

**GOVERNMENT DEGREE COLLEGE,
PARKAL
HANUMAKONDA DISTRICT,
T.S. – 506 164**



DEPARTMENT OF ZOOLOGY

[ACADEMIC YEAR: 2021-2022]

FORMAT – II

**Bridge Course
Innovative Best Practice**

Submitted by:

**Dr. Vailla Rajaiah
Assistant Professor**

INDEX

CONTENTS

1.Structural Organisation of Life

2.Invertebrates

3.Vertebates

4.Physiology

5.Ecology

6.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

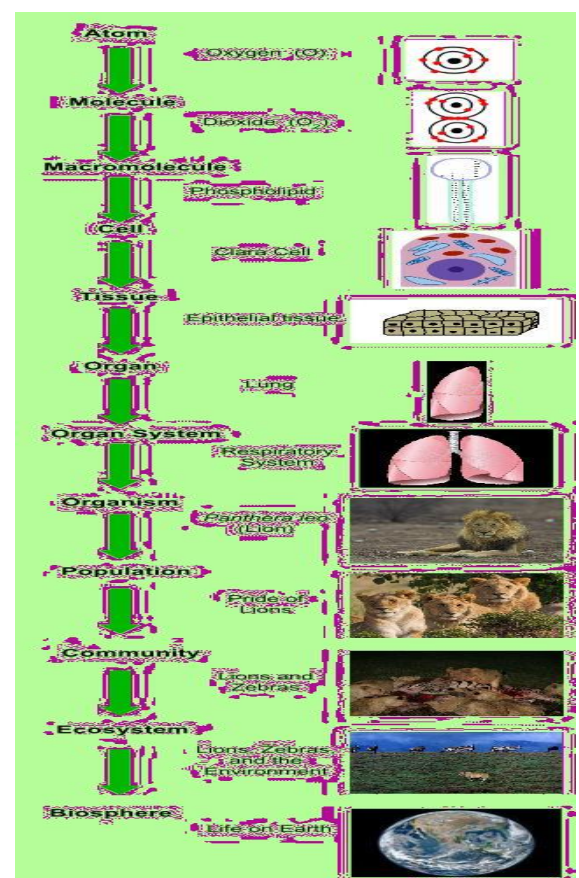
All living things are made up of **basic units** called **cells** for both plants and animals

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?

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



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.

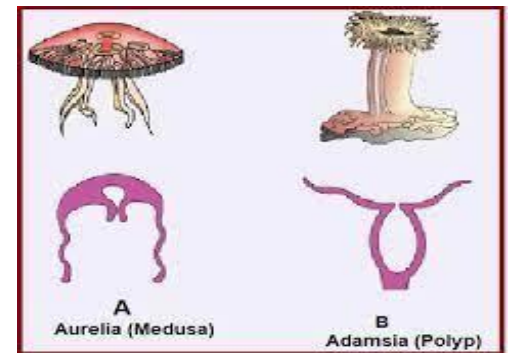
Porifera Examples: Sycon, Hylonema, Cliona, Euplectella, Spongilla.

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.



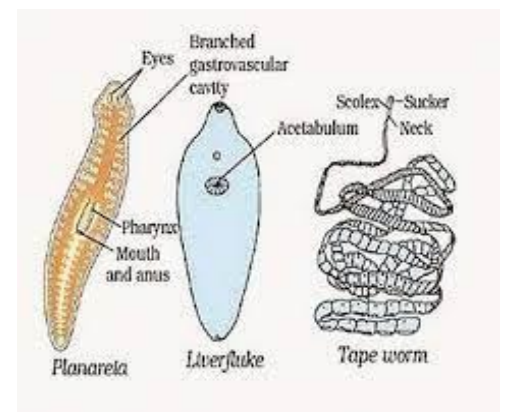
General characteristics Kingdom: Animalia.

-
- 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.

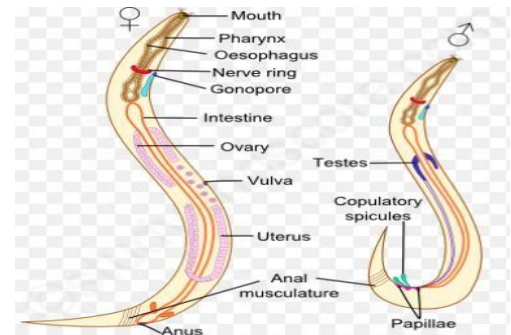


Platyhelminthes Examples: Taenia (Tapeworms), Fasciola (Liver fluke), Taenia saginata (Beef tapeworm), Echinococcus granulosus – The dog tapeworm, Planeria (freshwater flatworm)

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, ...

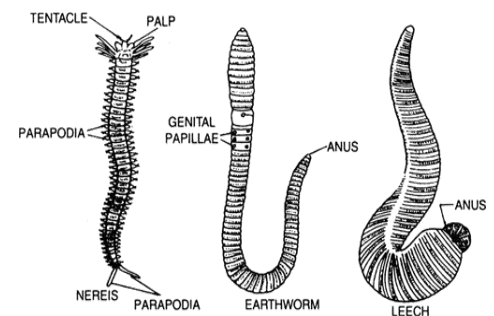
ANNELIDA (SEGMENTED BODY)

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.

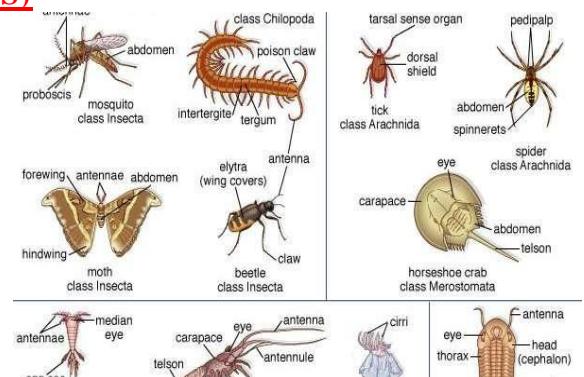
ARTHROPODA (ARTHRO=JOINTED, PODA= LEGS)

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?

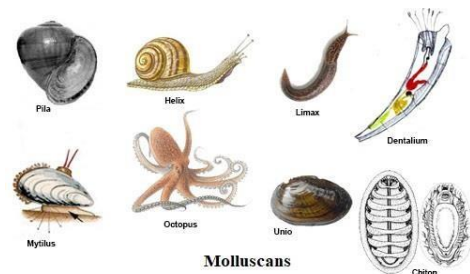
Definition: - Mollusca are animals which having soft body with unsegmented animals

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.

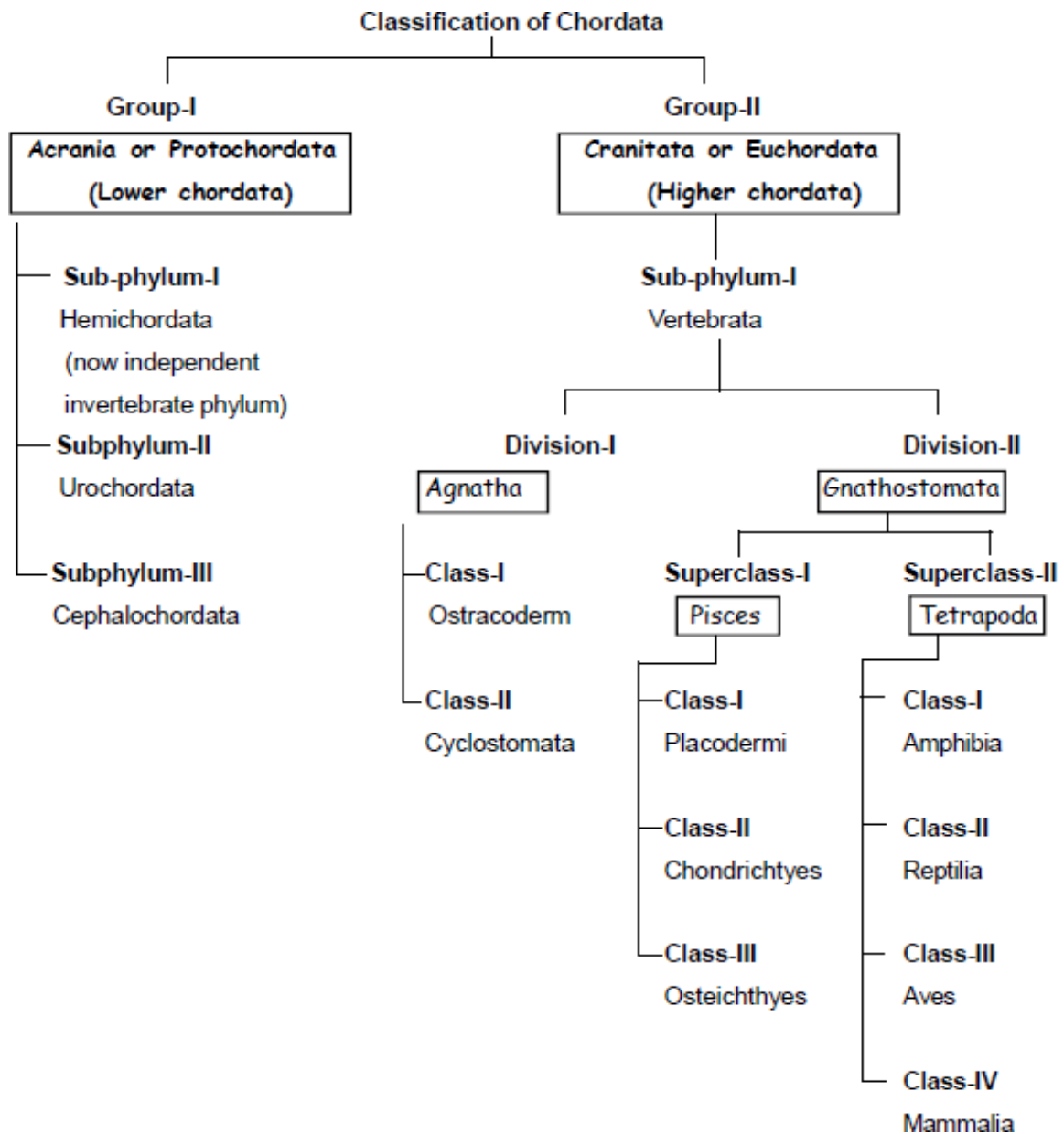


Echinoderms example:

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

Animal diversity of Vertebrates

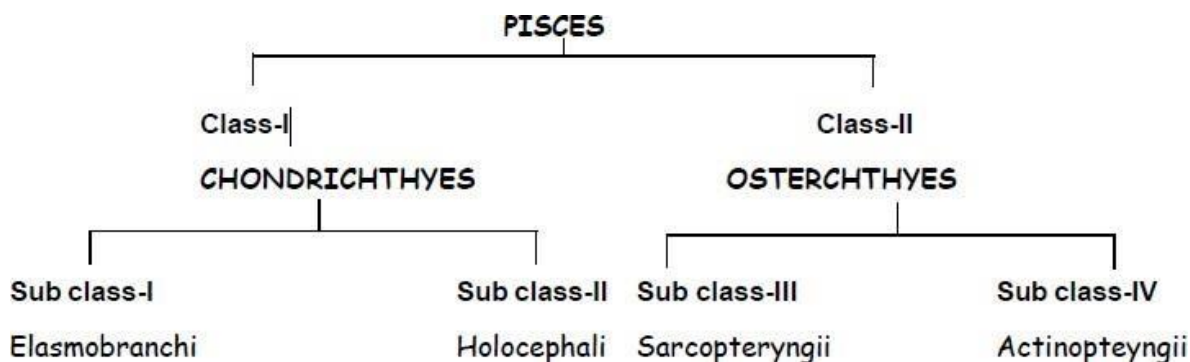
Vertebrate, also called Craniate, any animal of the subphylum Vertebrata, the predominant subphylum of the phylum Chordata. They have backbones, from which they derive their name. The vertebrates are also characterized by a muscular system consisting primarily of bilaterally paired masses and a central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

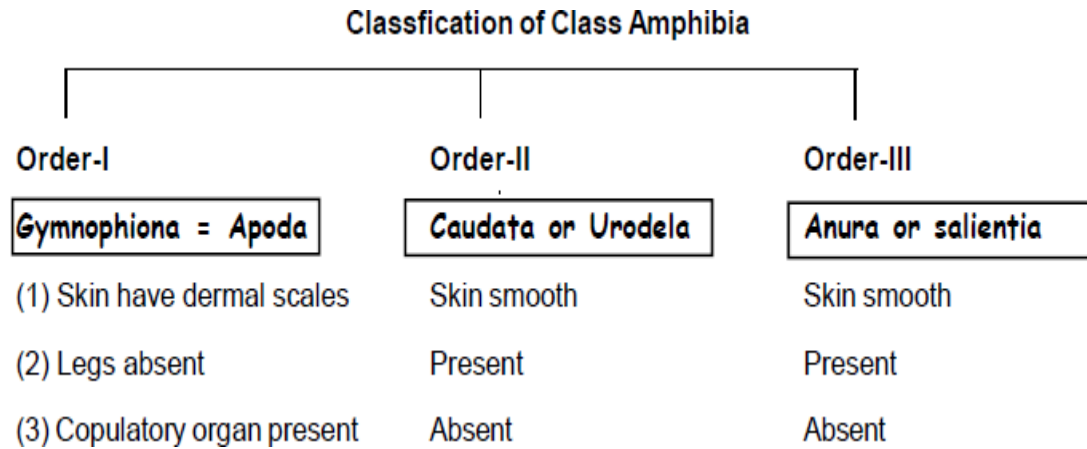
The tetrapods: Live primarily on land and are rather similar in habit. Members include the amphibians, reptiles, birds, and mammals.

