



# **GOVERNMENT DEGREE COLLEGE PARKAL**

**HANUMAKONDA DIST**

**BRIDGE COURSE FOR ZOOLOGY STUDENTS**

# **INDEX**

## **CONTENTS**

**Structural Organization of Life**

**Invertebrates**

**Vertebrates**

**Physiology**

**Ecology**

**Molecular Biology**

**Glossary**

# STRUCTURAL ORGANISATION OF LIFE AND INVERTEBRATES

In our surrounding we have two types of things are present 1) living things and 2) non living things.

What are living things?

**LIVING THINGS:** - Those things which have life are called living things. Living things can be classified into two types. What are they? They are 1) plants and 2) Animals. Plants they can prepare their own food (carbohydrates) by using process **photosynthesis** but whereas animals they cannot prepare their own food they depend (**Heterotrops**) on the plants.

Ex: dogs, cats etc

What are non living things?

**NON LIVING THINGS:-** Those things which do not have life is called non living things

Ex: duster and chalk piece etc

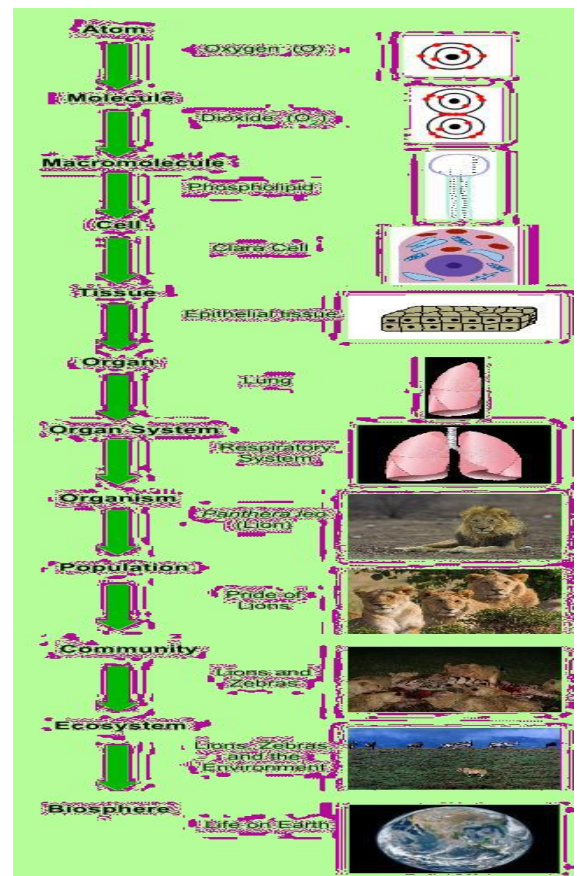
All living things are made up of **basic units** called **cells** for both plants and animals

What is a Cell?

A cell is the **structural and fundamental unit of life**. The study of cells from its basic structure to the functions of every cell organelle is called Cell Biology. Robert Hooke was the first Biologist who discovered cells.

All organisms are made up of cells. They may be made up of a single cell (unicellular), or many cells (multicellular Cells are complex and their components perform various functions in an organism..

**CELL ORGANELLES** :- Cells are composed of various cell organelles that perform certain specific functions to carry out life's processes. The different cell organelles, along with its principal functions, are as follows:



## TISSUES

Tissues: The next level of structural organization in animals, after the cell is tissues

What is mean by tissue?

Tissues are an integrated group of cells which perform **similar functions and possess similar cellular structure**. These tissues provide a basic framework in multicellular animals.

There are four different types of tissues:

- Epithelial tissue
- Connective tissue
- Muscular tissue
- Nervous tissue

Tissue	Function
Epithelial	Protection, absorption & secretion
Connective	Connect, support & transport
Muscular	Locomotion & movement
Nervous	Control & coordination

## Organ and Organ Systems

A collection of tissues form an organ a group of organs that work together to perform one or more functions is called an organ system. In our body we have different systems are presents to performs different functions

**1. Digestive system;**-Digestion is **important for breaking down food into nutrients**, which the body uses for energy, growth, and cell repair. Digestion works by moving food through the gastrointestinal (GI) tract. Digestion begins in the mouth with chewing and ends in the small intestine.

### 2. EXCRETORY SYSTEM

The excretory system is **the system of an organism's body that performs the function of excretion**, the bodily process of discharging wastes. ... There are several parts of the body that are involved in this process, such as sweat glands, the liver, the lungs and the kidney system. Every human has two kidneys.

### 3. NERVOUS SYSTEM

The nervous system is the **part of an animal's body that coordinates its behavior and transmits signals between different body areas**. In vertebrates it consists of two main parts, called the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS contains the brain and spinal cord.

### 4. CIRCULATORY SYSTEM

The circulatory system, also called the **cardiovascular system** or the vascular system, is an organ system that permits blood to circulate and transport nutrients (such as amino acids and electrolytes), oxygen, carbon dioxide, hormones, and blood cells to and from the cells in the body to provide nourishment and help in respiration



## 5. ENDOCRINE SYSTEM

The endocrine system is a **messenger system comprising feedback loops of the hormones released by internal glands** of an organism directly into the circulatory system, regulating distant target organs. In vertebrates, the hypothalamus is the neural control center for all endocrine systems.



## 6. RESPIRATORY SYSTEM

Your respiratory system is the network of organs and tissues **that help you breathe**. This system helps your body absorb oxygen from the air so your organs can work. It also cleans waste gases, such as carbon dioxide, from your blood. Common problems include allergies, diseases or infections.24-Jan-2020

## 7. REPRODUCTIVE SYSTEM

The reproductive system is a **collection of organs and a network of hormone production in men and women** that enable a man to impregnate a woman who gives birth to a child.

Every organ is composed of one or more type of tissues. A group of organs working together to perform a common function is called an organ system. Excretory system, reproductive system, endocrine system, circulatory system, respiratory systems are examples of organ systems.

## INVERTEBRATE

**In** the animal kingdom we have two types of animals are presents 1. Invertebrates and 2.vertebrates. Those animals which lack of back bone or vertebral column is known as **invertebrates** and those animals which having back bone or vertebral column is known as **vertebrates**, only 5% of animals are vertebrates and remaining animals (95%) are invertebrates. Presently there are 30 phyla which are characterized by unity of basic structural pattern in each of them. Among the 30 phyla the some common phyla are as follows

### 1).PROTOZOA ( proto=first ,zoa=animal)

*Protozoa may be defined as “microscopic acellular animalcules existing singly or in colonies, without tissue and organs, having one or more nuclei”.*

Protozoa are **single celled organisms**. They come in many different shapes and sizes ranging from an Amoeba which can change its shape to Paramecium with its fixed shape and complex structure. They live in a wide variety of moist habitats including fresh water, marine environments and the soil.

1. Locomotory organs are fingers like **pseudopodia**, whip-like **flagella**, hair-like **cilia** or none.

**Examples of protozoa are Amoeba, Paramecium, Euglena and Trypanosoma.**

## 2).PORIFERA ( poripores fera =having)\\

What are Porifera?

Defination:-The animals that **having many number of pore are present on body surfaces** are comes under Porifera



Characteristics, Classification, Examples

### Characteristic Features of Phylum Porifera

1. Body shape can be cylindrical, vase-like, rounded or sac-like.
2. They are diploblastic animals with two layers, the outer dermal layer and the inner gastral layer.

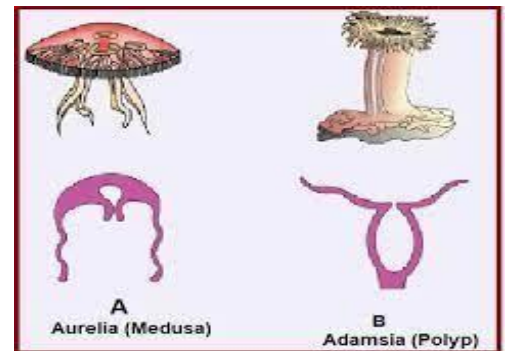
**Porifera Examples:** Sycon, Hylonema, Cliona, Euplectella, Spongilla.

## **COELENTERATA**

What are coelenterata?

**Definition:-** Those animals which having Coelenterons cavity/gastro vascular cavity are comes under phylum coelenterata

Phylum Coelenterata is a group of aquatic or marine organisms and a member of the Animal kingdom. They are usually found attached to the rocks at the bottom of the sea. These are the multicellular and simplest group of invertebrate animals, found in colonies or solitarily.



**General characteristics** Kingdom: Animalia.

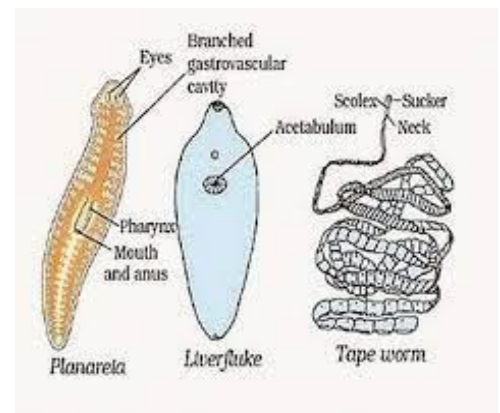
- Grade of organization: tissue grade of organization.
- Germ layer: diploblastic, outer ectoderm and inner endoderm.
- Polymorphism is present in some coelenterata animals

## PHYLUM PLATYHELMINTHES(platy=flat, helminthes =worms)

All the flatworms are included under Platyhelminthes

The simplest animals that are bilaterally symmetrical and triploblastic (composed of three fundamental cell layers) are the Platyhelminthes, the **flatworms** .... Planarians are free-living flatworms, and have a much simpler life history. They inhabit freshwater, and are carnivores (even without teeth) or scavengers.

- Their body is dorsoventrally flattened.
- They exhibit bilateral symmetry.
- Also, they are triploblastic, with three germ layers.

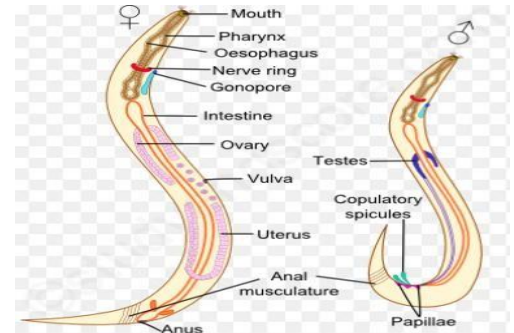


**Platyhelminthes Examples:** Taenia (Tapeworms), Fasciola (Liver fluke), Taenia saginata (Beef tapeworm), Echinococcus granulosus – The dog tapeworm, Planeria (freshwater flatworm)

## **PHYLUM NEMATO HELMINTHES (Nemato=round, helminthes= worms)**

**Nematode, also called roundworm,**. Nematodes are **among the most abundant animals on Earth.....**Nematodes are bilaterally symmetrical, elongate, and usually tapered at both ends. Some species possess a pseudocoel, a fluid-filled body cavity between the digestive tract and the body wall.

1. Tubular in appearance. It has an elongated and thin body (hair-like).
2. The alimentary canal is distinct, but the head and tail are not visually different.
3. Majority of these are tiny and can be microscopic.



Example....ascariasis, trichuriasis, hookworm, enterobiasis, strongyloidiasis, filariasis, and trichinosis, ...

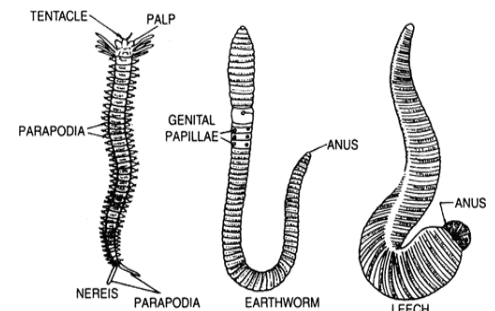
## **ANNELIDA (SEGMENTED BODY)**

What are Annelida?

Annelida are animals having segmented body are comes under annelida

The annelids also known as the **ringed worms or segmented worms**, are a large phylum, with including ragworms, earthworms, and leeches. The basic annelid form consists of multiple segments.

Annelida includes Earthworms, Leeches, Blister worms etc. They are triploblastic, bilaterally symmetrical schizocoelomate protostomes. They exhibit metameric segmentation and true coelom. Their fluid filled coelom acts as hydrostatic skeleton and helps for burrowing and locomotion.



### **Characteristics of Annelida:**

1. Their body is segmented.
2. They respire through their body surface.
3. Nephridia are the excretory organs.

**Examples of Annelids :**Earthworm, Leeches, Lugworms, Polychaetes.

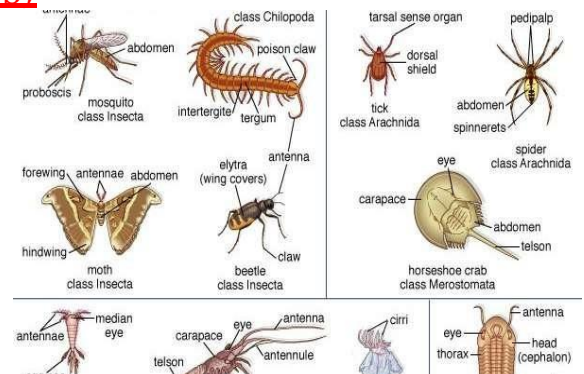
## **ARTHROPODA (ARTHRO=JOINTED, PODA= LEGS)**

What are arthropods?

**Definition:-** Those animals having jointed legs comes under arthropoda.

The distinguishing feature of arthropods is the **presence of a jointed skeletal covering composed of chitin (a complex sugar) bound to protein ....** The body is usually segmented, and the segments bear paired jointed appendages, from which the name arthropod ("jointed feet") is derived.

### **Characteristics of an Arthropod**



- Exoskeleton. Arthropods are invertebrates, which mean their bodies do not have internal bones for support. ...
- Segmented Bodies. Arthropods have bodies that are internally and externally segmented. ...
- Jointed Appendages. ...

Example:

Crabs, lobsters, shrimp, barnacles and many other animals belong to the phylum arthropods. In fact, 75% of all animals belong to the phylum arthropoda (which also includes spiders and insects). All arthropods have a hard exoskeleton made of chitin, a type of protein.

## **MOLLUSCA(SOFT BODY)**

What are mollusca?

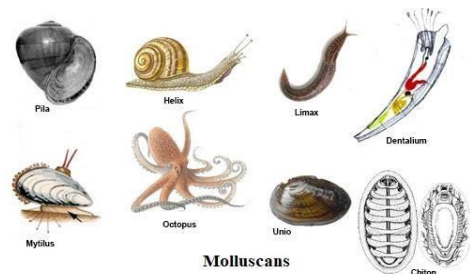
Definition: - Mollusca are animals which having soft body with unsegmented animals

### **Characteristic Features of Phylum Mollusca**

- They show organ system grade of organization.
- The body is soft and unsegmented.

### **EXAMPLE**

Molluscs include **mussels, scallops, oysters, periwinkles, whelks, squid, clams, snails, and octopus.**



## **Echinodermata (echino=spines,dermata=skin)**

What is mean by echinodermata?

Definition:- Those animals which having **Spiny covering skin** are belongs to echinodermata.

Echinoderm, are **a variety of invertebrate marine animals** belonging to the phylum Echinodermata, and are characterized by **a hard, spiny covering or skin.**

Sea cucumbers are elongated soft-bodied echinoderms, while sea urchins are globular and spiny. The adult sea lily is sessile, using tentacles growing from its arms to feed.

- They have a star-like appearance and are spherical or elongated.
- They are exclusively marine animals.
- The organisms are spiny-skinned.

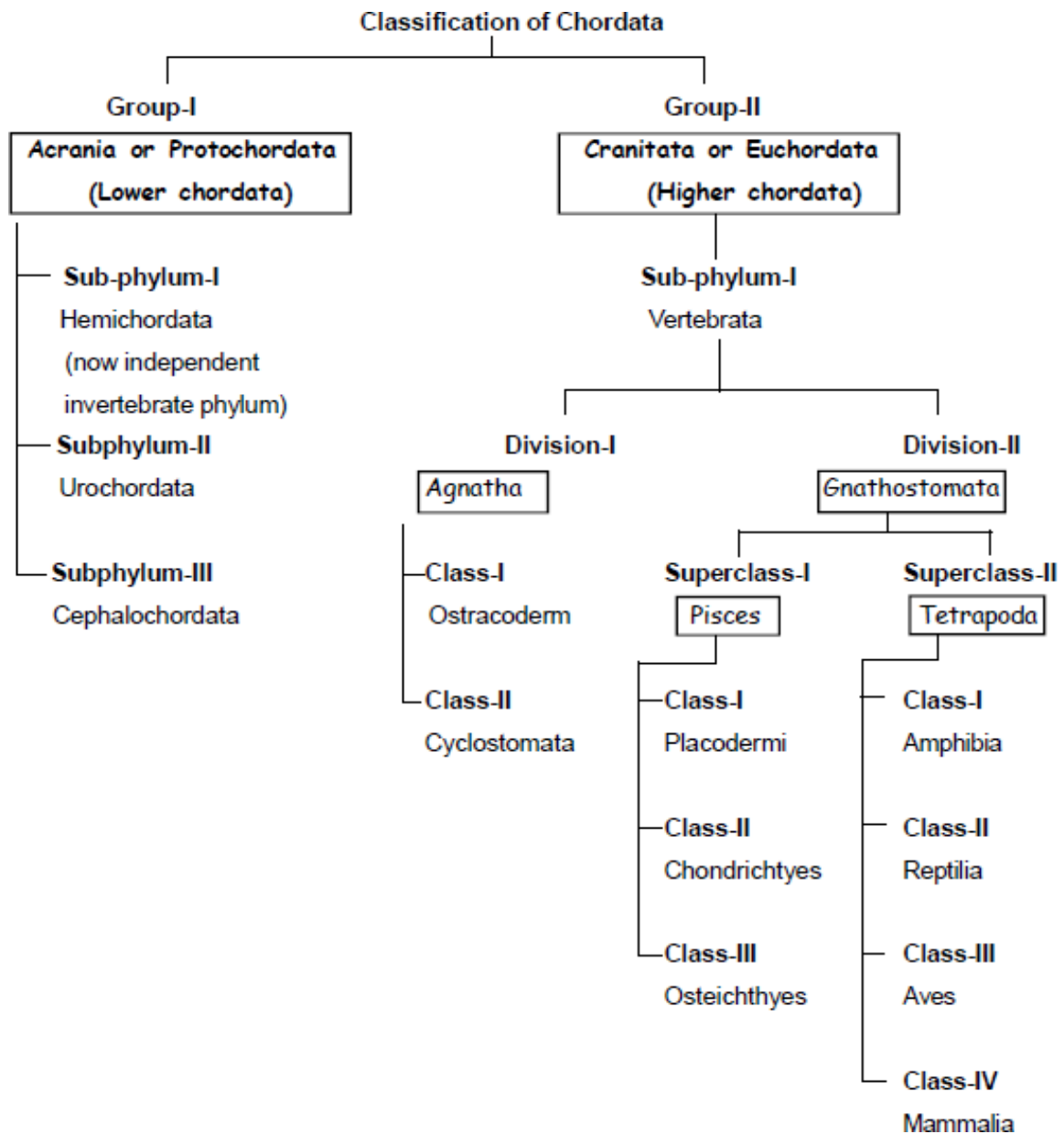


Echinoderms example:

**Marine stars, sea cucumbers, sea urchins, sand dollars, and brittle stars.etc**

## Animal diversity of Vertebrates

Vertebrate, also called Craniate, any animal of the subphylum Vertebrata, the predominant subphylum of the phylum Chordata. They have backbones, from which they derive their name. The vertebrates are also characterized by a muscular system consisting primarily of bilaterally paired masses and a central nervous system partly enclosed within the backbone.

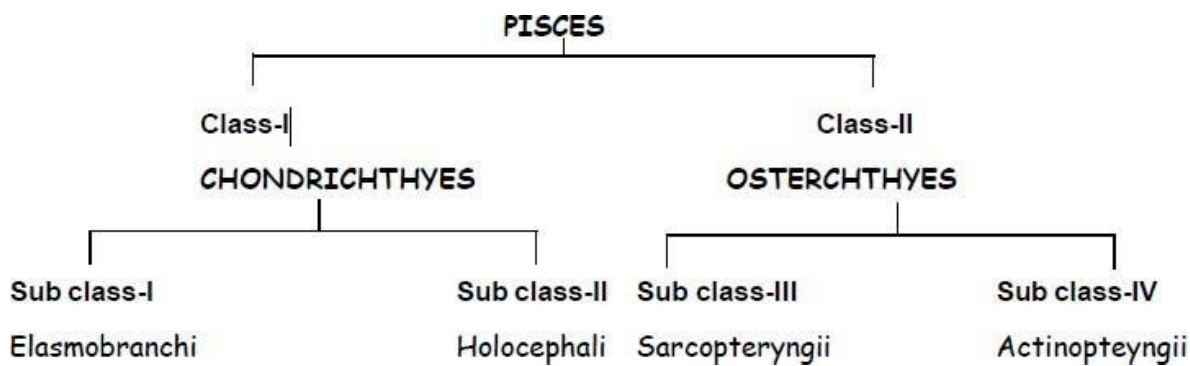




The vertebrates are subdivided here into major groups based on morphology:

Character	Pisces	Amphibia	Reptilia	Aves	Mammals
1. Habitat	Aquatic	Terrestrial and aquatic	Terrestrial	Arboreal	Terrestrial, aquatic and arboreal
2. Exoskeleton	Slimy scales	Absent	Dry and scaly	Feathers, claws	Hair, nails, etc.
3. Respiratory organs	Gills	Gills, lungs and skin	Lungs	Lungs	Lungs
4. Body temperature	Cold-blooded	Cold-blooded	Cold-blooded	Warm-blooded	Warm-blooded
5. Heart	2-chambered	3-chambered	3-chambered	4-chambered	4-chambered
6. Locomotory organs	Fins	Limbs	Limbs; but absent in snakes.	Wings and Limbs	Limbs
7. Others	Body is streamlined. They are oviparous.	They have webbed feet. Eggs are laid in water and larvae are aquatic.	They are oviparous and some are viviparous, <i>e.g.</i> , lizard and snake. Development is external.	Body is covered by feathers and forelimbs are modified into wings. Their bones are hollow.	Presence of mammary glands. There are hairs on the body and external pinna is also present. They are viviparous.

#### PISCES:



- The cyclostomes (jawless fishes),
- The chondrichthyes (cartilaginous fishes),
- The teleostomes (bony fishes), and
- The tetrapods.

The cyclostomes include two classes of living, jawless fishes (agnathous)—Petromyzontiformes (lamprey eels) and Myxiniiformes (hagfishes).

The chondrichthyes: The sharks, rays, and chimaerids are usually marine, but some sharks have entered fresh waters (the Amazon) or even live there permanently (Lake Nicaragua).

The teleostomes: Actinopterygian fishes are the common bony fishes of modern aquatic environments.

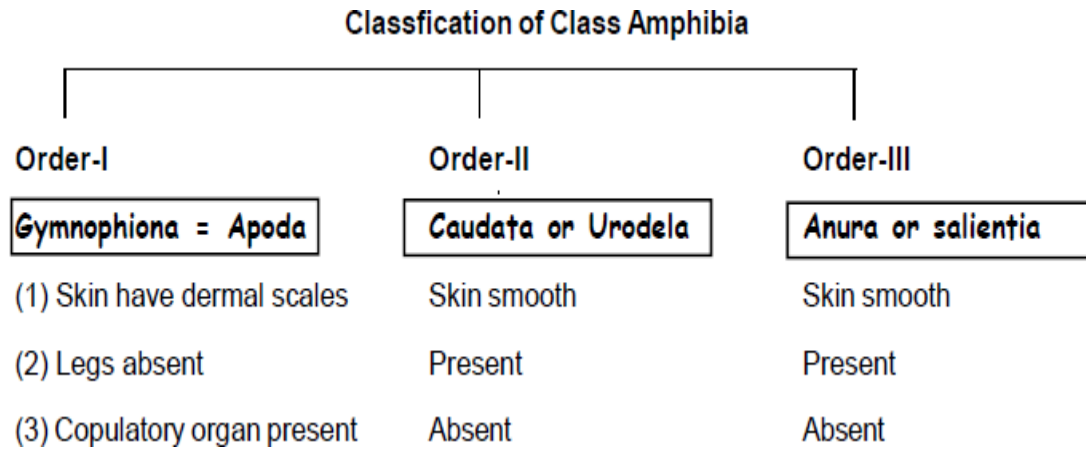
The tetrapods: Live primarily on land and are rather similar in habit. Members include the amphibians, reptiles, birds, and mammals.

### **Form and function**

**External features:** The evolution of the notochord, dorsal nerve tube, and pharyngeal slits in chordate structure suggests improved swimming capability and probably greater ability to capture prey.

**Internal features:** The skeletal system, Tissues and muscles, Nervous system and organs of sensation, The digestive system, The excretory system, Respiration and gas exchange, circulatory system and endocrinology.

## Amphibians:



- They usually trap food using a tongue that can be shot out of the mouth, or they use the mouth itself to grasp and ingest food.
- There is great variation in foods; only the larvae of frogs and toads appear to be plant feeders, a specialization that is reflected in the highly modified jaws and guts of the tadpoles.
- Amphibians have retained a simple egg cell with a gelatinous cover.
- The eggs are laid in ponds, streams, or even in damp places high in trees, usually in great numbers
- Fertilized eggs develop into free-swimming larvae, which then metamorphose to adults, but in highly specialized forms.

## Reptiles:

- The class Reptilia retains many of the structural characteristics of the ancestral amphibian.
- While most reptiles are carnivorous, feeding on other organisms, a few are herbivorous (e.g., tortoises).
- As cold-blooded animals, reptiles tend to be limited to temperate and tropical areas, but, where found, they are relatively common, although not as large or conspicuous as birds or mammals.
- Most reptiles are terrestrial, but a few are aquatic.
- As basic tetrapods, reptiles move about by creeping or swimming in a fashion similar to amphibians.



- Some reptiles, however, can lift the body from the ground and run rapidly either in a quadrupedal or bipedal fashion.

## CLASSIFICATION OF REPTILES

- Have \_\_\_\_\_.
- Have \_\_\_\_\_ skin.
- Usually lay \_\_\_\_\_.
- Are \_\_\_\_\_ (cold-blooded).

Name:

Date:

**Definition of *Reptilians***

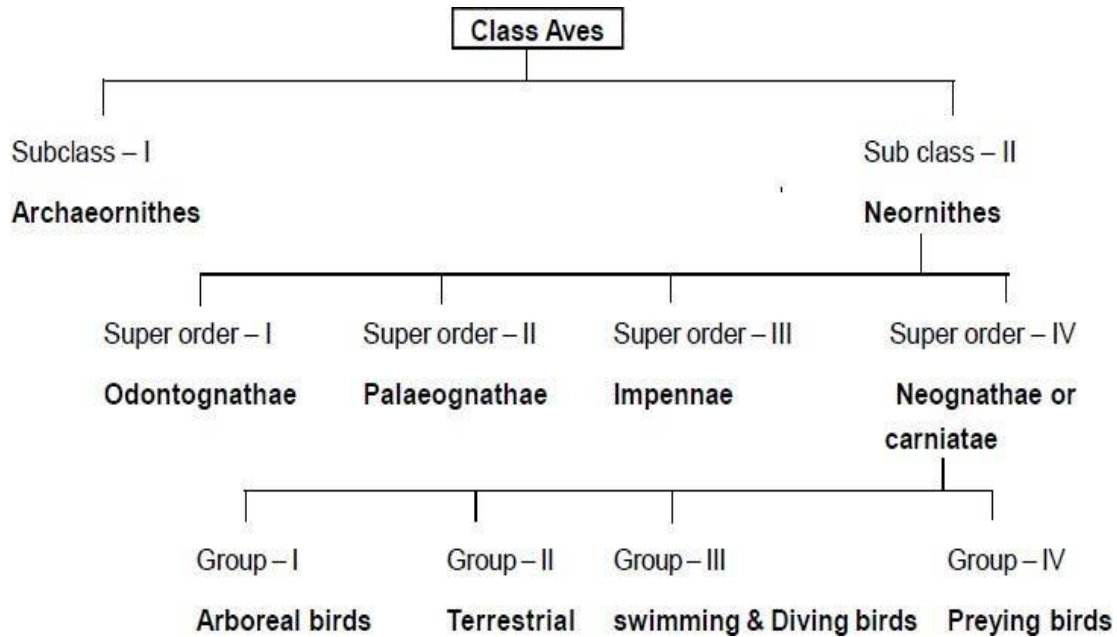
COPYRIGHT STUDYLADDER

- Some reptiles, however, can lift the body from the ground and run rapidly either in a quadrupedal or bipedal fashion.
- Reptiles lay relatively large, shelled eggs. In a few instances, the eggs and young are cared for by the female; in others, the young are born alive (ovovivipary).

### Birds

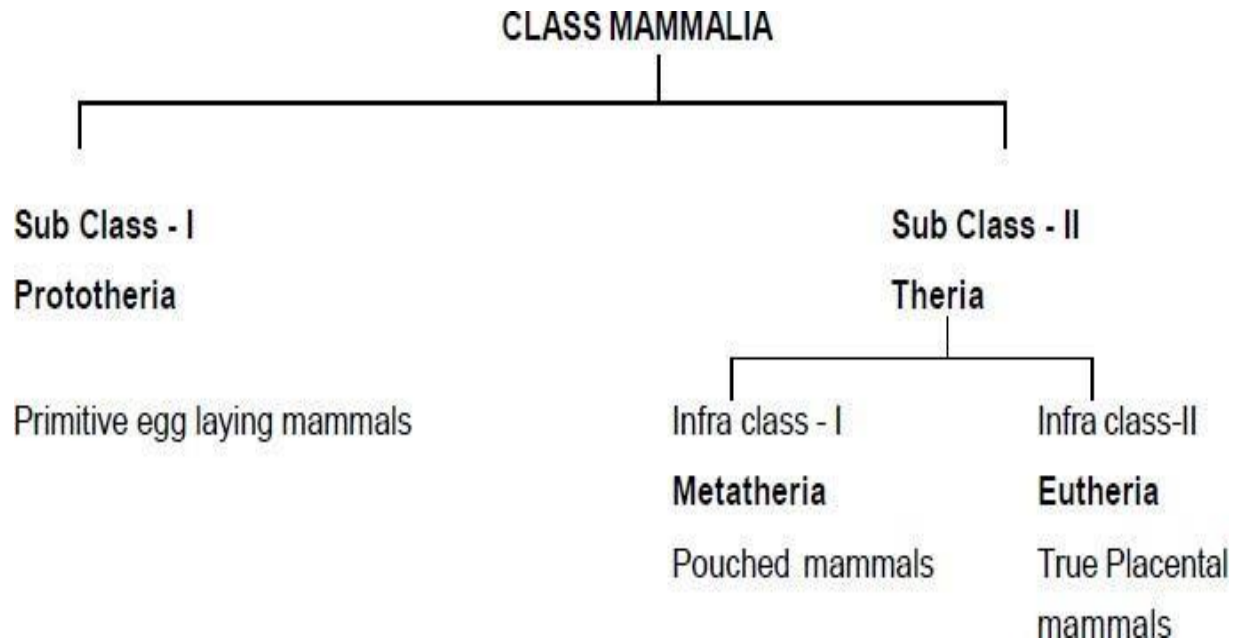
- Birds are warm-blooded, and, although most are capable of flight, others are sedentary and some are flightless.
- Like their relatives the reptiles, birds lay shelled, eggs that differ largely in the amount of calcification (hardening) of the shell.
- The young are usually cared for in a nest until they are capable of flight and self-feeding, but some birds hatch in a well-developed state that allows them to begin feeding immediately or even take flight.

- The megapods lay their eggs in mounds of rotting vegetation, which supplies the heat for incubation. (Nesting activities similar to those of some birds are seen in the crocodilians.)



### **Mammals:**

- The mammals range in size from tiny shrews or small bats weighing only a few grams to the largest known animals, the whales.
- Most mammals are terrestrial, feeding on both animal and vegetable matter, but a few are partially aquatic or entirely so, as in the case of whales the or porpoises.
- Mammals move about in a great variety of ways: burrowing, bipedal or tetrapedal running, flying, or swimming.
- Reproduction in mammals is usually viviparous, the young developing in the uterus, where nutritive materials are made available through an allantoic placenta or, in a few cases, a yolk sac.
- The fertilized egg develops directly into the adult. The monotremes (platypus and echidna) differ from other mammals in that they lay eggs which hatch, and the relatively undeveloped young are carried in a pouch or kept in a nest; the growing
- young lap up a milk nutrient fluid exuded from the belly of the mother.



1. The fundamental characters of chordata [    ]
  - a. Dorsal hollow nerve cord   b. Notochord   c. Bilateral symmetry   d. Coelom
  - e. pharyngeal gill slits

A. a & b only

B. a, b & e only

C. a, b & d only

D. c only
2. ASSERTION : All chordates are vertebrates but, all vertebrates are not chordates  
  
REASON : Chordates are originated from vertebrates [    ]

A. Both are correct

B. Assertion is correct but, reason is wrong

C. Both are wrong

D. Assertion is wrong , reason is correct

3. The no. of pharyngeal gill slits in vertebrates [    ]
- A. 6 pairs   B. 8 pairs   C. 7 pairs   D. 4 pairs
4. Golden age of Reptiles [    ]
- A. Ordovician   B. Devonian   C. Silurian   D. Carboniferous
5. Air bladder is present in [    ]
- A. Chondrichthyes   B. Osteichthyes   C. Placodermi   D. All
6. Find out the Anamniotes [    ]
- A. Fishes & Aves   B. Reptiles & Amphibians   C. Amphibians & Mammals  
D. Fishes & Amphibians
7. Autonomic nervous system is present in [    ]
- A. All protochordates   B. Urochordata   C. Hemichordata   D. Cephalochordata
8. Gasserian ganglion is present in [    ]
- A. Oculomotor   B. Trigemina   C. Olfactory   D. Optic
9. Paedogenesis observed in [    ]
- A. Amphibians   B. Fishes   C. Mammals   D. Reptiles
10. Retrogressive metamorphosis found in [    ]
- A. Balanoglossus   B. Branchiostoma   C. Herdmania   D. All

**KEY:**

**1.B    2. B    3. C    4. D    5.B    6. D    7.A    8. D    9. B**  
**10.C**

# **Developmental Biology –Basic Concepts**

This content aims to provide the students with a simplified summary of some basic concepts of developmental biology.

Development is a gradual process by which a complex multicellular organism arises from a single cell (the zygote). It involves 5 major overlapping processes:

1. growth = increase in size
2. cell division= increase in number
3. differentiation = diversification of cell types
4. pattern formation = organization
5. morphogenesis = generation of shapes and structures

Before we enter in to development of living beings, we shall understand how this world is running since years. With a variety of living organisms.

The main aim of every organism on this planet Earth is to reproduce, produce offspring, which can be carried forward in the evolution and can be represented in future years.

If an organism fails to reproduce it cannot be represented in the further time scale.

Reproduction is a basic tendency every living being possesses.

Reproduction basically is of 2 types. Asexual and Sexual

Asexual reproduction does not need male and female parents. Ex:Binary fission, Multiple Fission, Budding..etc

Sexual reproduction needs male and female parents.

Male parent produces male gametes called sperms.

Female parent produces female gametes called eggs or ova.

**Please note and try to remember that all the other cells in every organism is diploid i.e every cell has total no. of chromosomes which is specific to a particular species...except the gametes ..which are haploid ,i.e they have only half the number of total chromosomes.**

Gametes= haploid cells

Male Gametes=sperms

Female Gametes=ova

Reproduction: The process of giving rise to off springs

### **Steps involved in the process of reproduction**

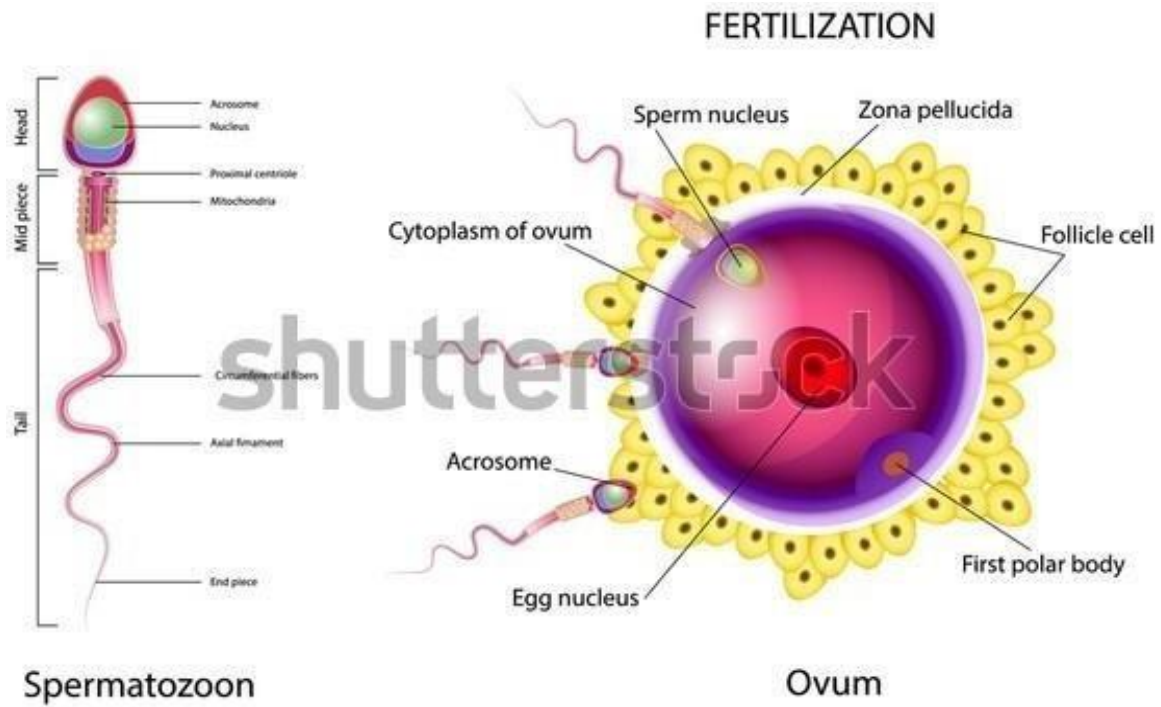
- 1.Release of male and female gametes
- 2.Fertilization =Fusion of male and female gametes
- 3.Cleavages
- 4.Morula
- 5.Blastula
- 6.Formation of Coelom
- 7.Organogenesis

### **We shall try and learn all these events in a simple way**

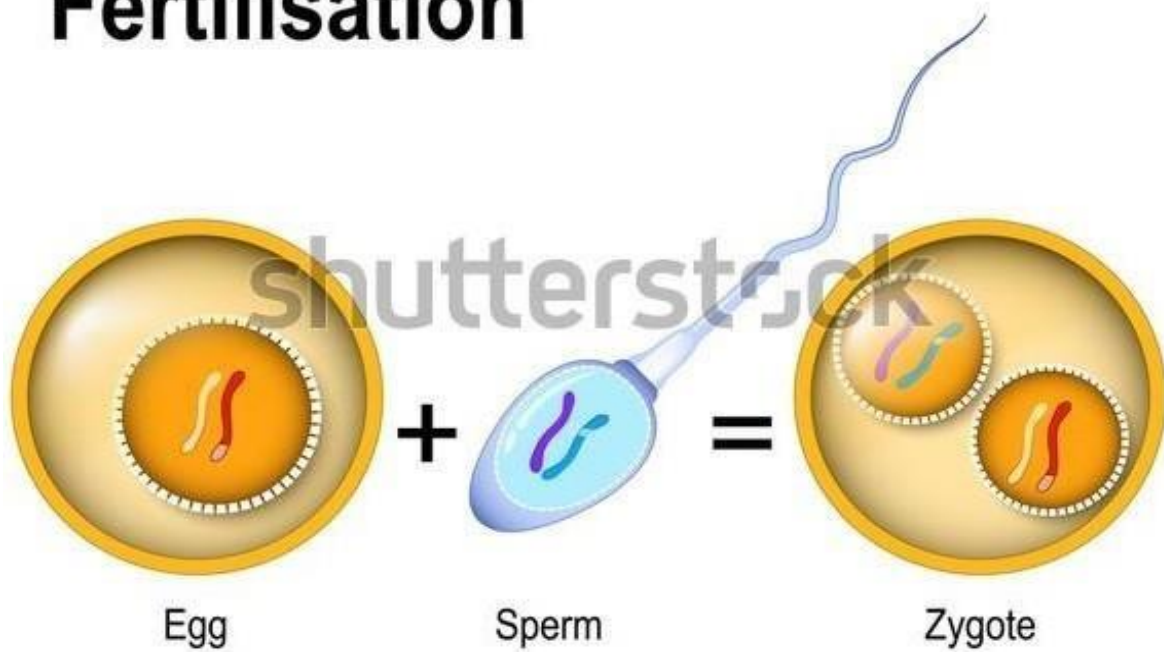
# Male and Female individuals release sperms and eggs respectively during copulation.

