the centre of a flower and is the **female** reproductive part
- A pistil consists of stigma, style and ovary. Ovary contains one or more ovules
- Flowers which contain either only pistil or only stamens are called **unisexual flowers**
- **Corn, papaya and cucumber** produce unisexual flowers
- Flowers which contain both **stamens and pistil** are called **bisexual flowers**
- **Mustard, Hibiscus, rose and petunia** have bisexual flowers
- The ovary contains ovules and each ovule has an egg cell. The male germ-cell produced by pollen grain fuses with the female gamete present in the ovule. This fusion of the germ-cells or fertilisation gives us the zygote which is capable of growing into a new plant
- Reproduction in flowering plants involves transfer of pollen grains from the anther to the stigma which is referred to as pollination.
- In self-pollination pollen grains are transferred from the anther to the stigma of the same flower
- In cross-pollination pollen grains are transferred from the anther of one flower to the stigma of another flower of the same kind
- Pollination takes place in plants with the help of wind, water and insects
- After the pollen lands on a suitable stigma, it has to reach the female germ-cells which are in the ovary
- The process of fusion of male and female gametes to form a zygote is called **fertilisation**.
- In sexual reproduction a male and a female gamete fuse to form a **zygote**.
- The **zygote** divides several times to form an embryo within the ovule
- The **zygote** develops into an **embryo**

- The **ovule develops a tough coat** and is gradually converted into a **seed**. The ovary grows rapidly and ripens to form a fruit.
- The seed contains the future plant or embryo which develops into a seedling under appropriate conditions. This process is known as germination.

SEXUAL REPRODUCTION IN HUMAN BEINGS

- Reproduction resulting from the fusion of male and female gametes is called sexual reproduction.
- Fertilisation that takes place inside the female body is called internal fertilisation. This is observed in human beings and other animals such as hens, cows and dogs.
- Fertilisation that takes place outside the female body is called external fertilisation. This is observed in frogs, fish, starfish, etc
- Animals such as human beings, cows and dogs which give birth to young ones are called **viviparous animals**.
- Animals such as hen, frog, lizard and butterfly which lay eggs are called **oviparous animals.**
- Organs of the reproductive system are divided into primary and secondary (accessory) sex organs.
- Primary reproductive organs include the gonads (Testes in male and Ovaries in female).

MALE REPRODUCTIVE SYSTEM

- The male reproductive system in human beings consists of testes which produce sperms, vas deferens, seminal vesicles, prostate gland, urethra and penis.
- The formation of germ-cells or sperms takes place in the testes.
- Testes are located outside the abdominal cavity in scrotum because sperm formation requires a lower temperature than the normal body temperature.
- The role of the **testes** is secretion of the hormone **testosterone**.
- The sperms formed are delivered through the vas deferens which unites with a tube coming from the urinary bladder. Along the path of the vas deferens, glands like the prostate and the seminal vesicles add their secretions so that the sperms are now in a fluid which makes their transport easier and this fluid also provides nutrition
- The urethra thus forms a common passage for both the sperms and urine.
- The sperms are tiny bodies that consist of mainly genetic material and a long tail that helps them to move towards the female germ-cell

FEMALE REPRODUCTIVE SYSTEM

- The female reproductive system in human beings consists of ovaries, fallopian tubes, uterus and vagina.
- The **ovary** produces female gametes called ova.
- **Oestrogen** is female sex hormones. Oestrogen regulates **menstrual cycle**
- The ovaries contain thousands of immature eggs.
- The egg is carried from the ovary to the womb through a thin oviduct or fallopian tube
- The two oviducts unite into an elastic bag-like structure known as the uterus. The uterus opens into the vagina through the cervix.