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*

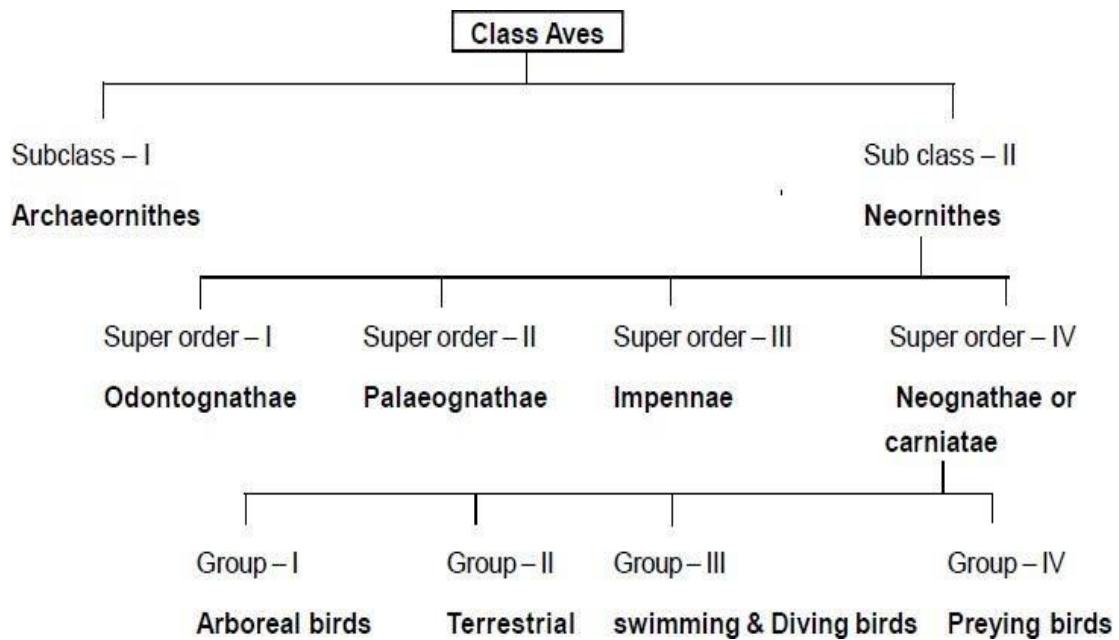
COPYRIGHT STUDYLADDER

- 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

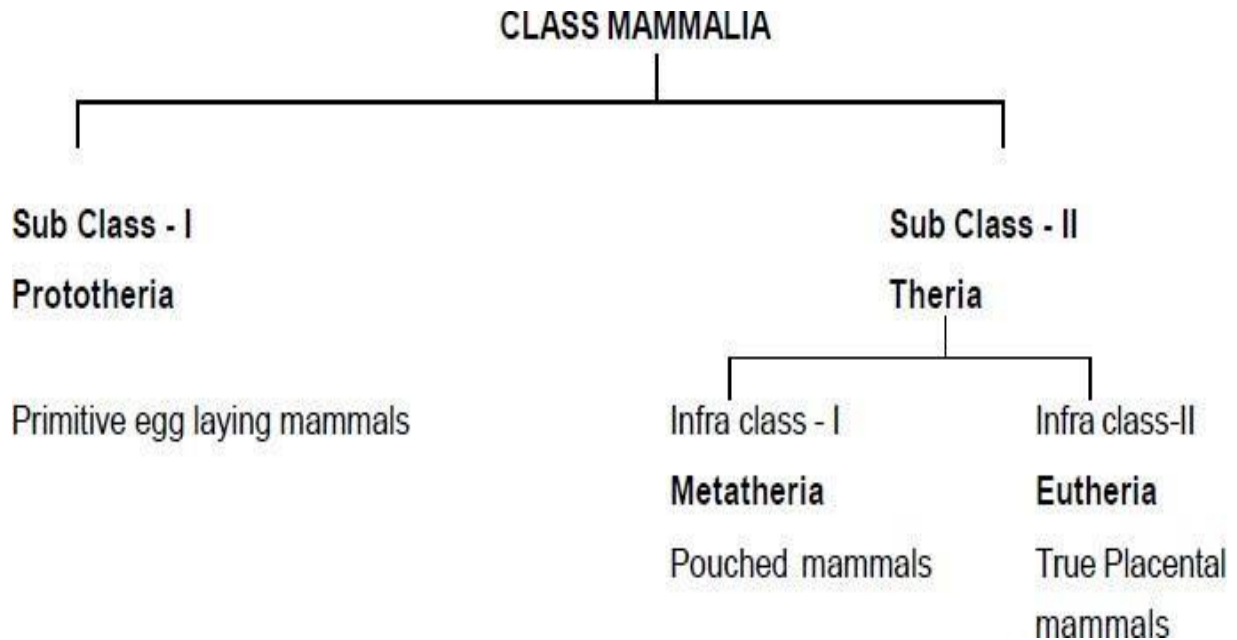
- Birds are warm-blooded, and, although most are capable of flight, others are sedentary and some are flightless.
- Like their relatives the reptiles, birds lay shelled, eggs that differ largely in the amount of calcification (hardening) of the shell.
- The young are usually cared for in a nest until 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:

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

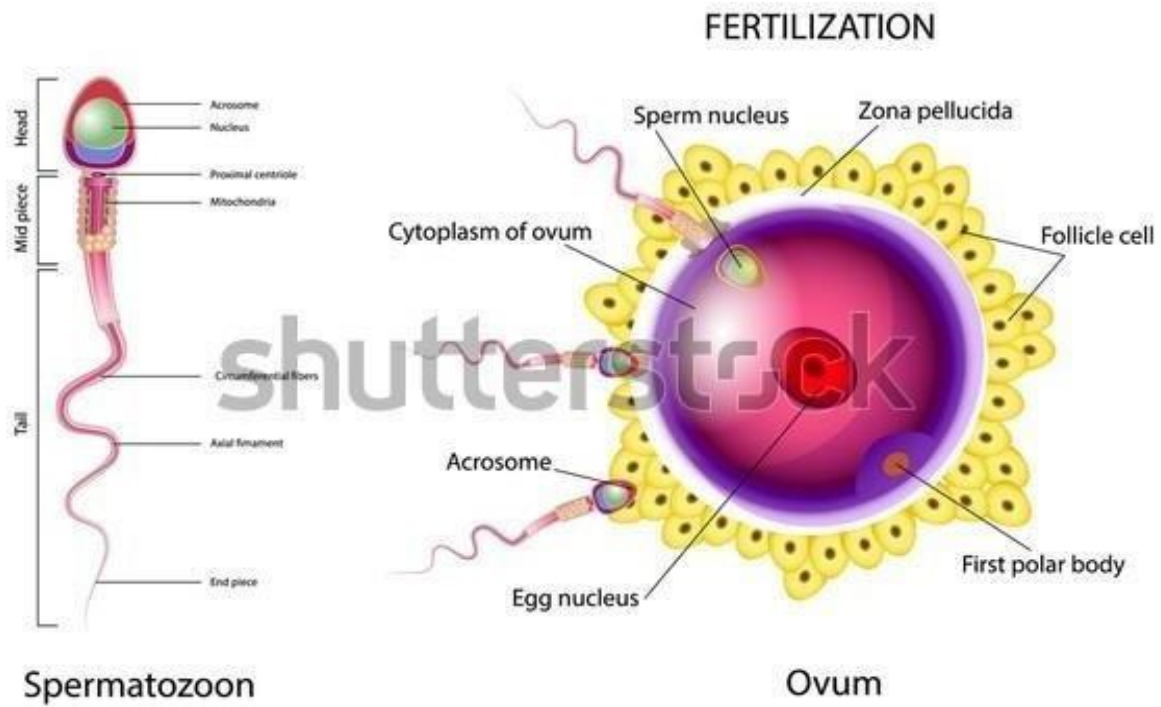
- 1.Release of male and female gametes
- 2.Fertilization =Fusion of male and female gametes
- 3.Cleavages
- 4.Morula
- 5.Blastula
- 6.Formation of Coelom
- 7.Organogenesis

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

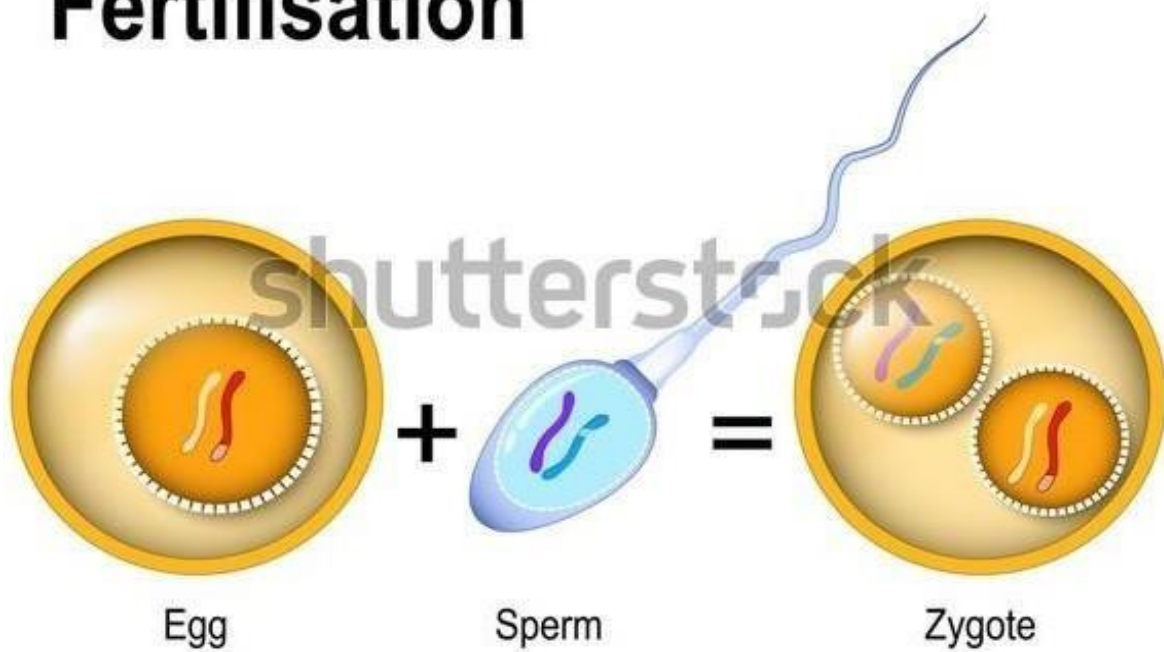
Male and Female individuals release sperms and eggs respectively during copulation.