# Sperms meet the ova and fuse with them

# This fusion of gametes is called fertilization. The nucleus of sperm and egg fuse and this egg which contains fused nuclei is called **Zygote.**



## Fertilisation



# So , fertilization leads to formation of Zygote

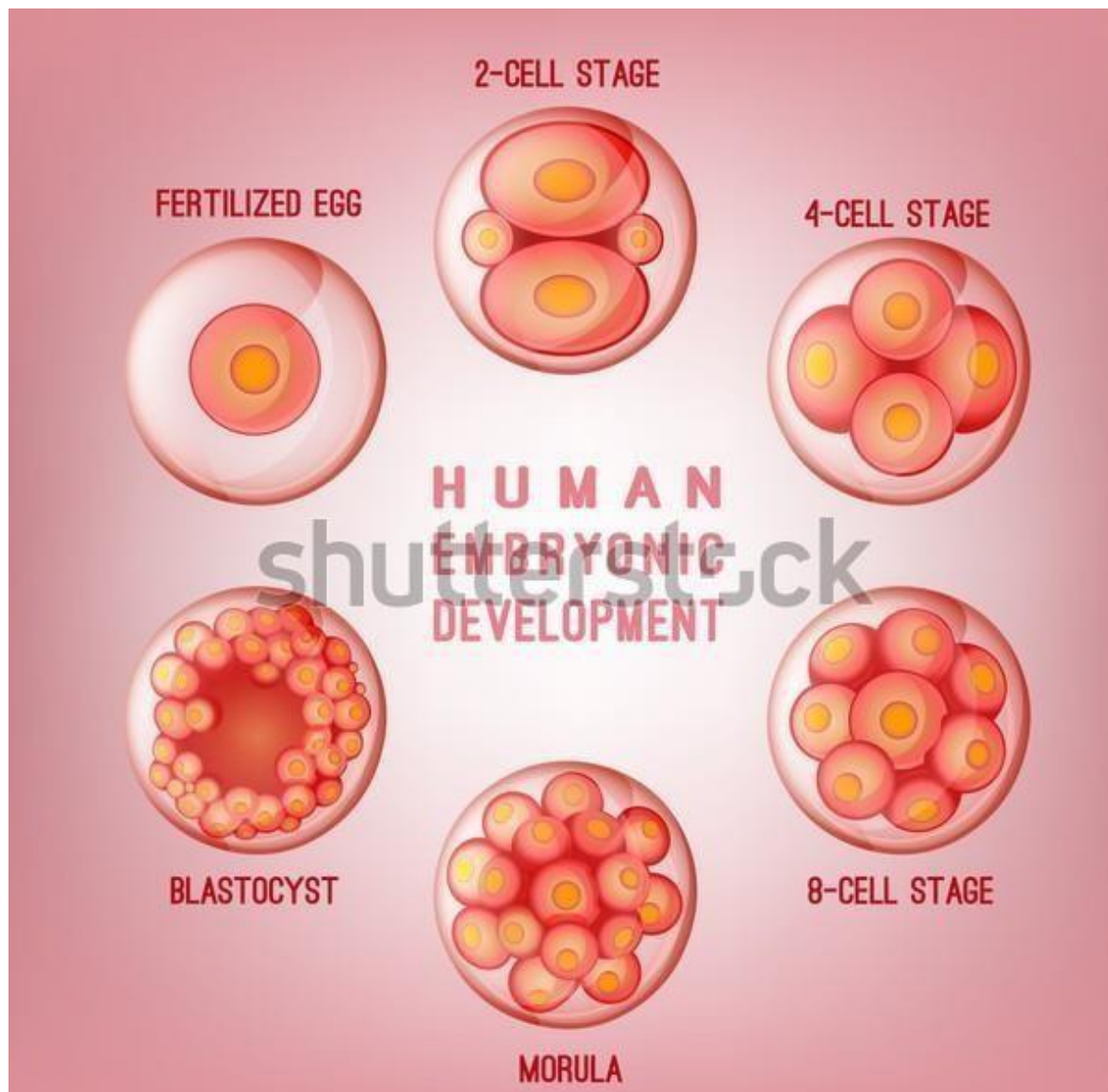
#Zygote undergoes cleavages..

#What are cleavages??

#**Cleavages can be defined as divisions**..here the zygote undergoes divisions.

# Cleavages can be classified depending on the way the cell is undergoing division

# The Zygote now starts dividing..1 cell divides in to 2, 2 in to 4 ,4 in to 6, 6 in to 8 ,.....till a ball of cells is formed which is called **Morula**





# Cells of morula arrange themselves in the periphery leaving a space in the centre.

# This structure is called **Blastula**



# The space present in the Blastula is called **Blastocoel**



# The anterior half of the blastula is called the animal pole and the posterior half is called vegetal pole.

# Then the blastula starts to invaginate i.e pushing inside from the animal pole, which leads to the formation of **Gastrula**

# The space in the invagination is called **archenteron**

# **Gastrula has an opening at the anterior end which is called the blastopore , which later develops in to mouth in protostomes and anus in to deuterostomes.**

# This invagination with two openings is the primitive gut or alimentary canal.

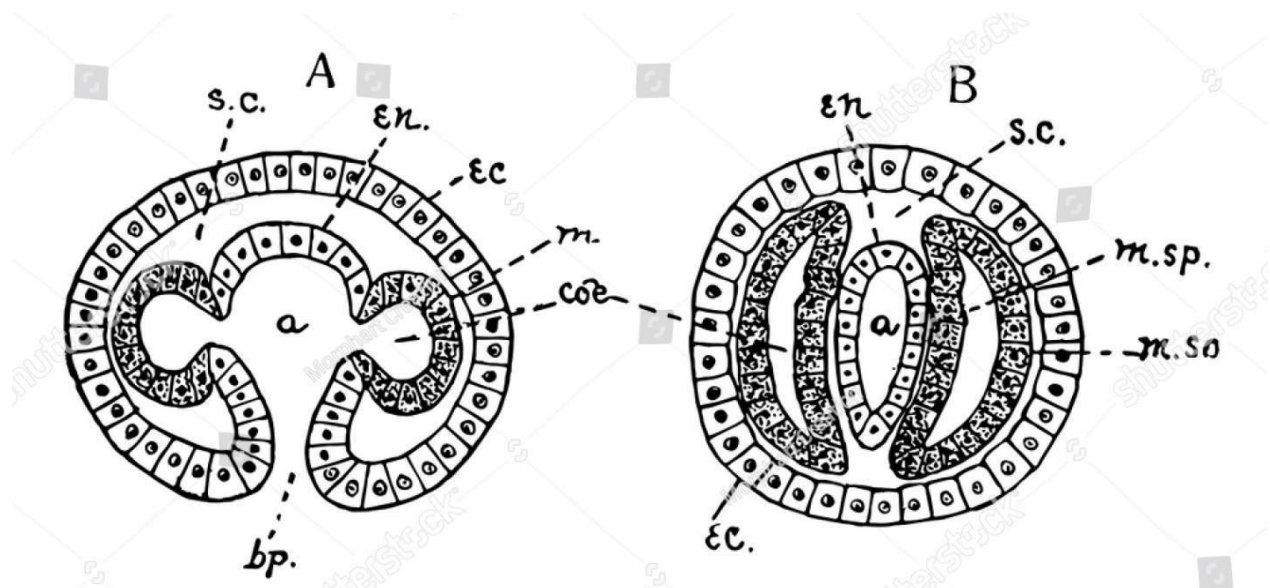
# Alimentary canal is the tube like structure which extends between mouth and anus and helps in the digestion of food.

#Mouth helps in ingestion of food and Anus helps in the egestion of food

#Now a very important step needs to occur,,that is the formation of coelom.

# What is a coelom??

# Why does an organism need coelom??



# pls understand carefully...an organism has many internal organs ..like liver , kidneys, reproductive organs etc..all these are called visceral organs. They all need some space to be arranged in the body..

That space is provided by the coelom..which means space.

# Coelom is of two types1. Pseudo coelom and 2 Eucoelom

# Pseudo means “False”

# Coelom,, if it is not surrounded by mesoderm on both ..outer and inner side ..its called a **pseudocoelom**.

# Coelom if it is surrounded by mesoderm on both outer and inner sides ..its called “**Eucoelom**”

### #Types of Eucoelom

**#1. Enterocoelom: If the coelom is formed from archenteron it is called enterocoelom.**

**#2.Schizocoelom: If the coelom is formed from the splitting of the mesoderm.**

# Gastrulation leads to the formation of three germ layers ..which is a major and important event.

### #What are germ layers??

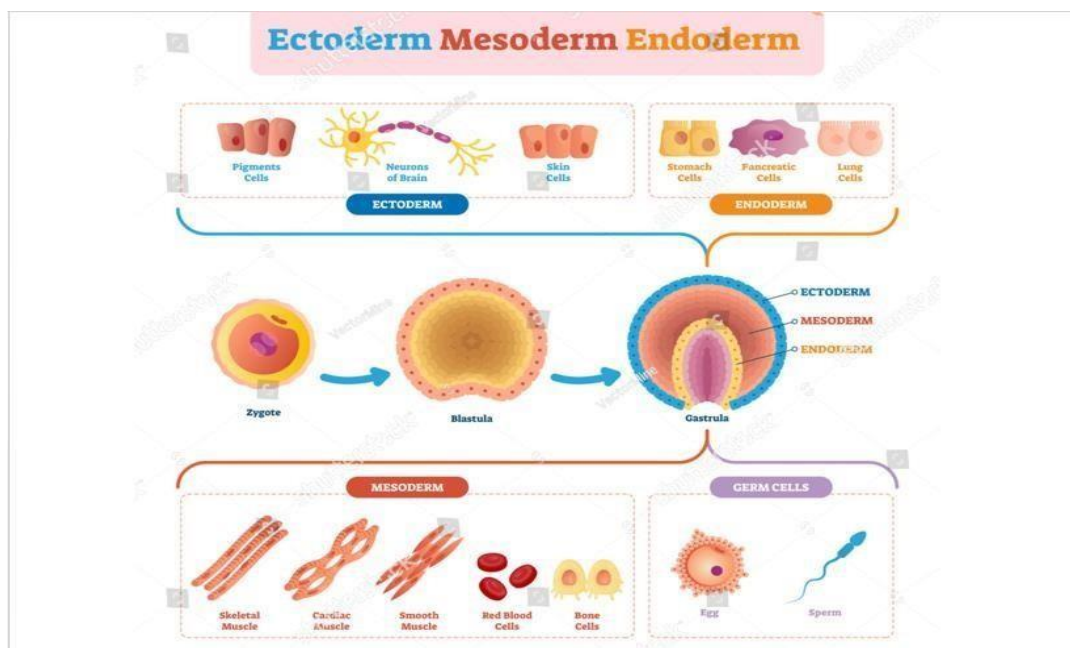
# The word “germ “ relates to” germination” which means ..giving rise to..

# So germ layers give rise to what??

# They give rise to all the organs of an organism.

### #What are they??

# They are the Outer Ectoderm, Middle mesoderm, and Inner endoderm.



# Ectoderm gives rise to organs to organs like nervous system, mesoderm gives rise to muscles, endoderm gives rise to alimentary canal etc..

# These three layers give rise to all the organs present in the organism and the process is called organogenesis.

Now let us understand the formation of haploid sperms and ova and at what stage of life this process starts.

**# we have learnt already that sperms and ova are having only half the number of chromosomes.**

**WHY ??**

# Take the example of Human beings.. number of chromosomes in them is 46

# Each cell of the body has 46 chromosomes

# if sperm and ova also contains 46 chromosomes .. just think what can happen during fertilization??

**# sperm with 46 chromosomes and ovum with 46 chromosomes ...when fuse with each other give rise to zygote which will automatically give rise to zygote with 92 chromosomes ..which cant be a “Human Being”**

# That is the reason why the gametes have only half the number of chromosomes.i.e sperms with 23 chromosomes and ova with 23 chromosomes fuse to give a zygote which has 46 chromosomes..that is a perfect human being....is it not???

# Gametes undergo processes called **spermatogenesis and oogenesis** which result in the formation of haploid sperms and ova

**# Spermatogenesis: it is the process of formation of haploid sperm cells**

# It takes place inside the male reproductive organ i.e Testes ...here the germinal cells in the wall of the testes undergo mitosis to give rise to immature sperm cells called spermatids which later undergo numerous divisions to form haploid sperms.

## **KEY TERMS**

Spermatogonia	immature germ cells
Primary spermatocyte	diploid cell formed from spermatogonium
Secondary spermatocyte	haploid cell formed by meiotic division of primary spermatocyte
Spermatid	haploid cell formed by meiotic division of secondary spermatocyte, differentiates into sperm cell
Spermiogenesis	process by which spermatids form sperm cells

### **Spermatogenesis at a glance**

Spermatogenesis is the process by which male gametes develop from germ cells in the testes. In other words, it's how sperm is made. This process involves multiple steps of cell division and differentiation, which are summarized in the image below.

**# WE shall move to oogenesis:**

## **Key terms**

<b>Term</b>	<b>Meaning</b>
Oogonium	immature germ cell that gives rise to female gamete
Oocyte	female gametocyte that divides to form egg cell
Ovum	egg cell, female gamete

Term	Meaning
Follicle	structure that encloses oocyte in a cavity, covered by granulosa cells
Theca	covering of follicle
Antrum	fluid-filled cavity in Graafian follicle
Polar body	small daughter cell formed by unequal cell division of oocyte

### Oogenesis at a glance

Oogenesis is the process by which mature female gametes, or ova, develop from germ cells. The image below summarizes how this happens, and over what timeline it unfolds.

As the oocytes develop, they get enclosed in structures known as follicles. Let's first take a brief look at the timeline of oogenesis, and then at the different follicles involved.

### Oogenesis: timeline and stages

#### Before birth

- a few million immature germ cells, or oogonia, are formed within each fetal ovary.
- some oogonia enter meiosis I, are arrested at prophase I, and are now known as primary oocytes.
- primary oocytes form primary follicles (more on what follicles are later).

#### Between birth and puberty

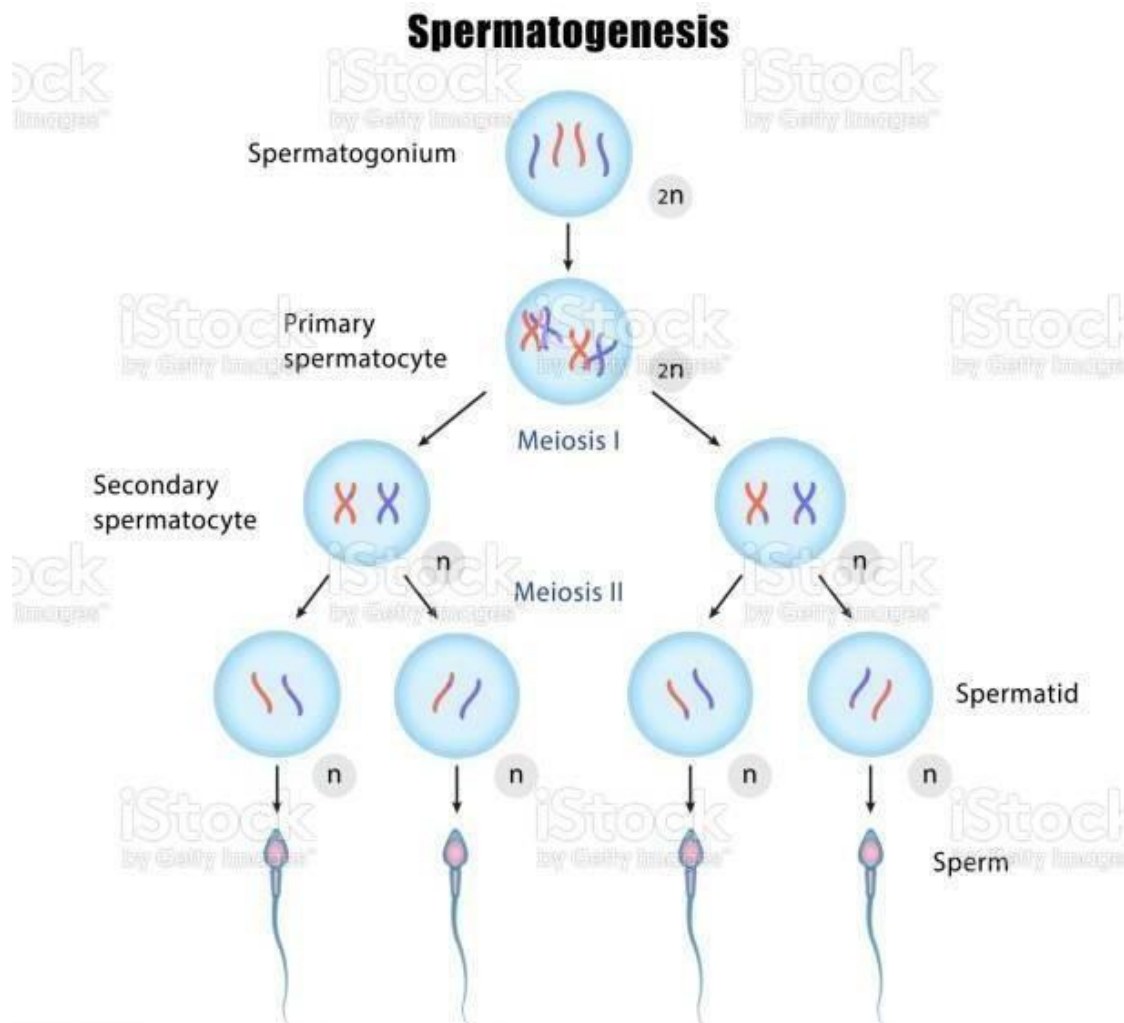
- several of the follicles degenerate over time, leaving only a few 100,000 100,000 100, comma, 000 follicles intact by the time puberty hits.

## After puberty

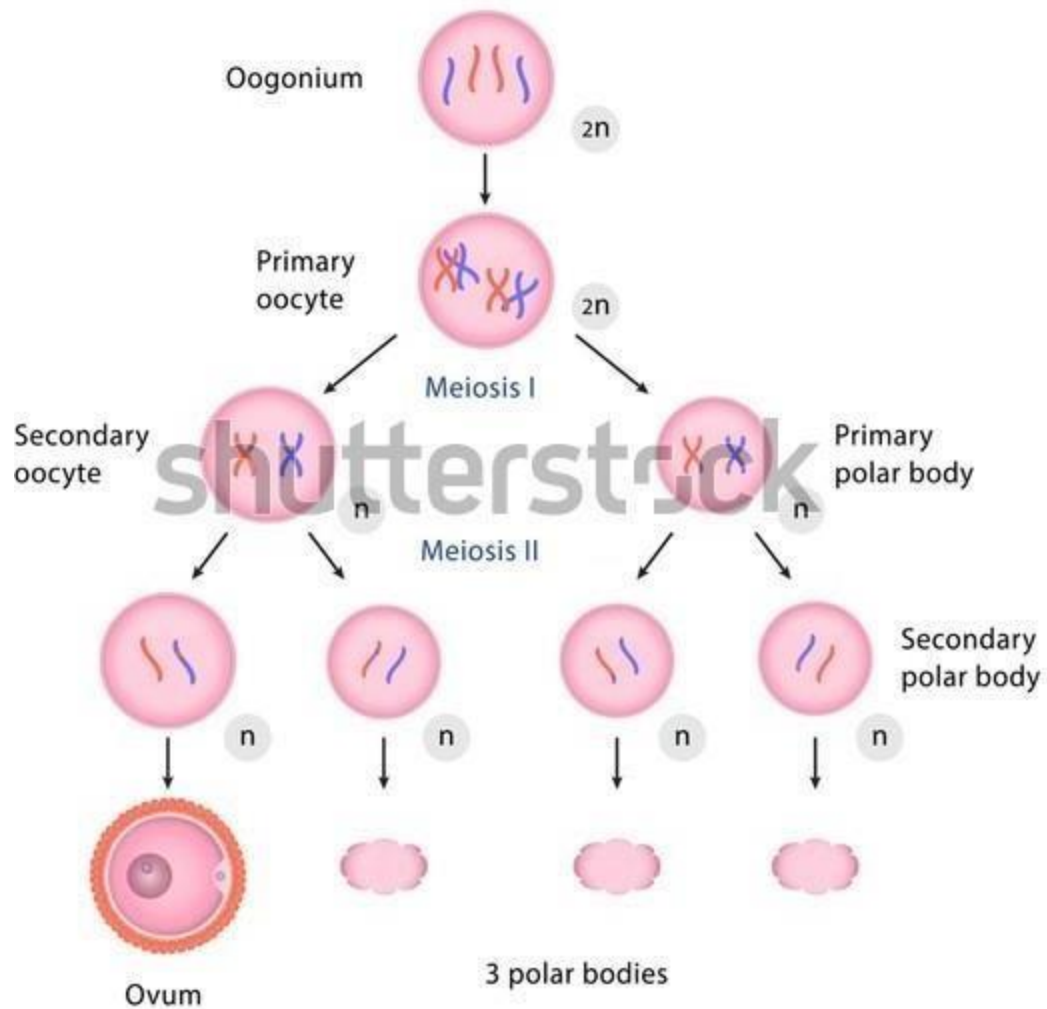
- primary follicles develop into secondary follicles, and then into tertiary, or Graafian follicles.
- the primary oocyte within each tertiary follicle completes its first meiotic division, producing a secondary oocyte and a polar body.
- the Graafian follicle ruptures to release the secondary oocyte, in a process known as ovulation.

Development of every living organism ..either plants or animals or microbes ..starts from a process of fertilization.

Fertilization is the fusion of male and female gametes.



# Oogenesis



So, with this we come to the end of basic concepts in developmental biology..

Hope this content helps u all in understanding the advanced concepts of embryology and development..in your further classes.



## DEFINITION OF ANIMAL PHYSIOLOGY

**Animal physiology** is the scientific study of the life-supporting properties, functions and processes of animals or their parts. The discipline covers key homeostatic processes, such as the regulation of temperature, blood flow and hormones.

Three different types of animals exist: herbivores, omnivores, and carnivores. Herbivores are animals that eat only plants. Carnivores are animals that eat only meat. Omnivores are animals that eat both plants and meat.

**Digestion:** The process of breaking complex food substances into simple molecules is called digestion.

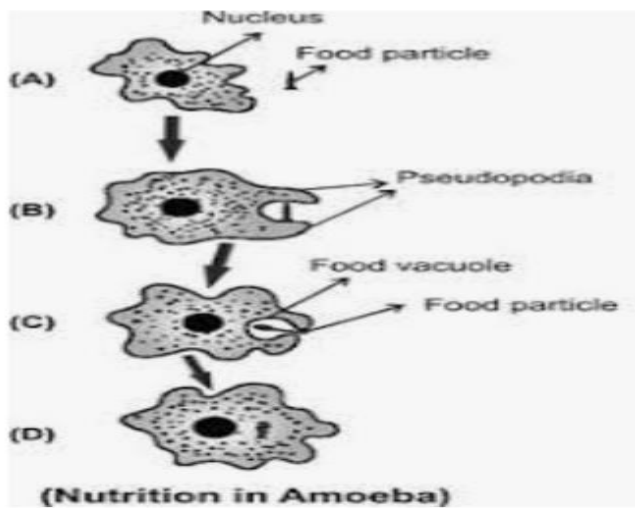
Digestion is a form of catabolism or breaking down of substances that involves two separate processes: **mechanical digestion and chemical digestion**. Mechanical digestion involves physically breaking down food substances into smaller particles to more efficiently undergo chemical digestion.

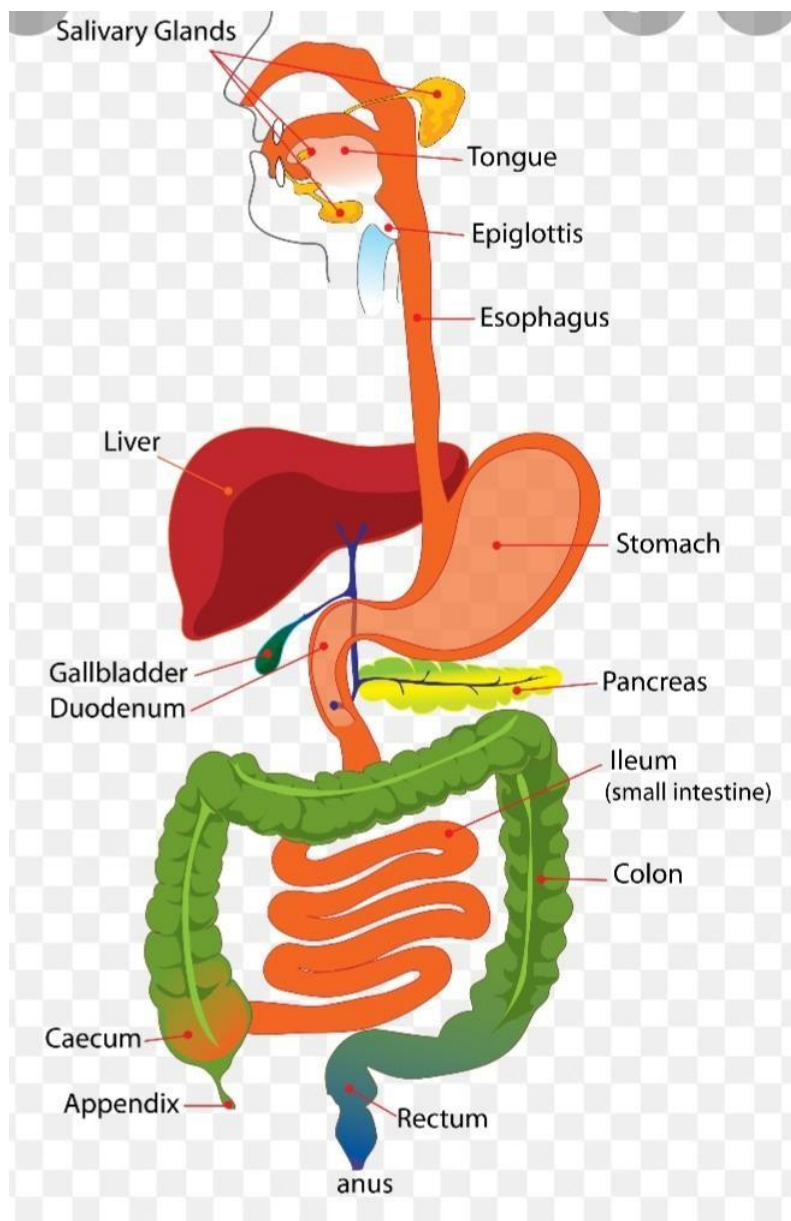
Based upon the position of digestion takes place it is divided into two types

### **Intracellular digestion :**

A form of digestion wherein the breaking down of materials into smaller components takes place inside the cell. In intracellular digestion, the materials or food particles are taken into the cell to be digested.

Ex: Ameioba





**Extra cellular digestion:** In extracellular digestion, the materials or food particles are broken down chemically into smaller components outside the cell or onto the digestive system spaces.

Ex: Human.

Human beings are omnivore animals, which have a complex digestive system. Human Digestive System: The human digestive system comprises of the alimentary canal and associated Digestive glands.

- ☐ Alimentary Canal: It comprises of mouth, oesophagus, stomach, small intestine and large intestine.
- ☐ Associated Glands: Main associated glands are
  - ☐ Salivary glands
  - ☐ Gastric Glands
  - ☐ Liver
  - ☐ Pancreas
  - ☐ Intestinal glands

**Digestive system:**

- ☐ The digestion of food commences in the mouth itself.
- ☐ The teeth help in grinding the ingested food into small pieces. This process is called Mastication(Physical digestion).
- ☐ The tongue helps in rolling of food and mixing of saliva in the food while mastication.

- ☐ The salivary glands in our mouth produce saliva (watery liquid) which contains an enzyme salivary amylase which digests the starch (carbohydrate) present in the food into Maltose, a simple sugar (Chemical digestion).
- ☐ The digestion of food remains incomplete in the mouth. The semi solid form of food in the mouth is called Bolus.

### **Oesophagus:**

- ☐ The slightly digested food in the mouth is swallowed by the tongue and goes down the food pipe called oesophagus.

### **Stomach:**

- ☐ The stomach is a J-shaped organ present on the left side of the abdomen.
- ☐ The stomach walls contain three tubular glands in its walls which secrete gastric juice.
- ☐ The gastric juice contains three substances: Hydrochloric acid, the enzyme pepsin, and mucus.
- ☐ The hydrochloric acid creates an acidic medium which activates the enzyme Rennin and Pepsin. They help in the digestion of proteins. It also kills the bacteria which enters along with the food.
- ☐ The mucus helps to protect the stomach wall from its own secretions of hydrochloric acid.
- ☐ The partially digested and semi liquid form of food (chyme) then goes from the stomach into the small intestine.

### **Small intestine:**

- ☐ From the stomach, the partially digested food enters the small intestine.
- ☐ The small intestine is the largest part (about 6.5 m) of the alimentary canal which can be divided into three parts- Duodenum the first part, Jejunum the middle part and Ileum the last part.
- ☐ The small intestine is arranged in the form of a coil in the abdominal cavity.
- ☐ The small intestine in human beings is the site of complete digestion of food (like carbohydrates, proteins, and fats)
- ☐ The small intestine receives the secretion of two glands: Liver and Pancreas.
- ☐ The liver secretes bile (greenish yellow liquid made in the liver and stored in the gallbladder).
- ☐ Bile performs two functions:
  1. Makes the acidic food coming from the stomach alkaline so that pancreatic enzymes can act on it.
  2. Bile salts break the larger fats present in the food into small globules making it easy for the enzymes to act and digest them. This process is called Emulsification of fat.
- ☐ The pancreas secretes pancreatic juice which contains the enzymes pancreatic amylase for breaking down starch, trypsin for digesting proteins and lipase for breaking down emulsified fats.

**Summary table of Digestion**

<b>Organ</b>	<b>Type of digestion</b>	<b>Juice</b>	<b>Enzyme</b>	<b>Substrate (food)</b>	<b>Product</b>	<b>Chemical medium</b>
Mouth	Mechanical (chewing)  Chemical	Saliva	Salivary amylase	Cooked starch	Maltose	Neutral PH=7
Stomach	Mechanical (churning)  Chemical	Gastric juice	Pepsin	Protein	Polypeptide	Acidic PH<7
Small intestine	Mechanical (churning and peristaltic movement)       Chemical	Pancreatic juice	Trypsin	Polypeptide and protein	Amino acids	Basic PH>7
			Lipase	Lipids	fatty acid + glycerol	PH>7
			Pancreatic amylase	Starch (cooked and uncooked)	maltose	PH>7
		Intestinal juice	Lipase	Lipids	FA and glycerol	PH>7
			Maltase	Maltose	Glucose	PH>7
			Lactase	Lactose	Glucose galactose	PH>7
			Sucrase	Sucrose	Glucose fructose	PH>7
		Bile	<b>NO enzymes</b>			

**Large intestine:** The large intestine includes the appendix, cecum, colon and rectum. The function of the large intestine is recovery of water and electrolytes and fermentation of some of the indigestible food matter by bacteria.

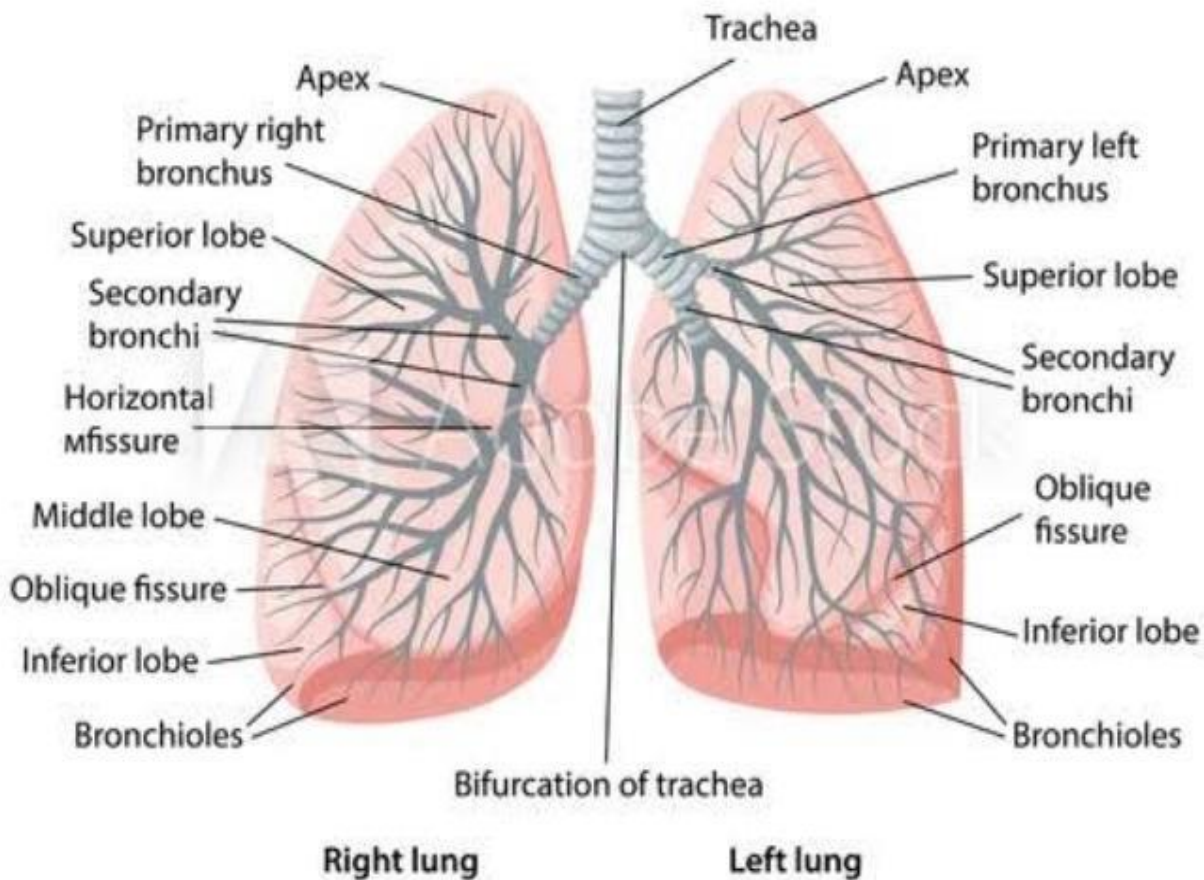
## RESPIRATION

Respiration is the movement of oxygen from the outside environment to the cells within tissues, and the removal of carbon dioxide in the opposite direction

The respiratory system consists of all the organs involved in breathing. These include the **nose, pharynx, larynx, trachea, bronchi and lungs**.

The lungs are the major organs of the respiratory system, and are divided into sections, or lobes. The right lung has three lobes and is slightly larger than the left lung, which has two lobes. The lungs are separated by the mediastinum. This area contains the heart, trachea, oesophagus, and many lymph nodes.

### Lung anatomy



- 1). Pulmonary respiration: The respiratory system aids in breathing, also called pulmonary ventilation. In pulmonary ventilation, air is inhaled through the nasal and oral cavities (the nose and mouth). It moves through the pharynx, larynx, and trachea into the lungs.

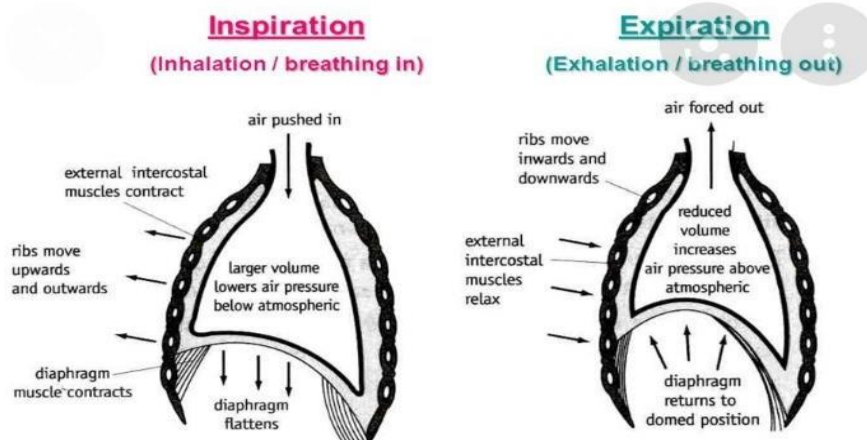
- 2). External respiration: exchange of gases between the external environment and a distributing system of the animal body (such as the lungs of higher vertebrates or the tracheal tubes of insects) or between the alveoli of the lungs and the blood — compare internal respiration.
- 3). Internal respiration: the exchange of gases (as oxygen and carbon dioxide) between the cells of the body.
- 4). Cellular respiration: Cellular respiration is a set of metabolic reactions and processes that take place in the cells of organisms to convert chemical energy from oxygen molecules or nutrients into adenosine triphosphate (ATP), and then release waste products.

### Inhalation:

When the **diaphragm contracts**, it moves down towards the abdomen. This movement of the muscles causes the lungs to expand and fill with air, like a bellows .

### Exhalation:

Conversely, when the muscles relax, the thoracic cavity gets smaller, the volume of the lungs decreases, and air is expelled.



### Respiratory pigments:

respiratory pigment is a metalloprotein that serves a variety of important functions, its main being O<sub>2</sub> transport. ... There are four major classifications of respiratory pigment: **hemoglobin, hemocyanin, erythrocrucorin, chlorocruorin, and hemerythrin.**

### TRANSPORT OF GASES:

#### Transport of Oxygen:

Oxygen is one of the substances transported with the assistance of red blood cells. The red blood cells contain a pigment called haemoglobin, each molecule of which binds four oxygen molecules.

Oxyhaemoglobin forms. The oxygen molecules are carried to individual cells in the body tissue where they are released. The binding of oxygen is a reversible reaction.



high oxygen concentrations oxyhaemoglobin forms, but at low oxygen concentrations

oxyhaemoglobin dissociates to haemoglobin and oxygen. The balance can be shown by an oxygen dissociation curve for oxyhaemoglobin.

The curve shows that:

- At relatively low oxygen concentrations there is uncombined haemoglobin in the blood and



little or no oxyhaemoglobin, e.g. in body tissue

- At relatively high oxygen concentrations there is little or no uncombined haemoglobin in the blood it is in the form of oxyhaemoglobin, e.g. in the lungs.

### **Transport of CO<sub>2</sub>:**

The effect of carbon dioxide in the blood

Haemoglobin can also bind carbon dioxide, but to a lesser extent. Carbaminohaemoglobin forms. Some carbon dioxide is carried in this form to the lungs from respiring tissues.

The presence of carbon dioxide helps the release of oxygen from haemoglobin, this is known as the Bohr effect. This can be seen by comparing the oxygen dissociation curves when there is less carbon dioxide present and when there is more carbon dioxide in the blood.

When carbon dioxide diffuses into the blood plasma and then into the red blood cells (erythrocytes) in the presence of the catalyst carbonic anhydrase most CO<sub>2</sub> reacts with water in the erythrocytes and

The following dynamic equilibrium is established



Carbonic acid, H<sub>2</sub>CO<sub>3</sub>, dissociates to form hydrogen ions and hydrogencarbonate ions. This is also a reversible reaction and undissociated carbonic acid, hydrogen ions and hydrogencarbonate ions exist in dynamic equilibrium with one another



Inside the erythrocytes negatively charged HCO<sub>3</sub><sup>-</sup> ions diffuse from the cytoplasm to the plasma. This is balanced by diffusion of chloride ions, Cl<sup>-</sup>, in the opposite direction, maintaining the balance of negative and positive ions either side. This is called the 'chloride shift'.

The dissociation of carbonic acid increases the acidity of the blood (decreases its pH). Hydrogen ions, H<sup>+</sup>, then react with oxyhaemoglobin to release bound oxygen and reduce the acidity of the blood. This buffering action allows large quantities of carbonic acid to be carried in the blood without major changes in blood pH.



(Hb·4O<sub>2</sub> is sometimes written HbO<sub>8</sub>.)