- Sexual reproduction in human beings involves the introduction of sperm in the vagina of the female. Fertilisation occurs in the **fallopian tube.**
- During fertilisation the nuclei of the sperm and the egg fuse to form a single nucleus. This results in the formation of a fertilised **egg or zygote**
- The stage of the embryo in which all the body parts can be identified is called a **foetus**.
- **Uterus** is the part where development of the baby takes place.
- The uterus prepares itself every month to receive and nurture the growing embryo. The lining thickens and is richly supplied with blood to nourish the growing embryo.
- The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.
- The developing embryo will also generate waste substances which can be removed by transferring them into the mother's blood through the placenta.
- The development of the child inside the mother's body takes approximately **nine months.**
- If the **egg** is not fertilized it lives for about **one day.** Since the ovary releases one egg every month, the uterus also prepares itself every month to receive a fertilised egg. Thus its lining becomes thick and spongy. This would be required for nourishing the embryo if fertilisation had taken place. Now, however, this lining is not needed any longer. So, the lining slowly breaks and comes out through the vagina as blood and mucous. This cycle takes place roughly every month and is known as menstruation. It usually lasts for about two to eight days.
- Menstruation occurs in **28 day cycles**
- Contraception to avoid pregnancy can be achieved by the use of condoms, oral pills, copper-T and other methods

LIST OF HUMAN DISEASES CAUSED BY BACTERIA, VIRUS, FUNGI, AND PROTOZOA

DISEASE CAUSED BY VIRUSES

- **Chicken pox** :It is caused by Varicella-zoster virus.
- **Small Pox :** It is caused by Variola virus.
- **Common Cold :** It is caused by Rhinovirus.
- **AIDS** (Acquired ImmunoDeficiency Syndrome) :It is caused by Human Immunodeficiency Virus (HIV).
- **Measles** :It is caused by Measles virus.
- **Mumps** :It is caused by Mumps virus.
- **Rabies** : It is caused by Rabies virus (Rhabdoviridae family).
- **Dengue fever** :It is caused by Dengue virus
- **Influenza**: It is caused by H1N1 virus

DISEASE CAUSED BY BACTERIA

- **Whooping Cough**: It is caused by a bacterium called Bordetella pertussis.
- **Diphtheria:** It is caused by Coryne bacterium diphtheriae.

- **Cholera:** It is caused by Vibrio cholerae.
- **Leprosy :** It is caused by Mycobacterium leprae.
- **Pneumonia:** It is caused by Streptococcus pneumoniae.
- **Tetanus :** It is caused by Clostridium tetani.
- **Typhoid** : It is caused by Salmonella typhi.
- **Tuberculosis** : It is caused by Mycobacterium tuberculosis.
- **Plague** : It is caused by Yersinia pestis

DISEASE CAUSED BY PROTOZOAN

- **Malaria**: It is spread by Anopheles mosquitoes. The Plasmodium parasite that causes malaria
- **Amoebic dysentery:** It is caused by Entamoebahistolytica.
- **Sleeping sickness**: It is caused by Trypanosomabrucei.
- **Kala-azar**: It is caused by Leishmaniadonovani

DISEASE CAUSED BY FUNGI

- **Ringworm**: Three different genera of fungi namely Epidermophyton, Microsporum andTrichophyton cause ringworm.

DISEASE CAUSED BY WORMS

- **Tapeworm** : They are intestinal parasites. It cannot live on its own. It survives within the intestine of an animal including human.
- **Filariasis** : It is caused by thread.
- **Pinworm** : It is caused by small, thin, white roundworm called Enterobius vermicularis.

PLANT DISEASES

VIRAL DISEASES

- Mosaic disease of tobacco: It is caused by Tobocco mosaic virus
- Bunchy top of banana: This disease is caused by banana virus

BACTERIAL DISEASE

- Wilt of potato: It is caused by Pseudomonas solonacearum bacteria
- Bacterial blight of rice: This disease caused by Xanthomonasoryzae
- Black arm of cotton: This disease caused by Xanthomonas bacteria
- Citrus canker: The factor of this desease is Xanthomonascitri bacteria

FUNGAL DISEASE

- Rust of wheat is a disease caused by fungi puccinia

- Damping off of seedling is caused by fungus pythiumdebaryanum
- Red root of sugarcane is caused by fungus colletorichumfalcatum