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

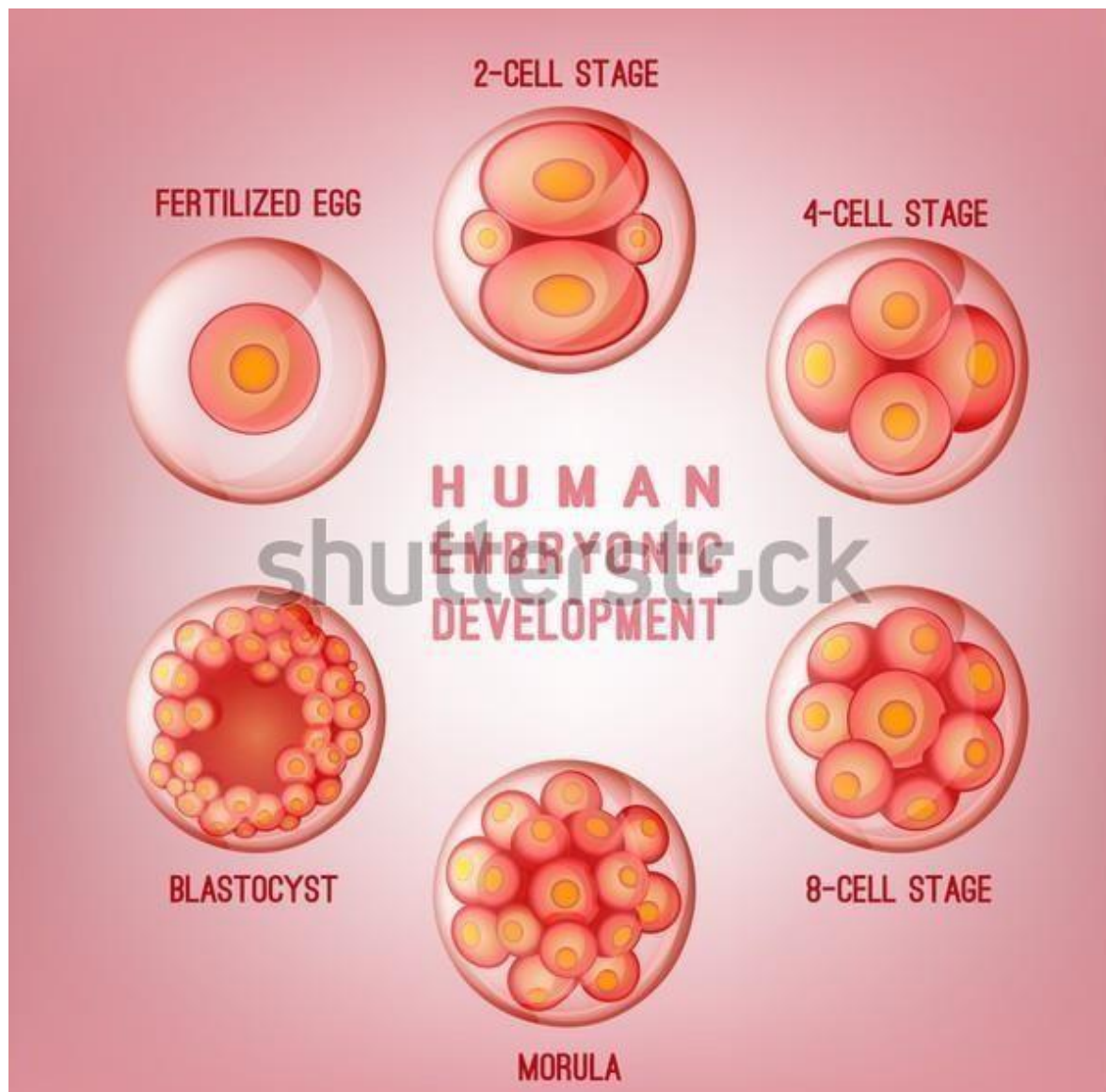
#Zygote undergoes cleavages..

#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.

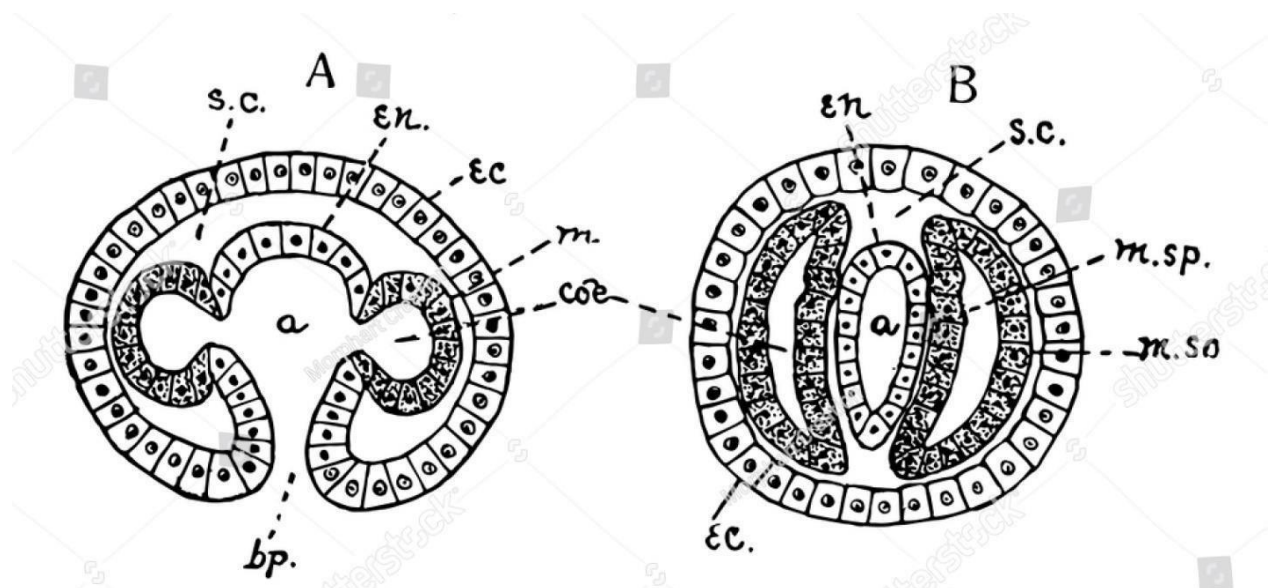
Alimentary canal is the tube like structure which extends between mouth and anus and helps in the digestion of food.

#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 types 1. 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??

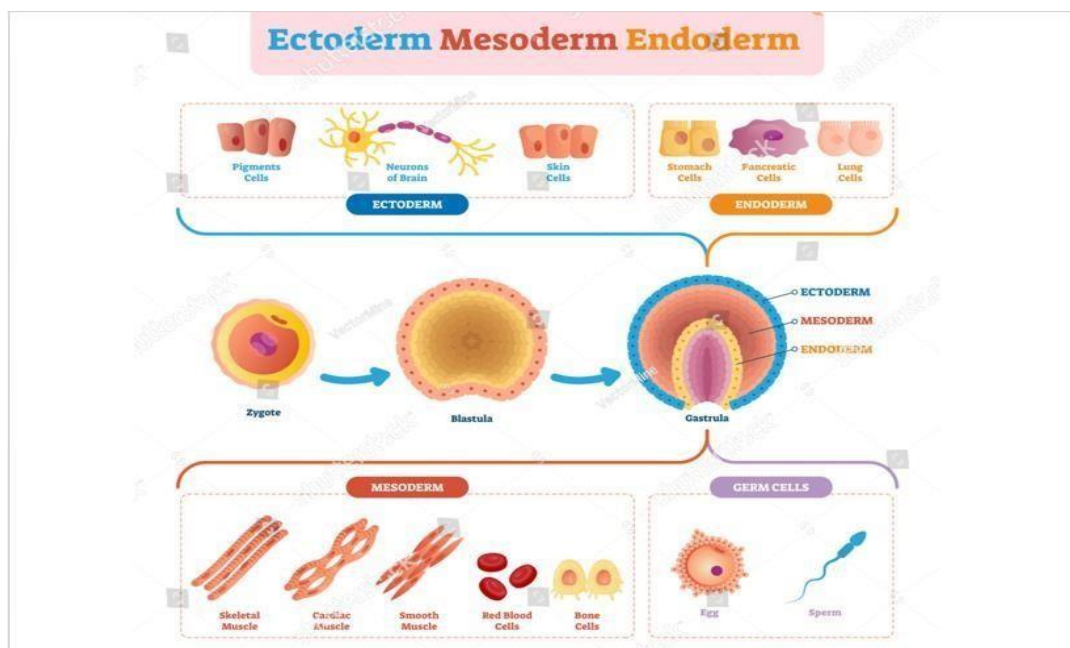
The word “germ “ relates to” germination” which means ..giving rise to..

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 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

Term	Meaning
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

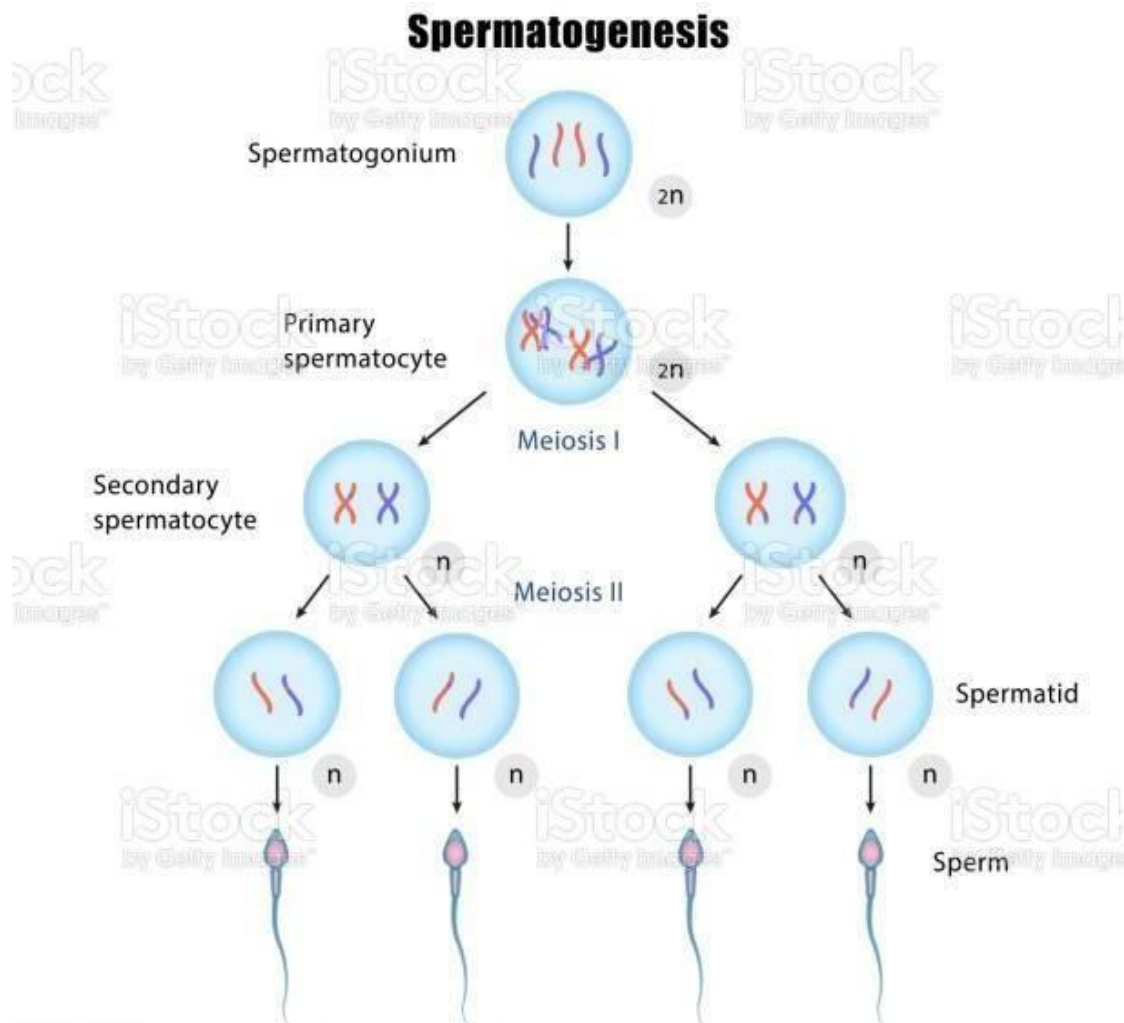
- several of the follicles degenerate over time, leaving only a few 100,000 100,000 100,000 follicles intact by the time puberty hits.