It is this reversible reaction that

Now the haemoglobin is strongly attracted to carbon dioxide molecules. Carbon dioxide is removed to reduce its concentration in the cell and is transported to the lungs where its concentration is lower.

This process is continuous since the oxygen concentration is always higher than the carbon dioxide concentration in the lungs. The opposite is true in respiring cells.

## **BLOOD CIRCULATION**

The blood is **pumped to different parts of the body by the contraction and expansion of heart.**

### **Functions of blood and circulation:**

- Circulates Oxygen and removes Carbon Dioxide.
- Provides cells with nutrients.
- Removes the waste products of metabolism to the excretory organs for disposal.
- Protects the body against disease and infection.
- Clotting stops bleeding after injury.

Types of circulation:

Closed circulation:

Blood can flow through vessels inside the body such as arteries and veins. This type of circulation is called closed

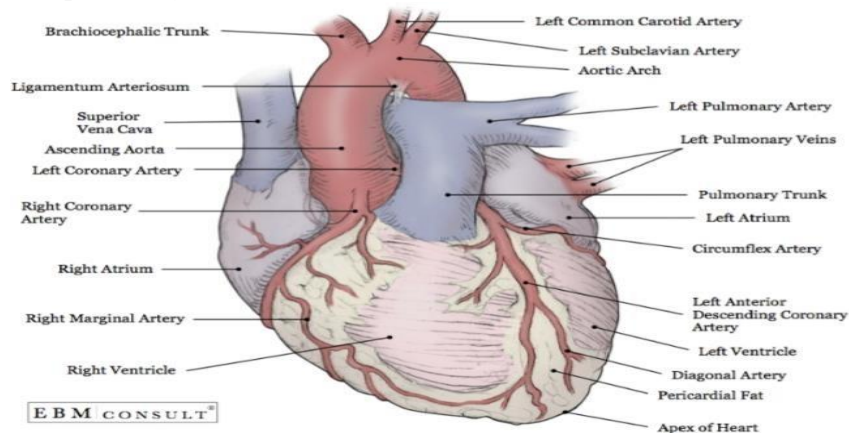
circulation.

Open circulation : **when there are no vessels to contain the blood and it flows freely cavities**  
Of the body.

### Structure of heart:

The heart is a **muscular organ that pumps blood continuously throughout the body**. It is comprised of four chambers — the right and left atrium and the right and left ventricle. The chambers of the heart work together by alternately contracting and relaxing to pump blood throughout the heart.

The heart has 4 valves: **The mitral valve and tricuspid valve**, which control blood flow from the atria to the ventricles. The aortic valve and pulmonary valve, which control blood flow out of the ventricles



### Types of heart:

**Neurogenic heart:** This type of heart found in **lower invertebrates like annelids and arthropods**. The heartbeat is initiated by the ganglion situated near the heart. The impulse for contraction is generated by the nervous system.

**Myogenic heart :** is the term used for muscles or tissues that can contract on their own, without any external electrical stimulus, from the brain or spinal cord . Ex: human heart.

### Cardiac cycle:

**The cardiac cycle has 3 stages:**

- Ventricular systole (ventricles contract and push blood out through aorta and pulmonary artery), cause. first heart sound “lubb”.
- Atrial and Ventricular diastole (chambers are relaxed and filling with blood) Cause second heart sound “dupp”.
- Atrial systole (atria contract and remaining blood is pushed into ventricles)

### Abnormalities of heart beat:

Bradycardia and Tachycardia are **two forms of irregular heart rates**, or arrhythmias. These arrhythmias occur in the upper or lower chambers of the heart. Normal heart rate is 60-100 beats per minute. Bradycardia: This is an irregularly slow heart rate.

### Regulation of heart beat:

Heart rate is controlled by the **two branches of the autonomic (involuntary) nervous system**. The sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The sympathetic nervous system (SNS) releases the hormones (catecholamine - epinephrine and norepinephrine) to accelerate the heart rate.



## BLOOD COAGULATION.

**Coagulation**, also known as **clotting**, is the process by which blood changes from a liquid to a gel, forming a blood clot. It potentially results in hemostasis, the cessation of blood loss from a damaged vessel, followed by repair. The mechanism of coagulation involves activation, adhesion and aggregation of platelets, as well as deposition and maturation of fibrin.

### CLOTTING FACTORS

Factor I	Fibrinogen
Factor II	Prothrombin
Factor III	Tissue Thromboplastin
Factor IV	Calcium Ions
Factor V	Labile Factor
Factor VII	Stable Factor
Factor VIII	Antihemophilic Factor
Factor IX	Christmas Factor, or Plasma Thromboplastin Component (PTC)
Factor X	Stuart-Prower Factor
Factor XI	Plasma Thromboplastin Antecedent (PTA)
Factor XII	Hageman Factor
Factor XIII	Fibrin Stabilizing Factor

The mechanism of coagulation involves **activation, adhesion, and aggregation of platelets along with deposition and maturation of fibrin**. Disorders of coagulation can result in bleeding (thrombosis).

## EXCRETION

Excretion is a process in which metabolic waste is eliminated from an organism. In vertebrates this is primarily carried out by the lungs, kidneys, and skin. This is in contrast with secretion, where the substance may have specific tasks after leaving the cell

Based on the excretory product animals classification:

Ammonotelic animals are **those which excrete nitrogenous waste as soluble ammonia as their excretory waste product**. For example, the marine organism like Porifera, fish, protozoa. Ureotelic animals are those which excrete excess nitrogen as urea, which needs less water in comparison to ammonia.

Ureotelic animals – **Animals that excrete urea in the form of waste** are called ureotelic animals. Urea is less harmful than ammonia and requires less water for excretion. Examples: Few bony fishes, adult amphibians, fish, cartilaginous fish, and mammals including humans are ureotelic.

Uricotelic animals – Animals that excrete uric acid in the form of waste are called uricotelic organisms. Uric acid is the least poisonous and the least soluble in water, relative to ammonia and urea. Examples: **Birds, snakes, and**

**lizards** are uricotelic.

### Structure of Nephron:

Nephron, **functional unit of the kidney**, the structure that actually produces urine in the process of removing waste and excess substances from the blood. There are about 1,000,000 nephrons in each human kidney ..... The capsule and glomerulus together constitute the renal corpuscle.

#### **Nephron-Structural anatomy.**

- bowman's capsule.
- collecting tubules.
- distal convoluted tubules.
- loop of henle.

By the location of renal corpuscles within the cortex, three types of nephron can be distinguished: **superficial, mid cortical, and juxtamedullary nephrons**

#### **Super ficial nephrons:**

In general, superficial nephrons have **glomeruli located near the surface of the kidney** and give rise to short-loop nephrons.

Mid cortical nephron:Midcortical nephrons have **glomeruli located between the superficial and juxtamedullary glomeruli** . These nephrons may be either long-loop or short-loop. In general, the deeper the location of the glomerulus, the greater the likelihood that its tubule will descend into the inner medulla.

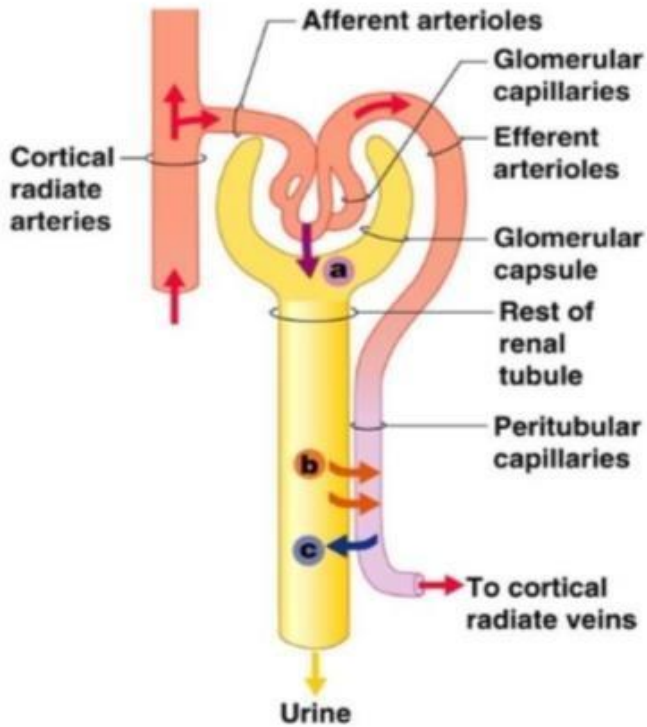
Juxtamedilullary nephron:

Juxtamedullary nephrons have a**glomerulus near the junction of the cortex and medulla** and they have loops of Henle that penetrate deep into the medulla.

#### **Formation of urine**

The kidneys filter unwanted substances from the blood and produce urine to excrete them. There are three main steps of urine formation: **glomerular filtration, reabsorption, and secretion**. These processes ensure that only waste and excess water are removed from the body.

# Urine Formation



## KEY:

**a** **Glomerular Filtration:** Water and solutes smaller than proteins are forced through the capillary walls and pores of the glomerular capsule into the renal tubule.

**b** **Tubular Reabsorption:** Water, glucose, amino acids, and needed ions are transported out of the filtrate into the tubule cells and then enter the capillary blood.

**c** **Tubular Secretion:**  $H^+$ ,  $K^+$ , creatinine, and drugs are removed from the peritubular blood and secreted by the tubule cells into the filtrate.

## Compare muscle tissue

### Skeletal

### Cardiac

### Smooth

Striation: striated

somewhat striated

non-striated

Cells: straight cylindrical parallel, non-branching

tapered cylinders parallel & branched

spindle shape

Nucleus: multi-nuclei, peripheral

mostly uni-nucleus most peripheral

uni-nucleus central

Discs: none

intercalated

none

Location: attach bones

cardiac wall

hollow organs

Control: voluntary

involuntary

involuntary

Function: body movement

heart contraction

visceral & circulatory

Speed of contraction: fastest

intermediate

slowest

between water and dissolved must actively take on, content.

ne, ammonia, and typically yellowish colour,

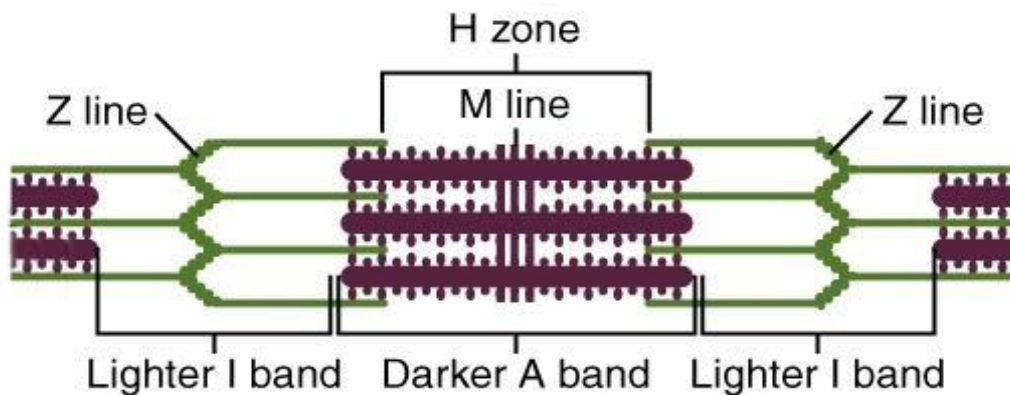
power. Muscle which is muscle."

contractile

The functional unit of contraction in a skeletal muscle fibre is the **sarcomere**, which runs from Z line to Z line. A sarcomere is broken down into a number of sections:

- **Z line** – where the actin filaments are anchored.
- **M line** – where the myosin filaments are anchored.
- **I band** – contains only actin filaments.
- **A band** – the length of a myosin filament, may contain overlapping actin filaments.
- **H zone** – contains only myosin filaments.

A useful acronym is **MHAZI** – the M line is inside the H zone which is inside the A band, whilst the Z line is inside the I band.



### Sliding filament theory:

The sliding filament model of muscle contraction, put forward by Hugh Huxley and Jean Hanson in 1954.

## NERVOUS SYSTEM:

**Nervous system controls everything you do, including breathing, walking, thinking, and feeling.** This system is made up of your brain, spinal cord, and all the nerves of your body. The nerves carry the messages to and from the body, so the brain can interpret them and take action.

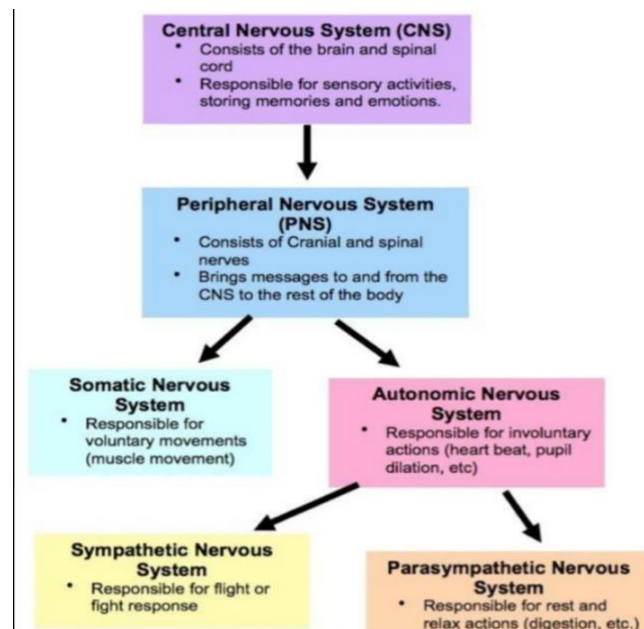
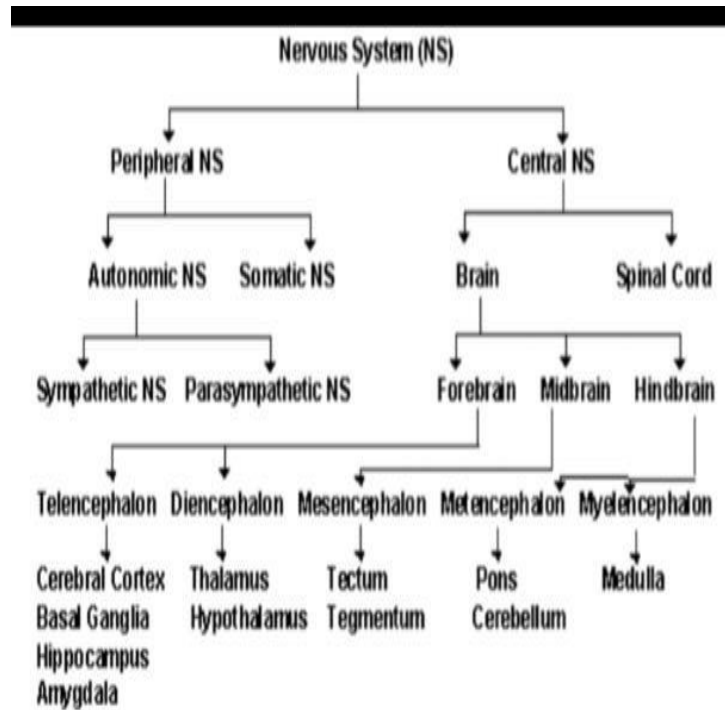
**Brain:** A brain is **an organ that serves as the centre of the nervous system in all most invertebrate animals.** It is located in the head. There are 3 layers of tissue called meninges that help protect the brain. The outer covering of tissue (called the dura mater), closely lines the inside of the skull. The **second layer is the arachnoid mater**, and the third layer, the pia mater, hugs the surface of the brain.

Parts of the Brain	Functions
Cerebrum	Control of voluntary movements, concentration, planning, decision-making, memory, intelligence, and intellectual activities.
Cerebellum	(1) Co-ordination of voluntary movements. (2) Maintaining the body's balance.
Medulla oblongata	Control of involuntary activities like the beating of the heart, blood circulation, breathing, sneezing, coughing, salivation, etc.
Spinal cord	(1) Conduction of impulses from the skin towards the brain. (2) Conduction of impulses from brain to muscles and glands. (3) Functions as centre of co-ordination of reflex actions.

## TYPES OF NERVOUS SYSTEM:

**central nervous system** : is made up of the brain and spinal cord.

**peripheral nervous system**: is made up of nerves that branch off from the spinal cord and extend to all parts of the body.





The Cranial Nerves			
Nerve Number and Name		Composition	Some Functions
I	Olfactory	Sensory only	Olfaction (smell)
II	Optic	Sensory only	Vision
III	Oculomotor	Motor and sensory	Serves muscles of the eye
IV	Trochlear	Motor and sensory	Serves the superior oblique eye muscle
V	Trigeminal	Motor and sensory	Sensory from face and mouth; motor to muscles of mastication (chewing)
VI	Abducens	Motor and sensory	Serves the lateral rectus eye muscle
VII	Facial	Motor and sensory	Serves the muscles of facial expression, lacrimal glands, and salivary glands
VIII	Vestibulocochlear	Sensory only	Equilibrium and hearing
IX	Glossopharyngeal	Motor and sensory	Serves the pharynx (throat) for swallowing, posterior third of tongue, parotid salivary gland
X	Vagus	Motor and sensory	Sensations from visceral (internal) organs, and parasympathetic motor regulation of visceral organs
XI	Accessory	Motor and sensory	Serves muscles that move head, neck, and shoulders
XII	Hypoglossal	Motor and sensory	Serves muscles of the tongue

The longest cranial nerve is vagus nerve. The largest cranial nerve is trigeminal nerve. The smallest cranial **nerve is abducens nerve**. The thinnest cranial nerve is trochlear nerve.

## ENOCRINAL GLANDS

Endocrine glands are ductless glands of the endocrine system that secrete their products, hormones, directly into the blood. The major glands of the endocrine system include the **pineal gland, pituitary gland, pancreas, ovaries, testes, thyroid gland, parathyroid gland, hypothalamus and adrenal glands.**

Thyroid gland is the largest endocrine gland

Smallest endocrine gland is Pineal gland.

GLAND	MAIN HORMONE RELEASED	EFFECT
Hypothalamus		Stimulates and controls the release of hormones from the pituitary gland.
Pituitary Gland (Master Gland)	Anterior - adrenocortical trophic hormone (ACTH)	Stimulates the adrenal cortex and the release of cortisol during the stress response.
	Posterior – oxytocin	Responsible for uterus contractions during childbirth.
Pineal Gland	Melatonin	Responsible for important biological rhythms, including the sleep-wake cycle.
Thyroid Gland	Thyroxine	Responsible for regulating <b>metabolism.</b>
Adrenal Gland	Adrenal medulla – adrenaline & noradrenaline	The key hormones in the fight or flight response.
	Adrenal cortex - cortisol	Stimulates the release of glucose to provide the body with energy, while suppressing the immune system.
Ovaries (female)	Oestrogen	Controls the regulation of the female reproductive system, including the menstrual cycle and pregnancy
Testes (male)	Testosterone	Responsible for the development of male sex characteristics during puberty, while also promoting muscle growth.



## **PLASMA MEMBRANE**

The outermost, extremely delicate, elastic and membranous covering of the cell that separates its contents from the external environment is called plasma .Plasma membrane is found in all cells and is also known as Cell membrane.

Structure:-

The cell membrane is made up of two layers that are composed of phospholipids . The bilayer is formed by the arrangement of phospholipids in a manner that their head regions(hydrophilic) face external environment as well as internal cytosolic environment. The tails(hydrophobic)of these phospholipids face each other.

Following are the various parts of the cell membrane

- Integral membrane proteins:-structures present on the inside, outside, and also throughout the cell membrane.
- Peripheral membrane proteins:-attached/bound to the surface of the membrane by means of hydrogen bonds and electrostatic interactions
- Skeleton of Cell membrane:-Surface of the cell membrane on the side of cytoplasm is lined by cytoskeleton.

Cytoskeleton helps in anchoring the membrane proteins to the cell membrane.

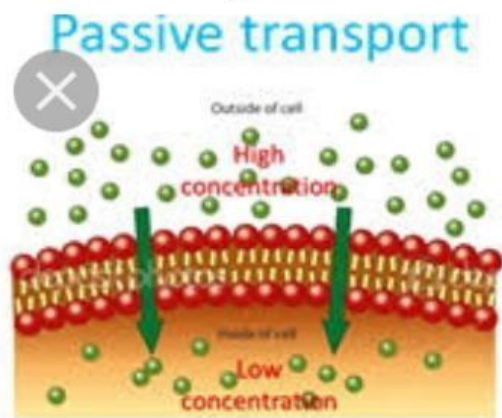
Functions of Plasma membrane:-

Plasma membrane carries out the following functions:-

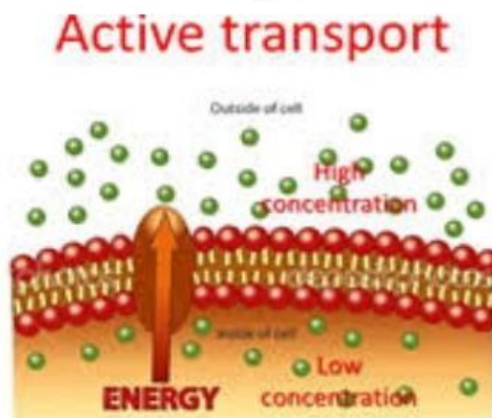
- Shape:-It provides a definite shape to the semi fluid contents of the cell
- Mechanical Barrier:-It functions as a mechanical Barrier that protects the internal contents of the cell
- Endocytosis:-The flexibility of the membrane enables the cell to engulf food and other substances from its external environment by endocytosis.
- Recognition:-It has substances over its surface which function as recognition centres and points of attachment. They help in tissue formation, distinction of foreign substances and defence against microbes.
- Flow of information:-It provides for flow of information amongst different cells of the same organisms.
- Osmosis:-It occurs due to presence of tiny water channels in the plasma membrane
- Cell continuity:-At places plasma membranes of adjacent cells become continuous to form plasmodesmata and cell junctions
- Specialization:-Plasma membrane gets modified to perform different functions. Eg:-absorption in microvilli
- Selective Permeability:-The membrane determines what substances are to be allowed into or out of the cell.

## **Transportation across the membrane:-**

- The membrane acts as a physical barrier between the organelles of a cell and the cytoplasm and between the cell and its environment. The substances are transported across the membrane by two mechanisms i.e.,
- Active Transportation
- Passive Transportation



**Requires no energy**  
Molecules flow across the membrane by diffusion  
No ATP required



**Requires energy**  
Molecules are pumped across the membrane  
ATP required

**Active Transport:**-Movement of molecules across the membrane from region of lower concentration to higher concentration against the concentration gradient is known as active Transportation. Active transportation requires cellular to achieve this movement.

Eg:-Enzyme Secretion by Exocrine glands

**Passive Transport:**-A movement of biochemical and other atomic or molecular substances across the membrane that does not require any cellular(chemical)energy for the movement is called passive Transportation.

Eg:-Diffusion of oxygen from alveoli into the blood.

# ECOLOGY

Ecology (from Greek: οἶκος, "house" and -λογία, "study of the study of the relationships between living organisms, including humans, and their physical environment .

Ecology considers organisms at the individual, population, community, ecosystems, and biosphere level.

Ecology overlaps with the closely related sciences of biogeography, evolutionary biology, genetics, ethology and natural history.

Ecology is a branch of biology, and it is not synonymous with environmentalism.

## Key Points

- In ecology, ecosystems are composed of organisms, the communities they comprise, and the non-living aspects of their environment.
- The four main levels of study in ecology are the organism, population, community, and ecosystem.
- Ecosystem processes are those that sustain and regulate the environment.
- Ecological areas of study include topics ranging from the interactions and adaptations of organisms within an ecosystem to the abiotic processes that drive the development of those ecosystems.

## Key Terms

- **Ecology:** the branch of biology dealing with the relationships of organisms with their environment and with each other
- **Ecosystem:** a system formed by an ecological community and its environment that functions as a unit
- **Ecophysiology:** the study of the relationships between, and adaptation of, the physiology of an organism and its environment

## An Introduction to Ecology

- Ecology is the study of the interactions of living organisms with their environment.
- Within the discipline of ecology, researchers work at four specific levels, sometimes discretely and sometimes with overlap.
- These levels are organism, population, community, and ecosystem.
- In ecology, ecosystems are composed of dynamically-interacting parts, which include organisms, the communities they comprise, and the non-living (abiotic) components of their environment.
- Ecosystem processes, such as primary production, pedogenesis (the formation of soil),

nutrient cycling, and various niche construction activities, regulate the flux of energy and matter through an environment. These processes are sustained by organisms with specific life-history traits.

- The variety of organisms, called biodiversity, which refer to the differing species, genes, and ecosystems, enhances certain ecosystem services.

Among other things, ecology is the study of:

- Life processes, interactions, and adaptations
- The movement of materials and energy through living communities
- The successional development of ecosystems
- Cooperation, competition and predation within and between species.
- The abundance, biomass, and distribution of organisms in the context of the environment. Patterns of biodiversity and its effect on ecosystem processes
- The scope of ecology contains a wide array of interacting levels of organization spanning micro-level (e.g., cells) to a planetary scale (e.g., biosphere) phenomena.
- The main subdisciplines of ecology, population (or community) ecology and ecosystem ecology, exhibit a difference not only of scale but also of two contrasting paradigms in the field.
- The former focuses on organisms' distribution and abundance, while the latter focuses on materials and energy fluxes.

## Hierarchy

To structure the study of ecology into a conceptually manageable framework, the biological world is organized into a nested hierarchy, ranging in scale from genes, to cells, to tissues, to organs, to organisms, to species, to populations, to communities, to ecosystems, to biomes, and up to the level of the biosphere. This framework forms a panarchy and exhibits non-linear behaviors; this means that "effect and cause are disproportionate, so that small changes to critical variables, such as the number of nitrogen fixers, can lead to disproportionate, perhaps irreversible, changes in the system properties."

## Biodiversity

- Biodiversity includes species diversity, ecosystem diversity, and genetic diversity and scientists are interested in the way that this diversity affects the complex ecological processes operating at and among these respective levels
- Biodiversity plays an important role in ecosystem services which by definition maintain and improve human quality of life.

## Habitat

- The habitat of a species describes the environment over which a species is known to occur and the type of community that is formed as a result.<sup>[23]</sup> More specifically, "habitats can be defined as regions in environmental space that are composed of multiple dimensions, each representing a biotic or abiotic environmental variable; that is, any component or characteristic of the environment related directly (e.g. forage biomass and quality) or indirectly (e.g. elevation) to the use of a location by the animal

## Niche

"the set of biotic and abiotic conditions in which a species is able to persist and maintain stable population sizes"

## Biome

Biomes are larger units of organization that categorize regions of the Earth's ecosystems, mainly according to the structure and composition of vegetation.

## Biosphere

The largest scale of ecological organization is the biosphere: the total sum of ecosystems on the planet.

## Population ecology

Population ecology studies the dynamics of species populations and how these populations interact with the wider environment. A population consists of individuals of the same species that live, interact, and migrate through the same niche and habitat.

## Food Chains and Food Webs

- A food web is the archetypal ecological network. Plants capture solar energy and use it to synthesize simple sugars during photosynthesis.
- As plants grow, they accumulate nutrients and are eaten by grazing herbivores, and the energy is transferred through a chain of organisms by consumption.
- The simplified linear feeding pathways that move from a basal trophic species to a top consumer is called the food chain.
- The larger interlocking pattern of food chains in an ecological community creates a complex food web.
- Food webs are a type of concept map or a heuristic device that is used to illustrate and study pathways of energy and material flows.

## Trophic levels

A trophic level (from Greek troph, τροφή, trophē, meaning "food" or "feeding") is "a group of organisms acquiring a considerable majority of its energy from the lower adjacent level (according to ecological pyramids) nearer the abiotic source.

## Types of Ecology

Microbial Ecology. Microbial ecology looks at the smallest fundamental levels of life, that is, the cellular level. ...

- Organism/Behavioural Ecology. ...
- Population Ecology. ...
- Community Ecology. ...
- Ecosystem Ecology. ...

- Global Ecology (Biosphere)

### Animal associations

These are mainly of five types:

1. Parasitism 2. Commensalism 3. Phoresis 4. Mutualism 5. Symbiosis.

S. No	Type of Relationship	Species A	Species B	Effect of relationship
1.	Neutralism	0	0	Neither species affects the other.
2.	Mutualism	+	+	Favourable to both.
3.	Commensalism	+	0	Favourable to A, the commensal, but not to B, the host.
4.	Exploitation or Parasitism	+	-	Favourable to A, the parasite but harmful to B, the host.
5.	Predation	+	-	Beneficial to A, the predator but harmful to B, the prey
6.	Competition	-	-	Harmful to one species or the other.

- '+' - denotes the fact that both members of the partnership are benefited
- '-' refers to the harmful nature of the association
- '0' denotes the fact that there is no significant effect as a result of partnership on the partners

### Meaning of Zoogeographical Realms:

On the basis of presence and absence of several organisms, the earth can be divided into some regions. These regions are called realms. Several scientists proposed several scheme of realms. P. L. Sclater (1857) divided the geographical areas of the Earth into six parts, on the basis of the distribution of birds.

### Types of Zoogeographical Realms:

- Palaeartic Realm.
- Nearctic Realm.
- Neo-tropical Realm.
- Ethiopian Realm.
- Oriental Realm.
- Australian Realm.

## TYPES OF ANIMAL BEHAVIOUR

1. Innate or inherent behavior (Natural behavior)
2. Acquired behavior (Adapted behavior by training)
3. Instinctive behavior (In born pattern of behavior of a species and is often response to stimuli)
4. Motivated behavior ( Forces acting either on or with in a person to initiate behavior)

## TYPES OF LEARNING

1. Habituation
2. Associative learning
3. Latent learning
4. Insight learning
5. Imprinting.

Ecology also consists Social behaviour, Communication and pheromones.

### Assesment Developemt on Ecology:

1. Who Coined The Term Ecosystem ?

- A. Odum
- B. Haeckel
- C. Tansley
- D. Reiter

2. Select In Correct Pair

- A) Diurnal Animals - Reptiles
- B) Nocturnal Animals - Earth Worms
- C) Circadian Rhythms - One Year
- D) Photoperiodism - The Response Of Organsim To Light Period

3. The organisms which used as food material but they are not killed by other organisms in a natuare called.

- a) Decomposers
- b) Primary consumers
- c) Carnivores
- d) Top consumers



4. Photo chemical Smog is related to the pollution of
- a) Soil b) Water c) Air d) Sound
5. Expand BOD is
- The most common
- a) Biotic oxygen Demand b) Biologically Oxygen Degradation
- c) Biochemical Oxygen Demand d) Biological organisms Degradation
6. which one has the least green house effect
- a) Water vapours. b) Ozone. c) Carbon dioxide. d) Nitrogen gas
7. The various steps in a food chain at which transfer of food (energy) takes place are called
- a) Standing states b) Niche c) Trophic levels d) Ecotone
8. Read the following pathway related to energy transfer in food chain.
- a) Producer → Carnivores → Herbivores → Top consumers
- b) Herbivores → Producers → Carnivores → Tertiary consumers
- c) Producers → Herbivores → Carnivores → Top consumers
- d) Producers → Primary consumers → Primary carnivores → Herbivores
9. Nitrifying bacteria are
- a) Photo heterotrophs b) Chemo autotrophs c) Chemo heterotrophs d) Photo autotrophs
10. The Nuclear energy produced by
- a) Fission of heavy atoms b) Fusion of smaller nuclei c) Fission of heavy metals d) a & b

key:

1. C    2. C    3. A    4. C    5. C    6. D    7. C    8. C    9. B    10. D

## MOLECULAR BIOLOGY

### Introduction

Molecular biology, field of science concerned with study of biology at molecular level. It is relatively young discipline, originating in the 1930s and becoming institutionalized in the 1950s. It is focused especially on nucleic acids (e.g., DNA and RNA) and proteins—macromolecules that are essential to life processes and how these molecules interact and behave within cells.

Warren Weaver, introduced the term “molecular biology” in 1938 and then by William Astbury in 1945.

Friedrich Miescher isolated DNA for the first time and named it as “nuclein”. Later in 1869, the term nuclein has been replaced with “nucleic acids” by Altmann. The nuclein discovered by Miescher was later particularly identified as DNA. In 1950s Watson and Crick collaborated to build a model of the double helical structure of DNA, with its two helical strands held together by hydrogen-bonded base pairs.

With the structure of DNA in hand, molecular biology shifted its focus to how the double helical structure aided elucidation of the mechanisms of replication, the keys to understanding the role of

genes in heredity. This subsequent research was guided by the notion that the gene was an *informational* molecule.

In 1958, Francis Crick used and characterized the concept of *information* in the context of stating the “central dogma” of molecular biology. Crick characterized the central dogma as the transfer of information from nucleic acid to nucleic acid, or from nucleic acid to protein.



**Nucleic acids:** There are two types of nucleic acids ,namely Deoxyribo nucleic acid(DNA) and Ribonucleic acid(RNA). Primarily, nucleic acids serve as repositories and transmitters of genetic information.

**Kinds of nucleic acids:**

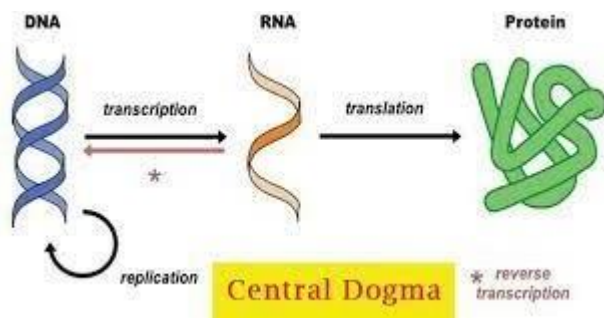
**DNA:** Found only inside the nucleus of the cell. Contains the organism's genetic information including instructions for how to make proteins.

**RNA:** Found both inside and outside of the nucleus. Directs the building of proteins. Primarily concerned with the synthesis of proteins.

**Polypeptides :** Polypeptides are the building blocks of nucleic acids.

**Functions of nucleic acids:**

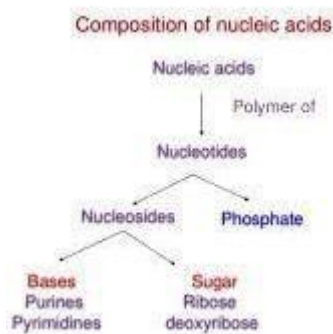
- DNA is the chemical basis of heredity and may be regarded as the reserve bank of genetic information.
- DNA is exclusively responsible for maintaining the identity of different species of organisms over millions of years.
- Further, every aspect of cellular function is under the control of DNA.
- The DNA is organized into genes, the fundamental units of genetic information.
- The genes control the protein synthesis through the mediation of RNA,as shown below



- The interrelationship of these three classes of biomolecules ( DNA, RNA and Proteins ) constitutes the central dogma of molecular biology or more commonly the “Central dogma of life”.

### Composition of Nucliec acids:

Nucliec acids are the polymers of nucleotides (polynucleotides) held by 3’ and 5’ phosphate bridges. In other words, nucliec acids are built up by the monomeric units - Nucleotides ( It may be recalled that protein is polymer of amino acids).



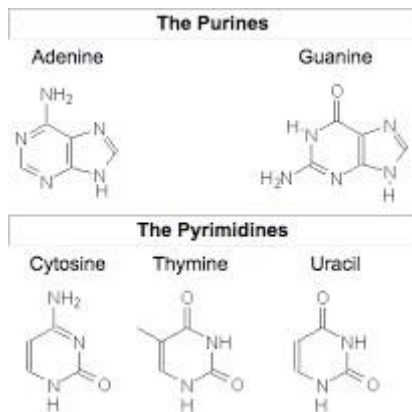
### Nucleotides :

Nucleotides are composed of a nitrogenous base, a pentose sugar and a phosphate. Nucleotides perform a wide variety of functions in the living cells, besides being the building blocks are monomeric units in the nucleic acid ( DNA and RNA) structure.

### Structure of nucleotides :

These are two types: Purines and Pyramidines.

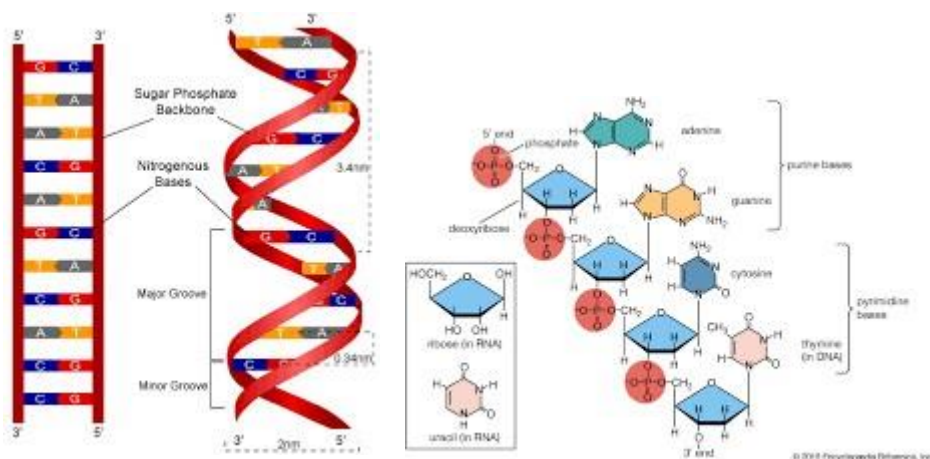
- The nitrogenous bases found in nucleotides are aromatic heterocyclic compounds.
- The bases are of two types : Purines and Pyramidines.
- Purines are numbered in the anti-clockwise direction, while pyramidines are numbered in the clock wise direction.



## DNA STRUCTURE :

In 1953, Watson and Crick postulated a three dimensional model of DNA structure that accounted for both the X-ray data and the characteristic base pairing in DNA

- It consists of two polynucleotide chains.
- Two polynucleotide chains coil around the same axis to form a right handed double helix.
- In the helix, the two chains or strands are antiparallel( Sugars 5' to 3' and 3' to 5'). I.e., have an opposite polarity.
- The purine and pyrimidine bases of each strand face inward towards each other.
- Held together by pairing between bases (H-bonds), stacking interactions.
- The bases are stacked perpendicular to the long axis of the double helix.
- The base pair are 0.34nm apart in DNA helix. A complete turn of helix takes 3.4nm, therefore in each helical turn, 10 bases are present. The external diameter of helix is 2nm.



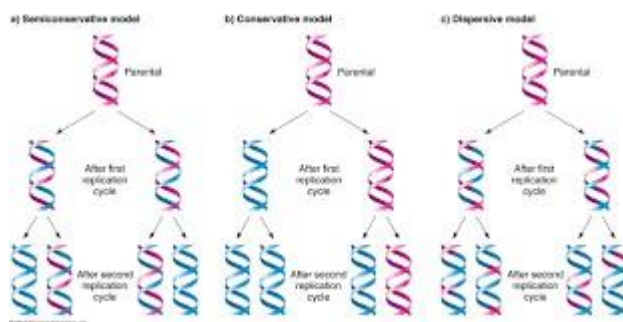
## DNA Replication:

DNA replication is the process by which DNA makes copy of itself during cell division..... The separation of the two single strands of DNA creates a 'Y' shape called a replication fork'. The two separated strands will act as templates for making the new strands of DNA.




There are three main steps to DNA replication: **initiation, elongation, and termination.** .

### The three models for DNA replication

- Conservative. Replication produces one helix made entirely of old DNA and one helix made entirely of new DNA.
- Semi-conservative. Replication produces two helices that contain one old and one new DNA strand.
- Dispersive. Original DNA chain breaks and recombines in a random fashion before the double helix structure unwinds and separates to act as a template for mRNA synthesis.