SCIENTIFIC NAMES OF PLANTS, FRUITS AND VEGETABLES

Common Name	**Scientific Name**
Mango	Mangiferaindica
Lemon	Citrus Limonium
Bamboo	Bamboosaaridinarifolia
Banyan	Ficusbenghalensis
Banana	Musa paradisicum
Cucumber	Cucumissativas
Guava	Psidiumguajava
Orange	Citrus aurantium
Watermelon	Citrulluslanatus
Pineapple	Ananascomosus
Tomato	Lycopersicanesculentum
Soybean	Glycine Max
Sandalwood	Santalum album
Rice	Oryza sativa
Spinach	Spinaciaoleracea
Potato	Solanumtubersum
Onion	Allium cepa
Pepper	Capsicum Annum
Mustard	Brassica Juncea
Neem	Azadhirachtaindica
Drumstick	Moringaoleifera
Corn	Zea Mays
Carrot	Daucascarota
Capsicum	Capsicum fruitscence

Ginger	Zingiberofficinale
Brinjal	Solanummelongena
Turmeric	Curcuma longa
Pea	Pisumsativum
Coriander	Coriandrumsativum
Carrot	Daucuscarota
Rose	Rosa
Sugarcane	Saccharum
Sunflower	Helianthus annuus
Tea	Camellia sinensis
Tulsi	Ocimumtenuiflorum

IMPORTANT BRANCHES OF SCIENCE

- Study of Bones is called – **Osteology**
- Study of Soils is called – **Pedology**
- Branch of science dealing with Urinary system is called – **Urology**
- Study of Viruses is called – **Virology**
- Study of resistance of body against infection (immunity) is called – **Immunology**
- Study of Muscles is called – **Myology**
- Study of development of Embryos is called – **Embryology**
- Study of Insects is called – **Entomology**
- Study of the Nervous system, its functions and its disorders is called – **Neurology**
- Branch of Biology dealing with the phenomena of Heredity is called – **Genetics**
- Study of causes of Diseases is called – **Etiology**
- Study of Ears and their diseases is called – **Otology**
- Study of Condition and Structure of Earth is called – **Geology**
- Study of Kidneys and its function is called – **Nephrology**
- Study of Birds is called – **Ornithology**
- Study of Fossils is called – **Palaeontology**
- Study of Female Reproductive System is called – **Gynaecology**
- Study of production of Three Dimensional Image using Laser is called – **Holography**
- Study of Snakes is called – **Serpentology**
- Production of Raw Silk by rearing of Silk Worms is called – **Sericulture**
- Study of Algae is called –**Phycology**
- Study of diseases, symptoms, cause and remedy is called – **Pathology**

- Study of Serum is called – **Serology**
- The Breeding, Rearing, and Transplantation of Fish is called – **Pisciculture**
- Study of Eyes and its diseases is called – **Opthamology**
- Study of Heavenly bodies is called –**Astronomy**
- Study of bacteria and the diseases caused by them is called – **Bacteriology**
- Science dealing with the origin and development of mankind is called – **Anthropology**
- Study of cells is called – **Cytology**
- Science dealing with the functions and the diseases of heart is called – **Cardiology**
- Study of skin is called – **Dermatology**
- Study of Blood Vascular System is called – **Angiology**
- Study of Fungi and fungus diseases is called – **Mycology**
- Study of Tumors is called – **Oncology**
- Study of Liver and its diseases is called – **Hepatology**
- Study of fungi is called – **Mycology**
- Study of skill worm breeding – **Sericulture**
- Study of bodily diseases – **Pathology**
- Study of poisons - **Toxicology**

BIOLOGY ONE LINERS

- Glucose in stored in the form of Glycogen in Animals.
- Ascariasis is caused by Round Worm
- BCG vaccination (Bacillus Calmette Guerin) gives immunity from Tuberculosis.
- Blood groups was discovered by Karl Landsteiner
- The first successful heart transplant in India was performed by Dr. PanangipalliVenugopal
- The polio vaccine was discovered by Jonas Salk
- Companion cells are unique to Angiosperms
- DNA stands for Deoxyribonucleic Acid.
- Endocrine glands are also known as Ductless Glands.
- The Small Pox vaccine was discovered by Edward Jenner
- Deficiency of iodine leads to Goiter.
- First vaccine produced by bio-technology was used against Hepatitis-B virus
- Turmeric is obtained from Stem of a Plant.
- Genes are made by Polynucleotides.
- Haematopoiesis occurs in Bone marrow.
- Leoprasy is also known as Hansen's disease.
- A human skull has 22 Bones.
- Deposition of Lactic Acid in the muscles leads to a feeling of fatigue in Humans
- BCG is the first vaccine injected into a newly born baby.