After puberty

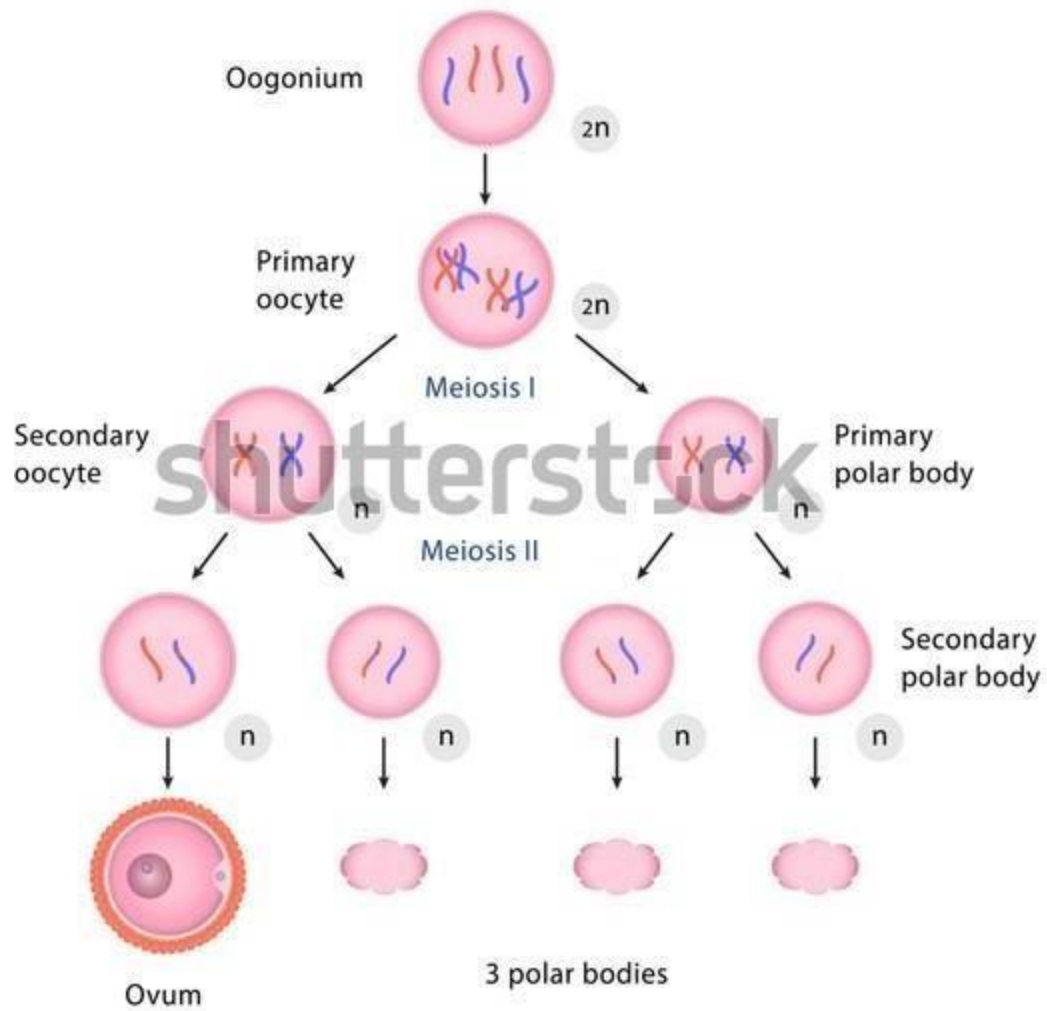
- primary follicles develop into secondary follicles, and then into tertiary, or Graafian follicles.
- the primary oocyte within each tertiary follicle completes its first meiotic division, producing a secondary oocyte and a polar body.
- the Graafian follicle ruptures to release the secondary oocyte,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

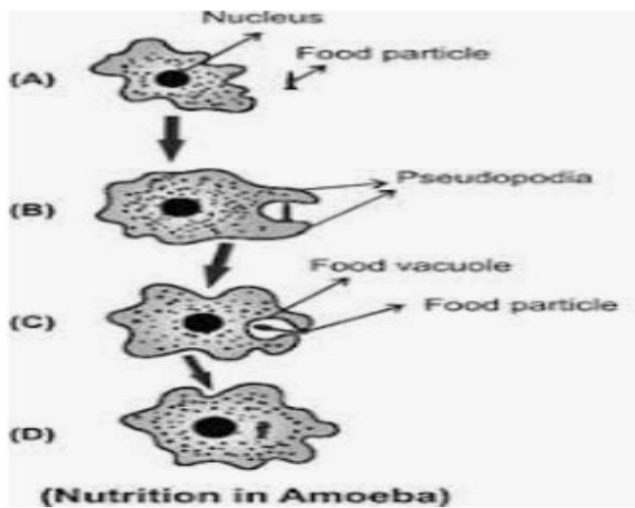
Digestion is a form of catabolism or breaking down of substances that involves two separate processes: **mechanical digestion and chemical digestion**. Mechanical digestion involves physically breaking down food substances into smaller particles to more efficiently undergo chemical digestion.

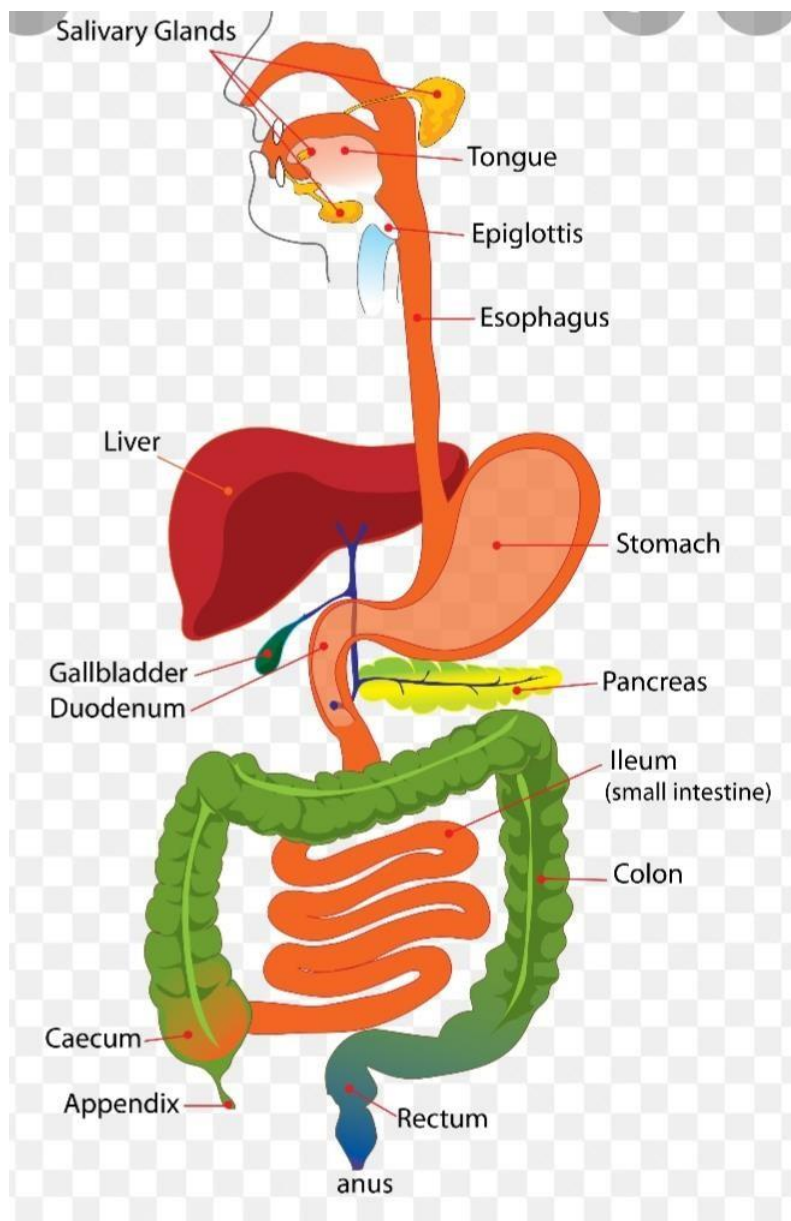
Based upon the position of digestion takes place it is divided into two types

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

Organ	Type of digestion	Juice	Enzyme	Substrate (food)	Product	Chemical medium
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	NO enzymes			

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.

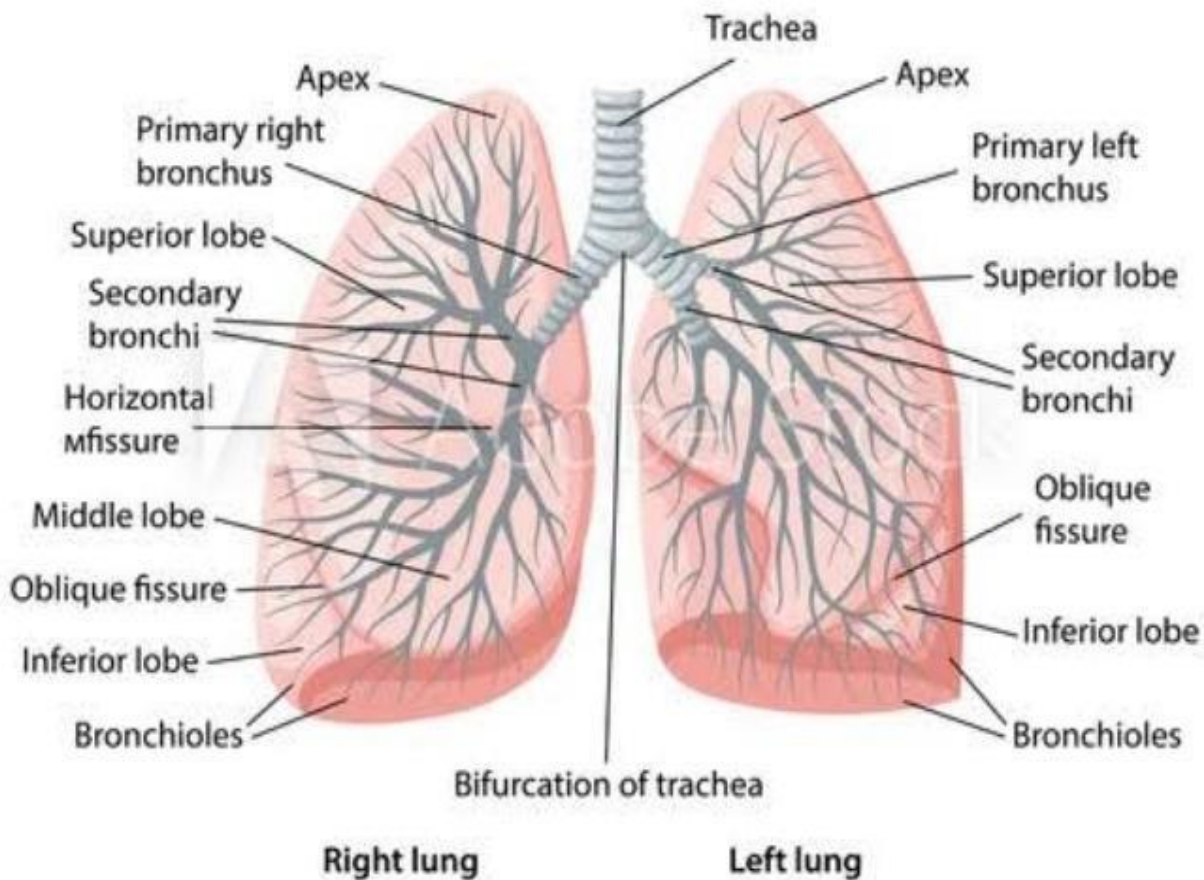
RESPIRATION

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.