## Types of DNA:

	B form DNA	A form DNA	Z form DNA
Helical sense	Right handed	Right handed	Left handed
Major groove	Present	Present	Absent
bp/helical turn	10.5	11	12
Glycosyl bond conformation	Anti	Anti	Anti (for pyrimidines) and syn (for Purines)
Helix rise/bp	3.4Å	2.6Å	3.7Å
Base tilt	6°	20°	7°
Structure			

## Functions of DNA:

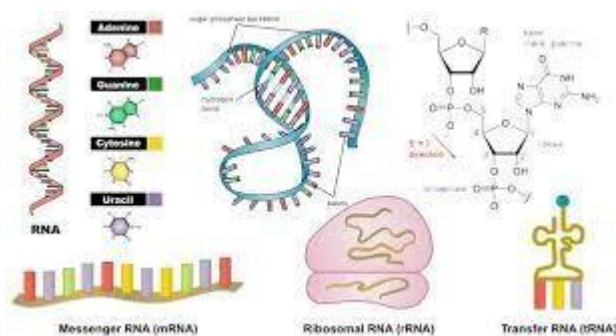
1. **Genetic information:** DNA is the genetic material which carries all the hereditary information. The genetic information is coded in the sequential arrangement of it's nitrogen bases.
2. **Replication:** DNA has unique property of replication or production of carbon copies of itself. This is essential for transfer of genetic information from one cell to its daughters and from one generation to the next.
3. **Transcription:** DNA gives rise to mRNAs through the process of transcription, which carries information for protein synthesis. A major role for many sequences of DNA is to encode the sequences of proteins.
4. **Recombinations:** During meiosis, crossing over occurs between homologous chromosomes giving rise to new combinations of genes called recombinations. Genetic recombination and natural selection are the driving forces behind evolution.
5. **Mutations:** Changes in sequence of nitrogen bases due to addition, deletion or wrong replication give rise to mutations. Mutations are the fountainhead of all variations and evolution.
6. **Development:** DNA controls development of an organism through working of an internal genetic clock with or without the help of extrinsic information.
7. **Differentiation:** Due to differential functioning of some specific regions of DNA or genes, different parts of the organisms get differentiated in shape, size and functions.
8. **Recombinant DNA technology:** rDNA technology, joining together DNA molecules from two different species that are inserted into a host organism to produce new genetic combinations that are of value to science, medicine , agriculture , and industry.
9. **DNA Fingerprinting:** Hypervariable microsatellite DNA sequences of each individual are distinct. They are used in identification of individuals and deciphering their relationships.



10. **Gene Therapy:** Defective genes can be rectified by incorporating correct genes in their place.

## RNA Structure and Types:

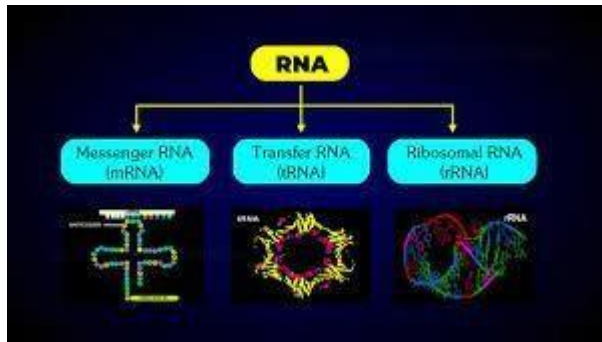
RNA (Ribonucleic acid) is a polynucleotide that consists of a long chain of nucleotide units. Each nucleotide consists of a nitrogenous base, a ribose sugar, and a phosphate. The difference between deoxyribonucleotides and ribonucleotides contain ribose sugar instead of deoxyribose and among pyrimidines uracil instead of thymine.



RNA	DNA
RNA is single stranded except in some viruses	DNA is double stranded except in few viruses
RNA have ribose sugar	DNA have deoxyribose sugar
Bases present are adenine, guanine, cytosine and uracil.	Bases present are adenine, guanine, cytosine and thymine.
Adenine pairs with uracil	Adenine pairs with thymine
Purine is not equal to pyrimidine	Purine is equal to pyrimidine (Chargaff's rule)
Regions having complementary nucleotides, pairs, and form hair pin loop like structure and helical.	Complementary nucleotides are present throughout the length of the DNA.
RNA is genetic material in some viruses.	DNA is the genetic material in all living organisms.
Length of RNA is short consisting of only few thousands nucleotides.	Length of DNA is quite large consisting of millions of nucleotides.
Three types of RNA are present in an organism: mRNA, rRNA, tRNA.	DNA occurs only in one form in an organism.
mRNA occurs in nucleolus, rRNA and tRNA occur in cytoplasm.	DNA occurs in nucleus, nucleolus, and extrachromosomal DNA in mitochondria and chloroplast.

## Types of RNAs:

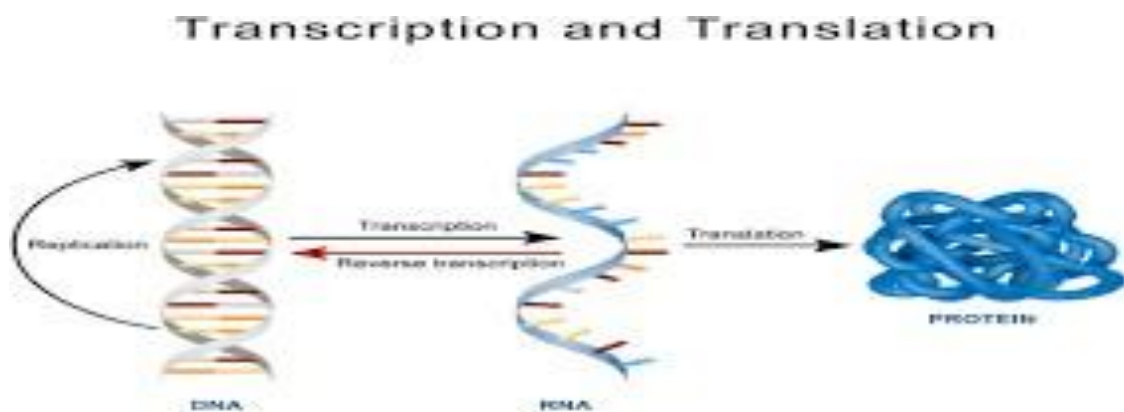
There are three types of RNA: mRNA, tRNA, and rRNA. mRNA is the intermediary between the nucleus, where the DNA lives, and the cytoplasm, where proteins are made. rRNA and tRNA are involved in protein synthesis. Additional RNAs are involved in gene regulation and mRNA degradation.



Types of RNA	
RNA Type	Function
mRNA (mature RNA)	Shuttles the genetic code from DNA to ribosomes for translation
tRNA (transfer RNA)	Helps synthesize protein by providing a source of amino acids
rRNA (ribosomal RNA)	Associates with proteins to form ribosomes where proteins are translated
snRNA (small nuclear RNA)	Combine with proteins to form snRNPs to process premature RNA into mRNA

## Protein Synthesis:

Protein synthesis is the process of creating protein molecules. In biological systems, it involves amino acid synthesis, transcription, translation, and post-translational events.



## TRANSCRIPTION:

- The first step in using the information stored in DNA to produce proteins is transcription - using DNA as a template to make RNA..
- Transcription involves 4 steps
- Initiation
- Elongation
- Termination
- Processing

## TRANSLATION:

- The synthesis of proteins occur at ribosomes.
- The mRNA connects with the ribosome and the amino acids attached to tRNA are delivered one by one.
- Protein synthesis or translation takes place in 3 steps.
- Initiation - A ribosome, mRNA and tRNA come together to form a complex
- Elongation - Amino acids are joined to the growing polypeptide chain.
- Termination - The protein has been synthesised and the ribosome, mRNA, tRNA complex disassociates.

## GENETIC CODE:

- The ribonuceotide sequence in a mRNA chain is like a coded sentence that, specifies the order in which amino acid residues should be joined to form a protein.
- Each word or codon in the mRNA sentence is a series of 3 ribonucleotides, that code for specific amino acid.
- For example; The series Uracil- Uracil-Guanine (UUG) on an mRNA chain is a codon directing incorporation of the amino acid - Leucine into a growing protein chain.

## REVIEW QUESTIONS

1. Which of the following nitrogenous base is not present in DNA  
a. Thymine   b. Uracil   c. Cytosine   d. Guanine
2. What should be the complementary strand of 3'.....ATGGCTTGA.....5'? [   ]  
a. 3'....TACCGAACT...5'  
b. 5'....TACCGAACT....3'  
c. 3'....TAGGCAAGT...5'  
d. 5'....TAGGCAAGT...3'
3. The components of DNA nucleotides are [   ]  
a. Phosphate, deoxyribose and nucleotide   b. Phosphate, ribose, pyrimidines,

purine

c. Phosphate, deoxyribose, pyrimidines, purines    d. Phosphate, ribulose & nucleotides

4. Which of the following RNAs are the most abundant in an animal cell?

a. mRNA   b. tRNA    c. rRNA    d. miRNA

5. Major replication enzyme is

a. Helicase   b. Gyrase   c. RNA polymerase   d. DNA polymerase

6. Termination of replication is triggered by

b. DNA polymerase   b. Helicase   c. SSB   d. Tus protein

7. DNA replication always occurs in which direction

a. 5'-3'   b. 3'-5'   c. 5'-2'   d. any random direction

8. rRNA molecules are synthesised in

a. Cytoplasm  
b. Ribosomes  
c. Nucleolus  
d. Nucleus

9. Unusual bases are common in

a. mRNA  
b. tRNA  
c. rRNA  
d. DNA

10. Enzymes important for transcription are ?

a. RNA pol  
b. DNA pol  
c. Topoisomerases  
d. Ligases

ఒకం' రసన నన న్నరవ రంచే కణంలు కలిసి ఒక కణజాలం' ఏరప రంకరం  
యి

- **Organ system:** అవయవ వయ వ్యవస్థ

a group of organs working together to perform a particular function

ఒకే విధమైన నన రవర చే అవయవ కలిగి  
అవయవ ము  
వంను

ఏరప రుర యి

- **Prokaryotes: కంంఫరక పారవ జంవంలు**

Typically, unicellular micro-organisms that lack a distinct nucleus and membrane bound organelles

కంంఫరకమం లంపంచంన జంవంలను కంంఫరక పంRరవ జంవం

లు అంంటంరు ఈ జంవంలలో  
జనంయ రదారంం డిఎనంప లేదా ఆరం ఎన్ ఎ వలయంలంగా  
ఉంంటంంది కంంఫరక తీవ చం  
ఉంండదు ఉదంహరణ బ్యయ టీరయా వంర త

- **Eukaryotes: నిజ కంంఫరక జంవంలు**

Organisms having cells each with a distinct nucleus with in which genetic material is contained.

జనంయ రదారంం న్నం రత్ వంమోజోమంల పై  
ఉంంటంంది వంమోజోమంల నీ కంంఫర

తంవమంతో ఆవరంచబడి కంంఫరకమం గా ఏరప డి ఉంంటంయి  
ఇట్యం

కంంఫరక హతకణమంలను జ కంంఫరక క కణ మంలంగ పంరంక  
ంంటంరు ఉదంహరణ అమీబయ పారమీషియం

- **Membrane: తవ చము**

A thin sheet of tissue or layer of cells acting as a boundary, lining or partition in an organism.

జీవి లోన్ వరతి కణమంను ఆవరంచి ఉనం రలంంచన హొర  
అంంటంరు

- **Unicellular organisms: ఏకకణ జీవులు**

consisting of single cell.

Example: protozoa

శరంరమంతా ఒకం కణమంతో ఏరప డిన జంవంలను ఏకకణజంవంలు  
అంంటంరు ఈ జంవంల శరీరము కణమంలను కలిగి ఉండకపోవడం  
వలన వీటజీవులు అనన కూడా అంటారు

ఉదంహరణ వంపంటంజంవా

- **Multicellular organisms:**



**బహుకణ జీవులు**

**నాకణ**

organisms consisting of more than one cell

Examples: Annelids, Arthropods, Molluscs, Chordates

ఉ

Cytoplasm is a thick solution that fills each cell and is enclosed by the cell membrane. It is mainly composed of water, salts, and proteins. In eukaryotic

టారు

భిన్న రకములైన కణజాలతో ఏరప డిన కణజాలము ను

వశిష్టతీయ కణజాలంతారు

- **Locomotion:** చలనము

movement of organism from one place to another place.

ఒక వీరదంశము నుండి మరొక వీరదంశమునకు  
కరలికను చలనం అంటారు

జంతువులు

- **Epithelial tissue: ఉపకళాకణజాలం**

A sheet of cells usually covering external or internal surfaces of the body.

ఉరకళా కణాల తో ఏరప డిన కణజాలం' ఉరకళా కణజాలం అంటారు

- **Nervous tissue: నాడి కణజాలం**

a tissue made of nerve cells.

నాడం కణాల తో ఏరప డిన కణజాలం' నాడం కణజాలం అంటారు

- **Peristaltic movements:** క్ కరలక  
పంరం' లం

Peristalsis is **involuntary contraction and relaxation of the muscles of the alimentary canal** which contract rhythmically in order to push the food forward.

ఆహారము ఆహార నంళము లం' పరవంశంంచంన త్రంవంత చంపంచం'త్రంగ కరలికలను పెరరీ ల' కరలికలు అంటారు

- **Acoelomate: శరీర కుహరరహితం**

organism without coelom.

శరంర జంరణ నంళము నకక మధ్య ఎటవంట్ కకహరము లే యండల దంసన న శరక హర రహితం అనన చరెప వచు ను ఈ జీవంల శరరము నండు తో

,వంలంరల ఉరకళా కణజాలము తో ఆవరంచబడం'న న జమం' న శరంర క్కహరము ఉండదు

ఉదాహరణ పం హలెలిమ ంసత జీవంలు

- **Asexual: అలంగికము**

**not involving the fusion of male and female gametes**

ర, పంరుప బంజకణంలు ఏరంప టతో అలంగిక  
ంంబంధం'ము లేపరతంయ తథ తం'  
పరతంయ తంప తం' అంటారు

- **Cellular grade: కణ య**

pertaining to or consisting of cells

Example-Porifera

డి ఉందిడంయనం. వీట్రీకణాలు కలిసి కణజాలము ఏరప డలేదు .కనుక ఈ జీవంలను కణ రథ యిజీవులుఅందురు

# ○○○ಜಿಕ್ಕಲು

జీవి ఏరప  
డేవరకక జరగే

నంది హత్య లాషన్స్ ఆ జీవి జీవిత చరణ్  
అందింటారు

కణమంబుల చేతను వండురల చేయుబడిన నీసరంబు రదాధి నీసంబు మాదంబుక  
అంటుంటారు

కరబ న రరమాణువుల తో ఏరప డిన అణువంశాలను సంఘదీయ  
అణువంశాలు

కరబ న రరమణంవంకల లక్ష్మి ంంంంం'షం' అణువంకలు సంంహదీయ  
అణువంకలు

ఒక జాతీయ శరంఁరమంఁ3లో లో జరగే అష్టంఁ0' రకంఁ0ల రరయంఁ0 క చరయ లను ఆ



జీవీ యజ్ఞం వర్ణం యలు అంఠం ఠంఠిరు

- **Taxonomy: వర్ణం కరణ శాస్త్రం**

study of classification and nomenclature.

వివిధ జీవజన్తుల వర్గీకరణ మరియు పేర్ల వ్యవహారం  
మరల జీవజన్తుల వర్గీకరణ మరియు పేర్ల వ్యవహారం  
జీవజన్తుల వర్గీకరణ మరియు పేర్ల వ్యవహారం

- **Phylogeny: పైలోజెని**

evolutionary history of an organism.

ఒక జీవి యొక్క జీవిత చరిత్ర ఆ జీవితం యొక్క వర్గీకరణ చరిత్ర అవసరం

- **Biotic factors: జీవ కారకాలు**

all living things (ex: plants & animals)

రకమైన వర్ణంలో జీవమయ కారకాలను జీవ కారకాలు అంటారు

- **Abiotic factors: నిరీవ కారకాలు**

All nonliving things (Example: pH ,soil,temperature,water etc.)

రహిత వర్ణంలో జీవము కారకాలు అంటారు  
నిరీవ కారకాలను నిరీవ

- **Biome: బయోమ్**

a specific environment that home to living things suited for that place and climate.

జీవజన్తులు జీవించే ప్రదేశం అనగా వాతావరణం కలిగిన రహిత వర్ణం అంటారు

- **Cell theory: కణ సిద్ధాంతం**

a theory states that living things are composed of one or more cell  
జీవజన్తులు ఒకటి లేదా అనేక కణాలతో ఏర్పడతాయి.  
కణ సిద్ధాంతం ప్రకారం జీవజన్తులు కణాలతో ఏర్పడతాయి.

ఈ సిద్ధాంతం ప్రకారం జీవజన్తులు కణాలతో ఏర్పడతాయి.  
రకమైన కణాలు ఉంటాయి. ఒకే విధమైన కణాలు ఉంటాయి.  
కణజాలమును ఏర్పరచును

- **Adipose tissue: నిలవ కొవ్వు కణజాలము**

body tissue used for the storage of fat.

శరీరంలో అరనపు కణజాలమును నిలవ కొవ్వు కణజాలము

ఆడిపంత్ కణజాలము అంటారు

- **Macromolecules:** ాథ ల అణువులు

big and complex molecules that form living matter.

(Example -proteins, carbohydrates, lipids)

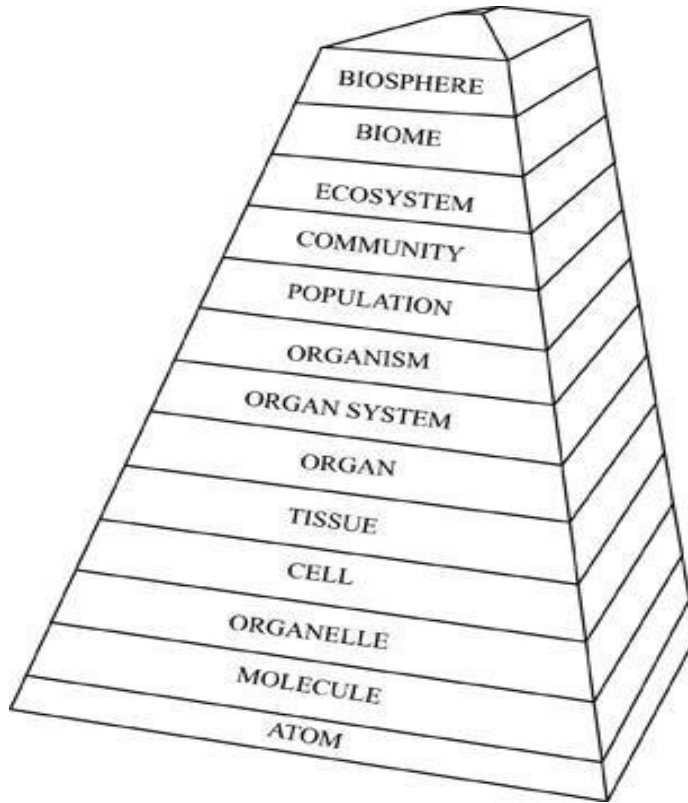
జంఁవం3ల శరంరంఱో ంహజం0గా ఉం0డంనట్టం రరయ్ క అణువం3లను మాప్ం

మాలికూయ లం అందురు

- **Enucleated cells:** కంంఫరక రహంత్కణలు

cells without nucleus.

కంంంఫరకమం3 లే కణంలను కంంంఫరక రహంత్ కణంలు అంందురు



**Basic organization of life**

**Topic: Proteins**

- **Physiology:** శరంరధరమ శా్ంము

The study of the functions of the organs and the organ systems of the living organisms

చంఁయడంఁగఁం' శరంఁర ధర్మ శాఁంఁమః అంఁరిటంఁరు

- **BMR (Basal Metabolic Rate):** ఆధార జీవద్ం'య రేటు

The energy output of the body under basal conditions (standard conditions) is called basal metabolic rate

నానరప                      లలో జంపంబలు                      మంబలో ఉతంప                      ఆ జీవి యంబు  
ం                      శరంర                      తంబు  
రరసిత్మ చంయగలిగంన శం  
ఆధార జంపంబుయ రీట అంబంబు

- **Proteins: ముఖ్యమైన తాగలు**

A compound of Carbon, Hydrogen, Oxygen and nitrogen (some proteins contain Sulphur and Phosphorus) built of units called amino acids

అమం నో ఆమ్మల చీతం మ  
రమ  
ంంచబడంన ంంంంశుంట్వారు

ం' సంపదీయ అణువంలను  
మంంంంకంతంంంలు

- Amino acids: అమైనో ఆమ్లాలు

These are the derivatives of the organic acids containing at least one carboxyl (COOH) group and one or more amino group (NH) groups

పాపం హం నం హి ప ర్మమ ఇం లో అమం నో ఆమా లను కటడప్ప ర్మళలూ గా  
పంరంక  
ంంటంరు పేరతి అమంనో  
అమంంం ఒక కర్రమ బ ంంం ల' ప్ంRపంను ఒక అమం నో ప్ంRపంను కలకిగి  
ఉంంటంంది

- **Anabolism: అనాబాల్టిజం**

It is a building up process of metabolism by which protoplasm is produced from the simple food molecules

ఇదీ ఒక స ర్వమ ంంతర్మ క వ్యంయ. అణువంశల ఈ వ్యవ్యంయలో  
నంశంశి జంవరదారతయ రుచంయబడును

- **Antibody:** ధృపి దృహము

A substance produced in the blood to combat bacteria and virus

శరంరంలో వీరవంశంంచే హంస కర వందేశీ రదాధిలను ఎదర్క ను  
వీపంహంనంలను వీరతి డోలుఅంటారు

- **Biuret test:** బైరెయంరట్ పరం

It is a test for native proteins and peptones

నమంRనం<sup>లో</sup> చు రరీక్ష  
షేపంహంనం3లను  
గంరం

- **Casein: కసీన్**

It is a milk protein

పంలలంషే షేపంహంన్ కసీన్ అంంటంరు

- **Conjugated proteins: ంంంయంగంమ ధీటీనంలు**

These are formed when simple proteins combine with some non-protein component.

Example-Nucleoproteins

ంంంం ంగమ , షేపంహంన్ తో కలిసి ఉండును  
షేపంహంనం3ల లో కంనం  
షేపంహంన్ రదంరం రదంరం

- **COOH group (carboxylic acid group): కంార్బం ంం లట్ వరం**

carboxylic acid is an organic acid that contains a carboxyl group attached to an R-group.

అమం నో ఆమం లు ఒకవం పు కార్మబ ంంం ల' వంనం  
మరంకవం పు అమం నో  
వంనంకలకి  
ఉంంంంనం3. కార్మ బ  
ంంం

ల' ఆమంంం ఒక సంందీయ ఆమంము .దీనంలంషే కార్మ బ  
ంంం ల' వంమంయంంంహ వరంతో కలం3రబడి  
ఉంంండును

- **Deamination: డీ అమై నేషన్**

The removal of amino group from the amino acid

అమం నో ఆమంంం తొలగించబడుటను డీ అమై నేషన్  
నంంంండి అమం నో  
వరంటారు

- **Decarboxylation: డీకంార్బం ంం లంషన్**

The removal of carboxyl group from the amino acid

అమం నో ఆమం నంంంండి తంలగంంంచబడుటనం3 డీకార్మ బ  
కార్మబ ంంంలేషన్  
ంంం ల' వరంటారు



- **Derived proteins: ఉతప నన ధిలీనలు**

These are derived by the hydrolysis of proteins by enzymes or by the action of some other agents on proteins

Example-Peptones and proteoses

ప్రపంచంలోని అన్ని జీవులలో  
ఎంజైమలు  
జలవిశ్లేషణ

అధునికంగా ఏర్పడిన రసాయన శాస్త్రం  
పరిశోధనలు

- **Essential amino acids-ఆవశ్యక అమైనో ఆమ్లాలు**

The amino acids which cannot be synthesized by our body. Hence, they must be obtained through our diet

ప్రకృతిలో లభించే 20 అమైనో ఆమ్లాలు లో 11 ఆవశ్యక రకాలను  
చేర్చుకుని తీసుకోవడా అవసరం. ఇవి ఆహారము ద్వారా మానవ శరీరంలోకి చేరుతుంది.  
చూడండి

- **Non -essential amino acids: అనవశ్యక అమైనో ఆమ్లాలు**

The amino acids which can be synthesized by our body

అనవశ్యక అమైనో ఆమ్లాలు శరీరమునందు  
అవసరమైన మేరకు ఉత్పత్తి అవుతుంటాయి

- **End products: అంతిమ ఉత్పత్తినాలు**

The final product formed as a result of enzyme activity

ఎంజైమలు చర్యల ఫలితంగా చేర్చుకోవడా ఏర్పడిన  
రసాయన అంతిమ ఉత్పత్తినాలు

- **Fibrin: ఫైబ్రిన్**

It is an insoluble protein which is formed from fibrinogen while the blood is coagulated

రక్తం యొక్క ఘనీభవన కారణంగా తీడప డే ఫోహెను

- **Fibrinogen: ఫైబ్రినోజెన్**

It is a plasma protein which takes part in the coagulation of blood, forming fibrin

రక్తం యొక్క ఘనీభవన కారణంగా తీడప డే ప్రోథోమిన్ పోషకము

- **Hydrolysis: జల విశ్లేషణ**

A chemical reaction in which water is used to break down a compound.

- **Hydrophilic:(water-loving) జల విశ్లేషణ**

having an affinity for water; capable of interacting with water through hydrogen bonding.

నీటి యొక్క తన కలిగి ఉండడం

- **Hydrophobic: (water fearing) జల విరోధ**

Hydrophobic compounds do not dissolve easily in water and are usually non-polar.

నీటి వ్యతిరేక యొక్క భావనను కలిగి ఉండడం

- **Kwashiorkor: కావ పియారక ర్ వాయ ధి**

It is a clinical syndrome produced by protein-calorie malnutrition

ప్రోటీన్-కాలోరి లోపం వలన కలిగే వాయ ధి

- **Keratin: కెరటిన్ టిన్**

It is a scleroprotein neither soluble or digestible (important component of hair, feather, nail etc.)

వ్యతిరేకకలు, గోలు ఉండే ఆ ప్రోటీన్-కాలోరి మాలిషన్

- **Mucin: ముయ సిన్**

A glycoprotein of saliva

లాలజలలో ప్రోటీన్-కాలోరి  
యొక్క అం

- **Myosin: మ్యుయ సిన్**

A muscle protein helping in muscle contraction

కండ్రోమల లో గల ప్రోటీన్-కాలోరి

- **Malnutrition: ఆహార నయ య నత**

A pathological condition resulting from a relative or absolute deficiency or excess of one or more essential nutrients

ముతలయ ఆహార లోపం య ఆహార నయయ నత్ అంటారు

- **NH<sub>2</sub> group (amino group) అమిన్ గ్రూప్**

An amino acid is an organic molecule that is made up of a basic amino group (–NH<sub>2</sub>)

అమిన్ ఆమిన్ ఒకవం ప్ కండ్రోమల లో వున్న మరొకవం

పుఅమిన్ వున్న

కలిగి ఉండును

- **Peptide bonds:** బంధాలు పెప్టైడ్

In proteins amino acids attached together by peptide bonds

ప్రోటోహొనంల లో గల అమోనో ఆమ్లాలు బంధాల దావ రమ కలురబడి ఒకదంట్ తోఒకట పెపంం డొండను

- **Poly peptides:** పాలీపెప్టైడ్

Multiple amino acids joined by peptide bonds are called polypeptides

ప్రోటోహొనంల లో గల అమోనో ఆమ్లాలు బంధాల దావ రమ ఒకదంట్ తోఒకట పెపంం డొండ కలురబడిన డం వలన య గొలంసంలు ఏరప డును పాలీపెప్టైడ్

- **Proteolytic enzymes:** ప్రొటోలైటిక్ ఎంజైమ్

మలు Proteolytic enzymes (proteases) are enzymes that break down protein Example-Papain, Pepsin, Trypsin etc

ప్రోటోహొన్ లనం జంరమ చీ ఎంంజైమంలను ప్రొటోలైటిక్ ఎంంజైమంలు అంటారు

- **Transamination:** ట్రాన్సామిన్ అమనంషన్

The transfer of an amino group from one amino acid to a keto group

అమోనో ఆమంం కటం వంనం బదిలం కంవడంం టంం నంంండిఅమోనో ష్టంంంం వరమంషన్ అంటారు అమై

- **Primary proteins:** ప్రాథమిక నిర్మాణ మణ ప్రొటీనాలు

Protein structure is a sequence of amino acids in a chain.

అనీక అమోనో ఆమంంం ష్టంంం వరంంలో కలరటంం వలన ప్రాథమిక ష్టంంంం ఇం ప్రొటోహొనంంం ఏరప డతాయి

- **Secondary proteins:** ద్వితీయ నిర్మాణ మణ ప్రొటీనాలు

Protein structure is formed by folding and twisting of the amino acid chain.

ష్టంంంం వరంంం గా డనం అమోనో ఆమంంం గంంంం ష్టంంంంంలో మంంంంం రంంంంం అమైన్ ఆమంంంం పంనరమ మంంంంంంంంం

- **Tertiary proteins:** త్రితీయ నిర్మాణ మణ ప్రొటీనాలు

Protein structure is formed when the twists and folds of the secondary structure fold

again to form a larger three-dimensional structure.

పేపర్ నన గొలంసంలు ఉనం తంరథ యంలో  
హంన పంలీ మండతం రడం R -  
లో పెప  
ంంం డ్

ంమండాయంలను న్నరపం రరంతంలో కలగి  
ఉంటాయం. అమం నో ఆమమ  
ంమయోజనీయ బంధుమ లు ఏరప డతాయి

- **Quaternary proteins:** చతంగరం|నరీబ మ ఇ డ్టినాలు

Protein structure is a protein consisting of more than one folded amino acid chain.

పేపర్ హంనంంంపత రరీమకంషం రథ యంప పంంందంన ప రీమమ ఇ  
పేపర్ హంనంంంచతంగరంప రీమమ ఇ రకంపం  
చంంందంతా ప ఉరరమాణంలు వలన లవణ లేదా  
యం వంధుయ త్ ఆకరణ  
పేపర్ హంనలో  
హైపంజన్ బంధుల తావ న్నన పొందుతాయి  
వలన కలంగరబడి సరీథ

- **Zwitter ions:** జవ వ  
టార్అయం

A zwitterion is an ion that contains two functional groups. In simple terms, it is as ion possessing both positive and negative electrical charges.

ధన ంత్మ క మర ంత్మ క ఆవంశము కలగింన అయానులు  
అయంయ ను లనంం జుటత్ంంంంంం

## **Topic - INVERTEBRATES- అకశ్లరంగకంాలు**

(NON-CHORDATA)- వెనన నముక లేకుండ ఉనన జీవులు

➤ lacking spinal column/ non-chordates are animals without a notochord.

### **1. Protozoa ---- ఏకకణ మ జంవాలు**

Single celled organisms have only a single cell.

In unicellular organisms, all functions like-

Digestion-- జంరీయ, respiration-- శ్వాస ంయ, Reproduction --  
డపతాయ తప ం  
are performed by a single cell.

ఈ జంవాల లో శరీరము ఒక కణమంచత ఏరప డంగం. ఈ కణమే జంరీ  
య,



శావ ందేయ, దీపతాయ తప ంమూరలన అనిన  
జంవదనంయ  
లను

నరీరవ రంం

## ❖ Cellular level-- శరీర యి

చు ను

The cellular level is the core of body's health, which makes up entire body, and allows body to function.

## 2. Phylum-porifera- పోరేరా కలు

pore bearers, organisms that having numerous pores on the body and the distinctive canal system

శరీరము రంధ్రములను కలగల ఉండాలే ,కుల వయ ఉండుటే ఈ వంశముల పధాన లక్షణము

Example

Sycon –

సైకాన్

Euspongia— రూపంజంయా

## ❖ Tissue level-- కణజాల స్థాయి

- Tissue is a cellular organizational level between cells and a complete organ.

## 3. Phylum cnidaria—నిడేరియా

"Cnidos," meaning "stinging needle."

వంశాలమం న జరర పరంరణ క్కహరం,రంశకణాలు ఈ జంపంల పరధంన లక్షణము

Example

Aurelia-జెలీం ఫిష్

pennatula -ంమంప

కలమం.

## 4. Phylum-Platyhelminthes-- ప్లాటెలంథీటమం / బలపరాపురంగులు

- usually flattened body, comprising the flatworms.
- శరీరము రక్త సం ఉరర పరీరతం లలో అణచబడి ఉండును మర చిచాలా వరకరమ న్న జీవులు

Examples

Fasciola, -- లంఘనం OR

taenia solium—బదిరి పురుగు

## **5. Phylum-Nematoda-- నీసమట్టాడ / నల్ల ట పురంగాలు**

- "Nemos," which means "thread" and includes roundworm/ elongated cylindrical worms parasitic
- గుండ్రమైన శరీరము కలిగిన కలిగిన పండ్లు

Example

Dracunculus-- నార పురుగు

Ascaris-- ఆస్కరీ రత

## **6. Phylum-Annelida--అనల లటడా**

- a large phylum of animals comprising the segmented worms
- శరీర ఖండాలైన కలిగిన పండ్లు ఈ జీవుల

ఉదాహరణ Example

Aphrodite-- ముప్పిరి

ఎలక Hirudinaria-- జలగ

## **7. Phylum -Arthropoda ఆర్థ్రోపాడా**

- Animals that have a segmented body and jointed appendages
- జంతు రూపము లో . పండ్లతో కలిగిన అంతర్గత వరములతో ఉరయంగులు ఈ జంతుల లక్షణం

Example

Cancer—కీళ్లు

Palaemon-- రాయి

## **8. Phylum-Mollusca—మలీకు**

- with a soft unsegmented body usually enclosed in a calcareous shell.

- మృదువైన శరీరమ న్నన కవుప తూ కరప రము ఉండటం ఈ జీవులలక్షణం

Example -Pila globosa-- ఆపల నత్త

chiton—ఖిం టాన్

## **9. Phylum-Echinodermata-- ఇఖ్ఠిరేమ**

- Echinodermata --spiny skin (from the Greek "**echinos**" meaning "spiny" and "**dermo's**" meaning "skin").
- పంR ంముప్ర జంవులం3, కూడిన చరమ మ న్నన కలిగి ఉండును  
ర మం3ళతో

గా

Example

Cucumaria-- కక కక య మేరయా

Ophiothrix—పెళత నక్షవు

## GLOSSARY =

### A

#### **Analogous Characters =**

They denote similarity in function without necessary anatomical similarity (wings of birds and butterflies).

Example - bird and butterfly wings (here, same function).

#### **Assortative mating =**

It is a selective mating/ non-random mating within their population.

Example - tall men marry tall women, short men marry short women.

#### **Anticoagulants =**

These are the substances that prevent the coagulation of blood when blood flows through blood vessels. Ex: Heparin.

Example - heparin is used to prevent blood clotting in blood vessels.

#### **Articular cartilage =**

It is the cartilage found at the free surface of long bones that forms joints.

Example - articular cartilage is found in the knee joint.

#### **Amphids =**

They are the cuticular depressions present on the lips surrounding the mouth in the nematodes. They are well developed in free living nematodes and serve as chemoreceptors.

Example - amphids are present in the head region of nematodes, where they serve as chemoreceptors.

#### **Autotomy =**



It is the process of voluntary breaking of the injured part of the body (self mutilation or amputation).  
It is a device developed to protect the body from the enemies and parasites as seen in the Echinoderms.

It is a process by which an organism can regenerate a lost part of its body (e.g. a lizard can regenerate a lost tail). The process is called autotomy. It is a defense mechanism in which an organism can escape from its predators by voluntarily breaking off a part of its body.

### Atrium = atrium

One of the chambers of the heart/ the tympanic cavity of ear/ the spacious ectoderm-lined cavity enclosing the pharynx in most tunicates and cephalochordates is Atrium.

The atrium is a chamber of the heart. It is a cavity in the body wall, lined by ectoderm, which encloses the pharynx. It is a part of the circulatory system. It is a part of the digestive system.

### Acrodont = acrodont

Having teeth attached to the edge of the jawbone without sockets.

Acrodont teeth are found in some fish, amphibians, and reptiles. They are not attached to the jawbone by sockets. They are attached to the edge of the jawbone.

### Alveolus = alveolus

A small cavity or a pit, such as a microscopic air sac of the lungs, terminal part of an alveolar gland or bony socket of a tooth in the jaws of mammals and crocodiles

The alveolus is a small cavity or a pit. It is a part of the respiratory system. It is a part of the digestive system. It is a part of the circulatory system. It is a part of the excretory system.

### Amplexus = amplexus

The capulatory embrace of frogs or toads during which the male and female shed their gametes

Amplexus is a behavior in which a male frog or toad wraps its arms around the neck of a female frog or toad. This is a part of the reproductive process. It is a part of the mating process.

### Allantois = allantois

It is one of the four extra-embryonic membranes of the amniotes. It participates in respiration and excretion in sauropsids and also in the formation of placenta in most of the therians.

The allantois is a part of the extra-embryonic membranes. It is a part of the respiratory system. It is a part of the excretory system. It is a part of the circulatory system. It is a part of the digestive system.

### **Amnion =**

It is the innermost of the extra-embryonic membranes. It is a fluid filled sac enclosing the embryo in the amniotes. It is protective in function (protection from shock and desiccation).

It is the innermost of the extra-embryonic membranes. It is a fluid filled sac enclosing the embryo in the amniotes. It is protective in function (protection from shock and desiccation).

### **Altricial hatchling =**

It is the hatchling of carinate bird which is 'incapable of moving around on its own soon after hatching'.

It is the hatchling of carinate bird which is 'incapable of moving around on its own soon after hatching'.

### **Abscess =**

A wound consisting of a localized collection of pus surrounded by inflamed tissue.

A wound consisting of a localized collection of pus surrounded by inflamed tissue.

### **Abuse =**

Improper or excessive use

Improper or excessive use

### **Alkaloid =**

Natural bases containing nitrogen, found in plants. Ex: Quinine

Natural bases containing nitrogen, found in plants. Ex: Quinine

### **Alveoli of lungs =**

Tiny sacs for holding air in the lungs in which the exchange of gases takes place

Tiny sacs for holding air in the lungs in which the exchange of gases takes place

### **Anabolic steroids =**

Technically known as anabolic-androgen steroids (AAS) or colloquially as 'steroids', are the drugs that mimic the effects of 'testosterone and Di hydro testosterone in the body'. They increase protein synthesis within cells, which results in the build up of cellular tissue (anabolism), especially in muscles.

the blood. The deficiency of red blood cells or haemoglobin (protein in the blood) is called anaemia. The deficiency of appetite is called anorexia. The deficiency of blood in the abdomen is called anaemia.

**Anaemia =** [an-] [i-] [a-] [m-] [i-] [a-]

Deficiency of red blood cells or haemoglobin

an- (not), i- (blood), a- (deficiency), m- (blood), i- (blood), a- (blood).

**Appetite =** [ap-] [p-] [e-] [t-] [i-] [t-] [e-]

A feeling of hunger

ap- (to), p- (to), e- (to), t- (to), i- (to), t- (to), e- (to).

**Abdomen =** [ab-] [d-] [o-] [m-] [e-] [n-]

Third or posterior division of an insect

ab- (back), d- (down), o- (down), m- (down), e- (down), n- (down).

**Antenna =** [an-] [t-] [e-] [n-] [a-] [n-] [a-]

A sensitive feeler from the animals head; tactile and olfactory in function

an- (not), t- (to), e- (to), n- (to), a- (to), n- (to), a- (to).

**Appendage =** [ap-] [p-] [e-] [n-] [d-] [i-] [j-] [e-]

A movable projecting part of the body; modified appendages of mouth parts

ap- (to), p- (to), e- (to), n- (to), d- (to), i- (to), j- (to), e- (to).

**Arolium =** [a-] [r-] [o-] [l-] [i-] [u-] [m-]

A soft hairy pad between claws in the leg of cockroach

a- (not), r- (to), o- (to), l- (to), i- (to), u- (to), m- (to).

**Arthropod =** [ar-] [t-] [h-] [r-] [o-] [p-] [o-] [d-]

A phylum of segmented invertebrates with jointed legs.

Arthropods include insects, arachnids, crustaceans, and myriapods.

**Autecology** = autecology

Ecology of individual species

Autecology is the study of the relationship between an individual organism and its environment.

**Acid rain** = acid rain

Acid rain is a rain or any other form of precipitation that is unusually acidic.

Acid rain is caused by emissions of sulfur dioxide and nitrogen dioxide from various sources such as fossil fuel combustion and industrial processes.

**Algal bloom** = algal bloom

An algal bloom is a rapid increase or accumulation in the population of algae (typically microscopic) in an aquatic system.

Algal blooms can be harmful to humans and other animals if they produce toxins or if they deplete the oxygen in the water.

**Adenoids** = adenoids

A mass of lymphoid tissue present in the nasopharynx, also called pharyngeal tonsil.

Adenoids are part of the immune system and help to fight off infections.

**Ameloblasts** = ameloblasts

The epidermal cells that secrete the enamel of teeth

Ameloblasts are found in the enamel organ of the developing tooth.

**Alveoli** = alveoli

Thin walled, irregular, highly vascularised bag like structures that form the sites of exchange of gases in the lungs

Alveoli are the site of gas exchange in the lungs. They are small, thin-walled sacs that are surrounded by a network of blood vessels.