- Food poisoning is caused by Clostrideamboutulium.
- Alcoholic drink contains Ethyl Alcohol
- Progesterone hormone is used as an oral contraceptive.
- The longest and largest bone in the human body is Femur.
- Iron is present in hemoglobin.
- The PH value of human blood is 7.4
- The plants grow under water stress conditions are called Xerophytes
- During photosynthesis, Solar Energy is converted to Chemical energy.
- Stapes is the smallest bone in the human body.
- The study of Trees is called Dendrology.
- Charles Darwin proposed the Theory of natural selection
- Turpentine oil is obtained from Resin from Pines.
- Upper most layer of skin is Epidermis
- Magnesium found in Chlorophyll.
- Chloroplast is called as kitchen of plant cell.
- Lysosome is known as 'Suicidal bags of cell'
- 120mm/80mm is systolic and diastolic pressure in a healthy man
- Dermatology is the study of Human Skin
- RBC's count in the blood is increased when a person is having Polycythemia.
- Insulin regulates the amount of glucose in the blood.
- Hydrogen gas used for making vegetable ghee.
- Liver is the largest gland in the human body.
- The smallest functional unit of a kidney is Nephron.
- James D. Watson, a Nobel Prize winning scientist is expert in the field of Genetics.
- Polio is caused by a Virus.
- The flow of energy in the Energy Pyramid is always Upwards.
- Saliva helps in the digestion of Starch.
- Father chromosome is used for sex determination test.
- The bio-gas used for cooking is a mixture of Methane &Carbondioxide.
- The yellow colour of the human feces is a result of the pigment called Urobilin.
- Sulphur dioxide causes the most serious health hazards.
- Vitamin K is required for the synthesis of Prothrombin.
- Chloroquine is used in anti-malarial drug.
- Dental cavities are caused because of the deficiency of Fluorine.
- Penicillin is extracted from fungus
- elements increases the
- Boron increase the absorption of water and calcium in plants
- Lymphocytes helps in blood circulation

- Our bones and teeth are generally made of Tricalcium phosphate
- Angora wool is extracted from rabbit
- Pituitary gland is located in brain
- Onion is a modified form of stem
- The pollination of maize takes place by pollination by air
- X-rays are not able to capture clear picture of intestine because radiologists do not take direct X-ray photographs of intestine.
- Exobiology deals with the study of life in other planets and space
- The disease caused by Asbestos is Emphysema
- Dehydration in human body is caused due to the loss of water
- Ostrich is the largest living bird in the world
- The age Of trees is determined by its growth rings
- Kidney disease in man is caused by the pollutant Cadmium
- Maximum photosynthetic activity occurs inblue and red region of light
- AIDS virus hassingle-stranded RNA
- A breath test used by traffic police to check drunken driving used in potassium dichromate-sulphuric acid
- Typhoid fever is caused by bacteria
- Pathogenic bacteria secrete Antigens
- Kolkata is the Botanical Survey of India headquartered
- Sweetex used by the diabetic patients has energy content of Zero calories
- The element which Is the most abundant In the human body is Oxygen
- Oxygen liberated during photosynthesis is coming from water
- Eugen Steinach discovered sex hormones.
- Fermentation Is a process of decomposition of anorganic compound by enzymes
- Amniocentesis is a method for determination of fetal health conditions
- During photosynthesis the liberated gas is oxygen
- Penicillin is a first antibiotic
- Virus contains a Protein and lipid
- The sex of a child is determined before birth by fetus of mother
- The Theory of Evolution was put forward by Charles Darwin
- The total number of vertebrae in a human being is 33
- On the average 65 percentage of human body has the element of oxygen
- BCG vaccination is to be given to a newborn child within 48 hours
- The hybrid between horse and donkey is called Mule
- Glaucoma is a disease of the eyes
- The chemical used for destroying Fungi in water tanks is Copper sulphate
- Watson and Crick discover chemical structure of DNA
- Darwin finches refer to a group of Birds