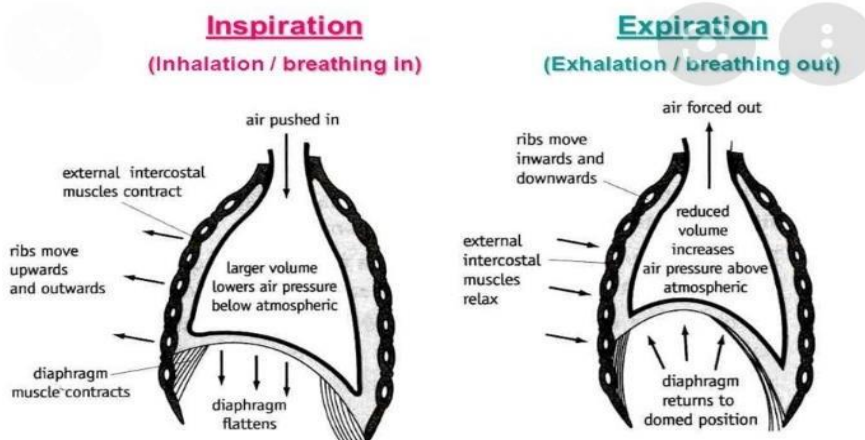
- 2). External respiration: exchange of gases between the external environment and a distributing system of the animal body (such as the lungs of higher vertebrates or the tracheal tubes of insects) or between the alveoli of the lungs and the blood — compare internal respiration.
- 3). Internal respiration: 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 O₂ transport. ... There are four major classifications of respiratory pigment: **hemoglobin**, **hemocyanin**, **erythrocrutorin-chlorocrutorin**, 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 CO₂:

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 CO₂ reacts with water in the erythrocytes and

The following dynamic equilibrium is established



Carbonic acid, H₂CO₃, 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 HCO₃⁻ ions diffuse from the cytoplasm to the plasma. This is balanced by diffusion of chloride ions, Cl⁻, 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⁺, 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·4O₂ is sometimes written HbO₈.)

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

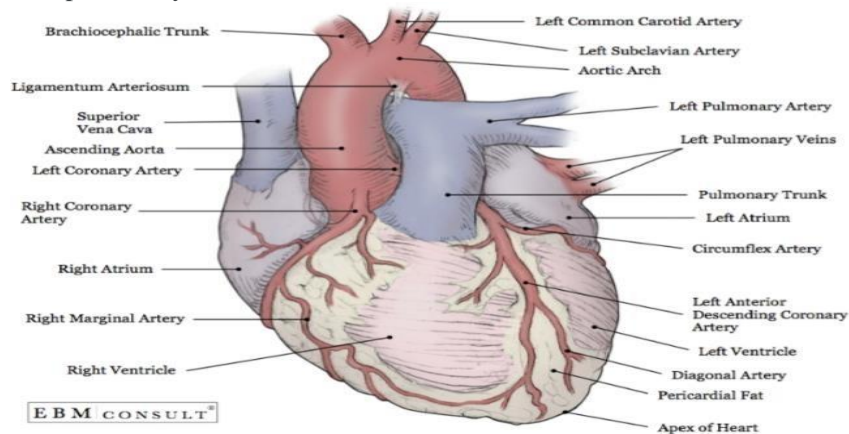
circulation.

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.

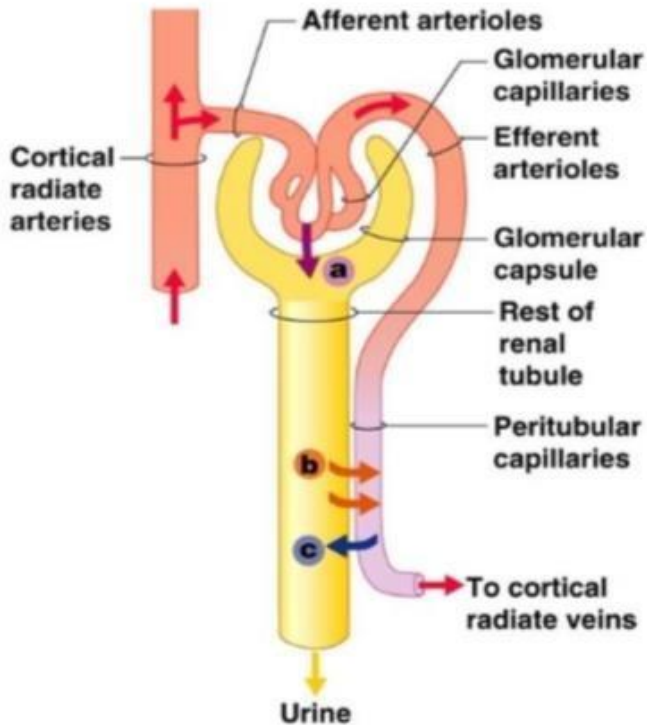
Juxtamedilullary nephron:

Juxtamedullary nephrons have **aglomerulus 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,

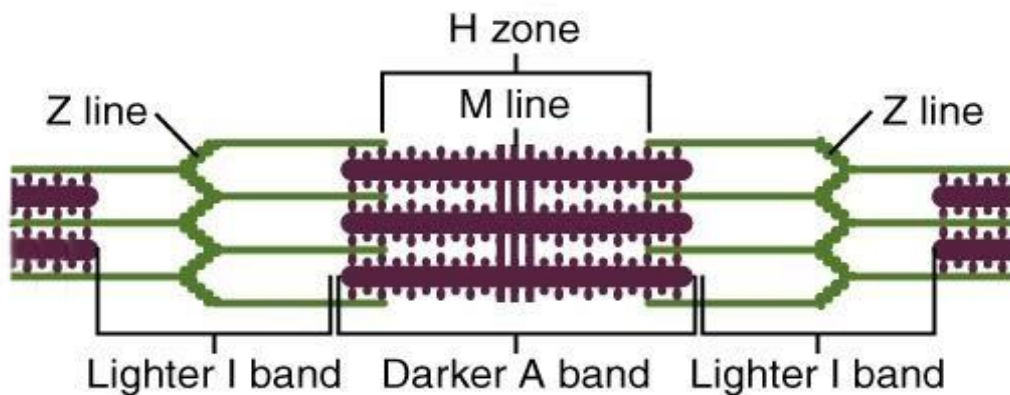
power. Muscle which is muscle."

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.

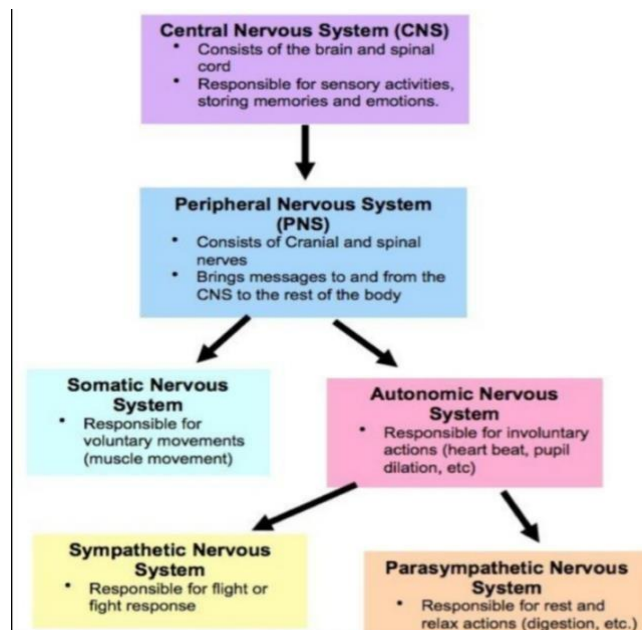
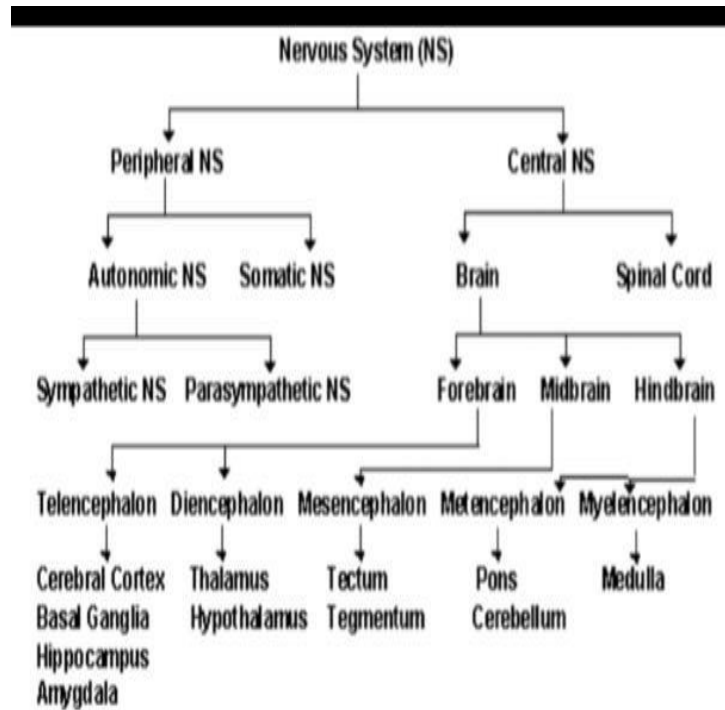
Brain: A brain is **an organ that serves as the centre of the nervous system in all most invertebrate animals.** It is located in the head. There are 3 layers of tissue called meninges that help protect the brain. The outer covering of tissue (called the dura mater), closely lines the inside of the skull.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

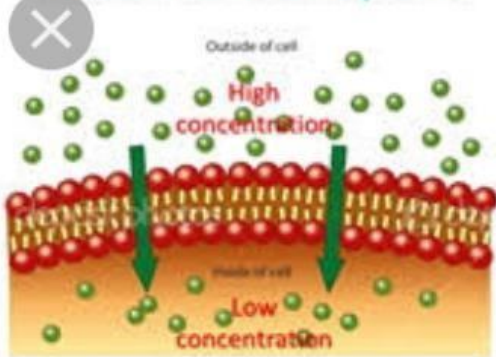
Plasma membrane carries out the following functions:-

- 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

Passive transport

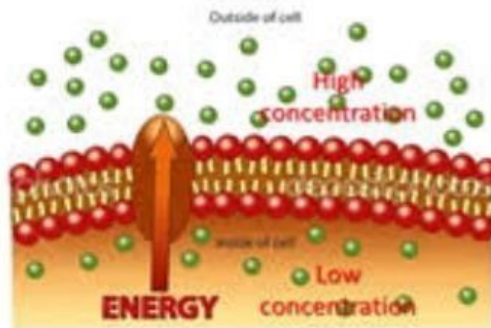


Requires no energy

Molecules flow across the membrane by diffusion

No ATP required

Active transport



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.^[23] 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:

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:

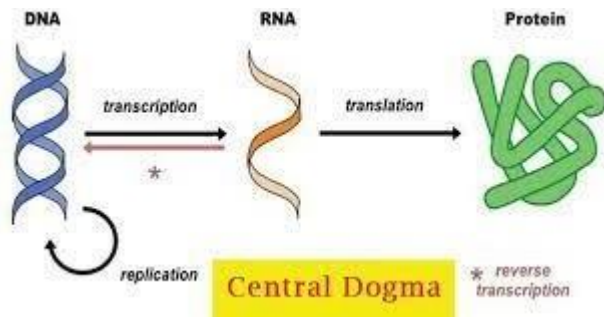
DNA: Found only inside the nucleus of the cell. Contains the organism's genetic information including instructions for how to make proteins.

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:

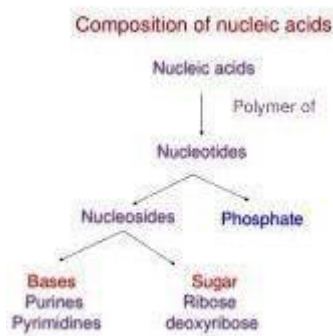
- DNA is the chemical basis of heredity and may be regarded as the reserve bank of genetic information.
- DNA is exclusively responsible for maintaining the identity of different species of organisms over millions of years.
- Further, every aspect of cellular function is under the control of DNA.
- The 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).



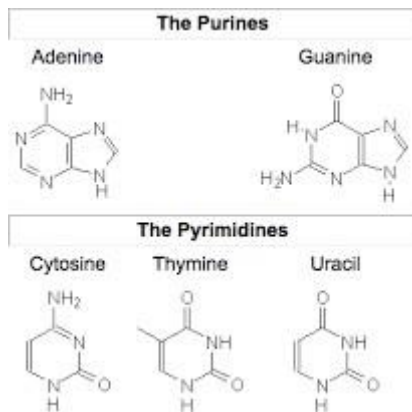
Nucleotides :

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.