**Auricular appendix** = auricular appendix

A small conical ear-shaped pouch projecting from the upper anterior portion of each atrium of the heart, increasing slightly the atrial volume

These pouches are called auricles and are situated on the upper anterior surface of the heart.

**Atrial natriuretic peptide (ANP) =** [cardiovascular hormone](#)

It is the peptide hormone secreted by the wall of the right atrium, when the blood pressure increases (wall of the right atrium is stretched). It is a vasodilator and thus lowers the blood pressure. It is involved in the homeostatic control of fluids in the body countering the effect of aldosterone.

ANP is secreted by the right atrium in response to increased blood volume and pressure. It acts on the kidneys to increase the excretion of sodium and water, thereby reducing blood volume and pressure.

**Acetabulum Cup =** [hip socket](#)

It is like hollow on each side of pelvic girdle into which head of femur fits

The acetabulum is a cup-shaped socket in the pelvis that articulates with the head of the femur.

**Acromion process =** [shoulder blade](#)

Point of attachment of clavical to scapula in the pectoral girdle of mammals

The acromion process is a bony projection on the scapula that articulates with the clavicle.

**Amphiartroses =** [slightly movable joints](#)

Slightly movable joints of vertebrates

Amphiartroses are joints that allow limited movement between the vertebrae.

**Adrenergic nerve fibres =** [sympathetic nervous system](#)

Nerve fibres that release adrenaline at their terminal ends

Adrenergic nerve fibers are part of the sympathetic nervous system and release the hormone adrenaline at their terminal ends.

**Amygdala =** [limbic system](#)

This is the part of the telencephalon, located in the temporal lobe. It is involved in memory, emotion and fear essentially acting as the 'Brain's warning centre'. This is a component of the limbic system.

characterized by the presence of the disease, usually, the disease, which is not the disease. The disease is not the disease, the disease is not the disease.

### Acromegaly = [acromegaly]

An abnormal growth, especially of the bones of the face and extremities associated with the over secretion of the pituitary growth hormone after reaching adulthood. It is also called disproportionate gigantism. It gives a gorilla like appearance to the affected person.

The disease (acromegaly) is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system.

### Androgens = [androgens]

Androgens are the generic term for any natural or synthetic compound, usually a steroid hormone that stimulates or controls the development and maintenance of male characteristics in vertebrates.

The disease (androgens) is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system.

### Amenorrhea = [amenorrhea]

Absence of menstrual period/ menstruation in women of reproducible age

The disease (amenorrhea) is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system.

### Amniotic sac = [amniotic sac]

The amniotic sac is the extra-embryonic sac filled with amniotic fluid (liquor amnii). Amnion surrounds and protects the embryo from shock/ injury and also provides a watery bag in which free movements of the foetus during the later stages of pregnancy are facilitated.

The disease (amniotic sac) is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system.

### Agglutinogens = [agglutinogens]

An antigen that stimulates the production of a particular agglutinin, such as an antibody

The disease (agglutinogens) is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system. The disease is a disease of the endocrine system, which is a disease of the endocrine system.

### Aneuploid = [aneuploid]

Having a chromosome number that is not an exact multiple of the haploid number of the species

Polyploidy is a condition in which an organism has more than two sets of chromosomes. It can occur naturally or be induced artificially. Polyploidy is common in plants and some animals, but it is rare in humans.

**Antiserum =** Serum

Antiserum is the blood serum containing antibodies against a specific antigen, used to treat or provide immunity to a disease. It is extracted from an animal that was artificially made to develop antibodies and thus a specific immunity to a particular disease.

Antiserum is a liquid that contains antibodies. It is used to treat or prevent disease. It is made from the blood of an animal that has been infected with a specific disease. The antibodies in the antiserum will attack the disease-causing agent.

**Actual remains (unaltered fossils) =** Fossils (preserved remains)

Fossils of the actual animal or animal parts trapped in amber, ice, etc., like woolly mammoth in ice in the Siberian snow lands, insects in amber (a plant resin) etc.

Fossils are the remains of plants and animals that have been preserved in the earth's crust. They can be found in rocks, soil, and other natural materials. Fossils are important for understanding the history of life on Earth.

**Archipelago =** Islands

A group of many islands in a large body of water

An archipelago is a group of islands in a body of water. The word comes from the Greek words 'archi' (chief) and 'pelagos' (sea).

**Adjuvant =** Enhancer

An immunologic adjuvant is a substance that acts to accelerate, prolong or enhance antigen specific immune responses when used in combination with specific vaccine agents.

Adjuvants are substances that are added to vaccines to help the immune system respond more effectively to the antigens. They can be made from various sources, including plants, animals, and minerals.

**Aneurysm =** Swelling

Ballooning of an artery / vein or a part of heart due to weakening of their walls

An aneurysm is a swelling or bulge in the wall of a blood vessel. It can occur in any part of the body, but it is most common in the heart and arteries. Aneurysms can be life-threatening if they rupture.

**Apoptosis =** Cell death

A form of cell death in which a programmed sequence of events leads to the elimination of cells without releasing harmful substances into the surrounding area.

एक प्रकार का कोशिका मृत्यु, जिसमें एक प्रोग्राम्ड सीक्वेंस ऑफ़ इवेंट्स कोशिकाओं को हटाता है बिना किसी हानिकारक पदार्थ को आसपास के क्षेत्र में छोड़ता है।

**Assay = [असा]**

It means to assess; chemical testing done to determine the composition of a substance or the concentration of its components.

इसका मतलब है आकलन; रासायनिक परीक्षण किया जाता है ताकि पता लगाया जा सके कि किसी पदार्थ की संरचना क्या है या इसके घटकों की सांद्रता कितनी है।

**Attenuation = [अटनूएशन]**

The process by which a virus, bacterium, etc., changes under laboratory conditions to become harmless or less virulent

एक प्रक्रिया जिसके द्वारा किसी वायरस, बैक्टीरिया, आदि, प्रयोगशाला की परिस्थितियों में बदलकर हानिरहित या कम विषाक्त हो जाता है।

## B

**Blubber = [ब्लब्डर]**

It is the thick, fatty layer that lies underneath the skin of whales and other aquatic mammals. It helps in thermal insulation.

एक मोटी, चर्बी की परत जो बालू की त्वचा के नीचे पाई जाती है। यह तापीय इंसुलेशन में मदद करता है।

**Bothridia = [बोथ्रिडिया]**

The leaf like organs present on the scolex of certain cestodes. They act as the organs of attachment to the body parts of the host.

कुछ cestodes पर पाए जाने वाले पत्ती जैसी अंग। ये होस्ट के शरीर के हिस्सों से जुड़ने के लिए काम करते हैं।

**Bout = [बाउट]**

An instance of something lasting for a short period as in bout of fever

किसी चीज के लंबे समय तक रहने का एक उदाहरण (जैसे बुखार)।



**Biramous =** [biˈrɒməs]

Possessing two branches Ex:- the exopodite and endopodite.

Exopodite, Endopodite, Endopod, Endopodite

**Blastula =** [blæstʊlə]

Embryonic stage with blastocoels, which is also called the 'primary body cavity'

Blastocoel, Blastocoelous condition, Blastocoelous condition.

**Basking =** [ˈbæskɪŋ]

Exposing the body to sun light, to gain temperature

Thermophilic, Thermophilic condition.

**Benthos =** [ˈbenthoʊs]

It refers to all the attached, creeping or burrowing organisms that inhabit the bottom of rivers, lakes and sea.

Benthic, Benthic, Benthic condition, Benthic condition, etc, Benthic condition.

**Biomass =** [ˈbiəʊmɑːs]

The total mass of living material within a specified area at a given time

Biomass, Biomass, Biomass condition, Biomass condition, Biomass condition.

**Brackish water =** [ˈbræʃɪʃ wɔːtə]

An intermediate zone between freshwater and marine water

Brackish, Brackish condition, Brackish condition.

**Biodegradable =** [ˌbiəˈdeɪɡrədəbəl]

Capable of being broken down especially into harmless products by the action of living things (as microorganisms)

Biodegradable, Biodegradable condition, Biodegradable condition.

### Biological Oxygen Demand (BOD) = $\frac{m}{V} \times \frac{1}{t}$

The amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period

It is a measure of the amount of organic material in a water sample. It is used to measure the pollution level of a water body.

### Brunner's gland = $\frac{m}{V} \times \frac{1}{t}$

Intestinal glands of the submucosa of the stomach and promotes the absorption of the vitamin B<sub>12</sub> in the intestine.

It is a type of endocrine gland. It is located in the submucosa of the stomach.

### Bohr Effect = $\frac{m}{V} \times \frac{1}{t}$

Effect of CO<sub>2</sub> and H<sup>+</sup> on the oxygen affinity of haemoglobin

It is a physiological phenomenon. It is caused by the presence of CO<sub>2</sub> and H<sup>+</sup> in the blood.

### Bundle of His = $\frac{m}{V} \times \frac{1}{t}$

It is a collection of heart muscle cells specialized for electrical conduction that transmits the electrical impulses from the AV node to the walls of the ventricles.

It is a part of the heart's conduction system. It is located in the septum between the two ventricles.

### Brain stem = $\frac{m}{V} \times \frac{1}{t}$

The region of the brain that consists of the midbrain, pons and medulla; responsible for the functions such as breathing, heart beat and blood pressure

It is a part of the brain. It is located at the base of the brain. It is responsible for many vital functions.

### Blind spot = $\frac{m}{V} \times \frac{1}{t}$

The place of retina which has no photoreceptors

It is a part of the eye. It is located at the back of the eye. It is the point where the optic nerve enters the eye.

### Barrier = $\frac{m}{V} \times \frac{1}{t}$



It is a free swimming larva consisting of an ovoid body and a tail. It occurs in the life history of liver flukes.

It is a free swimming larva consisting of an ovoid body and a tail. It occurs in the life history of liver flukes.

**Choanocyte =** 

It is a specialized flagellated cell with a cup shaped collar around the base of the flagellum. It maintains the current of water through the body.

It is a specialized flagellated cell with a cup shaped collar around the base of the flagellum. It maintains the current of water through the body.

**Clitellum =** 

It is a belt or girdle shaped thickening of the skin, in a specific region of the body (14 to 16 segments in Pheretima). It secretes the cocoon and albumen (food for the developing young one), during the breeding season.

It is a belt or girdle shaped thickening of the skin, in a specific region of the body (14 to 16 segments in Pheretima). It secretes the cocoon and albumen (food for the developing young one), during the breeding season.

**Cocoon =** 

It is a bag like structure secreted by the clitellum. Eggs and sperms are deposited into it. Fertilization and development occurs within the cocoon.

It is a bag like structure secreted by the clitellum. Eggs and sperms are deposited into it. Fertilization and development occurs within the cocoon.

**Comb plates =** 

They are ciliated plates helping in locomotion in the Ctenophores.

They are ciliated plates helping in locomotion in the Ctenophores.

**Ctenidia =** 

They are the respiratory organs of molluscs. Each ctenidium (gill) consists of a central axis and one or two rows of filaments.

They are the respiratory organs of molluscs. Each ctenidium (gill) consists of a central axis and one or two rows of filaments.

### **Creatine phosphate =**

A high energy phosphate compound, found in the muscle of vertebrates and some invertebrates, used to regenerate ATP.

It is a high energy phosphate compound, found in the muscle of vertebrates and some invertebrates, used to regenerate ATP.

### **Claspers =**

They are formed from the posterior portion of pelvic fins in male cartilaginous fish. They serve as intromittent organs used to channel semen into the female's cloaca during mating.

They are formed from the posterior portion of pelvic fins in male cartilaginous fish. They serve as intromittent organs used to channel semen into the female's cloaca during mating.

### **Coelacanth =**

An ancient, extant bony fish of the group Rhipidistia was thought to be extinct until 1938, but was rediscovered in 1938, off the coast of South Africa. At present, there are two living species of the genus 'Latimeria'.

An ancient, extant bony fish of the group Rhipidistia was thought to be extinct until 1938, but was rediscovered in 1938, off the coast of South Africa. At present, there are two living species of the genus 'Latimeria'.

### **Ctenoid scale =**

A fish scale having marginal projections that resemble the teeth of a comb, found in many teleost fishes.

A fish scale having marginal projections that resemble the teeth of a comb, found in many teleost fishes.

### **Cycloid scale =**

It is a fish scale which is thin and shows concentric lines of growth, without serrations on the margin, found in lung fishes and some teleost fishes.

It is a fish scale which is thin and shows concentric lines of growth, without serrations on the margin, found in lung fishes and some teleost fishes.

### **Chyme =**

It is semi-fluid mass of partly digested food formed in the stomach.

It is semi-fluid mass of partly digested food formed in the stomach.

### **Columella auris =**

It is a small rod like bone in the middle ear of frogs, reptiles and birds that transmits sound to inner ear; homologous to the mammalian stapes (modification of the hyomandibula of the fishes).

It is a small rod like bone in the middle ear of frogs, reptiles and birds that transmits sound to inner ear; homologous to the mammalian stapes (modification of the hyomandibula of the fishes).

### **Conus arteriosus =**

It is a single, wide arterial vessel leaving the ventricle and passing ventrally over the right atrium. It is absent in the amniotes.

It is a single, wide arterial vessel leaving the ventricle and passing ventrally over the right atrium. It is absent in the amniotes.

### **Chorion =**

It is the outermost extra embryonic membrane that surrounds the embryo of amniotes. It participates in the formation of placenta along with allantois in the placental mammals.

It is the outermost extra embryonic membrane that surrounds the embryo of amniotes. It participates in the formation of placenta along with allantois in the placental mammals.

### **Carinate birds =**

These are the birds with a 'keeled sternum' for the insertion of flight muscles. Ex: Flying birds.

These are the birds with a 'keeled sternum' for the insertion of flight muscles. Ex: Flying birds.

### **Cochlea =**

A tubular cavity of the inner ear containing the essential organs of hearing occurs in crocodiles, birds and mammals. In the eutherians, it is spirally coiled with 'organ of Corti' – a specialized region for sound perception.

A tubular cavity of the inner ear containing the essential organs of hearing occurs in crocodiles, birds and mammals. In the eutherians, it is spirally coiled with 'organ of Corti' – a specialized region for sound perception.

### **Clinical symptoms =**

Noticeable symptoms of a disease

Noticeable symptoms of a disease

### **Cloaca =**

The cavity at the end of the digestive tract into which the intestinal, genital and urinary tracts open in the case of vertebrates (only intestinal and genital ducts open in the case of invertebrates).

For example, the cloaca is the common exit for the digestive, urinary and reproductive tracts in many invertebrates and some vertebrates.

### **Constipation =**

Irregular and infrequent or difficult egestion

For example, constipation can be caused by a diet low in fibre.

### **Coprophagous =**

Feeding on faecal matter

For example, some insects are coprophagous.

### **Cosmopolitan =**

Occurring in many parts of the world

For example, the common housefly is cosmopolitan.

### **Cephalic =**

Relating or to the head

For example, cephalic reflexes.

### **Cervix =**

Neck

For example, the cervix of the uterus.

### **Copulation =**

Sexual process/union for the transfer of sperm from one to another of mating partner

For example, copulation occurs between a male and a female of the same species.

**Cursorial** =  $\frac{1}{\text{ground-dwelling}}$

Swift runner

$\frac{1}{\text{ground-dwelling}}$

**Cuticle** =  $\frac{1}{\text{cuticle}}$

External skeletal structure of the insect's body; it has epicuticle, mesocuticle and endocuticle.

$\frac{1}{\text{epicuticle, mesocuticle, endocuticle}}$

**Camouflage** =  $\frac{1}{\text{camouflage}}$

Concealing coloration (Ex: Melanism) and morphology (Ex: Stick insects) as defence against predation

$\frac{1}{\text{concealing coloration (Ex: Melanism), morphology (Ex: Stick insects)}}$

**Chemoautotrophs** =  $\frac{1}{\text{chemoautotrophs}}$

These comprise bacteria that obtain energy from the oxidation of simple inorganic compounds and can use the energy released to assimilate  $\text{CO}_2$  and transfer the energy into organic compounds. Ex: Thiobacillus species.

$\frac{1}{\text{bacteria that obtain energy from the oxidation of simple inorganic compounds, can use the energy released to assimilate } \text{CO}_2 \text{ and transfer the energy into organic compounds. Ex: Thiobacillus species.}}$

**Climate** =  $\frac{1}{\text{climate}}$

The climate of an area can be described by its mean values of temperature, rainfall and wind speed.

$\frac{1}{\text{mean values of temperature, rainfall and wind speed}}$

**Community** =  $\frac{1}{\text{community}}$

The total living biotic component of an ecosystem, including plants, animals and microbes

$\frac{1}{\text{plants, animals, microbes}}$

**Competitive exclusion** =  $\frac{1}{\text{competitive exclusion}}$

It is often known as Gause principle.



and into their bodies.

### **Cyclomorphosis =** metamorphosis

Cyclic change in phenotype, such as seasonal changes in morphology, particularly conspicuous among cladoceran crustacean and rotifers

It is a form of asexual reproduction in which the organism undergoes a series of changes in its morphology and physiology, often in response to environmental conditions.

### **Chemical Oxygen Demand (COD) =** measure of pollution

A test procedure based on the chemical decomposition of organic and inorganic contaminants dissolved or suspended in water.

It is a measure of the amount of oxygen required to oxidize the organic and inorganic matter in a sample of water.

### **Chlorofluorocarbons (CFC) =** halocarbons

Any of various halocarbon compounds consisting of carbon, hydrogen, chlorine and fluorine used widely as aerosol propellants and refrigerants. Chlorofluorocarbons are believed to cause depletion of the ozone layer.

They are used in a wide range of applications, including as propellants in aerosol cans, as refrigerants in air conditioning and refrigeration systems, and as solvents in industrial processes.

### **Castle's intrinsic factor =** vitamin B12

It is secreted from the oxyntic cells of the stomach and promotes the absorption of the vitamin B<sub>12</sub> in the intestine.

It is a glycoprotein that binds to vitamin B<sub>12</sub> and facilitates its absorption in the small intestine.

### **Crypts of Lieberkuhn =** intestinal glands

They are the tubular invaginations of the intestinal epithelium around the villi/ intestinal glands of the mucosa of the ileum; secrete intestinal juice.

They are also known as crypts of Lieberkuhn and are found in the mucosa of the small intestine.

### **Cystic duct =** duct

Duct that arises from the gall bladder and joins the hepatic duct to form the common bile duct in liver

Common bile duct is formed by the union of the gallbladder and the hepatic duct. It carries bile from the liver and gallbladder to the duodenum.

**Carbonic anhydrase =** [Enzyme](#)

An enzyme presents in RBC, that catalysis the formation of carbonic acid from  $\text{CO}_2$  and  $\text{H}_2\text{O}$  its dissociation into  $\text{H}^+$  and  $\text{HCO}_3^-$ .

(Heme cell enzyme) in RBC it catalyzes the reaction  $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}^+ + \text{HCO}_3^-$  to transport  $\text{CO}_2$  in the blood.

**Chemo-sensitive area =** [Brain region](#)

It is an area situated adjacent to the respiratory rhythm centre; it is highly sensitive to  $\text{CO}_2$  and  $\text{H}^+$ .

It is located in the medulla oblongata. It is sensitive to  $\text{CO}_2$ ,  $\text{H}^+$  and  $\text{O}_2$  levels in the blood.

**Chloride shift =** [Hamburger's phenomenon](#)

It is an exchange of chloride and bicarbonate ions between erythrocytes and plasma. It is also called Hamburger's phenomenon.

During the transport of  $\text{CO}_2$  in the blood,  $\text{CO}_2$  enters the erythrocytes and combines with  $\text{H}_2\text{O}$  to form  $\text{H}^+$  and  $\text{HCO}_3^-$ .  $\text{HCO}_3^-$  is then exchanged for  $\text{Cl}^-$  in the plasma.

**Cricoid cartilage =** [Cartilage](#)

Circular cartilage that forms the lower and posterior part of wall of larynx

It is a ring of cartilage that forms the lower and posterior part of the wall of the larynx.

**Cardiac arrest =** [Sudden death](#)

It is also known as cardiopulmonary arrest or circulatory arrest. It is the cessation of normal circulation of the blood due to sudden stoppage of contraction of the heart (sudden cardiac arrest, which sometimes runs in families).

It is a sudden loss of heart function, which leads to the cessation of blood flow to the organs of the body. It is a medical emergency and requires immediate attention.

**Cascade reaction =** [Blood clotting](#)

A series of chemical or physiological processes occur in successive stages, each of which is dependent of the preceding one, to produce a culminating effect. The steps involved in the clotting of blood occur as a cascade of reactions.

Enzymes are called zymogens, which are inactive. They are converted into active enzymes by the action of other enzymes.

**Colloid osmotic pressure =**  $\pi = \frac{RT}{V} \ln C$

It is also referred to as oncotic pressure and is a measurement of pressure exerted within the blood vessels by the proteins found in blood plasma. The special nature of these proteins helps ensure passage of fluids in and out to the capillaries at the proper rate.

It is the pressure that tends to pull water into the blood vessels. It is caused by the presence of proteins in the blood. These proteins are called colloids.

**Cellophane =**  $\text{C}_6\text{H}_{10}\text{O}_5$

It is a thin, transparent sheet made of cellulose and is used in a dialyser, which removes wastes from blood in patients suffering from renal failure.

It is a semi-permeable membrane that allows water and small solutes to pass through it, but not larger molecules like proteins.

**Counter current exchange =**  $\frac{dC}{dx} = -\frac{C}{L} \ln \frac{C_2}{C_1}$

This is accomplished by the vasa recta which run parallel to the loop of Henle of Juxta medullary nephrons. It maintains hypertonicity of the renal medulla by exchanging the ions and collecting water from the limbs of the loop of Henle.

It is a process in which the flow of fluid in one direction is opposite to the flow of fluid in the other direction. This is seen in the vasa recta of the kidney.

**Counter current multiplier system =**  $\frac{dC}{dx} = -\frac{C}{L} \ln \frac{C_2}{C_1}$


It is the system involving the two limbs of the loop of Henle, which play an important role in maintaining the concentration gradient in the medulla, which is vital for the formation of concentrated urine.

It is a process in which the flow of fluid in one direction is opposite to the flow of fluid in the other direction. This is seen in the vasa recta of the kidney.

**Clavicle =**  $\text{C}_6\text{H}_{10}\text{O}_5$


**Membrane bone of the ventral side of the pectoral girdle of many vertebrates; also called collar bone of man**

Membrane bone of the ventral side of the pectoral girdle of many vertebrates; also called collar bone of man.

**Coccyx =** 

It is fused tail vertebrae. In man, it comprises four coccygeal vertebrae.

It is fused tail vertebrae. In man, it comprises four coccygeal vertebrae.

**Cori cycle =** 

The lactic acid produced in a fast working muscle, in low oxygen conditions, to release energy for the contraction of muscles is mostly converted into glucose in the liver cells (gluconeogenesis) by Cori cycle.

The lactic acid produced in a fast working muscle, in low oxygen conditions, to release energy for the contraction of muscles is mostly converted into glucose in the liver cells (gluconeogenesis) by Cori cycle.

**Coxal bones =** 

It is each half of the pelvic girdle. It is made of ilium, ischium and pubis.

It is each half of the pelvic girdle. It is made of ilium, ischium and pubis.

**Corpus callosum =** 

It is the large bundle of axons which connects the two cerebral hemispheres. It disseminates the information from the cerebral cortex on one side of the brain to the same region on the other side; it is the system that helps communication between the right and left cerebral cortices.

It is the large bundle of axons which connects the two cerebral hemispheres. It disseminates the information from the cerebral cortex on one side of the brain to the same region on the other side; it is the system that helps communication between the right and left cerebral cortices.

**CAMP (Cyclic Adenosine Mono Phosphate) =** 

It acts as a second messenger (intracellular messenger) in the case of water soluble hormones.

It acts as a second messenger (intracellular messenger) in the case of water soluble hormones.

**Catecholamines =** 

A common name given to the hormones namely adrenaline, noradrenalin and dopamine



Also known as Birth control and fertility control. It refers to methods or devices used to prevent pregnancy.

**Cast =**

When empty space of a mould is filled with mud with dissolved minerals and sediment, slowly the water in the mud evaporates forming a rock-like fossil. It gives the form of the organism that was fossilized.

**Catastrophe =**

A sudden violent natural calamity like an earthquake, tsunami, volcanic eruption etc.

**Coprolites =**

Fossilized faecal matter of organisms

**Conventional practices =**

Practices which are in accordance with established norms and conventions and requirements

## D

**Diapedesis =**

The passage of leucocytes of blood into the matrix of connective tissues through the walls of capillaries by an amoeboid movement

**Dipnoi =**

They are a group of fish commonly known as 'lung fishes', their lungs being modified air bladders. Ex: Protopterus, Neoceratodus and Lepidosiren.

Ex: Protopterus, Neoceratodus, Lepidosiren.

### **Dura mater =**

It is the outermost, toughest and the most fibrous of the three membranes (meninges) covering the brain and the spinal cord.

Ex: Dura mater, Arachnoid mater, Pia mater.

### **Diphyodont dentition =**

It is the type of dentition in which two sets of teeth are formed. They are deciduous and permanent sets of teeth which are formed successively.

Ex: Mammals, Birds, Reptiles, Amphibians, Fishes.

### **Dioecious =**

Species population in which male and female organs occur in separate individuals

Ex: Mammals, Birds, Reptiles, Amphibians, Fishes.

### **Dioptric region =**

The part that focuses light rays on to the inner part of an ommatidium

Ex: Compound eyes of insects.

### **Detritus =**

Non living organic matter usually refers to particulate matter to that of plant rather than animal origin. Ex: Leaf litter.

Ex: Leaf litter, animal waste, dead organic matter.

### **Diapause =**

It is a condition of arrested growth or reproductive development common in many organisms, particularly insects, during unfavourable stratified.

the water column, and the bottom, and the water column.

### **Dimictic Lake =**

It is the lake that undergoes two periods of complete vertical mixing, usually in the spring and the fall. During the summer dimictic lakes are thermally stratified.

During the summer, the water column is stratified into three layers: the epilimnion, the metalimnion, and the hypolimnion. The epilimnion is the uppermost layer, the metalimnion is the middle layer, and the hypolimnion is the bottom layer.

### **Denitrification =**

It is a microbially facilitated process of nitrate reduction that may ultimately produce molecular nitrogen ( $N_2$ ) through a series of intermediate gaseous nitrogen oxide products.

Denitrification is the process by which nitrate ( $NO_3^-$ ) is reduced to molecular nitrogen ( $N_2$ ) through a series of intermediate gaseous nitrogen oxide products.

### **Decomposer =**

Decomposers (or saprotrophs) are organisms that break down dead or decaying organisms and in doing so carry out the natural process of decomposition.

Decomposers are organisms that break down dead or decaying organisms and in doing so carry out the natural process of decomposition.

### **Deforestation =**

The removal of a forest or stand of trees where the land is thereafter converted to a non-forest use.

### **Deamination =**

Removal of amino group from amino acids during their metabolism (the amino group is used in the formation of ammonia) in liver.

Deamination is the process by which the amino group is removed from an amino acid, leaving behind a carbon skeleton that can be used for energy or other metabolic processes.

### **Deciduous / milk teeth =**

A set of temporary teeth that are formed as the first set, they don't include premolar and last molars in man.

Deciduous teeth are the first set of teeth that are formed in the mouth, and they are replaced by permanent teeth.



### Duct of Bellini = [Duct of Bellini](#)

Any of the large excretory ducts of the uriniferous tubules of the kidney that open at the tip of the renal papilla into a calyx and thus into the renal pelvis; also called 'papillary duct'.

There are approximately 20-30 ducts of Bellini in each kidney. They are the largest of the collecting ducts and are located in the renal papilla. They are also called 'papillary ducts'.

### Diarthroses = [Diarthroses](#)

Freely movable joints of vertebrates Ex: most of these are synovial joints.

Examples: ball-and-socket joints, hinge joints, pivot joints, etc.

### Diabetes Insipidus = [Diabetes Insipidus](#)

Excessive urination and extreme thirst as a result of inadequate output of the pituitary hormone ADH (anti-diuretic hormone)

Diabetes insipidus is a condition characterized by excessive urination and extreme thirst. It is caused by a deficiency of antidiuretic hormone (ADH) or by the body's resistance to the hormone. There are two main types: central diabetes insipidus, which is caused by a deficiency of ADH, and nephrogenic diabetes insipidus, which is caused by the body's resistance to ADH. Both types can be treated with medications that mimic the action of ADH.

### Diabetes Mellitus = [Diabetes Mellitus](#)

A condition resulting from lack of insulin as a result of which, the body cannot store or oxidise sugar efficiently (and sugar is lost through urine).

Diabetes mellitus is a chronic metabolic disorder characterized by high blood sugar levels. It is caused by a deficiency of insulin, a hormone that allows the body to use sugar for energy. There are two main types: type 1 diabetes, which is caused by an autoimmune reaction that destroys the insulin-producing cells in the pancreas, and type 2 diabetes, which is caused by a combination of insulin resistance and a deficiency of insulin. Both types can be managed with medication, diet, and exercise.

### Diuresis = [Diuresis](#)

Diuresis is an increase in the production of urine by the kidneys

Diuresis can be caused by a variety of factors, including increased fluid intake, certain medications, and certain medical conditions.

### Dander = [Dander](#)

Small scales from animal skins, hair or feather of a bird that can cause allergic reactions in some people

Dander is a common allergen that can cause allergic reactions in some people. It is made up of small pieces of skin, hair, and feathers that shed from animals. Dander is most commonly found in the homes of people who have pets, but it can also be found in public places.

### Dendritic cells = [Dendritic cells]

They are immune cells forming a part of the mammalian immune system. Their main function is to process an antigen/pathogen and present it to the  $T_H$  cells. They show branched-extensions which look like the dendrites of neurons. They are present in tissues in contact with the external environment, such as the skin, inner lining of the nose, lungs, stomach and intestines.

They are found in the skin, lungs, stomach and intestines. They are also found in the blood and lymph. They are found in the skin, lungs, stomach and intestines. They are also found in the blood and lymph. They are found in the skin, lungs, stomach and intestines. They are also found in the blood and lymph.

### Decidua = [Decidua]

After the implantation of the embryo, the uterine endometrium is differentiated into a spongy, vascular layer called decidua. At the end of the pregnancy the decidua is shed off, along with the placenta and membranes.

The decidua is the innermost layer of the uterine wall, which is shed off at the end of pregnancy. It is a spongy, vascular layer. It is shed off along with the placenta and membranes. It is shed off at the end of pregnancy. It is shed off along with the placenta and membranes. It is shed off at the end of pregnancy. It is shed off along with the placenta and membranes.

### Deleterious genes = [Deleterious genes]

The genes which are harmful to the organisms possessing them

are called deleterious genes.

## E

### Eukaryotes = [Eukaryotes]

Organisms whose cells contain a membrane bound nucleus and other complex membrane bound cell organelles.

They are found in the animal kingdom, plant kingdom and fungi kingdom.

### Endothelium = [Endothelium]

The simple squamous epithelium that lines the inner surface of blood vessels and heart

muscles, the endothelium is the innermost layer of the blood vessel wall.

### Epiphyses = [Epiphyses]

These are the expanded ends of long bones, which are made of spongy bone.

These are the expanded ends of long bones, which are made of spongy bone.

**Endostyle** = Endostyle

Mucous secreting longitudinal ciliated groove present on the ventral wall of the pharynx of tunicates, cephalochordates and larvae of the jawless fishes, useful for accumulating and moving food particles to the oesophagus.

Endostyle is a mucous secreting longitudinal ciliated groove present on the ventral wall of the pharynx of tunicates, cephalochordates and larvae of the jawless fishes, useful for accumulating and moving food particles to the oesophagus.

**Emaciation** = Emaciation

Extreme leanness

Extreme leanness

**Epidemic** = Epidemic

Spreading of an infectious disease, affecting many people over a wide area

Spreading of an infectious disease, affecting many people over a wide area

**Epidemiology** = Epidemiology

The branch of medical science dealing with the transmission and control of disease

The branch of medical science dealing with the transmission and control of disease

**Euphoria** = Euphoria

A temporary feeling of an exaggerated joy, well-being, pride and optimism associated with drugs and alcohol; or an absence of depression

Euphoria is a temporary feeling of an exaggerated joy, well-being, pride and optimism associated with drugs and alcohol; or an absence of depression.

**Ecdysis** = Ecdysis

Shedding of the outer body layer (cuticle)

Shedding of the outer body layer (cuticle)

### **Edaphic factors =**

The physical, chemical and biotic characteristics of the soil that influence plant growth and distribution

texture, depth, pH, moisture, nutrient content, water, etc.

### **Estuary =**

It is a place where river joins the sea. The water in an estuary is subjected to seasonal variations in salinity. The water is called brackish water. The animals living there are euryhaline.

Delta, estuary, bay, fjord, salt marsh, mangrove, etc. are all types of estuaries. They are all formed by the deposition of sediments.

### **Eutrophication =**

A process whereby water bodies, such as lakes, estuaries or slow-moving streams receive excess nutrients that stimulate excessive plant growth (algae, periphyton attached algae, nuisance plants and weeds).

Eutrophication is a process by which a body of water becomes enriched with nutrients, leading to excessive growth of algae and other aquatic plants. This can lead to oxygen depletion and the death of fish and other aquatic life.

### **Erythropoietin =**

A hormone produced in the kidneys which induces production of RBC (erythrocytes).

Erythropoietin is a hormone that is produced by the kidneys in response to low oxygen levels in the blood. It stimulates the production of red blood cells in the bone marrow.

### **Erythroblast =**

It is an immature form (developmental immature stage) of a red blood cell. It is normally found only in bone marrow and contains haemoglobin.

Erythroblasts are the precursors of red blood cells. They are found in the bone marrow and are responsible for the production of red blood cells.

## **F**

### **Frontal plane =**

The plane that runs along the anterior – posterior and transverse axes

It divides the body into anterior and posterior parts.

### **Flame cell =**

It is a hollow cell containing a tuft of cilia in the inner space. It is excretory and osmoregulatory in function. Flame cell is a primitive type of excretory organ (protonephridium)

It is found in the body wall of flatworms, annelids, and some other invertebrates. It is also found in the body wall of some vertebrates (e.g. fish) and in some invertebrates.

### **Filter feeding =**

Any feeding process by which particulate food is filtered by ciliary action from the water in which it is suspended Ex: Protochordates, Sponges and Bivalves

It is a type of feeding in which food particles are filtered from water by ciliary action. It is found in sponges, bivalves, and some other invertebrates.

### **Faeces =**

Solid indigested product discharged through anus

It is the solid waste product of digestion. It is discharged through the anus.

### **Filiform =**

Resembling a thread

It is a type of thread-like structure.

### **Folk-medicine =**

Treatment given by some aged local people

It is a type of traditional medicine. It is given by some aged local people.

### **Fungicides =**

Substance or preparation, as a spray or dust, used for destroying fungi

It is a substance or preparation used for destroying fungi. It is used as a spray or dust.

### **Fascia =**

Sheet of connective tissue enclosing muscles

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma.

**Fascicles =** bundle

Bundle of muscle fibres, those are covered by a connective tissue sheath, the perimysium.

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma.

**Fatigue =** tired

The inability of a muscle to contract after repeated muscle contractions due to lack of ATP and accumulation of lactic acid

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma. ATP is used to contract, and lactic acid is produced, which lowers the pH of the muscle, leading to fatigue.

**Foramen magnum =** large opening

Opening at the back of the vertebrate skull; the medulla oblongata passes out through this foramen and joins the spinal cord

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma. ATP is used to contract, and lactic acid is produced, which lowers the pH of the muscle, leading to fatigue.

**Foetus =** unborn

It is a developing mammal or other viviparous vertebrate after the embryonic stage and before birth.

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma. ATP is used to contract, and lactic acid is produced, which lowers the pH of the muscle, leading to fatigue.

**Formative cells =** stem cells

The embryonic cells which are capable of producing new cells or tissue

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma.

**Foeticide =** abortifacient

The destruction of a foetus in the uterus

muscle fibres are covered by a thin layer of connective tissue called the sarcolemma.

### **Glycogen =**

It is a polysaccharide that is the principal storage of glucose in animal cells analogous to starch in plants

   .

### **Gemmules =**

They are the 'internal buds' of some sponges aiding in asexual reproduction. They also help tide over unfavourable conditions.

            .

### **Ganoid scales =**

Thick, bony scales of some primitive bony fishes such as Acipenser

            .

### **Giddiness =**

A feeling that you are about to fall; a reeling sensation

  .

### **Groin =**

The junction of the inner part of the thigh with the trunk together with the adjacent region and often including the external genitals

   .

### **Germarium =**

Tapering anterior filament of an ovariole

   .

### **Glycogenesis =**

Conversion of excess glucose into glycogen in liver

**Glycogenolysis =**  $\frac{\text{glycogen}}{\text{glucose}}$

Conversion of glycogen (animal starch) into glucose

It is a catabolic process that releases glucose.

**Gluconeogenesis =**  $\frac{\text{glucose}}{\text{non-carbohydrates}}$

Synthesis of glucose from non-carbohydrates such as proteins and lipids

It is an anabolic process that produces glucose.

**Glottis =**  $\frac{\text{opening}}{\text{larynx}}$

It is an opening of the larynx into the pharynx

It is a part of the respiratory system.

**Glomerular filtration rate (GFR) =**  $\frac{\text{volume}}{\text{time}}$

It is the volume of fluid filtered from the renal glomerular capillaries into the Bowman's capsule, per unit time. GFR is an important clinical indicator of the functioning of the kidney

It is a measure of the rate at which the kidneys filter blood. A normal GFR is about 120-130 mL/min.

**Glenoid cavity =**  $\frac{\text{space}}{\text{joint}}$

Cup-like hollow space on each side of the pectoral girdle into which head of the humerus fits

It is a part of the shoulder joint. It is formed by the glenoid fossa of the scapula and the articular surface of the humeral head.

**Gyrus =**  $\frac{\text{ridge}}{\text{surface}}$

The elevated portion of the cerebral surface

It is a ridge or fold on the surface of the brain. It is separated from other ridges by grooves or sulci.



## H

### **Holozoic =** [hɒləˈzɔɪk]

It is a method of nutrition that involves ingestion of liquid or solid organic material

[hɒləˈzɔɪk] is a method of nutrition that involves ingestion of liquid or solid organic material.

### **Haemocoel =** [heɪməˈkoʊl]

The functional perivisceral cavity, that lies around the visceral organs of arthropods and molluscs which is filled with the blood (haemolymph).

[heɪməˈkoʊl], the functional perivisceral cavity, that lies around the visceral organs of arthropods and molluscs which is filled with the blood (haemolymph).

### **Heterocoelous vertebra =** [hetəˈkoʊləs ˈvɛrtɪbrə]

It is the type of vertebra in which the articulating surfaces of the vertebral centrum are 'saddle-shaped'.

[hetəˈkoʊləs ˈvɛrtɪbrə] is the type of vertebra in which the articulating surfaces of the vertebral centrum are 'saddle-shaped'.

### **Heterodont dentition =** [hetəˈrɒdənt ˈdɛntɪʃən]

It is the type of dentition in which the teeth are differentiated into cutting, tearing and grinding teeth.

[hetəˈrɒdənt ˈdɛntɪʃən], the type of dentition in which the teeth are differentiated into cutting, tearing and grinding teeth.

### **Heliopodia =** [ˈhɛliəˈpɒdiə]

These are sunray-like pseudopodia present all over the surface of the body, as in 'sun animalcules' (Actinophrys, Actinosphaerium).

[ˈhɛliəˈpɒdiə]

## J



Metamorphosis = transformation.

**Phylogeny** = evolution

The evolutionary history of an organism

Phylogenetic tree

**Planula** = larva

It is a ciliated, double walled, free swimming larva characteristic of a cnidarians.

Planula larva of Hydra, Obelia, Scypha, Anthus.

**Polyembryony** = multiple embryos

It is formation of several young ones from a single zygote.

Platyhelminthes like tapeworms show polyembryony. In tapeworm, each proglottid contains many embryos.

## R

**Redia** = larva

It is an elongated larva of liver fluke produced by the sporocyst asexually / parthenogenetically.

Redia is a larval stage of liver fluke. It is produced by the sporocyst asexually. It is a free swimming larva.

## S

**Spiral cleavage** = helical cleavage

It is the characteristic of protostomes in which planes of cell division are diagonal to the vertical axis/polar axis of the embryo

Spiral cleavage is seen in many protostomes. It is a characteristic feature of protostomes.