- The tissue in man where no cell division occurs afterbirth is nerves
- Ketone bodies is an abnormal constituent of urine
- At very high altitude the Red Blood Corpuscles In the human body will increase in size
- A test tube baby means fertilisation in vitro and then transplantation in the uterus.
- The metal present in insulin is zinc
- Roundworm Is a human parasite found in the Large intestine
- Milk is a rich source of Vitamin B12
- Number of chromosomes in human body is 46
- xerophthalmia Is a deficiency disease caused by lack of Vitamin A
- A synthetic compound inhibiting the growth of bacteria is called antibiotic
- Carbohydrate is stored in the body as glycogen
- Amylase was the first enzyme isolated in pure crystalline form
- Process of digestion is helped by Enzyme
- Kidney excretes water ,fat and various catabolic wastes
- 8 second required for a heartbeat
- An ant can see the objects all around it due to the presence of Compound eyes
- Taenia sodium (Tape worm) lives as a parasite in Intestine of man/woman
- Eyes of potato are useful for Vegetative propagation
- Ginger is a stem and not a root because It has nodes and internodes
- Pregnant women usually become deficient in Calcium and Iron
- Thalassemia is a hereditary disease. It affects blood
- Jaundice affect Liver
- Adrenal is correlated with blood pressure
- Tuberculosis spreads through milk
- Study of field crops is called Agronomy
- Carrot is orange in colour because it contains carotene
- Full form of the infectious disease SARS is Severe Acute Respiratory Syndrome
- Founder of Homeopathy is Samuel Hahnemann
- Development of an egg without fertilization is called Parthenogenesis
- Literal meaning of the term “Homo Sapiens” is Man-The Wise
- Respiration is oxidation
- During photosynthesis green plants absorb carbon dioxide
- Adrenaline hormones is released in excess quantity during excitement
- Skin of human body is first highly affected by nuclear radiation
- M.R.I. stands for Magnetic Resonance Imaging
- The language used In writing the scientific name of animals is Latin
- Fluid part of blood devoid of corpuscles is called serum
- Vitamin – K can be synthesized by Liver

- The medical term used for the sleeplessness is Insomnia
- The causative agent of Tuberculosis is Mycobacterium
- The enzyme that is present in the saliva of man is Amylase
- Blood cancer is otherwise called as Leukaemia
- Dengue fever, Malaria and Filariasis are mosquito borne disease
- Earthworm Is called farmer's friend
- The term gene was coined by W. L. Johanssen
- Protein following is most important for the growth of children up to the age of 14
- Study of newly born up to the age of 3 months is called Neonatology
- The colour of human skin is produced by Melanin
- Jaundice is a symptom of disease of Liver
- The vaccination against small pox involves the introduction of weakened germs
- Deficiency of Vitamin B6 in man causes Anemia
- Washing of peeled vegetables removes the vitamin C
- A man with colour blindness will see red as Green
- The number of chambers in a human heart is Four
- The metal which is a constituent of vitamin B12 is Cobalt
- The vitamin that helps to prevent infections in the human body is Vitamin C
- Tetanus is caused by Clostridium
- Maximum harm to a tree is caused by loss of all leaves
- Blood pressure is controlled by Adrenal gland
- Bee Keeping is known as Apiculture
- Dolly the World's First cloned animal was a sheep
- An ECG shows the functioning of the heart
- Amoebic dysentery is caused by Entamoeba histolytic
- DNA test was developed by Watson and Crick
- Anaemia occurs due to the deficiency of folic acid
- Vegetables are easily perishable because of their high content of water
- Insufficient blood supply In human body is referred as Ischemia
- The limb bones of children become bent if there is deficiency of vitamin D
- Cereals are a rich source of starch
- Mitochondria called the power plants of the cell
- Chewing gum is made from Latex
- Pituitary gland is situated In the base of the brain
- Ringworm is a Fungal disease.
- The colour of the eye depends upon the pigment present in iris
- The vitamin most readily destroyed by heat is Ascorbic acid
- The term RH factor refers to Rhesus factor

- An instrument for measuring blood pressure is called Sphygmomanometer
- Amla is called Herbal Indian Doctor
- Thyroid is largest endocrine gland in the body
- The noble gas used for the treatment of cancer is Radon
- BT seed is associated with cotton
- Bark of this tree is used as a condiment Cinnamon
- The total number of biosphere reserves present In India are 18
- Growth of the baby in the uterus is found using Ultra sound
- A drug which helps in controlling fever is Paracetamol
- The deficiency of iron in man result in Anaemia