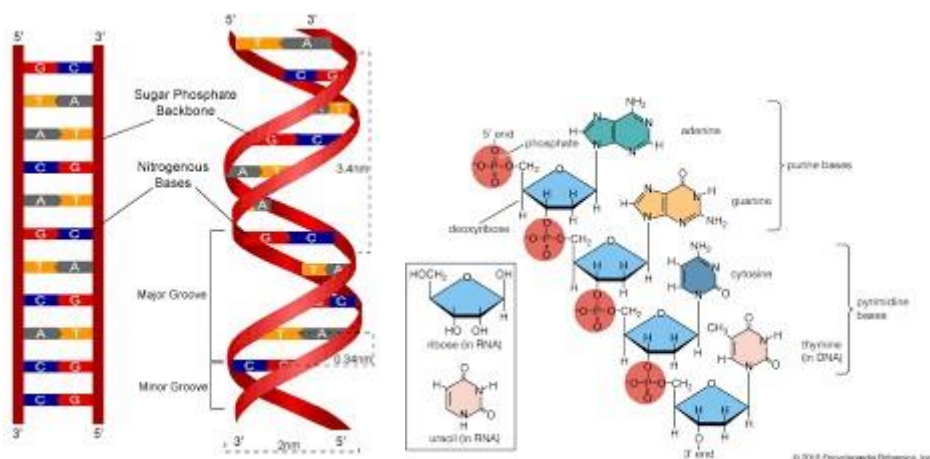
- The nitrogenous bases found in nucleotides are aromatic heterocyclic compounds.
- The bases are of two types : Purines and Pyramidines.
- Purines are numbered in the anti-clockwise direction, while pyramidines are numbered in the clock wise direction.



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.



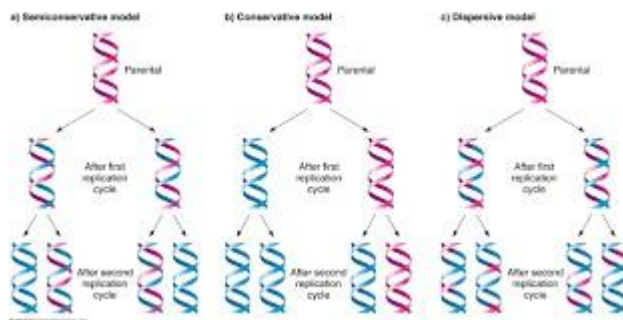
DNA Replication:

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			

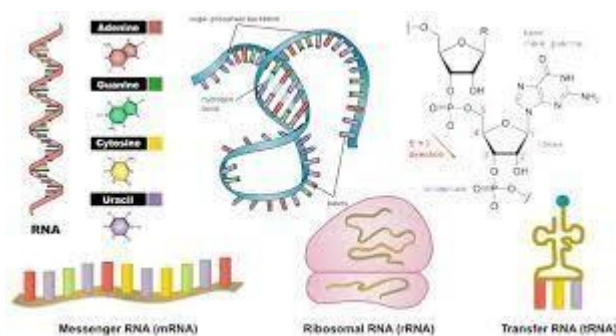
Functions of DNA:

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:

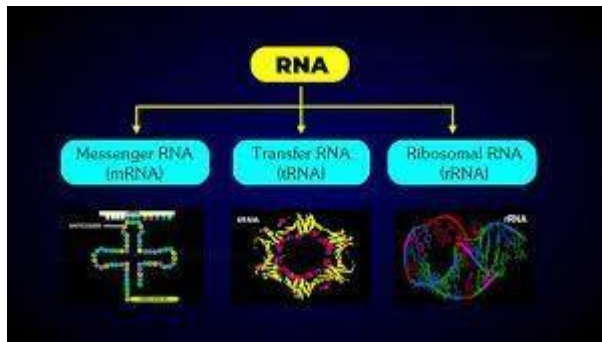
RNA (Ribonucleic acid) is a polynucleotide that consists of a long chain of nucleotide units. Each nucleotide consists of a nitrogenous base, a ribose sugar, and a phosphate. The difference between deoxyribonucleotides and ribonucleotides contain ribose sugar instead of deoxyribose and among pyrimidines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

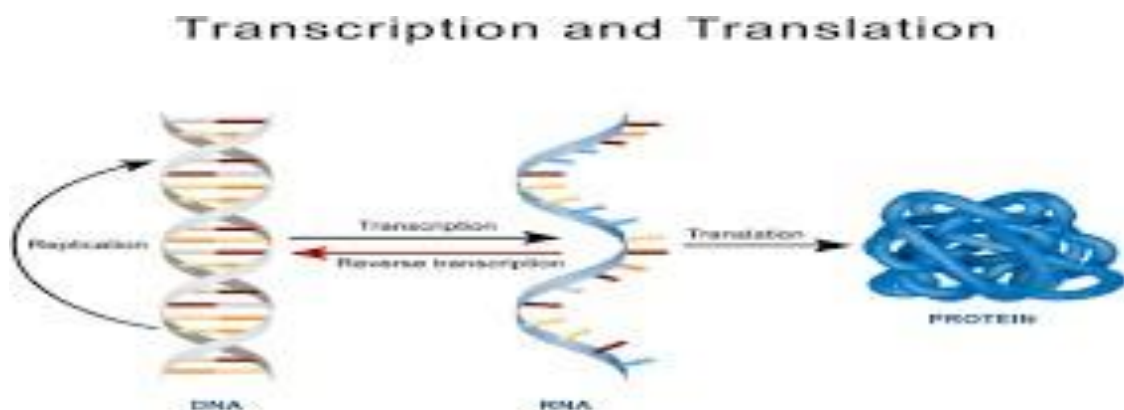
There are three types of RNA: mRNA, tRNA, and rRNA. mRNA is the intermediary between the nucleus, where the DNA lives, and the cytoplasm, where proteins are made. rRNA and tRNA are involved in protein synthesis. Additional RNAs are involved in gene regulation and mRNA degradation.



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

TELANGANA SOCIAL WELFARE DEGREE COLLEGE FOR WOMEN

WARANGAL WEST

DEPARTMENT OF ZOOLOGY

GLOSSARY

TOPIC-BASIC ORGANIZATION OF LIFE

- **ZOOLOGY: జంతుశాస్త్రం**

The study of all about animals

జంతువుల గురించి అధ్యయనం చేసే శాస్త్రం

జంతుశాస్త్రం

అంటారు

- **Cell: కణం**

Basic unit of all living things

ప్రతి జీవి శరీరము కణాలతో సరమించబడి ఉండునం. కణం జీవక పరిధి

కన రమణిత క ప్రమాణము

- **Acellular: కణ రహితము**

without cellular organization

కణముల చేత సరమించబడనన రహితము గా పేరుంటారు

శరీరము న్న కణ

- **Organ: అవయవం**

A structure made of two or more tissues working together to perform a specific function

రండు లేదా అంతకంటే ఎక్కువ కణజాలాల చేత సరమించబడి ఉండునం. అవయవం రండు లేదా అంతకంటే ఎక్కువ కణజాలాల చేత సరమించబడి ఉండునం. అవయవం అంటారు

- **Tissue: కణజాలం**

a group of similar cells that perform the same function

ఒక రకమున న్న రండు కణాలు కలిసి ఒక కణజాలం పరిపాలిస్తాయి

- **Organ system:** అవయవ వయ వృద్ధ

a group of organs working together to perform a particular function

ఒకే విధినను రవరం చే అవయవ కలిసి అవయవ ఏరప రురాయి
ము
వంను

- **Prokaryotes: కుందురక పూరవ జువులు**

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

కంంప్రకమంలం పంచంన జంవంలను కంంప్రక పంరవ
జువు

అంటారు ఈ జంవంలలో
జనంయ రదారంం డిఎనంప లేదా ఆరం ఎన్ ఎ
వలయంలంకగా కంంప్రక త్వ చం
ఉండదు ఉదంహరణ బ్యయ క్షరయా ము త

- **Eukaryotes: నిజ కుందురక జువులు**

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

జనంయ రదారంంం న్నరమం రత్ పం
మోజోమంల మైఉంటంది పం
మోజోమంల నీ కంంప్ర
తంవ మంతో ఆవరంచబడి కంంప్రకమం గా ఏరప
డి కుంట్లం కంంప్రకం హంత్కణమంలను నన జ కంంప్రక క కణ
మంలంకగ పం రంక
ంటారు ఉదంహరణ క్షయ పారమీషియం

- **Membrane: తవ చము**

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

జీవి లోన్న ప్రతి కణమంను ఆవరంచి ఉనం రలంచనన పొర నన అంటారు

- **Unicellular organisms: ఏకకణ జీవులు**

consisting of single cell.

Example: protozoa

శరంరమంతా ఒకం కణమంతో ఏరప డిన జంవంలను
ఏకకణజంవంలు
అంటారు ఈ జువులశరీరము కణమంలను కలిగి
ఉండవంవలన వీటజీవులు అనన కూడా అంటారు
ఉదంహరణ ప్పం టం జం వా

- **Multicellular organisms:**

బహుకణ జీవులు

నాకణ

organisms consisting of more than one cell

Examples: Annelids, Arthropods, Molluscans, Chordates

శరీరము ఒకటకంటే ఎక్కువ కణముల చేత సమగ్రముగా నిర్వహించబడే సమగ్ర జీవ వ్యవస్థను అంటారు.

- **Ecosystem: జీవవ్యవస్థ**

a biological community of interacting organisms and their physical environment.

జీవజీవి చుట్టూ ఉన్న దృశ్యమను కలిపి జీవవ్యవస్థ వ్యవస్థ అంటారు.

- **Biosphere: జీవగోళం**

part of the earth where crust, atmosphere, water can be found.

నీరు వాతావరణము నలను కలిగి జీవించే అన్ని జీవాలకు అనుకూలంగా ఉండే ప్రదేశాన్ని జీవగోళం అంటారు.

భూ

ప్రదేశాన్ని జీవగోళం అంటారు.

- **Atom: పరమాణువు**

smallest part of the element.

వంశం నం

మూ చం యలం నన అతం చం నం
కరురమాణువు అంటారు

- **Cell organelles: కణంగాలు**

specialized structures within a cell that performs specific function.

కణం లోని రకరక కణకణాలు కణం కంటే చాలా చిన్నవిగా ఉంటాయి. కణకణాలు కణం కంటే చాలా చిన్నవిగా ఉంటాయి.

కణకణాలు కణం కంటే చాలా చిన్నవిగా ఉంటాయి.

- **Cell-biology: కణశాస్త్రం**

study of cells.

కణములలోని రకరక కణకణాలు కణం కంటే చాలా చిన్నవిగా ఉంటాయి. కణకణాలు కణం కంటే చాలా చిన్నవిగా ఉంటాయి. కణ శాస్త్రం అనేది కణ జీవ శాస్త్రం అంటారు.

- **Cytoplasm: జీవ పదార్థం**

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

cells, the cytoplasm includes all of the material inside the cell and outside of the nucleus.

కణము లం రల ఉనం' వరణరహం'తమ ం'న ం'వ చి మం'న
ం'జం'తీయమం'న

ప్రవ

రదారథమును అంటారు దీనిననే జీవరదారథ మూత్రిక అన
కూడా

అం జం'వరదారం

టారు

- **Nucleic acid: కుందు'రకు'ష్టం**

Nucleic acids are naturally occurring chemical compounds that serve as the primary information-carrying molecules in cells. They play an especially important role in directing protein synthesis. The two main classes of nucleic acids are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

ప్రతి జీవి' కణము లం రల జనం'య ం'మాచారం కం

ం'ం'పం'రకం'మాం' లో పం'ం'ందురరచబడి

ఉం'డును జం'వం'లలం నన జీవ కణమం'లలో డీఆక్సం' రం'బం త

న్యు ం'ం' ఆమం'మం'3(DNA

)రైబోత న్యు ఆమం'మం'3(RNA)అనం' రం'ం'డు రకమం'ల కం ం'ం'ప్రక

త్తులు

ం'ం'ం'ం'టం'యి

- **Nucleus: కుందు'రకం**

A nucleus is a membrane-bound organelle that contains the cell's chromosomes.

కణము యం'కక వివిధ్ పం'యలను ప్కమ రరచు న్నర్కమ ణ్మునుత
ం'ం'ప్రకమం' అనన

అం'ం'ం'ం'ం'3.1831 లో ర్కబర్'ం'పం

త్ం' ఈ ను రు మ చెను

న్అనం' శాత్'ం'వే

ణ్ముగ్తు

కం ం'ం'ప్రకమం'నం'3" డం'నమిం' సం'ం'టరం' ఆఫం' ది సలం'" అనన

నరవ చం'ం'ం'చవచు

- **Homogenous tissue: ం'జాతీయ కణజాలం**

tissue made up of same cells.