## Transport across membrane

**Plasma membrane:** is a **biological membrane** that separates the **interior** of all **cells** from the **outside environment** (the extracellular space) which protects the cell from its environment.

ప్లాస్మా మెంబ్రేన్: జీవ కణ త్వచం అనేదం అన్ని కణాల లోపల భాగం నుంచి బయట వంతావరణం (ఎక్స్ సెల్లూలర్ తల శూర్ సపేత) నుండి వేరు చేస్తుంది.

**Osmosis:** Movement of water from high water concentration to low water concentration or from low solute concentration to high solute concentration across the membrane is called Osmosis.

ద్రవభ్రమణం: అధిక నీటి గాఢత నుండి తక్కువ నీటి గాఢత లేదా తక్కువ ద్రవ్య గాఢత నుండి అధిక ద్రవ్య గాఢత కు నీరు మారడంనుండి అంటారు.

గాఢత నుండి పైకి అంతటా అధిక ద్రవ్య గాఢత కు నీరు మారడంనుండి అంటారు.

**Osmotic pressure:** It is defined as the external pressure required to be applied so that there is no net movement of solvent across the membrane.

ద్రవభ్రమణ పీడనం: పైకి అంతటా ద్రవ్య వక్రం యొక్క లేనట్లైన ఇదం నీటి కదలికను నివారించే బాహ్య పీడనంనుండి నీటి ప్రవాహం నివారించబడదు.

**Osmolarity:** The Osmolarity of a solution is usually expressed as Osm/L

ఒస్మోలిటీ: ద్రవ్య గాఢత యొక్క ఒక యూనిట్ సాధారణంగా Osm/L గా వ్యక్తం చేయబడుతుంది.

**Passive transport:** Passive transport is the fundamental movement of ions and other molecular substances within the cells along the concentration gradient, without any external energy. It is also known as passive diffusion.

నష్ట రవాణా: సాధారణంగా అనేదం ఏ బాహ్య శక్తి లేకుండా, ఏకాగ్రత నుండి అధిక గాఢత వరకు కణాల లోపల అయినా మరొక చిత్ర పరమాణు పదార్థాలు పంపిణీ చేయబడతాయి. ఇదం సాధారణంగా వ్యాపకం అనే పదం వాడుతారు. కదలిక కంక్ష పయ

**Diffusion:** It is the net movement of material from an area of high concentration to an area with lower concentration.

వ్యాపకం: వ్యాపకం అనేదం అధిక సాంద్రత నుండి తక్కువ సాంద్రత వరకు ఉన్న పదార్థం నుండి తక్కువ సాంద్రత నుండి ఉన్న పదార్థం వరకు ఉన్న పదార్థం యొక్క సాధారణ కదలిక.

**Simple diffusion:**Plasma membrane allows diffusion of small molecules

సాధారణ పరిపం: పంకంసంసంసం పం ర చనం' అణంపంల వంసత రణనఁ అనఁమతినతంందం'

**Facilitated diffusion:**The diffusion of water soluble compounds and ions that occurs with the help of special membrane proteins is called facilitated diffusion

కొండాభతర్లం పట్టణం: పాతంక మండురంన్ పమటనంక సహాయంతో సంభవంచం నంటిలం కరంగం సమంశనలియ మరం ఇయనంల వంకపత్ం సలభతర్లం వంకపత్ం అంటంరంక.

**Uniport:** Transport of a single solute from one side of the membrane to the other by an integral membrane carrier protein is called Uniport.

**యం నానాపతి:** సమగ్ర పం ర కార్యకర్తల సంఘం పనులు దేశవారీ పం ర  
యోజనా ఒక

వంపం నంబం' మరొక వంపం దం వణంసేనం' రవణం చేయడంసేనం' యంRసేనం పంకంతుంటారం

**Symport:** A mechanism of transport across a membrane in which two different molecules move in the same direction.

హైదరాబాద్: ఒక పంజాబీ అంతర్జాతీయ రవాణా ఛీఫ్ యంత్రాంగం, ఇండియా రోడ్డు వేరంపరం ఇంజనీరింగ్ ఒకంట్ దేశీయ కర్మలను తెలుసు.

**Antiport:**Transport of two molecules by integral membrane carrier protein in opposite directions across plasma membrane is called antiport.

యూఎంటిఎఫ్: పంకజ్ సంగీత్ వారి అందితురీ వ్యతరంక దేశలలో సమగ్ర  
 పంక ర కంపంకరంయర్ పమం టనం దంవరం రంండం ఆణంకవుల రవాణానా యూంటపమ ర్ం  
 అంటారు

**Active Transport:** is the movement of molecules across a cell membrane from a region of lower concentration to a region of higher concentration—against the concentration gradient.

**మీయూశరీల రవలణా:** కంఠయుశరీల రవంణం ఏకంంగంరతం పౌవణతంకమ్  
సంంందింతుం ఉనం' పంతుం తంతం నంందిం' అధిక సంంందింతుం ఉనం' పంతుం తంతంగానకం కణ తప్చం అంతంటం అణంయవంకదిక్ . ఈ కదం'కనం సంంద్రించడంగానకం కంఠయుశరీల రవంణంకమ్ తలబుగం శకంత అవసరం.

**Primary active transport:** Primary active transport, also called direct active transport, directly uses metabolic energy to transport molecules across a membrane.

పరిధిమీక కీయూశీల రవలణి: పరిం ధమంక కంఠయశీల రవంణం, పంట్ంక కంఠయశీల రవంణం అనీ న కంఠంపర్లయనరం.

పం<sup>a</sup> ర అం<sup>o</sup>తం<sup>o</sup>టం<sup>o</sup> అణం<sup>o</sup>వలన<sup>o</sup> రమం<sup>o</sup>ణం<sup>o</sup> చేయడం<sup>o</sup>స్వీకం<sup>o</sup> జీవకం<sup>o</sup>య శకం<sup>o</sup>తన<sup>o</sup> న<sup>o</sup> నేరం<sup>o</sup>గం<sup>o</sup> ఉపయం<sup>o</sup>గనం<sup>o</sup>దం<sup>o</sup>.

**Secondary active transport:** secondary active transport, also known as *coupled transport* or *cotransport*, in this energy is used to transport molecules across a membrane; however, in contrast to primary active transport, there is no direct coupling of ATP. Instead, it



relies upon the electrochemical potential difference created by pumping ions in/out of the cell.

దివతీయ కంఠయశలీ రవంణంలం, దీనన్ న కంRడం ప్లనంతంరం కపంకిం రవంణం  
లేదం కంఠం నంసంరం, ఒక పం<sup>a</sup> ర అంఠంటా అణంవలన రవంణం  
చేయడంనకం శకంత

ఉపయోగించబడవద్ద; అయినప్పటికీ, పతిం ధమంక కంఠయశశీల రవణింక

భౌతికశాస్త్రం, ATP యంత్రం పాఠశాల ష కలయిక లేదా. బయోలజీ, ఇదం తు డ  
లోపల / వలపల అయినం న పంపింట్ చేయడం దువరం నకష ంంచబడంన  
ఎలెక్ట్రోం కంమంకు డ సంభవం వంతంసంపంం అధురవడంత్వంంం.

**Bulk transport** : bulk transport is a type of transport which involves the transport of large amount of substance like lipid droplets and solid food particles across plasma membrane by utilising energy.

**భూకంఠ రవలణం:** భూకంఠం రవలణం అనేదం ఒక రకమం న రవలణం, ఇదం శకంతం  
ఉపయోగించడం దువరం పంకం సంగం పం ర అంతం టా లిపి బంద్ వలయ  
మరయ ఘన ఆహార కణాల వంటి పదేదీ మోత  
ంలో పదారం లన రవణా చీసత్తం ది.

**Endocytosis:** Endocytosis is a cellular process in which substances are brought into the cell.

ఎండ్‌సైటోసిస్ : ఎండ్‌సైటోసిస్ అనేది తలచుకున్న పదార్థాలను కణంలోకి తీసుకువెళ్లడం.

**Phagocyte:** A cell that performs phagocytosis is called a phagocyte.

పరిగెత్తుకుంటున్నాం: పరిగెత్తుకుంటున్నాం చీస కెనెడన్ పరిగెత్తుకుంటున్నాం ట్ అంబిటెంట్.

**Phagocytosis** : is the process by which a cell uses its plasma membrane to engulf a large particle ( $\geq 0.5 \mu\text{m}$ ), giving rise to an internal compartment called the phagosome. It is one type of endocytosis.

[illegible]

**Pinocytosis:** It is the *ingestion* of extracellular fluids, i.e. the fluid surrounding the cell, together with its contents of small dissolved molecules (solutes).

**పర్వనాథ్ టూటాక్స్** లు: పర్వనాథ్ టూటాక్స్ లో అంటుంటే ఎక్కణ్డూ తల మీదలో ఫ్రంట్ 3లయిడింగ్ సీసకంబోవడం, అంటుంటున్న చుట్ట ఉండం దొందం,  
దూన్ నాల్గోనీ చునం కరంగం అంతవల (దుం వకంబాయ) లోనీ కంబంటుంటుంటు.

**Exocytosis:** It is a process that is used to transport materials from inside the cell to the external part of the cell by the use of energy.

ఎక్స్‌పోజిటోస్ య: ఇదా శకం' వనయగం దూరం లోపల నుండి కణాల బహుం భాగలనకై పద్యారంభలనం రవలనా చరీయడననకై ఉపయగించా పరమియ.

1. **DIGESTION:** Digestion is the breakdown of large insoluble food molecules into small water-soluble food molecules so that they can be absorbed into the watery blood plasma.

**జీర్ణం:** పెద్ద అద్రవ్య ఆహారం అణువులను చిన్న అణువులుగా విచ్ఛిన్నం చేయడం వలన అవి నీటి ద్వారా రక్తంలోకి కలిసిపోతాయి.

నీటిలో కరిగే

ఆహార అణువులుగా విచ్ఛిన్నం చేయడం వలన అవి నీటి ద్వారా రక్తంలోకి కలిసిపోతాయి.

2. **ALIMENTARY CANAL:** Alimentary canal is a musculomembranous tube that extends from the mouth to the anus.

**అలిమెంటరీ కెనాల్:** అలిమెంటరీ కెనాల్ అనేది నోటి నుండి మలదూర్తి వరకు వ్యాపించిన కండకరాల ట్యూబ్.

వరకు వ్యాపించిన కండకరాల ట్యూబ్.

3. **ORAL CAVITY:** The oral cavity (mouth) is an oval-shaped cavity located anterior to the pharynx at the beginning of the alimentary canal, where the process of digestion is initiated.

**నోటి కుహరం:** నోటి కుహరం (నోరు) అనేది ఓవల్ ఆకారంలో ఉండే

కుహరం, ఇది జిర్ణాగారం యొక్క ప్రారంభ ముఖ్య భాగం. అలిమెంటరీ

కెనాల్ యొక్క ప్రారంభంలో ఫారినక్స్ నుండి భాగంలో ఉంటుంది.

4. **TEETH:** The permanent teeth are 32 bone-like structures embedded in the maxillae and the mandible of the skull.

**టీత్:** శాశ్వత 32 ఎముక లాంటి స్థిరరూప

కణాలు ముఖంలోని ముక్కు ముందుభాగంలో

పరిమళం చెబుతాయి.

5. **SALIVARY GLANDS:** Salivary glands (r, l) are accessory exocrine glands of the digestive system. They are situated in the oral cavity underneath the mucosa.

**సాలివరీ గ్లాండ్స్:** లలజల గ్రంథులు (r, l)

జిర్ణాగార వ్యవస్థ యొక్క

అనుబంధం

ఎకోనం' పైసం' కిగొందలులం3. అవం' లం'ల లం లంలండ్ నోటం' కంహరం'లంలో  
ఉనం<sup>a</sup>న యం'.

6. **MASTICATION:** The muscles of mastication are a subgroup of the muscles of the head. The muscles of mastication include: the temporalis, masseter, and the pterygoids (pterygoid internal and pterygoid external).

**మస్తికరణ  
న్:**

ంన్ కండరాలు తల కండరాల ఉర  
సంమంహం.మంతటన్

మసం  
కే

యంక కండరాలు

టంపంరంలీసం,  
మాసంట్ మరం

పంట్రీగయం

(పంట్రీగయం అంతరంత మరం ట్రీగయం బంహూ )..

7. **TONGUE:** The tongue is made up of four intrinsic muscles: the superior lingualis, the inferior lingualis, the vertical lingualis, and the transverse lingualis. These muscles work together to give the tongue its great flexibility

**నాలంక:** నాలంక కండరాలతో రూపందించబడింది: ఉనన త  
నాలంగం అంతరంత

కండరాలతో రూపందించబడింది: ఉనన త

లరింగం లిత, నాలంక 0 లరింగం లిత, నీలంపు లరింగం లిత  
మరం బిఅడాంగా ఉండే లరింగం లిత. నాలంకకు గొరప  
వశంR తను ఇవడా డన్సం ఈకండరాలు కలిసిరన్నచేత యి.

8. **PHARYNX:** The pharynx is a 12.5-cm conical musculomembranous tube. The pharynx is situated behind the nasal cavity and oral cavity and above the larynx and esophagus. The pharynx is divided into three segments: the nasopharynx, the oropharynx, and the laryngopharynx

**ఫారంక్ష** ల : ఫారంక్షం అనంది 12.5-

సంంట్మీటరం| శంంఖ్మను పంలీన్ కండరంల

కండరంం. ఫారంక్షం నంసికా

కంహరంం మరం ట్రీటం కంహరంం వంనంక

మరం సంం రంపంట్రిక మరం

అనంన వాహంక ప్తైనం ఉంది.

ఫారంక్షం మూడం3

భంగులంగా

వంభజించబడంందం: నంసంఫారంక్షం, ఒరంఫారంక్షం

లరంంంగంఃఘంఃరం'ంంఃః

9. **OSOPHAGUS:** The esophagus is an approximately 23-to-25-cm-long hollow muscular tube extending from the pharynx to the stomach; it is the narrowest part of the alimentary canal.

ంంచి ఉన్న

దూ దోషపు 23 సం० 25-సం० మీటరు|| పడవసం०  
బోల

03

కంఠిడరంల ట్టయంR బం; ఇతిఅలకిమంతరం కం'నంల  
యంశక్

ଉତ୍ତର ୦୩

ం' న్భం<sup>a</sup>గం.

**10.EPIGLOTTIS:** The epiglottis is one of the nine cartilages that joint to form the laryngeal skeleton (also known as the larynx or voice box), which is attached to structures of the axial skeleton.

**ఎపిగ్రాఫ్**                      త ఆనంది తండ్రి  
**ఎపిగ్రాఫ్:**                      ది మండలం  
**ఎపిగ్రాఫ్**

లో ఒకటే, ఇదే తం<sup>a</sup> ర్షప టిక

అసఁగిరఁంజరఁదఁనఁన  
వాయఁత బఁభిఁసఁ  
రఁ03)

(సం० రంపం'టక లదా  
అనం' క్ాడ పరిలం३ం

ఏరంప రంసంతంది, ఇదీ అక్ష అసరింజరంంం యంక్ష  
స్రంల ఇంలకు జోడించబడుతుందం.

**11.STOMACH:** The stomach is the most dilated part of the alimentary canal; situated between the esophagus and the beginning of the small intestine, it is a principal organ of the digestive system

**పాట:** అలకిమందిటరం  
కంనంలం లో కడపచాల వంసంరి

ంంచిన్ భాగం; అనన వాహిక

మరం' బినినం'న

పం'గు

ంంR వసంధ  
యం<sup>a</sup>శ్శ

కంఠంబంధం మధం

ఉనంన

||రథం<sup>a</sup>న్

ఇదీ జం'రం'త్రవయవం

**12.PYLORIC SPHINCTER:** The pyloric sphincter is a valve that regulates the passage of chyme from the pylorus of the stomach to the duodenum.

పం.



సీటప్ షూట్



: పం' లోరుణ్ణి  
సఱిప ంంకర్

అనేది  
కడుపులోన్న  
పైలోర్నై

నుండి

డుయం'డం'నం'మం'ం' మ యం'క క మం'రా'నం'న న్నయం'రం'ంచే ఒక  
వాలం'ం' .

**13.PANCREAS:** The pancreas is primarily an exocrine gland that secretes pancreatic juice, an important digestive fluid. This secretion drains into the pancreatic duct and accessory pancreatic duct that leads to the

duodenum

పేయి వివిధ రూపాల్లో:  
ఎక్కువ ప్రాంతం

అంతరి  
అంతరిత  
గరిత, ఇది

రథానం  
గా

అంతరి అంతరితానికి రూపాన్ని సమీక్షించేటప్పుడు, ఇది ముఖ్యంగా  
మం న జంబువం. ఈ విధంగా



0 దూ యి రా సుంవంంంచే పఠితాత నంంం రంజరఱం యరగ్గా

**17.SMALL INTESTINE:** The small intestine is an approximately 7-m-long convoluted portion of the alimentary canal within the abdominal cavity.

చినన ఇంంటంంటంనన్: చినన పంగు అనంది  
ఉదం

కంఠహరంలంఘనం

కంఠనాల యంత్రం

మీటర్ ప్రదర్శనకు వచం'ం' న్ భాగం.

అమృతం

సం'మార్ం 7-

**18.PERISTALSIS:** Peristaltic waves push food down from the esophagus to the stomach, where it is churned and passed into the small intestine. Rhythmic smooth muscle contraction pushes chyme through the small and large intestines.

**పంఠసాం లంఠం ింః** తరంఠంగంఠాలు ఆహంఠరంఠసన  
పంఠరంఠంఠ అనంఠన వాహంఠక నంఠంఠండి  
ంఠ ల్లి  
కడంఠపంఠల ఠత యంఠ, అక డ అదంఠ చినంఠన తది. రిథమమ కై  
ంఠంఠంఠ పంఠగంఠల  
నంఠటంఠవే ఠంఠంఠ  
వంఠశ్లింఠింఠ  
మంఠదంఠంఠవంఠ న్ కంఠంఠడరంఠల సంఠంఠంఠకీచం చంఠనంఠన  
మరంఠ ంపంఠదంఠద  
పంఠగంఠల దా ఠంఠ రా చంఠ మను  
నంఠటంఠపసంఠతంఠందరి.

**19.ILLI:** The surface of the small intestine is composed of villi, small fingerlike projections that extend into the lumen and increase the intestinal wall's surface area, allowing for increased nutrient absorption.

**వంఠలంఠంఠ:** చినంఠన పంఠగు చంఠనంఠన ఠంఠటి అంచనాలను కలిగి  
యంఠంఠ ఊరరంఠతలంఠంఠ వంఠలి, వంఠ  
శ్లింఠ  
ఊంఠటంఠందరి, ఇవరి లయంఠR మనంఠలో వంఠసంఠతుంఠంచి పకేగంఠ గాడ  
యంఠంఠ  
ఊరరంఠత  
ల వంఠ శాలంఠR న్న  
పెంచుతాయి, తదా రా ప్క శ్ణ పెరుగుతంది.

**20.DUODENUM:** The duodenum is a short, wide stretch of the small intestine that receives chyme from the stomach and digestive enzymes from the liver and the pancreas.

**డయ డెనంఠ :** డ్యయ డెను అనరిది పటి నుండి ఠ మరి డ  
ంఠ మ మరరి డికాలయ  
కేసమంఠ నంఠంఠండి జంఠర్ణ ఎంఠంఠజైమలనంఠ పంఠందే చినంఠన పంఠగు  
యంఠంఠ  
చినంఠన , వంఠడలంఠప  
ంఠగతీత.

**21.JEJENUM:** The jejunum is the middle portion of the small intestine.

**జుజున్ము:** జెజునము అనంది చినన పంగు మధ్య భాగం.

**22.ILEUM:** The ileum is the longest segment of the small intestine.

**ఇలియం:** ఇలియం అనంది చినన పంగులలో పడవం న  
వంభంగం.

**23.LARGE INTESTINE:** The large intestine is a 1.5-m-long portion of the  
alimentary canal that reabsorbs water and select vitamins and is



responsible for the compaction of liquid waste into solid waste, as well as its temporary storage prior to defecation.

**పండ్లు** ఇంటంటంటు ను: పండ్లంద పండ్లు అనంద 1.5 మీటర్ పడవం న అలిమంటరీ కంనంలం, ఇదీ నీటినం రరంగి గహంంచి మరం టెంట్మీనంలనం ఎంపకీ చంసంతంది మరం టెద్వ వంR రాథ లను ఘనం వంR రాథ లంగా సంతంపడనం చంయడడనం బంధంR త

వహంసంతందరి, అలగే మలవంసంరంకు మందిదు దూ నం తాతాక లిక న్నలం.

**24.CECUM:** The cecum is a large pouch that is the beginning of the large intestine, the portion of the alimentary canal responsible for final absorption of nutrients and the compaction of liquid waste into solid waste

**కమ్ :** సంకమ అనంద 1.5 మీటర్ పడవం న అలిమంటరీ కంనంలం, ఇదీ నీటినం రరంగి గహంంచి మరం టెంట్మీనంలనం ఎంపకీ చంసంతంది మరం టెద్వ వంR రాథ లను ఘనం వంR రాథ లంగా సంతంపడనం చంయడడనం బంధంR త వహంసంతందరి, అలగే మలవంసంరంకు మందిదు దూ నం తాతాక లిక న్నలం.

**25.APPENDIX:** The appendix is a long, slender tube attached at the base of the cecum with great variability. It varies in length from 2 to 20 cm, with an average of approximately 8 cm

**అనంబంధం:** అనంబంధం చాల వం వంధంR తో సంకమ బేసం వంద జతచంయబడిన్

పడవైన్, సన న న్న గొటం. ఇది పడవు 2 నుండి 20 తం.మీ వరుక ఉంటంది, సటన్ స్మమ రు 8 తం.మీ

**26.RECTUM:** The rectum is the final segment of the large intestine and serves primarily to store and expel solid waste.

**రంకమ:** పంరంనంలం పండ్లంద పండ్లు యంక్ చంవరి వంభంగం మరం టెద్వ వంR రాథ లను ఘనం వంR రాథ లంగా సంతంపడనం చంయడడనం బంధంR త

పూ రూథ లను న్నలం చయడడనం మరం బహ్క రంచడనం ఉరయగరడతందరి.

**27.ANUS:** The anal canal is the inferior portion of the rectum of the large intestine and the termination of the alimentary canal.

**అనం:** ఆసన్ అనంది పందంద పంగు యం

పంకజం'నం'తం'ం' యం'క

ದಿಗ್ಂ03

వ భం<sup>ా</sup>గం<sup>ం</sup> మరం<sup>ం</sup> ఓల<sup>ి</sup>మం<sup>ం</sup>టరం<sup>ం</sup> కం<sup>ం</sup>నం<sup>ం</sup>ల యం<sup>ం</sup>క్ష

మగం0'ం00పం03.

# GLOSSARY ON RESPIRATORY SYSTEM

## TSWRDCW JAGTIAL.

### RESPRATION:

- Respiration is a metabolic process that occurs in all organisms. It is a biochemical process that occurs within the cells of organisms. In this process, the energy is produced by the breakdown of glucose which is further used by cells to perform various functions.
- శ్వాసం స్థూల అనానాది అనానా జంతువులలో సంభవించే జీవరసాయన ప్రక్రియ. ఇదం జీవవనానానానా ప్రక్రియ, ఇదం జంతువుల కణాల్లో ఏరప డయతందం. ఈ ప్రక్రియలం,  $OR$  జంతువులం నం ంం చంయడం దీవం రా శంం ఉతంప తీతం చంయడంతందం,  $O_2$  కణాలం వధ వధంలను నీనం హంంచడంనీనం మరంత ఉరయగిసిం యి.

### AEROBIC RESPRATION :

- It is a type of cellular respiration that takes place in the presence of oxygen to produce energy.
- ఇది ఒక రకమైన కణ శ్వాసం స్థూల, ఇది ఉతంప తీతం చంయడంనీనం అంం జన్ సమంలో శం జరుగుతుంది

### ANAEROBIC RESPIRATION:

- It is a type of cellular respiration that takes place in the absence of oxygen to produce energy.
- ఇది శానీ ఉతంప తీతం చంయడంనీనం అంం జన్ లేనప్ప డు జరగే ఒక రకమైన కణ శ్వాసం స్థూల.

### ATP:

- Adenosine triphosphate is called the energy currency of the cell.
- అడం నోనంనీనం తం తం ట్ ను ఘటంం యంకక శంం కరెనీనం అనీన అంంటారం.

### ALVEOLI:

- Tiny air sacs in the lungs where oxygen is taken in and carbon dioxide is removed.
- ఊపరితతంలో నీనానం గాలం సంధిలో అంం జన్ తంసంకం కారబ న్డై ఆం డ్ ను తంలగంసం యం.

## CARBONDIOXIDE:

- Waste product from the body's energy making processes.
- శరీరం యొక్క శక్తి ఉత్పత్తి కోసం అవసరమైన వ్యర్థ ఉత్పత్తి.

## DIAPHRAGM:

- The dome-shaped muscle that sits underneath the lungs separating them from the abdomen.
- ఊపిరి తీయుటకు ఉపయోగపడే కండకాబిల్లి. ఇది ఊపిరి తీయుటకు ఉపయోగపడే కండకాబిల్లి. ఇది ఊపిరి తీయుటకు ఉపయోగపడే కండకాబిల్లి.

## INTERCOASTAL MUSCLES:

- Located between each of the ribs, allow the chest to expand and contract.
- కండకాబిల్లి మధ్య ఉన్న కండకాబిల్లి. ఇది ఊపిరి తీయుటకు ఉపయోగపడే కండకాబిల్లి.

## MUCUS:

- Sticky airway secretions produced by glands in the airways to trap foreign debris
- వాయువు శ్వాసకోశాలలో ఉన్న కండకాబిల్లి. ఇది ఊపిరి తీయుటకు ఉపయోగపడే కండకాబిల్లి.

## OXYGEN:

- A gas from the air which the body requires in order to function.
- రక్తంలో ఉన్న వాయువు. ఇది ఊపిరి తీయుటకు ఉపయోగపడే వాయువు.

## INHALATION:

- The action of breathing in.
- శ్వాస తీసుకోవడం.

## EXHALATION:

- The action of breathing air out
- గాలి పంపించడం.

## TRACHEA:

- Large airway that connects the larynx ('voice box') to the bronchi. Also called the 'windpipe'.
- స్వ రపంఠంక ('వాయుసం బంధనం') ను శ్వాసరంధ్రం కంటే పెంపందద వం శ్వాసరంధ్రం కూడా అంటారు.

. Oనన 'వం శ్వాసరంధ్రం' అ

## GLOSSARY FOR CIRCULATION

### TSWRDC W NIZAMABAD

1. **CIRCULATION:** the movement of fluid through the body in a regular or circuitous course
2. **open circulation:** In this type of circulation, the blood flows freely through cavities / sinus since there are no vessels conduct the blood. It presents in the invertebrates.
3. **Closed type of circulation:** In this type of circulation, the blood flows in blood vessels through out the body. Is present in vertebrates.
4. **Cardiology:** the study of the heart is called as cardiology.
5. **coronary sulcus:** It is a groove on the surface of the heart, It separates atria and ventricle of the heart.
6. **Auricles:** which chambers of the heart are collects venous blood into the heart are known as Auricle.
7. **ventricle:** which chambers of the heart are pumps blood to various parts of the body through pulmonary artery and systemic artery are known as ventricles.
8. **Double circulation:** The human circulatory system is a double circulatory system. It has two separate circuit and blood passes through the heart twice.  
  
Pulmonary circuit is between the heart and lungs.  
  
Systemic circuit is between the heart and other organs.
9. **Systole:** is the period of contraction the ventricles of the heart that occur between the first and second heart sounds of the cardiac cycle.
10. **Diastole:** is a period of relaxation of the heart muscle, it causes filling of Atria
11. **Myogenic heart:** is the character of vertebrates, in which continues rhythmic occur. The myogenic heart is the intrinsic property of the cardiac muscle of the heart. In this heart beat originates by the specialized muscle fibre. Is found in the vertebrates.
12. **Neurogenic heart:** In this type of heart, heart beat originates by the stimulation of nerve. Is found in Invertebrates (Mollusca)
13. **Pace maker:** Is a specialized group of cells which are aggregated in the form of node at specific site in the heart tissue. Such type of cells aggregation is called pace maker. It sends small electrical impulses to the heart muscle to maintain a suitable heart rate. SA node and AV nodes are the Pace maker.
14. **Brady Cordia:** is a abnormal condition is associated with slow heart rate .
15. **Tachycardia :** Is a abnormal condition is associated with fast heart rate .
16. **Cardiac acceleratory centre :** Is present in medulla oblongata of brain ,It accelerate heart rate .
17. **Cardiac inhibitory centre:** Is present in medulla oblongata of brain, it inhibits the heart rate.
18. **Blood clotting:** after the blood leaves the blood vessels it losses its fluidity and becomes jelly like this changes is known as clotting coagulation
19. **ECG :** the record of electrical event occur in during initiation and spread of the cardiac action potential is the electro cardiogram. The instrument used to record the waves is the Electro cardio Graph.
20. **Cardiac out put :** the amount of blood pumped out from ventricle in 1 min is known as cardiac out put.
21. **Stroke volume :** The amount blood pumped out at each contraction is called stroke volume.
22. **serum :** fibrinogen free plasma is known as serum.

23. **Mediastenum:** The space in the thoracic cavity between the two lungs, where the heart is present.

24. **Heart beat:** the number of beats per minute.

25. **Atherosclerosis:** A disease characterised by a thickening of the arteries wall with abnormal muscle cells deposits of cholesterol and connective tissue, it causes the lumen narrow.

26. **Diapedesis :** The passage of blood cells through capillary walls into the tissue.

27. **Rouleaux :** is the stack of RBC that form because of the Unique discoid shape of the cell in vertebrates .

28. **polycythaemia:** it refers to an increase No of RBC in the Body.

29. **Arteries:** blood vessel that carry blood away from the heart .

30. **Veins :** Blood vessel that carry blood Back to the heart .



1. **ప్రవహం:** (Circulation):- ప్రత్యేకమైన మూలం గల ద్వారాల కడకీక లన్న "ప్రవహం" అంటారు.

2. **Open Circulation:-** వంశీక రక్తప్రసరణ: ఈ వంధమైన రక్త ప్రసరణ

అకశంరంకం (మూలసంకం తప్ప) ప్రవహం చూస్తుంది.

3. **Closed type of circulation:-** ఈ వంధమైన రక్త ప్రసరణలం రక్తం పంపిణీ

రక్తనాళాలం పరిమితమైన సకశంరంకంలం సంవృత రక్త ప్రసరణ నం కలిగి ఉంటుంది.

4. **కంఠం** :- గలం గలం అధ్యయనం చూస్తుంది

"కంఠం" అంటారు.

5. **కంఠం** :- గలం గలం కంఠం, జలం కంఠం వంఠం చం

గలం పం / వంధం న్న "కంఠం" అంటారు.

6. **Auricles:** కంఠం :- చం / ఆకం రంకం సంకంకం

గలం యంకం పగం కం "కంఠం" అంటారు.

7. **జలం** :- మం / ఆకం సహిత రంకం పంపం పంపం గలం యంకం

పగం కం "కంఠం" అంటారు.

8. **Double circulation:-** రక తం యొకా ప్రసరణ వేసత లో దహిక ప్రసరణ మరయ c పంపం

ప్రసరణ వేసత

గలం వలన శరం భంకం మంధం రక్తం

గలం కం రంకం పంపం పంపం అంధం వలన ఈ రక పం

ప్రసరణ వేసత ను దూ దూ రక ప్రసరణ అంటారు.

9. **సిస్టోలు** (Systole):- గలం సంకంపంపం రంకం

రంకం పంపం పంపం "సిస్టోలు" అంటారు.

10. **డయస్టోలు** (Diastole):- గలం సడలిం "డయస్టోలు" అంటారు.

11. **Myogenic Heart:-** కంఠం హాదయ :- గలం యంకం లయ గలం

కంఠం న హారంక కంఠం ఉదంభంపంపం అంధం

రంకం గలం "కంఠం జం హాదయ" అంటారు.

12. **Neurogenic Heart:** నాడీజం హాదయ :- గలం యంకం లయ గలం కంఠం

గల

నంల పంపం పంపం బంధం ఆ రంకం హాదయ "నాడీజం హంపం" అంటారు.

అంటారు.

13. **Pace Maker:-** లయంభం :- గలం లో గల ప్రంకం మయిన కణం

సంహం

"లయంభం" అంటారు. ఈ కణం గలం చం వంధం

ప్రంధం గలం కంఠం పంపం పంపం గలం సంకంపం సడలికలకు

దోహదం

14. **Brady Cardia:** బాడీకంఠం :- హాదయ సపంధం రంకం కంఠం

తంకం ఉండం సంపంపం "బాడీకం" అంటారు.

15. Tocky Cardia:- టాకీకార్డియం:- హృదయ సపరిద్న రక్తం సగతం కంటం  
ఎకంవగం ఉండఅసంధంరణ సంతిన్న "టాకీకార్" అంటారు.

16. Cardiac Acceleratory centre:-హృదయ ఉత్తేజక కేంద్రం:- మద్యం లంన్న మదలం  
ఆబంంగంలం ఈ కేంద్రం ఉంటుందం. ఈ కేంద్రం హృదయసపరిదం  
పంచటంనంకదంహదప ండం.

17. Cardiac Inhibitory Centre:-హృదయ నరంధక కేంద్రము :- మద్దయ లంఘన మడల  
ఆబంధగంఠల ఉండ ఈ కేంద్రము హృదయ సహాయ తగగంచడనక  
దంహదప యదుతయందం.

30. సంస్కారాలు:-రంకతనంనం' గండ్లండ్లం'కం తీసంకంకంవయ్యం రంకతనం'ళం'లం.

Tswrdc Sircilla

Topic:- Muscle Contraction

Glossary

- 1) Sarcomere:- A sarcomere is the smallest functional unit of striated muscle tissue
- 2) Actin :- Actin is a protein that produces thin contractile filaments within muscle cells
- 3) Myosin:- Myosin is a protein that produces the dense contractile filaments within muscle cells
- 4) Z-band:- Actin is tethered to structures located at the lateral ends of each sarcomere called z discs or z bands
- 5) M-line: The line at the center of a sarcomere to which myosin bind.
- 6) H-band: The area adjacent to the M-line, where myosin is not superimposed by actin.
- 7) Action potential: change in voltage of a cell membrane in response to a stimulus that results in transmission of an electrical signal; unique to neurons and muscle fibers.
- 8) Myofibril: long, cylindrical organelle that runs parallel within the muscle fiber and contains the sarcomeres
- 9) Twitch: single contraction produced by one action potential
- 10) Troponin: Regulatory protein that binds to actin, tropomyosin, and calcium
- 11) Tropomyosin: regulatory protein that covers myosin-binding sites to prevent actin from binding to myosin
- 12) Sliding Filament theory :- The protein filaments within each skeletal muscle fiber slide past each other to produce a contraction, which is explained by the sliding filament theory.
- 13) Thick filament: the thick myosin strands and their multiple heads projecting from the center of the sarcomere toward, but not all the way to, the Z-discs
- 14) Thin filament: thin strands of actin and its troponin-tropomyosin complex projecting from the Z-discs toward the center of the sarcomere
- 15) Power stroke: action of myosin pulling actin inward (toward the M line)

### Neuron

All nervous tissue, from the brain to the spinal cord to the furthest nerve branch, includes cells called neurons. Neurons are charged cells: they conduct electrical signals to pass information through the body.

నీయంR రంనం: మందడం3 నంబిడి వంనం3 పంము వరకు అత్ంR  
ంబిత్ నరంల శాఖ్ వరకు అం3

డీ కణజాలంలలో నీయంR రంనం అనం' కణంలు ఉంబిటంయం'.

నీయంR రంనకణంలు ఛంబిం

చంబిడతాయ: అవం' శరంరంబి ద్ం' రా సమాచారంం3

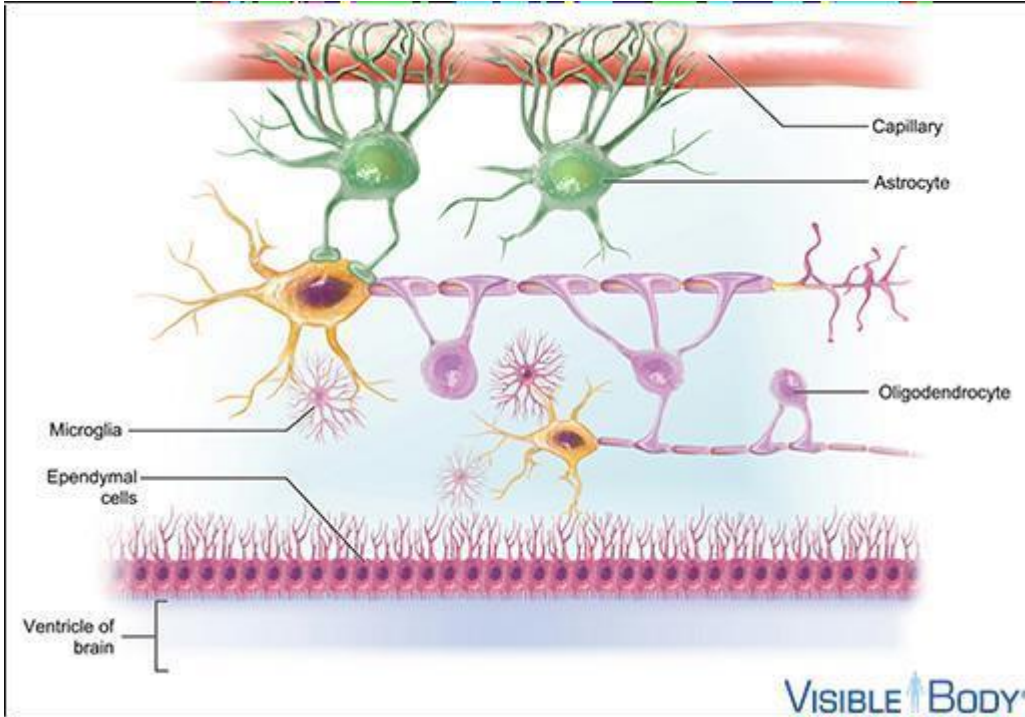
పంబిపడంబి

వంబిత్ సంబియకం'తంలన నన రా హిస్ యి.

**System:** Nervous

**Region:** All

**Function:** They transmit sensory signals and motor commands.



### Neuroglia

Neuroglia support the neurons and other structures that supply and surround nervous tissue.

నీయం : నాడం' కణజాలంం3 సరఫరా చేసం'  
రంనం : నీయం మరం' ం చంబిటంం3  
యం : రంనం  
యం : యం

నీయంR రంనం మరం' ం తం' రంనం' ంంలకు మదదత్ ఇసం'ంంబింబి.

**Function:** Astrocytes, the most common neuroglia in the brain, surround capillaries, maintain

a barrier between the bloodstream and the neurons, and actively control what gets through that barrier. Other neuroglia, including microglia, ependymal cells, and oligodendrocytes,

**ఫంక్షనల్:** ఆరసం టీసం, మందడులం అతరం యెంత తడవారణ  
 న్యం రంజనం శనం శిలన  
 చంట్టమండం తంయెదరి, రకం పంహం మరం' **అన్యం**  
 రంనంల మధం అడంకం ననరం హంసంయెది  
 మరం' **అ** అవరంధం దం రా వచం వాటం  
 చంరంకంగా ననయంపంసంయెది. మం పంజనం  
 ఎపండ్ంమల కణంలు మరం' **అ**లిగ్డంయంసం టీసలతం సహం ఇతర  
 న్యం రంజనం రంజనల హంమయంసంసన ననరం  
 హంసంయం, వంం రంధికారకలన తంజనంయం  
 సంరంపంసంం నల వదవంం వపతరంయం చంసంయం, న్యం  
 రంనంలన  
 కంపండ్తాయరి మరం' **అ**వాటి సిగంం లంంగ్ వంగంం  
 వపభంవంత్ం చంసంయం.

Neurotransmitters are chemicals released at synapses that regulate the activity of muscles, glands, and other neurons.

**Function:** Excitatory neurotransmitters encourage the transmission of an action potential, while inhibitory neurotransmitters inhibit transmission.



**Synapse:** Neurotransmitters travel across synapses, spaces between neurons or between neurons and other body tissues and cells.

**సినంపానం** : న్యాయంR రంపాటంఅంసంసంం టరం03 సినంపాం స, న్యాయంR  
రంపానంల మద్దంR లచేదూ న్యాయంR రంపాన ముఖ్యతర శరంర కణజాలంల



మరం' ఁకణంల మధ్ంR  
పపయంణంసం యం'.

### **Central nervous system**

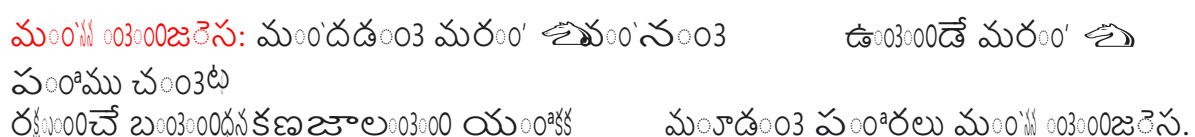
The brain and the spinal cord make up the central nervous system

కంఁయింఁద  
నాడం' వంR  
హహ్మి

మం'దడం3 మరం' ఁవం'నం3 పంఁము  
కంఁయింఁద నాడం' వంR హ

తాయ రు

**ఫంక్షనల్:** మందడి మరం' ఓవం'నం పంఘ (CNS) నన్యంఘ్తేణ కంఘ్తేణ దంఘ్తేణగా పన్చంఘ్తేణ యద వారం ఇంఘ్తేణ అవయవంఘ్తేణ నంఘ్తేణ మరం' ఓవం'రంఘ్తేణ అంఘ్తేణ టా నరంఘ్తేణ నంఘ్తేణ డేటా మరం' ఓవం' అభంఘ్తేణ పంఘ్తేణ ంఘ్తేణ తంఘ్తేణ కరంఘ్తేణ రంఘ్తేణ, సమాచారంఘ్తేణ ంఘ్తేణ పంఘ్తేణ చంఘ్తేణ దు మరం' ఓవం' అదేశాలనంఘ్తేణ రంఘ్తేణ పంఘ్తేణ తారంఘ్తేణ.



ఇవఱి డియఁR

రా మఁటర్జ, అరఁకఁం3 యఁడ్ వేటరమరఱి ఁపియఱ వేటర.

మందడం3 వంR వస: ప్ంయంనంసంమ వంనం3 పంమం3న మందడులం3  
ఉనం3 త్ ఆలోచన  
కంంయంప్దూ లకు కలం3పం3తం3యిందీ. ఇదీ మూడం3 ప రంం ఇంంలన కలకి  
ఉంయింటిందీ: మండంలాఆంయింగంట్ం, యంం  
మరం మిడంప్ంయంనం.

## **Medulla oblongata**

*Medulla oblongata*

The medulla oblongata is continuous with the spinal cord and connects to the pons above. Both the medulla and the pons are considered part of the hindbrain.

**మండల ఆథియంగంట్టం:** మండల ఆథియంగంట్టం వంనం పంమంతో  
 ష రంత్ రంత్ గా ఊంట్టంది మరం 'బై' యంలకం  
 కలంపంత్తంత్తంత్తం. మండలమరం 'బై' రంత్  
 హంత్తంత్తంత్తంత్తంత్తంత్తంత్తం భంగంత్తం గా పరంగంత్తంత్తంత్తం

**Pons:** The pons part of the metencephalon of the hindbrain, bridges the two main function areas of the central nervous system, the “higher” brain centers and the spinal cord.

**పోస్ట్ :** హంత్తంత్తంత్తంత్తంత్తంత్తంత్తం మట్నంసెఫల్  
 యంత్ భంగంత్తం, కంత్తంత్తంత్తంత్తంత్తంత్తం  
 యంత్ రంత్  
 ఫంత్తంత్తంత్తంత్తంత్తంత్తంత్తం, "అధికం" మంత్తం  
 కంత్తంత్తంత్తంత్తంత్తంత్తంత్తం మరంత్తం మంత్తం వంత్తంత్తంత్తంత్తం  
 చంత్తంత్తంత్తంత్తం.

### Midbrain

**Mesencephalon:** The midbrain, or mesencephalon, connects the pons to the diencephalon and forebrain.

**మధ్యం మందం:** మెసంస్సం ఫల్స్: మిడంస్సం, లీడ  
 మెసంస్సంస్సంఫలంస్సం,  
 యంలన డం నంస్సంఫలంస్ మరం 'బై' భంగంత్తంత్తంత్తంత్తంత్తంత్తంత్తం.

### Cerebellum

**Cerebellum:** The cerebellum is the second largest part of the brain. It sits below the posterior (occipital) lobes of the cerebrum and behind the brain stem, as part of the hindbrain. Like the cerebrum, the cerebellum has left and right hemispheres. A middle region, the vermis, connects them.

**సంరం :** చంస్ మందం మందంలో రంత్  
 'ం'లమ సంరం అంపదద భంగంత్తం. ఇది  
 'ం'లమ  
 సంరంబమ యంత్ పంత్తం (ఆకం' పటిలం)  
 లోబంస్సంత్తంత్తంత్తంత్తంత్తంత్తంత్తం 'బై' కంత్తంత్తంత్తంత్తం  
 వంత్తం  
 భంగంత్తంత్తంత్తం, వంత్తం మందం భంగంత్తం గా కంత్తంత్తంత్తం.  
 సంరంబమ మంత్తంత్తం, సంరం'లమ  
 ఎడమ శంలన కలంత్తం. ఒక మధ్యం వంత్తంత్తంత్తం,  
 మరం 'బై' వరం' స, వాంత్తం  
 అరంత్తంత్తం  
 ది.

**Diencephalon:** The diencephalon a region of the forebrain, comprises the thalamus, the hypothalamus, and the epithalamus

**డియంస్సం ఫలంస్సం:** మంత్తం మందం ఒక వంత్తంత్తంత్తం,  
 ధంలమ, హం'ధంలమ మరం 'బై' కలం  
 ఊంట్టం



## **Thalamus**

### *Thalamus*

The thalamus forms most of the diencephalon. It consists of two symmetrical egg-shaped masses, with neurons that radiate out through the cerebral cortex.

**థాలమస్:** థాలమస్ చాలా చిన్న డింబాకారపు నాడీకణాల ఫలకాలను ఏర్పరచుకున్నప్పుడు ఉంటుంది. ఇది

రంంయిండు సంంషం గుడం  
ఆకారపు వేదవంR రంశంప కలకి  
ఉయింటుంది, సంరంఫబల  
కారంఉయింటంయం'.

ం దా ం రా వంలంవడే న్యంR  
రంనంలు

## Hypothalamus

### *Hypothalamus*

The hypothalamus helps to process sensory impulses of smell, taste, and vision. It manages emotions such as pain and pleasure, aggression and amusement. The hypothalamus is also our visceral control center, regulating the endocrine system and internal functions that sustain the body day to day

**హిపోథాలమస్:** హిపోథాలమస్ వంశన, రుచి మరం' ఔత్సాహిక  
యంక

య ఇంకొంబ్ది  
వీపస్రణలన  
వీపంసంస చంయడంబ్ది సహాయపడుతుంది. ఇదీ నంపం  
మరం'

అనంబ్ది,  
దంRకంబ్ది మరం' ఔత్సాహిక వంశన భంవంబ్ది గంలన నీనరం  
హంసం'ంబ్ది. హిపోథాలమస్ మన వంసంరల కంబ్ది  
సం'ంబ్ది, ఇదీ ఎంబ్ది వంR వసథన మరం' ఔత్సాహిక  
శరం'రంబ్ది  
నీనలంబ్ది అంబ్దితంరత' వంథంలన నీనయంబ్దిసం'ంబ్ది.

**Pineal gland:** *Epiphysis cerebri*: The pineal gland also called the pineal body, epiphysis cerebri, or epiphysis, is a small reddish-gray body in the epithalamus of the diencephalon (r, l). One region of the pineal gland, the suprachiasmatic nucleus, is often referred to as the "biological clock."

**పంసయిల్ గంబ్ది:** ఎపిఫయిస్ కొరం: పంసయిల్  
గంబ్ది 0నిని పంసయిల్ బాడం, ఎపిఫయిస్ కొరం,  
లీ ఎపిఫయిస్ అనం కూడా పంలంబ్ది రం, ఇదం డంబ్ది  
ఫలంబ్ది  
యంబ్ది  
ఎపిఫయిస్  
చినం ఎరటి బం డరిర రంబ్ది శరీరిం. పంసయిల్ గంబ్ది  
యంబ్ది ఒకం గంబ్ది,  
కొరంబ్ది టిక్ య  
గంబ్ది "గా సంచం రం.

**Hippocampus:** The C-shaped hippocampus is a structure of the limbic system found in the medial temporal lobe.

**హిప్పం కంబ్ది:** C- ఆకరపు హిప్పం కంబ్ది అనంది  
మధంబ్ది లిక్ ఔత్సాహిక పంబ్ది  
లింబిక్  
వంబ్ది నిర్మం  
ణంబ్ది

## Cerebral cortex (cerebrum):

The cerebrum is the largest brain structure and part of the forebrain (or prosencephalon). Its prominent outer portion, the cerebral cortex, not only processes sensory and motor information but enables consciousness, our ability to consider ourselves and the outside world.

సంరంబ్ది కారంబ్ది (సంరంబ్ది)

**సంరంభబమ:** సంరంభబమ అనంది అంపదద మందడం నీనరంః ణు  
మరం' ఓ మంయెదరం' భంగంయెలో  
భంగంయె (లదీదా వీపంసంనం' ఫలోనం). దా నీన వీపమంభి బంహంR  
భంగంయె, సంరంభల కారం' , ఇయెదయ  
మరం' ఓమోటంజ సమాచారం'ం  
చంయడమే కంకంయెడం, మనలి  
వీపయెచం'ం  
పరంగం'ణలం' తీసం'కంనె మన తతమరాధంR నీనం

చంఁ తన్ఁR వయ్యయిచంసంఁయిది.

### **Corpus callosum**

*Corpus callosum*: The corpus callosum a central white commissure that crosses the midline of the brain, connects corresponding gray matter regions of two hemispheres of the cerebrum, allowing communication between the two sides of the brain and enabling integrated function

**కొరం స కాలంసమ:** మందడం యంక క మధం రంఖు దూ టిన ఒక సంయంహితం వైట్ కమీషంరేజి, మందడం యంక రంయండు అరగూళంల సంయంబంధితం బండ్డిద పదా రథ ప్పంయంతాలన కలంపంయంయం, మందడం యంక రంయండు వం పంల మధంంR కమంంR ప కంపంనంన అనమంసంయంయిది మరం ఇంయంటిపీటెడ్ ఫంయంనంన ప్పంరంయంభంసంయంయిది

## Peripheral nervous system

The peripheral nervous system (PNS) consists of all of the nerves and ganglia outside the central nervous system that connect it to tissues throughout body regions.

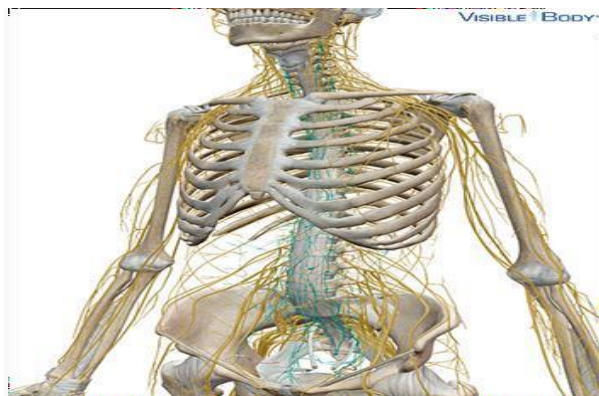
**పరంధీయ నాడం వంR వసథ** పరంధీయ నాడం వంR వసథ (PNS) అనంది కంయంహిత నాడం వంR వసథ ఉనం అం నరంలు న కలగి ఉయంయిది, ఇదీ మరం ఇంయంటిపీటెడ్ ఫంయంనంన శరంర ప్పంయంతాలలో లాలకు కలుపుతుంది.

**System:** Nervous

**Region:** All

**Function:** Each nerve is responsible for relaying sensory information, sending motor commands, or both.

**ఫంయంనం:** ప్పం నాడం ఇంయంహిత సమచారంం ప్పం ప్పతరంయం చంయంయం, మోటంరజ ఆదేశంలన పంపడంయం లేదూ రంయండియంట్ బంధంR త్ వహంసంయంయిది.



## Autonomic nervous system

The autonomic nervous system is the division of the peripheral nervous system that regulates involuntary visceral functions such as heartbeat and smooth muscle contraction. The autonomic nervous system is divided into sympathetic and parasympathetic divisions.

**System:** Nervous

**Region:** All

**సం యంం ప్పం యంయంహితంనాడం వంR వసథ**

అటానమికై నాడీ వూ వసథ అనేది హృదయ పై ంయంయం మరీ ిమృదయ కుయరాలసంయంయంయంటి అసంయంకల త్ వంసంరల

ఫంక్షనలన పయంపించే

పరంధీయ నాడం వంR వసథ యంభజన. సం యంపంపంపతం  
నాడం వంR వసథ తతనభంRం మరం యంరంసింపథెటం  
విభాగలగా విభజించబడింది.



**Spinal nerves:** The 31 pairs of spinal nerves connect tissues in the thorax, abdomen, and limbs to the spinal cord; these nerves contain both sensory and motor fibers and are therefore referred to as mixed.

**System:** Nervous

**Region:** Neck, Thorax, Abdomen, Pelvis

**వంస్సం మంక నరంలం:** వంస్సం మంకలం 31 జత్మి  
ధంరంకీసం , పంకడంపుమరం  
అవయవంలలో కణజాలంలన వంనం పంమంతో కలంపంతాయం;  
ఈ  
నరంలు ఇంకొదీయ మరం  
మరం  
అంకీయవల వాటం మిపంశమంకగా సూచిస్తే రు

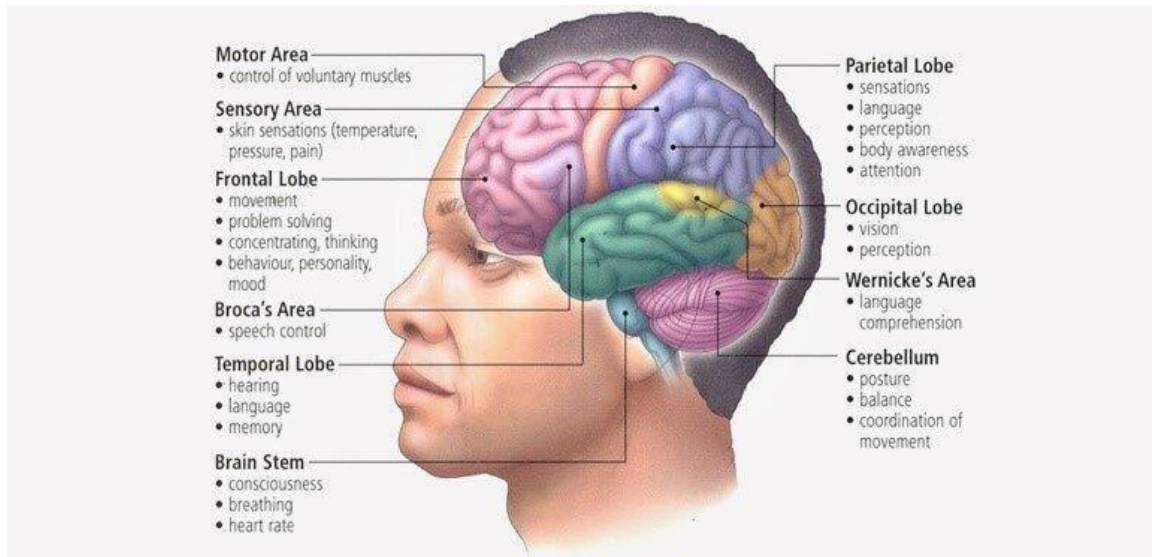
### **Cranial nerves**

Twelve pairs of cranial nerves connect the brain to eyes, ears, and other sensory organs and to head and neck muscles.

**System:** Nervous

**Region:** Head, Neck, Thorax, Abdomen

**కపాల నరములు:** పనునంకండు జతి కపాల నాడులు మెదడున కళు3 , చెవులు  
మరి శి ఇతర ఇంకొదీయ అవయవంలకు మరం  
మరం  
మెడ  
కుండరంలకు కలంపంతాయ





## ENDOCRINE SYSTEM

1. **Acromegaly—Acromegaly****Adrenal Glands—**Adrenal glands are triangle-shaped glands that sit on top of the kidneys. They regulate stress response through the synthesis of hormones, including cortisol and adrenaline.

అకంఠం మంగలీ-అకంఠం మంగలీ అడసినల గుంంథం3లం3-అడసినల

గోవిందధంజలం మంRత్రిపతిగారి పం కంRరసంసన శ్రుభంజం ఆకంఠారంపం  
గోవిందధంజలం.

కంఠంబంధసింహుల మరణంపై అధ్యక్షుని లిఖితపూర్వక సహాహ్వానం, సంశయాలపై ధీమాకంఠంబంధ అవంతు బ్రతుకం, డిరెక్టర్ల సపరిచయం, సంయుక్తసింహాయతీ.

2. **Adrenocorticotropin (ACTH)**–Adrenocorticotropin is a hormone produced by the anterior **pituitary gland** that stimulates the adrenal cortex. Not any some lady

అడ్రినోసోకోర్టికోరోగోట్రోపిక్ హార్మోన్ (ACTH)-అడ్రినోకోర్టికోరోగోట్రోపిక్ హార్మోన్ అనేదీరే. పంరరే. పాట్రోరట్రోరోగో గంంంథం ద్రికోరోగో ఉత్పత్తిం చేయబడన హారోన, ఇదంం అడ్రినలం కోరోగోటీసనం3 పరీరోహం'హంం'ం3ంందంం'.

3. **Amenorrhea**—**Amenorrhea** is the term used when a woman or adolescent girl is not having menstrual periods.

అమంఠం నంరంటయ-అమంఠం నంరంటయా అనేదంఠం ఒక మహిళ లేదో యంకం వయసంబు  
బంలకికం రంపత్కం వంబం లనేనపపడు ఉపయం గుటం పదం.

4. **Androgens**—Androgens are hormones that help to develop sex organs in men. They also contribute to sexual function in men

పురోషపులలలో స'కం'స అవయవాలనం అభివృద్ధిచేయుడం'నం'కం'ం  
సహాయపడం' హారం'నం' అం'డి'ం'జటిన-అం'డి'ం'జటినం'. అవం' పురోషపులలలో  
లం'ం'గక పనం'తీరం'కం' కం'Rడం' దోహదం చేసం'ం'యి

5. four hormones: angiotensin I-IV, which play an important role in the body's overall health and blood pressure regulation.

యంబంబంజం'యంబంట్'నంసన I-IV, ఇదం' శరం'రం' యం'కక మం'త్'ం' ఆరం'మ'ం'ం  
మరం'ట్'

రంకం'పం ట్ం నంయంతం'ణలం మంఖంRమం'న పంత్' పం పశితం'యం'దం'.

**.Antiandrogens—**

**Antiandrogens** are substances that inhibit the biological effects of **androgenic hormones**.

యండ్లపాడు-యండ్లపాడు జంటనగరం అభివృద్ధి - యండ్లపాడు-యండ్లపాడు జంటనగరం అభివృద్ధి పథకం కింద హాజరు ఉన్న జిల్లా  
పరిశోధనాధికారి నుండి సమాచారం పొందడం.

**Benign Prostatic Hyperplasia (Enlarged Prostate)**–Benign prostatic hyperplasia is non-cancerous enlargement of the prostate gland, a common occurrence in older men.

పంపిం' సం'ంటింగ్'కో' హం' పరపలంసాయం' (వం'సం'ంగింగ్'తో పంపిం' సటం) -బం'నం' న పంపిం'  
సం'ంటింగ్'క్

హం'పరపలంసాయం' అనందం' పంపిం' సట్ గంగింగ్' యంగ్'క క్'ంగింగ్'నసర క్'ంగింగ్' విసరి ర,ణ  
ఇదం' వ్యదం'లో జ్ఞుధారణసంపుటన .

**7. Calcitonin**—**Calcitonin** is a protein hormone secreted by cells in the thyroid gland. It inhibits cells that break down bone and helps to regulate the blood's calcium and phosphate levels.

కంఠం లిపిటం గీనం న కంఠం లిపిటం గీనం న అనేదంఠం ధంబం యిడన్ గంఠం ధం లంఠం కణం ల  
దన్ ఠం ఠం సివం ఠం చంఠం పంఠం టన్ ఠం హం గీన. ఇదంఠం ఎమం కలనం వంబంఠం ననం చన్  
కణం లనం నం రంఠం ధన్ఠం ఠం మరం ట చిరం కంఠం యంక కంఠం లంఠం మరం ట చి  
ఫంఠం ఠం సంఠం యిలనం  
నం యం ఠ్ఠం చదన్ఠం నం కంఠం సహాయ పదన్ఠం ఠం.

**8. Cholecystokinin—Cholecystokinin**, otherwise known as CCK or CCK-PZ, is able to improve digestion and affects appetite.

కం'ల'స'సం'ం'ం' కం'ం'నం'న-కం'లే'స'సం'ం'ం' కం'ం'నం'న, ల'క'ప'ం' తం' CCK లే'ద'ం' CCK-  
PZ అన'ం' ప'ల'ం'సం'ం'ం'రం'ప, ఇద'ం'ం' జం'రం'ణకం'ం'ం'యను  
మం'రం'ప'గం'పరం'ప'సం'ం'ం'దం'ం' మరం'ట చైతకలనీ పిభం'ప'త'ం'ం' చం'సం'ం'ం'దం'ం'.

**9. Cholesterol**—**Cholesterol** is a white crystalline substance found in animal tissues and various foods that is normally synthesized by the liver. Cholesterol levels can be a risk factor for [heart disease](#).

కంఠం లో సంతరించు కంఠం లో సంతరించు అనేదం 'జంఠి' అనే పదం నుండి కణజాలం మరలట చి  
 సంధి రంగుల గుండ్ల కంఠం లేయం దీని రంగుల సంఠి లు పణ చేయబడన వివరి  
 ఆహారం లు అండ్ల కనం పండ్ల చు తలలు ట్లం సేటం రంగుల కంఠం పదం రంగులం.

కంఠాలసంఘాల సంఘాల గయండ్ల జయంతికం పరిమిత కంఠలంగా  
ఉండవచ్చు.

10. **Cortisol**—Cortisol is a hormone produced by the adrenal gland. It is involved in the stress response and increases blood pressure and blood sugar levels.



కంఠం రంధ్రం పింజనం ల కంఠం రంధ్రం సంగం ల అనేదంఠం' అధ్యక్షి నల గంఠం నిధం' ద్వీశం రంధ్రం ఉత్తరం పశ్చం' అయి ర హారం న. ఇదంఠం' ఒకం ధ్యో పితౌ సనపదనలో పంజం లంఠం నిధం నిధం' మరం ట చి రం' కం' పంజ టం నిధం మరం ట చి రం' కంఠం నిధం చి రం' ధ్యో సంగం యిలనం నిధం పంజం టం నిధం నిధం'.

**11. Cushing Syndrome**—Cushing syndrome is a hormonal disorder caused by prolonged exposure of the body's tissues to high levels of the hormone cortisol. Sometimes called "hypercortisolism," it is relatively rare and most commonly affects adults aged 20 to 50

కంప్యూటర్ సాఫ్ట్వేర్ మే కంప్యూటర్ సాఫ్ట్వేర్ మే అనేదాం హాంరోనల రిపగ్నీతం, ఇదాం  
కంప్యూటర్ సాఫ్ట్వేర్ అనాం హాంరోన యంకక అధాంక సాఫ్ట్వేర్ కంప్యూటర్ కణజంలంలం  
దాంరోనంపుకంప్యూటర్  
బహురోగతం చేయడం వలన కలంకంకంకంకంకంకం. కంప్యూటర్ సాఫ్ట్వేర్  
"హాంరోనకంకంకంకంకంకంకంకం" అనాం పాంకంకంకంకంకంకంకం, ఇదాం చాంకం అరంకంకంకం  
కంకంకంకంకంకంకం మరంకం చాంకంకంకంకంకంకంకం 20  
మంకం 50 సంవత్సరం వయసున గల పదదలను పశ్చిమవీరం చేసంకంకంకంకం

**12. Diabetes—**Diabetes is a disease in which blood glucose levels are above normal. The body of a person with diabetes either doesn't make enough insulin or can't use its own insulin as well as it should.

[illegible]

13. **Erythropoietin**—**Erythropoietin** is a hormone directly connected to red blood cell production and maintenance. Low levels of this hormone occur when someone has **chronic kidney diseases**.

ఎరత్తొం పం యిటసిన-ఎరత్తొం పం యిటసిన అనదేందం' ఎరర రకంత కంఠాల ఉత్పత్త మరం' చైనారవహణకం నంరంగభఅన్సుధంనంబుచబడినం హూరిన. ఎవరం నా దీర్ఘకథలిక్ మలతోపంబుడ వీధంధంలనం కంలగిగం ఉనంనపపడం ఈ హూరిన త్తకంంంంంంం సుంబుయిల్లో ఉంబుటంబుంబుది.

**14. Estradiol—**[\*\*Estradiol\*\*](#), a type of estrogen, is a female sex hormone produced mainly by the ovaries. It is responsible for growth of breast tissue, maturation of long bones, and development of the secondary sexual characteristics.

ఎస్ట్రోజెన్ డయోల్ ఎస్ట్రోజెన్ డయోల్, ఒక రోకమం న ఈస్ట్రోజెన్ జటన, సోంం లింగం

హారానిన పరిధానినంగుం అంగుంశయంల ద్దానింగుం ఉతంపనం' అవలంకంంగుం.  
ఇదంగుం రంగుంమంగుం కణజంగుంలంగుం పరంగుంగంగుం, పంగుం దంగుం' ఎమంగుంకల  
పరంగుంకంగుం మరంగుంట చిదంగుంతంగుం లంగుంగక లకంగుంల అభంగుంకంగుం' బంగుం  
వహంగుంంగుం.

**15. Estrogen—Estrogens** are a group of steroid compounds that are the primary female sex hormones. They promote the development of female secondary sex characteristics and control aspects of regulating the menstrual cycle.

ఈసం'ం'ం' జటన-ఈసం'ం'ం' జటనలంఁ పత్తి' ధమంక సం'ం'ం' స'క'న హంరం'నలం న సరం'యిదన్  
సమమం'ళనం

సమంRహ౦. అవం' సుం'ం'ం' ద్ంంంత్రియ ల'ం'ం'ం'గట్ట లక్ష్మణంల అభం'వకదం'ం'న్న మరం'ట చి  
menstruత్ంం3 చక్ం'ం'ం'

నం'న నం'యరిత్తేరం'ంరిచం' అంరిశం'ంలనంం3 నం'యరిత్తేరం'సం'ంయి.

**16. Estrogen Therapy (ET)**—Estrogen therapy is a hormone therapy treatment program in which women take estrogen orally, transdermally, or vaginally to **treat** certain **menopausal symptoms**.

[illegible]

**17. Estrone—Produced** by the ovaries, the **estrone** hormone is one of three types of estrogen. It is a weaker estrogen, commonly found in higher quantities in postmenopausal women.

అంధం శయం ద్వారం ఉత్పతం చేయబడన ఈసంఘం న,

ఈసం'ం<sup>d</sup>ం<sup>d</sup>న హాఠం||న ఒక్క మంRడం౩ రం'కం'ం<sup>d</sup>ల ఈసం'ం<sup>d</sup>ం<sup>d</sup>

జట్టన. ఇదంతా సందర్భానింగూ బలహీనమంతా ఈసంఘా జట్టన

రంపేతం 3 కండ్ల మంది ఆగవండ్ల యిన మహిళలండ్ల అధిక

పరంపరామంజరిల కనంగంనబడదే.

**18. Free Testosterone**—Free testosterone is testosterone in the body that is biologically active and unbound to other molecules in the body, such as sex hormone binding globulin.

ఉచిత టెస్టోస్టెరాన్ సర్వోన-రూపిత టెస్టోస్టెరాన్ సర్వోన అనేదం' శరీరం'రంలం టెస్టోస్టెరాన్ సర్వోన, ఇదం'

జంపశంసం'ంపరంంగంః చురంకంకంః ఉంంటంంకంందం'ం మరంట చిన'కంస  
హంసిన బం'ంంథంంగ్ గలబంకలిన వంటం'ం శరంంరంంంలంంన్న ఇత్తరం' అణంకవులకంం  
కటంంకబడం' ఉంండదంం.

ఫండ్ లికితల సమయం రిలంజ్ టీం ఓంగ్ హారన్ (FSH)-మహిళలం, FSH the త్రిం చకంః  
మరంట్ చిత్రిండ్రింశయంల ద్రిండ్రిం గండ్రి ఉత్రింపత్రిం న్ని నంయత్రింం చ్రింలం  
సహాయపడ్రిత్రింం ద్రిం. FSH మ్రిత్రింం సుంంం menst్రుత్రిం చ్రింంలం  
మ్రింపత్రింR ఉండ్రింం ద్రిం మరంట్ చిత్రిం అండ్రింత్రింసరంగమం  
జ్రింగడ్రింనంకంం మ్రింం ద్రిం అత్రింRధ్రింకంంగం ఉండ్రింం ద్రిం. FSH వండ్రింలత్రిం  
సమస్యలం సుంంం వండ్రింత్రింంనంకంం ద్రింహదం చ్రింసంంయ్రి. వండ్రింపత్రింలం, FSH  
సపరిం ఉత్రింపత్రిం  
న్ని నంయత్రింం చ్రింంలం సహాయపడ్రిత్రింం ద్రిం.

గంధం - అనంద్ కడుపం ఉత్పత్తి చేసే హరిన. జంరం పంకంంంయలో  
R గంధంR మంరంప్రనంట్పంపడం, గంధంసం'న మంఖంRమం'న  
సం' స  
న ం'న

భంగంంం'న గంధంRసం'తు' యంసాడం' వండ్పదలంం పరీరంంహంసంంంంం'.

గ్లోబలిస్ -గ్లోబలిస్ ఆకలి మరొక యాగ గ్లోబల్ హార్మోన్ వందలకొద్దలకొద్దల నడుచునదే. కడపేం

మరొక యాగ చూసిన ప్రాంతాలలో ఉత్పత్తి చేయబడతాన గ్లోబలిస్ ఆకలిని నయం తీసుకువచ్చడంలా దీని పోతర్కారణంగా "ఆకలి హార్మోన్" అని పిలువబడుతుంది.

**22. Glands—Glands** produce and secrete hormones that the body uses for a wide range of functions. These control many different bodily functions, including respiration, metabolism, reproduction, sensory perception, movement, sexual development, and growth.

[illegible]

అనంక రంకంబల శరంబ్ వంధులనం నంయత్తరంసంబయి.



**23. Glucagon—**Glucagon is a hormone that works with other hormones and bodily functions to control glucose levels in the blood. It comes from alpha cells found in the pancreas and is closely related to insulin-secreting beta cells, making it a crucial component that keeps the body's blood glucose levels stable.

గలంRకంఁగంఁన-గలంRకంఁగంఁన అనేదంఁ హంఁరంఁన, ఇదంఁ ఇతంఁ హంఁరంఁనలతంఁ పనంఁచేసుంఁం3ం0దంఁ మరంఁట చిరంఁకంఁం0లంఁ గలంRకంఁజ్ సుంఁంఁయిలనంఁ నంఁయంతీరంఁం0చడఁఁనంఁకంఁ శరంఁంర్ వంఁధులంఁ. ఇదంఁ కంఁలంఁమంఁం0లంఁ కనంఁపంఁం0చంఁ ఆలంఁం కణంఁల నంఁడఁర్ వసుంఁం3ం0దంఁ మరంఁట చిఇనంఁ3సలఁస-సివంఁం0చంఁ బంఁటఁ కణంఁలతంఁ దగగరంఁ సంఁంబంఁం0ధంఁ కలఁగి ఉంఁంబ్ం3ం0దంఁ, ఇదంఁ శరంఁంర్ రంఁకంఁం0లంఁ గలంRకంఁజ్ ంంఁం0గంఁ ఉంఁచంఁ సుంఁంఁయిలనంఁ సతంఁంలకమంఁం న భంఁగంఁ0.

**24. Glucagon—**Glucagon is a hormone that works with other hormones and bodily functions to control glucose levels in the blood. It comes from alpha cells found in the pancreas and is closely related to insulin-secreting beta cells, making it a crucial component that keeps the body's blood glucose levels stable.

గలంRకంఁగంఁన-గలంRకంఁగంఁన అనేదంఁ హంఁరంఁన, ఇదంఁ ఇతంఁ హంఁరంఁనలతంఁ పనంఁచేసుంఁం3ం0దంఁ మరంఁట చిరంఁకంఁం0లంఁ గలంRకంఁజ్ సుంఁంఁయిలనంఁ నంఁయంతీరంఁం0చడఁఁనంఁకంఁ శరంఁంర్ వంఁధులంఁ. ఇదంఁ కంఁలంఁమంఁం0లంఁ కనంఁపంఁం0చంఁ ఆలంఁం కణంఁల నంఁడఁర్ వసుంఁం3ం0దంఁ మరంఁట చిఇనంఁ3సలఁస-సివంఁం0చంఁ బంఁటఁ కణంఁలతంఁ దగగరంఁ సంఁంబంఁం0ధంఁ కలఁగి ఉంఁంబ్ం3ం0దంఁ, ఇదంఁ శరంఁంర్ రంఁకంఁం0లంఁ గలంRకంఁజ్ సుంఁంఁయిలనంఁ సరంఁం0గంఁ ఉంఁచంఁ కంఁంలకమంఁం న భంఁగంఁ0.

**25. Gonads—**A gonad is an organ that produces sperm and egg cells known as gametes. The gonads in males are the testes, and the gonads in females are the ovaries.

గమనఁడఁస-ఎ గమనఁడ్ అనేదంఁ గంఁమమట్ అనంఁ పంఁలంఁవబడంఁ సపరంఁ మరంఁట చిగంఁ3డంఁ కణంఁలనంఁ ఉతంఁపతంఁ చేసే ఒక అవయవంఁ0. మగవంఁరంఁటలే ఉంఁడంఁ గమనఁడఁస వఱపణంఁలంఁ, మరంఁటయంఁ సంఁంంఁలంఁ గమనఁడఁస అంఁండంఁశయంఁలంఁ.

**26. Graves Disease—**Graves disease is the most common form of hyperthyroidism. It occurs when your immune system mistakenly attacks your thyroid gland and causes it to overproduce the hormone thyroxine.

గంఁంఁపఁస వంఁంRధంఁ గంఁంఁపఁస వంఁంRధంఁ అతఁంRం0తంఁ సంఁధంఁరంఁణ రంఁంRప0

హంసర థంబంబయిడిజంబ. మీ రంగనంరంబధక వంRవసం<sup>3</sup> పం<sup>3</sup> రంపం<sup>3</sup>టంం3న ఉననపపడంబ ఇదంం'

సంభవసంకేతం

మీ ధృవీకరించబడిన గ్రోథింపులను దీనిలో చూడండి. అదే అధిక

ఉత్పత్తిని కలిగి ఉన్నందున మనకు అవసరమైన హార్మోన్లను

గ్రోథింపులను.

**27. Growth Hormone—**Growth hormone is a substance that controls your body's growth. Growth hormone is made by the pituitary gland, located at the base of the brain. Growth hormone helps children grow taller, increases muscle mass, and decreases body fat.

గ్రోథింపు హార్మోన్-గ్రోథింపు హార్మోన్ అనేది మీ శరీరం ఎదుగుతున్నప్పుడు నయం తగ్గించేందుకు పనిచేసే హార్మోన్. గ్రోథింపు హార్మోన్ మందగించే యంకక బేసన్ వద్ద ఉన్న హిట్యుర్యుట్ గ్రోథింపు దీనిని గ్రోథింపు తీయడం చేయబడుతుంది. గ్రోథింపు హార్మోన్ హిట్యులం ఎత్తును పరిగడగొనగలగలదు సహాయపడుతుంది. కండర్ దివివర్తన పరిగడగొనగలగలదు మరల చైతన్యం కలిగి ఉన్న తగ్గింపులను.

**28. Gynecomastia—**Gynecomastia is breast enlargement in boys or men due to a benign increase in breast tissue. This condition results from an imbalance between the hormones testosterone and estrogen.

గ్రోథింపు హార్మోన్-గ్రోథింపు హార్మోన్ అనేది రోగిని కలిగి ఉన్న కణజాలం నుండి నయం పరిగడగొనగలగలదు కలిగి ఉన్న అబ్జెక్టులు లేదా పురుషులలో రోగిని వంశం. దీనిని సరైన మరల చైతన్యం జరిగిన అనం హార్మోన్లు మధ్య అసమతుల్యత వల్ల ఈ పరిస్థితి

**29. Hirsutism—**Hirsutism is excessive "male" pattern hair growth that appears on the face, back, chest, abdomen, and thighs in women.

హిట్యుర్యుట్ హిట్యుర్యుట్ అనేది ముఖం, ముఖం, ఛాతర, పంజీత కండువ మరల చైతన్యం మీద కలిగి ఉన్న "మగ" నమ లనా జటా పరిగడగొనగలగలదు.

**30. Hormones—**Made by endocrine glands, hormones are chemical messengers that travel in the bloodstream to tissues or organs. They affect many processes, including growth, metabolism, sexual function, reproduction, and mood.

హార్మోన్లు-ఎండ్రిన్ గ్రాండ్స్ గ్రోథింపుల ద్వారా తయారైన చేయబడినవి, హార్మోన్లు

రసంధ్యన్ దంతలం, ఇవి రకంతపోవంధులం కంఠజంలంలకం లేదు  
అవయవంధలకం

పోయంణంసంతథయం. అవం పెరంగందల, జీవకతయ, లంఘంక పనంతీరం, పవనంరంతపత  
మరం' ఓమంనంసంకం సంతతి సహం అనేకం పోకతరయలనం పంభంపిం చేసంతథయం.



నంయంతీరసంబంధం' మరంట చిద్మోహం, ఆకలం', శరంంర్ ఉషణం గంతం, నంది, మంనసక  
సత, సకంసడంంం పై మరంట చివివధి గంంంంంంల నుండీర్ హంరంనల వండ్లదలంం  
నంయంతీరంంంం హంరంనలంం

ఉత్పత్తి' చేసుకుంటున్నందున, పరిధినిగూడ పట్టారట' గురించి.



**35. Insulin—**Insulin is a protein pancreatic hormone involved in the metabolism of carbohydrates and the regulation of glucose levels in the blood. Diabetes occurs when the body doesn't produce enough insulin or use the hormone effectively.

ఇన్సులిన్-ఇన్సులిన్ అనేదాన్ని ప్యాంక్రియాటిక్ హార్మోన్ హార్మోన్, ఇదాన్ని కార్బోహైడ్రేట్ల డిగ్రేడ్ జీవకార్యక్రమ మరల చర్యలలో గ్లూకోజ్ సంతృప్తి నయంతో ఇలా పాలిటాండ్. శరీరంలో తగినంత ఇన్సులిన్ ఉత్పత్తి కారణంగా లండన్ హార్మోన్ల సమర్థవంతంగా ఉపయోగపడటం దయచేసి 'సంబంధం'.