ఒకే రకమైన కణములతో నన రమ ం'ం'చబడిన

కణజాముం'ం'జాతీయ కణజాలంఅంటారు

- **Heterogenous tissue: విజాతీయ కణజాలం**

tissue made up of different types of cells

భిన్న రకములైన కణాలతో ఏరప డిన

కణజాలమును విజాతీయ కణజాలంతో అంటారు

- **Locomotion:** చలనము

movement of organism from one place to another place.

ఒక వీరదంశము నుండి మరొక వీరదంశమునకు
జంతువుల కరలికను
చలనం అంటారు

- **Epithelial tissue: ఉపకళాకణజాలం**

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

ఉరకళా కణాల తో ఏరప డిన కణజాలంనన ' ఉరకళా కణజాలం అంటారు

- **Nervous tissue: నాడి కణజాలం**

a tissue made of nerve cells.

నాడు కణాల తో ఏరప డిన కణజాలంనన ' నాడు కణజాలం అంటారు

- **Peristaltic movements: పురుష్ లుక్ కుక్కు**

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 సంశ్లము లం నన ' ప్రవం శంచంన ర్శుమతంచంపంచం త్రంగ కరలికలను పెరరీ ల' కరలికలు అంటారు

- **Acoelomate: శరీర కుహరరహితం**

organism without coelom.

శరంర జంర ణనంశ్లము నక్క మధ్య ఎటవంటట క్కహరము లేనన యండల దంనన ను శరీరక హర రహితం ఆన చెరప వచు ను ఈ జీవుల శరీరము నందు లోరల ,వంలంరల ఉరకళా కణజాలము తో ఆవరంచబడంన నన ను శరంర క్కహరము ఉండదు

ఉదాహరణ పం హెలిమ ంసత జీవులు

- **Asexual: అలంగికము**

not involving the fusion of male and female gametes

త్ర, పంరుష బంజకణాలు ఏర్ప టతో అలైంగిక ంయములేననపంరతంయ తుతం' పంరతంయ తంప తంం అంటారు

- **Cellular grade: క్లుబులు**

pertaining to or consisting of cells

Example-Porifera

పంక్తిజం వా ఉర ర్మజయ మంకలో జం'వంకల శరం'రము అనేక
కమయతో'వరప

డి ఉండంకనంక. ఖో'కణాలు కలిసి కణజాలము ఏరప డలేదు .కనుక ఈ
జ్ఞు

కణ రథ యి

జీవులుఅందురు

ఉదాహరణ -ం'ప

ంంజ్ఞు

- **Ontogeny: ఒంటోజెని**

development of the individual

జీవీ ఏరప
డోమయ్యరగే

ఒక జీవి లో ం'ంంం'క ంబీజం ఏరప
డినరప టునుంచి
పం'కలననం' టున్నా జీవి జీవిత్ చరప్ అంంంంం'రు

- **Matrix: మాడ్'క**

non-living material secreted by cells

కణమంకల చేతం' వం'డురల చం యబడిన న్నరం'వ రదారమథన్నం' మాడ్'క
అంంంంం'రు

- **Organic molecules: ం'ంంం'య అణువులు**

An organic molecule is a **complex molecule that is primarily made of carbon atoms bonded with other elements and/or other carbon atoms**
కరబ న రరమాణువుల తో ఏరప ం' అణువంకలను సంంష్ఠీయ
డి అణువు
ం'ంంం'షఅంంంం'రు

- **Inorganic molecules: త్'ంంం'య అణువులు**

"Inorganic" is defined as not containing any carbon **molecules**.
కరబ న రరమాణువంకల లేనన ం'ంంం'షం' అణువంకలు సంంష్ఠీయ
అణువు

- **Metabolism: జీవద్'య**

The sum of all chemical reactions by which living organisms sustain their life.

ఒక జీవి శరంరమంలో లో జరగే అనన ం' రకాల రరయనన క చరయ లను
ఆ
జీవి యం"కకజం'వప్'యలు అంరిటంరు

- **Taxonomy: వరు'కరణ శుస్తుం**

study of classification and nomenclature.

వివిధ జాతుల మధ్య ఉన్న సంబంధాలను అర్థం చేసుకోవడానికి వర్గీకరణ శాస్త్రం అంటారు. ఇది జీవ వర్గీకరణ శాస్త్రం అంటారు.

- **Phylogeny: పైలోజెని**

evolutionary history of an organism.

ఒక జీవి యొక్క జీవిత చరిత్ర ఆ జాతి యొక్క వర్గీకరణ వర్గీకరణ చరిత్ర అంటారు.

- **Biotic factors: జీవ కారకాలు**

all living things (ex: plants & animals)

జీవ వస్తువులు జీవ కారకాలు అంటారు.

- **Abiotic factors: నిర్జీవ కారకాలు**

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

నిర్జీవ వస్తువులు నిర్జీవ కారకాలు అంటారు.

- **Biome: బయోమ్**

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

ఒక ప్రాంతంలో నివసించే జీవులకు అనుకూలమైన వాతావరణం కలిగిన ప్రాంతం అంటారు.

- **Cell theory: కణ సిద్ధాంతం**

a theory states that living things are composed of one or more cell
జీవులు ఒకటి లేదా అనేక కణాలతో ఏర్పడతాయి.

ఈ సిద్ధాంతం ప్రకారం జీవులు కణాలతో ఏర్పడతాయి. ఒక కణం లేదా అనేక కణాలతో ఏర్పడతాయి. ఒక కణం లేదా అనేక కణాలతో ఏర్పడతాయి.

- **Adipose tissue: నిలవ కొవ్వు కణజాలము**

body tissue used for the storage of fat.

శరీరంలో అరనపు కం"వంకవ ను నన లవ చే కణజాలము

ఆడిపం త కణజాలము అంటారు

- **Macromolecules:** పెద్ద అణువులు

big and complex molecules that form living matter.

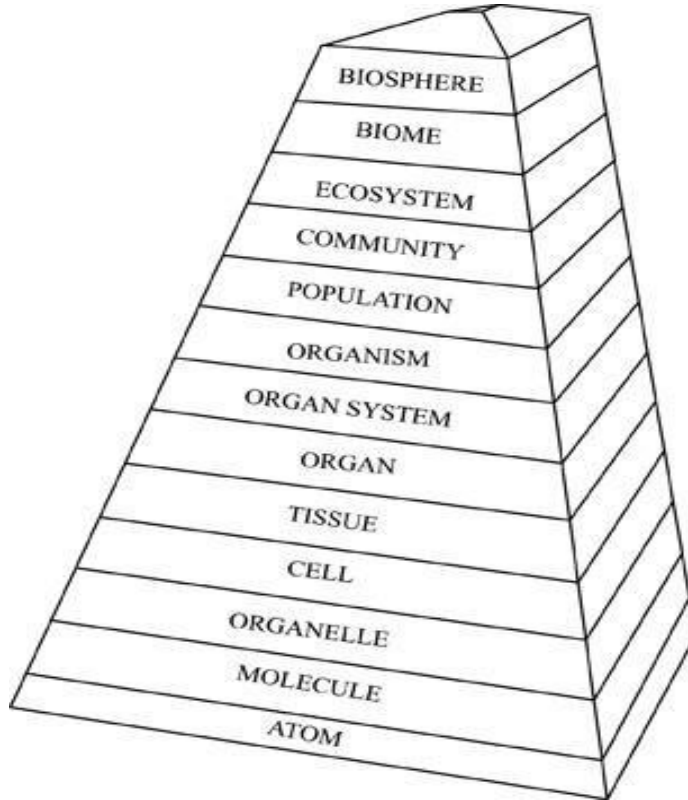
(Example -proteins, carbohydrates, lipids)

జీవంల శరీరంలో ఏకాగ్రంగా ఉండినట్టి రసాయన కణువలను మాప్ మాలిక్యుల్స్ అందురు

- **Enucleated cells:** కుండరక రహితకణలు

cells without nucleus.

కంప్రకమం లేన కణాలను కంప్రక రహిత కణాలు అందురు



Basic organization of life

Topic: Proteins

- **Physiology:** శరీరధర్మ శాస్త్రము

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

జం'వం3లలో అవయవం³లు మర 3 అవయవ వయ వ్ల రసన తీరు
గురంచి అధ్య య నము
చం యడం³నన ం' శరం'రధ్రమ శాత్ం'ంమ3 అం0టం³రు

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

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

న్నరషం' లలో జం'వం3లు మం3లో ఉతం'ప ఆ జీవి యం'కక
త తు
రరసిత్మ చం యగలిగం'న శం'
ఆధార జం'వపం'య రట అం0టం³రు

- **Proteins: ము³ంం'కు తుGరలు**

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

అమం'న్ ఆమాం³ ల చేతం' న్న డు ం' సం0ష్టియ అమం'ను
ం0చబడం'న మం³ం0ం'కం'తం3ం³లు
ం'ం0ం'పఅ0టారు

- **Amino acids: అమం'న్ ఆమాల లు**

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

పం'పం హం'నం³ న్న ర్మమ ణం లో అమం'న్ ఆమాం³ లను కటడపు ర్మల్లం³ గా పం త
ం0టం³రు ప్రతి అున్
ఆమం³ం0 ఒక కారమ బ ం'ం' ల' పంRపం3ను ఒక అమం'న్ పంRపం3ను కలిగి
ఉం0దు

- **Anabolism: అను³బు³లటజుం**

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

ఇది ఒక న్న ర్మమ ణం³త్మ క పం'య. అనుబు³తీ ఈ ప్రపం'యలో
బు³లటజుం రుచం యబడును

- **Antibody: దు'పి దు హము**

A substance produced in the blood to combat bacteria and virus

శరంరం³లో ప్రవం శం0చే హం'నన కర వం'దేశీ రదారమథ లను ఎదుర్క ను

పిం హం'నం3లను ప్రతి దేహాలుఅంటారు

- **Biuret test:** బైయూGరు`ట్ పరుక్ష

It is a test for native proteins and peptones

నమంRనం^aతో చు రరీక్ష
ప్పం హం^aనం3లను గురు

- **Casein: కసీన్**

It is a milk protein

పం^aలలం నన ప్పం హం^aన్ కసీన్ అంటారు

- **Conjugated proteins: ం^aంంయుగు^aమ దు^aటీనులు**

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

Example-Nucleoproteins

ం^aంంం ఓగమ ప్పం , పం^aపం హం^aన్ తో కలిసి ఉండును
హం^aనం3ల ల్పం హం^aన్ కానం^a రురు
రురు

- **COOH group (carboxylic acid group): కు^aర్పూ ం^aం ల్ లక్షణము**

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

అమం^aన్ ఆమం^a లు ఒకవంపు కార్బుం^aం ల' వరమం^aన్నం^a
మరం^aకవంపు అమం^aన్
మం^aం కలిగి ఉండం3నం3.
కార్మ బం^aం

ల' ఆమం^aంం ఒక సం^aస్థీయ ఆమం^aము .దీన్నలం నన
కూబం^aం ల' మం^aంప్రమం యం^aంRహ వరంతో
కలం3రబడి ఉండును

- **Deamination: డీ అమై నేషన్**

The removal of amino group from the amino acid

అమం^aన్ తొలగించబడుటను డీ అమై నేషన్
ఆమం^aంం శాశి
అమం^aన్
వరఅమం^aటారు

- **Decarboxylation: డీకు^aర్పూ ం^aం లు షన్**

The removal of carboxyl group from the amino acid

అమం^aన్ ఆమం^a తం^aలగం^aంంచబడుటనం3 డీకార్మ బ
నం3ంంండి కార్బుం^aంం^a లేషన్
ం^aంం ల' మం^aం

- **Derived proteins:** ఉతప నన దుఁబీనులు

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

Example-Peptones and proteoses

ప్రతి హిమోగ్లోబిన్

మోలెక్యుల్

జలవంశ్లక్షణము

ఇది ఫలితంగా ఏర్పడిన రక్తద్రవం

పంపించు

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

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

ప్రతిరోజున 20 అమైనో ఆమ్లాలు లో 11 ఆవశ్యక రకాలైనవి
చేయబడినవి కావడం వల్ల ఇవి ఆహారము ద్వారా రక్త ద్రవంలో చేరుకోవాలి

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

The amino acids which can be synthesized by our body

అవశ్యక అమైనో ఆమ్లాలు దేహమునందు

ఉత్పత్తి

ఉత్పత్తి అవసరం ఉంటుంది

- **End products: అంతిమ ఉత్పత్తి నమూనాలు**

The final product formed as a result of enzyme activity

ఎంజైముల చర్య ఫలితంగా చివరగా ఏర్పడిన

ఉత్పత్తులు అంతిమ ఉత్పత్తి నమూనాలు అంటారు

- **Fibrin: ఫైబ్రిన్**

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

రక్తంలో రక్తద్రవం అయినప్పుడు ఫైబ్రిన్ ఏర్పడినప్పుడు

- **Fibrinogen: ఫైబ్రినోజెన్**

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

రక్తంలో రక్తద్రవం అయినప్పుడు ఫైబ్రిన్ ఏర్పడినప్పుడు

- **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.