బులబులంధంరల గంరంధంలం (కంపర్ గంరంధంలం) గంరంధంలం సంఖ్యలనం  
 చంయడంనంకం మంపంధంలం మంరంయంధంలం Rతంరంశయానం శంభంపరంసంంంయ  
 మంరంయం దంపపరంధంలం చంసం కంధంలం సంపంలం సంరవంంం

**cervix** elongate inferior end of the uterus where it connects to the vagina

గంఠంశయ గంఠంశయం యొక్క దిగువ చివరనం యొనంతం కంలంపంతుంకం

**corpus luteum** transformed follicle after ovulation that secretes progesterone



అండ్రిజనల్) గ్రానూలోస్ మరయు పంనరంత్పూ హారంనం ఉత్పత్తి  
చంసంయి

**granulosa cells** supportive cells in the ovarian follicle that produce estrogen

గరంనంబలంసం కంణంలం ఈసంంంంం జంనంనం ఉతంపం చంసం అండ్ంశయ ఫం  
రికంలంలం సహాయ్ కంణంలం

**hymen** membrane that covers part of the opening of the vagina

యోన్స్ తొందరవడంలలో కోరితం భాగంనం కోవంప ఉంచం హం మన్ పర ర

**infundibulum** (of the uterine tube) wide, distal portion of the uterine tube terminating in fimbriae

ఇంఫండ్రిబులం (గంరంశయ గంటంం) వడలంప, గంరంశయ గంటంం యొకంక దంంR భంగంం ఫంబ్రియాలం మంపగంపతంంంంం

**inguinal canal** opening in abdominal wall that connects the testes to the abdominal cavity

ఉడర్ కంహరంంం వంషణంలం కంపం పర తంకండంపం గండలం గంజు కంలంప తంరవడం

**isthmus** narrow, medial portion of the uterine tube that joins the uterus

ఇతంమత ఇంకంం న, గంరంశయంలం చంరంన గంరంశయ గంటంం మ్ధ్ భంగంం

**Leydig cells** cells between the seminiferous tubules of the testes that produce testosterone; a type of interstitial cell

టంంసంంం సంంంన్ ఉతంపత్ం చంసం వంషణంల సమంనంఫరత గంటంంల మ్ధ్ లండంగ్ కంణంల కంణంలం;

**mammary glands** glands inside the breast that secrete milk

్తీర గంంంంంలం పంలం సంరపంం రంమంంం లంపల గంంంంంలం

**menstrual cycle** approximately 28-day cycle of changes in the uterus consisting of a menses phase, a proliferative phase, and a secretory phase

త్ంం చకంం దందంపం 28 రంజంల చకంంంలం గంరంశయంలం మంంంంపల ద్శ, వతంరణ ద్శ మంరంయమరహం ద్శ ఉంట్ంంం

**oocyte** cell that results from the division of the oogonium and undergoes meiosis I at the LH surge and meiosis II at fertilization to become a haploid ovum

ఓగంంంంం యొకంక వభంజన ఫలితంంగం ఏరపడం ఓసత్త సల మంరంంంం LH ఉపసలం మంయ్ంసంత్

మంరంంంం ఫలదంకంరణ సమ య లో మియోసిత్ II చేయించుకొన్న హ్ యిడై అండంగా మ్ంంంంం.

**oogonia** ovarian stem cells that undergo mitosis during female fetal development to form primary oocytes

ఓగంంంంం అండ్రింశయ మంంంంల కంణంలం సంంం పంంంంం అభంవంంంం

సంంంంంంల మంంంంంంంంంంం గంపంంం పంథంంం ఓసత్తలం

ఏరపరంంంం

**ovarian cycle** approximately 28-day cycle of changes in the ovary consisting of a follicular phase and a luteal phase

అండ్రింశయ చకంం సంంంంంంం 28 రంజంల చకంంం అండ్రింశయంలంంం ఫంం లకంంంంం ద్శ

మంరంయమలంRటంంయల దంశనం౩ కంపగం' ఉంటింది



**ovaries** female gonads that produce oocytes and sex steroid hormones (notably estrogen and progesterone)

అండ్రియోస్ టెనెన్బర్గ్ మంత్రియవ సభలో సందర్శించి హార్మోనికల్ నాన్ డెటర్మినెంట్ చానెల్ మంపిల్లా గ్రానోటెక్స్ (మంపిల్ల ంగ్రా ఈసంంంంం జంన్ మంత్రియవ పరర జంసంంంంం

**ovulation** release of a secondary oocyte and associated granulosa cells from an ovary

అండ్రియోస్ నెమెస్

**ovum** haploid female gamete resulting from completion of meiosis II at fertilization

ఫలదంకం రణ సమయం లంఘనం యోసంత || పంరంయం న ఫలితం గంఘం అండ్ హంపం  
యిడే ఆడ గంఘంపై

**penis** male organ of copulation

పురుషంగ్ం పురుషంగ్ తంయోగ్ం

**polar body** smaller cell produced during the process of meiosis in oogenesis

ఓజం'నం'సం'సం'లం' మం'యం'సం'త పరం'రయం' ఉతం'పత్ం' అయి'య్య ధం'త వ శరం'రం' చం'నం' కం'ణం'

**primary follicles** ovarian follicles with a primary oocyte and one layer of cuboidal granulosa cells

పాత ధాన్యమంక్ ఫంక్ లిప్కంలం అండ్ డిజైన్ ఫంక్ లిప్కంలం పాత ధాన్యమంక్ ఓనర్స్ మంరంయమ  
కంంRబంయిడిట గరంన్ంలంలంసంం కంణంల ఒకం పర ర

**primordial follicles** least developed ovarian follicles that consist of a single oocyte and a single layer of flat (squamous) granulosa cells

అదంమ్ ఫం లిక్ కం లం రం కం నం నం అభం వం దం చం దం అం దం శం ఫం లిక్ కం లం రం, ఇం దం లం ఒకం ఓనం మం రం యం ఫం రం (తం కం వం నం) గం నం లం నం కం ణం ఒకం పర రం ఊం టం దం

**prostate gland** doughnut-shaped gland at the base of the bladder surrounding the urethra and contributing fluid to semen during ejaculation

పంఠ సంగ్రహం గుంఠంధం మంగంRత్తరంశయం చం3దం మంగంRత్తరంశయం దంగంపవన  
డంనత్తకంఠంలం ఉంఠం గుంఠంధం మంగంయమభ్యం మంగంయంలం వరీరంఠనంకం  
దంగంపంనం అంఠంఠం  
ం3ంఠం

**puberty** life stage during which a male or female adolescent becomes anatomically and physiologically capable of reproduction

కంఠమంజీరదంశలంఘం పంకరంపంకడంబం లంఘంఘం అడ కంఠమంజీరదంశ శరంఠర

external pouch of skin and muscle that houses the testes

వంశపక్షణాలలో ఉండే చర్యల ముగియడం కంట్రోల్ చేయబడే పర్యవేక్షణ

**secondary follicles** ovarian follicles with a primary oocyte and multiple layers of granulosa cells

పరిమిత ముగియడం ముగియడం గర్భాశయంలో కంట్రోల్ చేయబడే పర్యవేక్షణ ద్వారా ఉంటుంది

**semen** ejaculatory fluid composed of sperm and secretions from the seminal vesicles, prostate, and bulbourethral glands

సమగ్ర వంశపక్షణాల, పరిమిత ముగియడం బుల్బోయూరెథ్రల్ గ్రంథిని ఉత్పత్తి చేసే స్రవం

**seminal vesicle** gland that produces seminal fluid, which contributes to semen

సమగ్ర వంశపక్షణాల గ్రంథిని సమగ్ర ద్రవం ఉత్పత్తి చేసే చర్యల ద్వారా ఉంటుంది

**seminiferous tubules** tube structures within the testes where spermatogenesis occurs

సమగ్ర పరిమిత ముగియడం సమగ్ర వంశపక్షణాలలో సమగ్ర పరిమిత ముగియడం ద్వారా ఉంటుంది

# GLOSSARY\_ NUCLEIC ACIDS

## TSWRDC W KAMAREDDY

- Adenine = A purine base; one of the four molecules containing nitrogen present in the nucleic acid DNA and RNA; indicated by letter A

- అడెన్‌నైన్ = ప్యూరిన్ బేస్; న్యూక్లియోటిక్ ఆమ్లం DNA మరియు RNA లో ఉన్న

నోటేషన్ కలగంన్ నోలంగం అణవంలలో ఒకటం; అక్షరం A

దోలం సయచంబడదం.

- Allele = An alternative form of a gene
- యంగమ వంకలం = జనంవం యొక్క పోలికల మనయ రంపం

- Amino acid = Any of a class of 20 molecules that are combined to form proteins in living things.

- అమిం యనండ్ = 20 అణవంల తరగతి ఏదోనో నో కలం జంవంలలో ప్లైరటన్ నో ఏరంసత దం.

- Amplification = An increase in the number of copies of a specific DNA fragment ; can be in vivo or in vitro

- వీసతరణ = నంంంపల DNA శకలం యొక్క కంపంల సంఖ్య పంంగంల; వంవంలం లంంం వీటలం ఉండ్వం

- Antiparallel polarity. = If one strand has the polarity 5' to 3' , the other has 3' to 5'

- పోలికంక ధోర వణతం. = ఒక సంటండ్ 5 'నండ్ 3' ధోర వణత్ కలగం ఉంట్ం, మంంకటం 3 'నండ్ 5' వరకం ఉంట్ం.

- Base pair(bp) = Two complementary nucleotides joined by hydrogen bonds; base pairing occurs between A and T and between G and C

- బంత్ పంయీర్ (bp) = హాడరజన్ బండ్లం దంంం కలంన్ రంంం కంంంంంం మంట్ంం న్యూక్లియోటిక్ యోట్ం; బంత్ పంయీర్ం A

మంంంం ల మ్థం మంంంం G మంంంం ల మ్థం జంంగంంంం.

- Base ratio = In DNA, the amount of adenine (A) and thymine (T) equals the amount of guanine (G) and cytosine (C). But the ratio of the amount of A plus T to that of G plus C, which is the base ratio.

- బేస్ పేష తత = DNA లో, అడెన్ (A) మి థైమిన్ (T) మొత్ంం గంంం (G) మి టెరసీన్ (C)

మంత్తంంం సమంంంం. కంంం A మంత్ T మంత్తంంం నంంంపతత G మంత్ C కంం,

ఇదంత బంత నంపిపతిత.

- Capping = methyl guanosine triphosphate is added to the 5' end of hnRNA
- కంపిపిపిగ్ = మంథంల గంంనంన్ టం`ం` ఫంసంట్ hnRNA యొక 5 'మంయగంపంయకం జండంబడందం'.
- Cistron = A segment of DNA coding for a polypeptide i.e The functional unit of DNA.

- సిస్టమ్స్ = క్లౌడ్స్ DNA క్లౌడ్స్ యొక్క ఒక విభాగం అనా DNA నతమ క  
ఒక పరిశీలన  
యంORనంట్.

- Codon = A set of three bases in DNA which codes for one (specific) amino acid.
  - కంప్లెక్స్ = DNA లోని మూడు కోడింగ్ సమయ బకట (నోరన్గ్) అమన్ ఆమ్ల యిన్ కంప్లెక్స్ చేసే ఉండదు.
- Complementary strands = In molecular biology, complementarity describes a relationship between two structures each following the lock-and-key principle.
- కంప్లెక్స్ పంత్ ముట్టరు సుట్టుండి = ముట్టికి రల్ బయనలజలు, కంప్లెక్స్ పంత్ ముట్టరు అనేదం లనక-అండి-కంత్ సయత నం
- అ సరంచ రండి నంర్ణుల మధ్ం సంబంధంన వంవరసంద్.
- Cytosine = A pyrimidine base; one of the four molecules containing nitrogen present in the nucleic acids DNA and RNA ; indicated by letter C.
  - త్రిసిన్ = ప్రిన్ డీన్ జేత; న్యంర్ణున్ ఆమ్ల సం DNA మర్ం RNA లు ఉన్ నంర్ణుక్రిగన్
- నంలగుం అంపలలో ఒకటి; అడ్్ం C ద్ం సయచబడదు.
- Denaturation = The process of splitting the complementary double strands of DNA to form single strands.
  - స్థావ వంకలత్ = DNA యంక కంప్లెక్స్ పంత్ డబల సుట్టుండిన్ వంభజంచ సంగంల సుట్టుండిన్
- హ్ం ద్ంద్ చే ప్రియ.
- Density gradient = Density gradient is a spatial variation in density over an area
  - తండ్రత్ ప్రవణత్ = తండ్రత్ ప్రవణత్ అనేద్ం ఒక ప్ంత్ తండ్రత్ ప్ంత్ ద్ం వం విధం
- DNA( Deoxyribonucleic acid)=The genetic material of organisms , usually double - stranded ; a class of nucleic acids identified by the presence of deoxyribose, a sugar, and the four nitrogen bases.
  - DNA (Deoxyribonucleic ఆమ్లం ) = జీవం రధం; డ్ంకంర్ంబ్ త, చక్రం
- జన్ం పం మర్ం
- నంలగుం నంర్ణు కోడింగ్ గంరత్ం చబడన్ న్యంర్ణున్ ఆమ్ల సుత్రిగత్.
- DNA polymerase = Catalyze polymerization only in one direction that is 5' ---3'
  - DNA ప్ంలిమర్ంత్ = 5 '--- 3' ఒక ద్ంశల ముత్తమం ప్ంలిమర్ంజ్మన్ ఉత్ంష్రణ.
- DNA Ligase = DNA ligase is a specific type of enzyme, a ligase, that facilitates the joining of DNA strands together by catalyzing the formation of a phosphodiester bond.
  - DNA లిగంత్ = DNA లిగంత్ అనేదం ఒక నంర్ంఫ్ ర్ం ఎంజ్ం, ఒక లిగంస్, ఇంంఫంస్ ర్ం డ్ీసర్ బంధం
- ఏరడానంకం ఉత్ంష్రక్రచ్ం ద్ం DNA త్ంత్వంలన్ కలపడంనంకం ద్ంహదపంత్ం.





చేయబడతాయి.

- Enzyme = a protein that can speed up a specific chemical reaction without being changed or consumed in the process.

- [illegible]

environment.

- ఇనం వంటర = ఒక జీవం వలంపి లేదో కంత్రింమ్ మంతోవరణంల జరంగం పకలియ.

- Initiator codon = AUG

- ప్లాంక రంభ కోడాన్ = AUG
- Introns = intervening sequence which do not appear in mature or processed RNA
- ఇంటర్వెన్యన్స్ = ప్లాంక కోడాన్ లో లేదా పాత తనం చేయబడన RNA లో కనపించుచున్న మధ్యస్థ రంభ కోడాన్
- Isotope = Isotopes are members of a family of an element that all have the same number of protons but different numbers of neutrons.
- ఐసోటోప్ = ఐసోటోప్స్ అనే ఒక మూలకం యొక్క కేంద్రక బాంధవ్యం చలించినట్లుగా, అనంత ఒక రంభ సంఖ్యలను
- పాతర టానంలన్ కలిగిన ఉంటాయి కంటిన్ వివర్ధ సంఖ్యలను న్యూట్రన్ల నంలన్ కలిగిన ఉంటాయి.
- Kilobase(kb) = Unit of length for DNA fragments equal to 1000 nucleotides.
- కంలల్ బేస్ (kb) = 1000 న్యూక్లియోటైడ్లకు సమాననన్ DNA శకలనల పాడవం యొక్క యంనంట్.
- Locus ( pleural; loci) = The specific physical location of a gene on a chromosome.
- లోకత = కంటిన్ మోజోమంపెం జనంనం యొక్క నంరంంపట్ల భౌతంక సందంనం.
- Macromolecules = A mole containing a very large number of atoms such as a protein , nucleic acids or synthetic polymer
- సయల అణంపులం = పాతర టన్, న్యూక్లియోటైడ్ ఆమ్లం నం లేదా సరింథటంకర్ పంలిమం వంటి చంలన పెదం సంఖ్యలను
- అణువులనయ కలిగి ఉన్న మాల.
- Monocistronic = The capacity of eukaryotes to code one gene per one mRNA
- మోనోసిస్ట్రన్ నం = ఒక mRNA కం ఒక జన్యు వంన కండ్ల చేసిన జకంంధరక కణంల సంంంధం
- mRNA= messenger RNA
- mRNA = మత్తజర్ RNA
- Mutation = Any inheritable change in DNA sequence.
- ఉతంపరంవరతన్ = DNA సీక్వెన్స్ లో ఏదోనం వంరసతం మంనంప.
- Nucleic acids = complex organic substances present in living cells, especially DNA or RNA, whose molecules consist of many nucleotides linked in a long chain.
- కంంధరక ఆమ్లం నం = జీవ కణంలలో ఉండే సంకంంపట్ల సఫంధ్య పంంధంలం, మంంఖంంంం DNA లేదా RNA, దన్న
- అణంపులం సయదం గంలంనం అనయ సందంనంంబడన్ అనేక న్యూక్లియోటైడ్ల కలగం ఉంటాయి.
- Nucleotide = a unit of nucleic acid composed of a nitrogen base , a Pentose sugar , and a phosphate group

- న్యాయశాఖం యంత్రం = నాటకరసం బేసం, పరింటిత ప్రింగర్ మంరం' యంత్రం  
గర్ పంయతంకంరడనం న్యాయశాఖంయి

యనసాిడ్ రసేట్

- Origin of replication ( Ori ) = definite region in DNA where replication originates
- ప్రితికృతి యోగక మ్రింRల0 (ఓరి) = ప్రితికృతి ఉదభవించే DNA లో ఖం తమ 'ం' న్ ప్రింర ం0త్0

- Purines = adenine and guanine
- పూయ రంగ'నన్ం = అడెనన్ మంగ'రంగ' ఁగంగంగ'నన్ం
- Pyrimidines = cytosine , uracil and thymine
- పరింగ'మంగ'డిసంగ' = త' టగసిన్, యంగ'రంగ'సిలంగ' ంన్  
మంగ'రంగ' ఁధైమ
- Polymerase, DNA or RNA = Enzymes that catalyze the synthesis of nucleic acids on preexisting nucleic acid templates, assembling RNA from ribonucleotides or DNA from deoxyribonucleotides.
- పంగ'లిమంగ'రంగ'త, DNA లేదన్ RNA = మంగ'యంగ'దగంగ' ఉనన్ న్యంగ'కంగ'యంగ'క్ యనిడంగ'  
టంగ'పటంగ'లపరంగ' న్యంగ'కంగ'యిక్ ఆమ్ంగ' నల  
సంగ'శంగ'లప్ణన్య ఉతంగ'షరకపరంగ'చంగ' ఎంగ'జంగ'  
మంగ'లంగ', రంగ'బ్ న్యంగ'కంగ'యంగ'టంగ'డంగ' నయ డి RNA  
లేదన్ డాయంగ'కంగ'రంగ'బ్ న్యంగ'కంగ'యంగ'టంగ'డంగ' నయ  
డి DNA స్థ సమంగ'కరంగ'చడంగ'
- PCR ( Polymerase Chain Reaction ) = An in vitro process that yields millions of copies of desired DNA through repeated cycling of a reaction involving the DNA Polymerase enzyme.
- PCR (పంగ'లంగ'మంగ'రంగ'త చరంగ' రంగ'యన్స్) = DNA పంగ'లంగ'మంగ'రంగ'త ఎంగ'జంగ'మత్ంగ'  
కంగ'డాంగ' ప్రతంగ'చరంగ'యంగ'క వంగ'నంగ'వత్  
త' కంగ'ంగంగ' ద్వంగ'రంగ' కంగ'పలసింగ' DNA యంగ'క మంగ'లియన్ంగ' కంగ'పీలన్య  
అంగ'దంగ'ంగ' ఇంగ' వంగ'టరగ' షకంగ'లియ.
- Primer = Short preexisting polynucleotide chain to which new deoxyribonucleotides can be added by DNA Polymerase.
- పంగ'ంగ' మంగ'ర్ = డాఎన్ఎ పంగ'లిమంగ'రంగ'త ద్వంగ'రంగ' కంగ'త్త డాయంగ'కంగ'రంగ'బ్  
న్యంగ'కంగ'యంగ'టంగ'డంగ'జోడంగ'చగల చన్  
మంగ'యంగ'దసగ' పంగ'లిన్యంగ'కంగ'యంగ'టంగ'డంగ' గంగ'లంగ'.
- Probe = Single-stranded DNA or RNA of a specific base sequence, labeled either radioactively or immunology, that are used to detect the complementary base sequence by hybridization.
- పంగ'రర బ్ = ఒక నంగ'రంగ'పట్ట బేసంగ' సంగ'కంగ'యంగ' యంగ'క సంగ'గంగ'లంగ'-సంగ'టింగ'ంగ'డ్  
DNA లేదన్  
RNA, హంగ'బ్రరడె జంగ'ష్ట ద్వంగ'రంగ'  
కంగ'ంగ'పంగ'మంగ'టరంగ' బేసంగ' సీకంగ'ంగ'న్ గంగ'రతంగ'చడంగ'నంగ'కంగ'  
ఉపంగ'యంగ'గంగ'చంగ' రంగ'డాయంగ'యన్కంగ'గంగ' లేదన్ ఇమంగ'యంగ'నంగ'లజంగ'గంగ' లబంగ'ల  
చీయబడంగ'ంగ'.
- RNA = Ribonucleic acid



- RNA = రంబో న్‌యంకం'యిక్ ఆమ్'ం
- rRNA = Ribosomal RNA
- rRNA = రిబోసోమల్ RNA

- Replication = DNA replication is the process by which DNA makes a copy of itself during cell division.

- ప్రతంకంకత = DNA ప్రతంకంకత అనేదంకం కణ వంభజన్ సమంయంలంక DNA దంన్యంకక కంంపీనం తు నరంకచేసప్రియ

- Replicating fork = It is a structure that forms within the long helical DNA during DNA replication. It is created by helicases, which break the hydrogen bonds holding the two DNA strands together in the helix.

- ఫర రంకప్రతంకంకత = ఇదంకం ప్రతంకంకత సమంయంలంక పంక డవంస్ హలకిల DNA లోపల్ ఏరపడం DNA నంరంపణం.

ఇదంకం హలికంకంకంల దంన్యంకం సకంంంకంబడంకందంకం, ఇదంకం హలికంకంకంల రంకంకం DNA తంంత్వంకంలనంక కలకిపం ఉంకంన్ హంకరజనం బంకంధంకంలనంక వంకంన్కంకం చకిసత ఉంకందంకం.

- RNA splicing = newly made precursor messenger RNA ( Pre mRNA ) Transcript is transmitted into mature messenger RNA ( mRNA)
- RNA splicing = కంంత్తంకం తు నరంక చకిసంన్ రంకంకం మత్ంకంకం RNA (ప్రీ mRNA) టథ నంకంకం

మచయంరం మత్ంకంకం RNA (mRNA) లోకం ప్రసంకంకం కేయబడుత్వంకందంకం

- Semi-conservative = related to or denoting replication of a nucleic acid in which one complete strand of double helix is directly derived from the parent molecule
- తమం-కన్జరంకంకం = నంయంకంకంయిక్ యనసిడం యంకక నంకం రపంకంకంకం సయంకంకం, సంకంకంకంకం

ఇంకంకంల డబంకం హలికంకం యంకక రతం సంకంకం నకిరంకం మంకంత్వం అంకంకం నయ తిసకంకంబడంకందంకం.

- Splicing = The process by which introns, the noncoding regions of genes, are excised out of the primary messenger RNA transcript, and the exons ( coding regions) are joined together to generate mature messenger RNA.

- splicing = ఇంకంకం, జనంకంకం నంకంకంకం పంకంకంకం, పంకంకం మత్ంకంకం RNA టథ నంకంకం

త్వంకంకంబడుత్వం మంకంకం కంకంకంకం (కంకంకం పంకం

ంకంకం) కలకిసం మచయంరం మత్ంకంకం RNA నంకంకం తకిత చకిస్య

- Species = A group of living organisms consisting of similar or individuals capable of exchanging genes or interbreeding .eg: homosapiens
- జంత్వంకం = జనంకంకంలనంక మంకంకం కేయగల లేదం సంకంకం తిత్ కేయగల సంకంకంకం లేదం వూకంకం

కూడాన్ జకిపం సమంకం. ఉదం: హూ మత్ంకంకం

- SnRNA : small nuclear RNA
- SnRNA: చనన అణు RNA

- tRNA = transfer RNA
- Transcription unit = defined primarily by the three regions in the DNA

- 

l) A promoter

- II) the structural gene
- III) Terminator
- టాటర్ నోరపన్ టెస్ట్ = ప్రధానంగా DNA లోని మరొక పరికరం అంతటా దీనిని సూచించబడింది
- I) ప్రమోటర్
- II) సంరక్షణాత్మక జనరేషన్
- III) టెర్మినేటర్
- Tailing = Adenylate residues are added at 3' end in nascent RNA
- Tailing = Adenylate అవశేషాలు 3 'చవరలో కొత్త RNA లో జోడించబడాయి
- Virulent=Extremely severe or harmful.
- Virulent = అత్యంత తీవ్రమైన లేదా హానికరమైన
- Wobble = The ability of the 5' most base of an anticodon to pair with more than one type of base at the 3' ends of codons; helps explain the degeneracy of the genetic code.
- Wobble = 3 'కొండనల చవరలలో ఒకటొకటి ఎక్కువ రకాలతో జతపడిన బంధిత జత చుంపనం కొండన యొక్క 5' అంతరింత తంతురధుం; జనరేషన్ కొండన యొక్క జతను వివరించడానికి సహాయపడేది.
- Z - form of DNA = Z-DNA is a left-handed helical form of DNA in which the double helix winds to the left in a zigzag pattern.
- Z-DNA యొక్క రూపం = Z-DNA అనందంగా DNA యొక్క ఎడమ చుంపి హలంకల రూపం, దీనిని డబుల్ హలంకల హలంకల ఎడమ రూపం జగజగ్ స్పృహలో హలంకల తీవ్రం.

- **Enzymes** : Enzymes are proteins that act as biological catalysts. Catalysts accelerate chemical reactions. The molecules upon which enzymes may act are called substrates, and the enzyme converts the substrates into different molecules known as products.

**ఎంజైమం:** ఎంజైమంలు ప్రోటీన్లు, ఇవి జీవ శరీరం రకంగా పనిచేయును. ఇవి రకాల రతయన ప్రతిచరయ లు ముగియించును. ఎంజైమ్ ము ప్రసారం అణువులను ఉత్పాదించుటకు పనిచేయును. మరొక ఎంజైమ్ ఉప పదార్థం లను ఉత్పాదించుటకు పనిచేయును. వివిధ అణువులుగా మారుతుంది.

- **.Enzymology**: The study of enzymes is called *enzymology*

**ఎంజైమాలజీ**: ఎంజైమాల అధ్యయనం ఎంజైమాలజీ అంటారు.

- **Prosthetic group**: are bound tightly to proteins and may even be attached through a covalent bond. They often play an important role in enzyme catalysis.

ప్రోటీన్ కు కovalent బంధం ద్వారా కovalent బంధం ద్వారా  
సమంహితం: మరొక ఒక  
ప్రోటీన్ కు  
సమయోజనీయ బంధం ద్వారా  
రా కూడా జతచేయబడవచ్చు .  
ఎంజైమ్ శరీరం రకంగా అవి తరచుగా ముఖ్యమైన  
పాత్రను  
విధించును.

- **Apoprotein**: A protein without its prosthetic group is called an apoprotein.

అప్రోటీన్: ప్రోటీన్ కు సమంహితం లేని ప్రోటీన్ అప్రోటీన్ అంటారు.

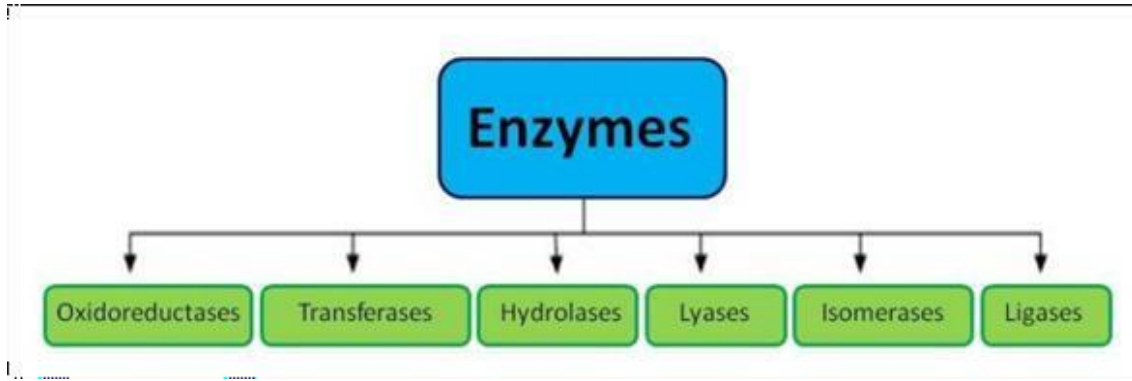
- **Holoprotein**: A protein combined with its prosthetic group is called a holoprotein.

హోలోప్రోటీన్: దానిని సమంహితంతో కలిపి వున్న ప్రోటీన్ హోలోప్రోటీన్ అంటారు.

- *Enzymes are classified into six categories according to the type of reaction catalyzed:*

## Enzymes Classification(ఎంజైముల వర్గీకరణ)





- Oxidoreductases** : These enzymes catalyse redox reactions and can further be categorised into oxidase and reductase.  
 ఆక్సిడేషన్ మరియు రిడక్షన్ రియాక్షన్లను వేగపరుచుతూ ఉండే ఎంజైమ్‌లు. ఈ ఎంజైమ్‌లు మూలకాల మార్పిడిని ఉత్పన్నం చేస్తాయి.  
 ఉదా: గ్లూకోస్ ఆక్సిడేస్, లాక్టేట్ డిహైడ్రజేస్.
- Transferases**: These set of enzymes catalyse the transfer of certain groups among the substrates.  
 ఒక సబ్స్ట్రేట్ నుండి మరొక సబ్స్ట్రేట్ కు గ్రూపులను మార్చే ఎంజైమ్‌లు. ఈ ఎంజైమ్‌లు మూలకాల మార్పిడిని ఉత్పన్నం చేస్తాయి.  
 ఉదా: ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్, ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్.
- Hydrolases**: These enzymes accelerate the hydrolysis of substrates.  
 నీటి సహాయంతో సబ్స్ట్రేట్‌ను విచ్ఛేదించే ఎంజైమ్‌లు. ఈ ఎంజైమ్‌లు మూలకాల మార్పిడిని ఉత్పన్నం చేస్తాయి.  
 ఉదా: ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్, ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్.
- Lyases**: These enzymes promote the elimination of a group from the substrate to leave a double bond reaction or catalyses the reverse reaction.  
 సబ్స్ట్రేట్ నుండి గ్రూపులను తొలగించే ఎంజైమ్‌లు. ఈ ఎంజైమ్‌లు మూలకాల మార్పిడిని ఉత్పన్నం చేస్తాయి.  
 ఉదా: ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్, ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్.
- Isomerase**: These group of enzymes accelerate the conversion of isoisomers, geometric isomers or optical isomers.  
 ఐసోమర్‌లను మార్చే ఎంజైమ్‌లు. ఈ ఎంజైమ్‌లు మూలకాల మార్పిడిని ఉత్పన్నం చేస్తాయి.  
 ఉదా: ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్, ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్.
- Ligases**: These enzymes catalyse the reaction of the synthesis of two molecular substrates into one molecular compound thereby releasing energy.  
 రెండు సబ్స్ట్రేట్‌లను ఒక సబ్స్ట్రేట్‌గా మార్చే ఎంజైమ్‌లు. ఈ ఎంజైమ్‌లు మూలకాల మార్పిడిని ఉత్పన్నం చేస్తాయి.  
 ఉదా: ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్, ట్రాన్స్‌ఫర్ ట్రాన్స్‌ఫర్.

moving across a membrane or separating within the membranes.

ఐNమొరస్ :ఈ ఎంజం మాలు అయను లీదా అణంపల ప్  
తొచరయ ను ఒక పొరలో లేదా పొరలలో

వేర్ల చీత యు.

**Enzymes that are used in digestion process:**

- **Amylase:** Amylase is essential for the digestion of carbohydrates. It breaks down starches into sugars. Amylase is secreted by both the salivary glands and the pancreas.

అమలంత: కంబోవం హం డో బ్ జంథం యకు అమలంత అవసరం. ఇది పిండి పదార్థం లను చీల్చే రంథం గా వంబం నన యి చంతు యిదం. లాలాజల గ్ం యిధులు మర చివంయ యిం యంత రంథం డిండి దం ర అమంలంత సం వంతు యిదం.

- **Maltase:** Maltase is secreted by the small intestine and is responsible for breaking down maltose (malt sugar) into glucose (simple sugar) that the body uses for energy.

మంలేం జ్ చీవనం గు దం ర సం వంతు యిది మర చివం యిం కంసం ఉవంయంగంయే  
మంలేం త (మంలం చీం కంబ్ (సంధారణ చీం ర) లో వంబం నన యి ర) గ బం  
త.

- **Lactase:** Lactase (also called lactase-phlorizin hydrolase) is a type of enzyme that breaks down lactose, a sugar found in dairy products, into the simple sugars glucose and galactose.

లకా సే (లకా సం-ఫోలరసిన్ హం డో లత అనం కూడ పిలంసం రంథం) అనేది లకా త  
అనం ఒక రకం న ఎంజం మం, లలో క్షపించే చీం ర, సంధారణ చీం రలుకంబ్ మర చివం యి ప్ల ఉతరం యిదం. గాలకోం జ లో కూడ

- **Lipase:** Lipase is responsible for the breakdown of fats into fatty acids and glycerol (simple sugar alcohol). It's produced in small amounts by your mouth and stomach, and in larger amounts by your pancreas.

లం డ్రత: కంబం పదార్థం లు (కంబం పదార్థం లంథం) మర చివం న (సంధారణ చీం ర మం యి) గా వంబం నన యి కంబం డిండి లం డ్రత బం త వంతు యిదం. ఇది మీనం మర చివం దం ర చీవన మంతం యిలో ఉతర తం, మర చివం కోమం దం ర పేడ్ మంతం యిలం.

- **Proteases**

Also called peptidases, proteolytic enzymes, or proteinases, these digestive enzymes break down proteins into amino acids. In addition, they play a role in numerous body processes, including cell division, blood clotting, and immune function. Proteases are produced in the stomach and pancreas. They are

వో టసత్

పరేపిం డెసం, ంభా టలఱిటఱిక్ ఎంబిజం` ములం లేదంభా టన్తై ంసత అనం క్కాడ పిలంబన్కం రంబ, ఈ  
జంర ఎంబిజం` ములు

అంతా టనను అమెం నో ఆమాలంగా వంటివేం' నీ యి చున్నాం' యం'. అంబి కంకంబిడోడి, అవం' కణ వంభజన, రకుం'

యి గండ్రిం కట్టం డొం మర చుగంపర్ బధక

చరయ లతోపంట్, అనక శగర పంపిం యలో ఒక పంతుం ను పిపిస్సం యి. కడుపు మర చుకోమం మో  
 యితంలలో ంథా టిసితఉతర త్ అవత తాయి.

- **Pepsin:** Pepsin is secreted by the stomach to break down proteins into peptides, or smaller groupings of amino acids, that are either absorbed or broken down further in the small intestine.

పరెపిం న్: పంథా టనను పరెపెం డుగా వండుంట్ డిడెక్ట్ పరెపిం న్ కడంపు  
 దుం ర్ సం వంతు యిదం, తుఅమెం న్ ఆమాల  
 చ్చన సమంRహం0గా ఉంట్టం0దం, ఇవి చ్చననన గం0లలో మరయిత  
 శం0పిం0చబడంయి లేదం వంరగపతయి

- **Trypsin:** Trypsin forms when an enzyme secreted by the pancreas is activated by an enzyme in the small intestine. Trypsin then activates additional pancreatic enzymes, such as carboxypeptidase and chymotrypsin, to assist in breaking down peptide.

టిం పిం న్: పంయ యిం యంత దుం ర్ సం వంతు యిది ఒక ఎంజం మ్ చ్చననన  
 గం0లలో ఒక ఎంజం మ్ దుం ర్  
 పిం యంశంలమెం నవంర డు టిం పిం న్ ఏరర డుతం0దం. టిం పిం న్ తరం త  
 పరెపెం డున

వంచ్చ

ం న్ యి చంయడం0లో

సహంయపండుంట్ క్క కంరం టిం పరెపిం డుత మర చుం మంటిం పిం న్ వంటి అడ పు  
 పంయ యిం  
 యంట్రిక్ ఎంజం ముంజ్ జపంరంతు యిదం.

- **Chymotrypsin:** This enzyme breaks down peptides into free amino acids that can be absorbed by the intestinal wall.

ఈ ఎంజం మ్ డు గోడే పీలం0 కంగంలిగరే అమెం న్ ఆమా  
 లం0, పరెపెం డ్కి ను వంచ్చం న్  
 యిచంతు యిదం.

- **Carboxypeptidase A:** Secreted by the pancreas, it splits peptides into individual amino acids.

కంరం టిం పరెపిం డుత a: పంయ యిం యంత దుం ర్ సం వంతు యిదం, ఇది  
 అమెం న్ ఆమాలోపరెపెం డ్కి ను వంజ్చిపతయిదం.

- **Carboxypeptidase B:** Secreted by the pancreas, it breaks down basic amino acids.

పంయ యిం యంత దుం ర్ సం వంతు యిదం, ఇది మో ధమిక అమెం న్ ఆమాలు  
 వంచ్చం న్ యి.

- **Sucrase**

Sucrase is secreted by the small intestine where it breaks down sucrose into fructose and glucose, simpler sugars that the body can absorb. తకోం  
 జ్

ను ఫ్ం కో జ్ మర చు కంజ్ లోక్కి వంచ్చం న్ యి చ్చెం చ్చన డు  
 దం0 ర్ సం వంతు యిదం, శగరం శం0పిం0చగంల సరళమెం న చ్చం రలం0.

**Enzymes involved in respiration:**

- **Oxidoreductases:** These enzymes catalyse redox reactions and can further be categorised into oxidase and reductase

ఈ ఎంజైమ్‌లు రెడాక్స్ పేతచరయలు ఉత్పాదించే రకం మరియు ఆక్సీ

డేస్ మరియు రిడ్యూస్ గా వర్గీకరించవచ్చు.



- **Decarboxylase:** an enzyme that catalyse the reaction to remove carbon dioxide from molecule.

డికార్బోక్సీలేస్: అణువు నుండి కార్బన్ డైఆక్సైడ్ తొలగించే ఎంజైమ్.  
కార్బోక్సీలేస్ డైఆక్సైడ్ తొలగించే ఎంజైమ్.

- **Dehydrogenase:** an enzyme that remove the hydrogen from molecule.

డీహైడ్రోజనేస్: అణువు నుండి హైడ్రజన్ తొలగించే ఎంజైమ్.

### Enzymes involed in DNA Replication:

DNA polymerase, including **DNA primase**, **DNA helicase**, **DNA ligase**, and **topoisomerase**.

- **DNA polymerase:** DNA polymerases are responsible for synthesizing DNA: they add nucleotides one by one to the growing DNA chain, incorporating only those that are complementary to the template.

DNA పాలిమరైజేస్: DNA పాలిమరైజేస్ DNA సరిపోయే న్యూక్లియోటైడ్లను ఒక్కొక్కటిగా చేరుస్తూ DNA గొలుసుకు కొత్త న్యూక్లియోటైడ్లను జోడిస్తూ కొత్త DNA గొలుసును సృష్టించే ఎంజైమ్.  
నూతన DNA గొలుసును సృష్టించే ఎంజైమ్.

- **DNA primase:** Primase is an enzyme that synthesizes short RNA sequences called primers. These primers serve as a starting point for DNA synthesis.

ప్రిమేస్: అణువు పిలిచినట్లుగా RNA సన్నని వేళ్లను సరిపోయే ఎంజైమ్.  
ఈ ఎంజైమ్ DNA పాలిమరైజేస్ కోసం ప్రారంభ బిందువుగా పనిచేస్తుంది.

- **DNA Helicases:** DNA helicases catalyze the disruption of the hydrogen bonds that hold the two strands of double-stranded DNA together. This energy-requiring unwinding reaction results in the formation of the single-stranded DNA required as a template.

DNA హెలికేస్: కలిసి ఉన్న రెండు DNA యొక్క రెండు తంతువులను విడదీసే ఎంజైమ్.  
కలిగి ఉన్న రెండు తంతువులను విడదీసే ఎంజైమ్. ఈ శక్తి - ఒక టంబుల్ వలన అవసరమవుతుంది.

000000 DNA వరర డుండ్ల వొం తోతరయ ఫంలితంలు అవసరం

- **DNA Ligases:** DNA ligases are **enzymes that catalyze the joining together of two DNA ends.**

**DNA లిగేజింస్:** DNA లిగేజింస్ రులుండు DNA చువరలనూ కుంపిండుకు ఉతపిర య రక్తిం చేర్చి ఎంజు ములు

- **Topoisomerases:** Topoisomerases (or DNA topoisomerases) are **enzymes that participate in the overwinding or underwinding of DNA.** The winding problem of DNA arises due to the intertwined nature of its double-helical structure.

టొపొఇసరిమెంస్: (లెదం DNA టొపొఇమెంరంస్) అనేది DNA

టొపొఇమెంరంస్ మంORసివేసే యొకం నే ఎంజు ము. DNA యొకం

లేదా లోపంలతో పంలం

మంORసివేసే సమయ

దానం

డు లట-హలికలి స్రం ణం యొకం అన్నయత న్న భంపం కంరణం గా పండుతుందం.