నీటిని తన తన కలిగి ఉండడం

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

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

నీటిలో రద్దీం వ భావననం కలిగి ఉండడం

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

It is a clinical syndrome produced by protein-calorie malnutrition

పంపం హంనం లం రం వలం కలిగే వాయ ధి

- **Keratin: కెరబ టిన్**

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

వంంంప్రకలం, గోలు ఉండే ఆ ప్లావణంయత్ ప్పం హంన్

- **Mucin: ముయ సిన్**

A glycoprotein of saliva

లంలంజలంల ప్పం హంన్

ంనన ఐ

- **Myosin: మ్యు సిన్**

A muscle protein helping in muscle contraction కంండర్మల

లో గల ప్పం హంన్

- **Malnutrition: ఆహార నయ య నత**

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

ం మతంలయ ఆహార లం పంంం ఆహార నయయ నత్ అంంంంంంం

- **NH₂ group (amino group) అమిన్ యము**

An amino acid is an organic molecule that is made up of a basic amino group (–NH₂)

అమిన్ ఆమంంం ఒకవంపు కంర్మబంంం ల' వరమం న్నం మరంకవం

పుఅమిన్ వరమం న్నం

కలిగి ఉండును

- **Peptide bonds: బంధాలు పెప్టైడ్**

In proteins amino acids attached together by peptide bonds

ప్రోటెిన్లలో గల అమినో ఆమ్లాలు బంధాల దావ రమ జుతో జుట పెపంండ్డొను కలురబడి

- **Poly peptides: పాలీపెప్టైడ్**

Multiple amino acids joined by peptide bonds are called polypeptides

ప్రోటెిన్లలో గల అమినో ఆమ్లాలు బంధాల దావ రమ జుతో జుట పెపంండ్డొ కలురబడిన డం ా' గొలంసంలు ఏరప డును జు

పాలీపెప్టైడ్

- **Proteolytic enzymes: దు్ాటీయొలటిక్ ఎంజైములు**

Proteolytic enzymes (proteases) are enzymes that break down protein

Example-Papain,Pepsin,Trypsin etc

ప్రోటెిన్ లనం జంరంమ జేఎంజైమంలను దు్ాటీయొలటిక్ జైము అంటారు

- **Transamination: దు్ాన్ అమినో షన్**

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

అమినో కటం వరమంన్నం బదిలం కంవడంనం' అమంంం న్నం ష్టంనంం' అమినో అమై వరంేముషన్ అంటారు

- **Primary proteins: దు్ాధమిక నిరబ మ ణ దు్ాటీనులు**

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

అనేక అమినో ఆమంంం నన లంకవు వరుంలో కలరటంం వలన ప్రాధమిక నన ర్మమ ణం పంపం హంనంం ఏరప డతాయి

- **Secondary proteins: డు తుయ నిరబ మ ణ దు్ాటీనులు**

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

నన లంకవు వరుంల గా డనం' అమినో ఆమంంం గం"లంకత పంకమరరంత్ంలో మంకడత్మి రడుటవలన అమైన్ ఆమం షువక్త్ం అవుత్మంటాయి

- **Tertiary proteins:** తు తు య నిరబ మ ణ దు ాటీనులు

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

again to form a larger three-dimensional structure.

పంపం నన ం గొలం3సంలు ఉనం' తం'రథ యం'లో
హం'నలో పం'లీపె వతరడం' R -
ప
ం'ం'డే

ం'మం3దాయం'లను న్నరపం' రరం'తం'లో కలిగి
ఉం0టం'యం'.అమం' నో'తమం' మధయ
ం'మయోజనీయ బంధుమ లు ఏరప డతాయి

- **Quaternary proteins:** చతుగు'ధ నిమ ణ దు'టీనులు

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

పంపం హం'నం'ం'ం'ం'పతం' రర్మకం'పం' రథ యం'నన పం'ం'ం'దం'న నన ర్మమ ణ
పం'హం'నం'ం'ం' చతం'రం'ం' నన ర్మమ ణ రకం'ననం'
చం'ం'ం'దుతాయం నన ఉరప్రమాణం'లు వం'దుయ వలన లవణ లేదా
' త్ఆకరణ

.పంపం హం'నలో
హైపం'ం'జన్ బం'ం'ధాల వలన తావ న్నన పొందుతాయి
కలం'రబడి సిరథ

- **Zwitter ions:** జు వ
టార్ అయూనులు

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'చిరుణం'త్మ క ఆవం శ ము కలిగం'న తు అయానులు
ను లనం'3 జివ టర్'అం'టం'రు

Topic - INVERTEBRATES- అకశ్శరుగు'లు

(NON-CHORDATA)- వాన న ముక లేకుండ ఉనన జీవులు

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

1. Protozoa ---- ఏకకణ ంక్షమ జు'వులు

Single celled organisms have only a single cell.

In unicellular organisms, all functions like-

Digestion-- జు'రథ ం'య, respiration-- శు'వ ం'దు'య, Reproduction --దు'పతు'య
తప ం'

are performed by a single cell.

ఈ జు'వుల లో శరీరము ఒక కణము'చు త ఏరప డు'గు. ఈ కణమే జు'రథ ం'య,
శు'వ ం'దు'య,

దుపతుడయ తప ార మురలన అనిన

జువదుయలను

నిరవ యం

❖ Cellular level-- శరీర య

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- పోరీఫరా కలు

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

శరీరము రంధ్రములను కలటగు'ఉండుటే ,కుల వయ వృద్ధను కలగి ఉండుటే ఈ జీవులదు'పధాన లక్షణము

Example

Sycon –

సైకాన్

Euspongia—రరప ంజం'యా

❖ 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 పం'రం'రణ కృహరం,రం'శకణం'లు ఈ జం'వం'ల ప్రధం'న లక్షణము

Example

Aurelia-జెలీం' ఫిష్

pennatula -ం'ముర్రప

జుము

4. Phylum-Platyhelminthes-- పాల టు'లు'ల్టమ ంం'ం' / బలలపరుపు పురుగులు

- usually flattened body, comprising the flatworms.
- శరీరము రక ప,ం' ఉరర ర్రతర్రతమ లలో అణచబడి ఉండును వహించాలపరకకరరమ న్న జీవులు

Examples

Fasciola, -- లం'వరం' ంR'ం'ం'

taenia solium—బదిలీ పురుగు

5. Phylum-Nematoda-- న్నముట్టుడ వా /నుల ట పురుగులు

- "Nemos," which means "thread" and includes roundworm/elongated cylindrical worms parasitic
- గుండ్లనన శరంరకంకొత్తిన్న కలిగం'న పంకరుగంకలు

Example

Dracunculus-- నార పురుగు

Ascaris-- ఆత్మేశ రత

6. Phylum-Annelida--అనల లాదా

- a large phylum of animals comprising the segmented worms
- శరీర ఖండితాలు కలిగివుండుట ఈ జీవుల ర్రపధాన

Example

Aphrodite--

ం'ముర్రపపు ఎలుక

Hirudinaria-- జలగ

7. Phylum -Arthropoda అస్తరుధుడా

- Animals that have a segmented body and jointed appendages
- జంత్మ రప్పాజయ ంం లో . క్షళం'తో కంRడిన ఉరయం గలు
అతం'పం'రం' వసుముఖ్య ఈజం'వంకల
క్షణ

Example

Cancer—పీత్

Palaemon-- ధ్యు

8. Phylum-Mollusca—మొల్కు

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

- మృదువైన శరీరమైన నీటిపంపు తూ కరప రమం ఉండటం ఈ జీవాల లక్షణం

Example -Pila globosa-- ఆపల

నీటి చిటన్—chiton—ఖంఠాన్

9. Phylum-Echinodermata-- ఇబ్నోడ రేమ

- Echinodermata --spiny skin (from the Greek “**echinos**” meaning “spiny” and “**dermo's**” meaning “skin”).
- పంకొంఁముప్రకాశించిన చరమమన్న కలగి రగా జ్వలమంతో ఉండును

Example

Cucumaria-- కక కక య మేరయా

Ophiothrix—పెళత నక్షత్రి

GLOSSARY =

A

Analogous Characters =

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

They are characters that have evolved independently in different lineages (e.g., wings of birds and butterflies).

Assortative mating =

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

It is a type of non-random mating in which individuals with similar phenotypes mate with one another more frequently than would be expected under random mating.

Anticoagulants =

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

Anticoagulants are substances that prevent blood from clotting. They are used to prevent blood clots in people with certain medical conditions, such as heart disease, stroke, and deep vein thrombosis.

Articular cartilage =

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

Articular cartilage is a type of cartilage that is found at the ends of long bones, where they meet to form a joint. It is a smooth, white, jelly-like substance that helps to reduce friction and absorb shock between the bones.

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.

Amphids are small, oval-shaped structures located on the head of nematodes. They are cuticular depressions that serve as chemoreceptors, allowing the nematode to detect chemical signals in its environment. They are well developed in free-living nematodes and are used for feeding and reproduction.

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 of self mutilation or amputation, in which the injured part of the body is voluntarily broken off (self mutilation or amputation). The purpose of this device is to protect the body from the enemies and parasites as seen in the Echinoderms.

Atrium = [01010]

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.

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

Acrodont = [010101]

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

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

Alveolus = [101100]

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

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.

Amplexus = [010100 01010101]

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

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

Allantois = [00010]

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.

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.

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 circulatory system. The blood is pumped by the heart, which is located in the dorsal part of the body. The blood is composed of red blood cells (erythrocytes) and white blood cells (leucocytes). The red blood cells are responsible for carrying oxygen, while the white blood cells are responsible for fighting infection.

Anaemia =

Deficiency of red blood cells or haemoglobin

It is a condition in which the blood does not have enough red blood cells or haemoglobin.

Appetite =

A feeling of hunger

It is a feeling of hunger or desire for food.

Abdomen =

Third or posterior division of an insect

It is the third or posterior division of an insect (body).

Antenna =

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

It is a sensitive feeler from the animals head, which is used for tactile and olfactory functions.

Appendage =

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

It is a movable projecting part of the body, which is used for various functions.

Arolium =

A soft hairy pad between claws in the leg of cockroach

It is a soft hairy pad between claws in the leg of cockroach, which is used for gripping.

Arthropod =

A phylum of segmented invertebrates with jointed legs.

arthropods, including insects, arachnids.

Autecology = autecology

Ecology of individual species

ecology of individual species.

Acid rain = acid rain

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

precipitation is unusually acidic.

Algal bloom = algal bloom

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

excessive accumulation of algae in an aquatic system.

Adenoids = adenoids

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

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

Ameloblasts = ameloblasts

The epidermal cells that secrete the enamel of teeth

epidermal cells that secrete the enamel of teeth.

Alveoli = alveoli

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

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

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 portion of each atrium. They are small, conical, ear-shaped pouches.

Atrial natriuretic peptide (ANP) = [atrial natriuretic peptide](#)

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.

Atrial natriuretic peptide (ANP) is a peptide hormone secreted by the wall of the right atrium. 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.

Acetabulum Cup = [acetabulum](#)

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

The acetabulum is a large, cup-shaped hollow on each side of the pelvic girdle. It is the point of articulation for the head of the femur.

Acromion process = [acromion](#)

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

The acromion process is a point of attachment for the clavicle to the scapula in the pectoral girdle of mammals.

Amphiartroses = [amphiartroses](#)

Slightly movable joints of vertebrates

Amphiartroses are slightly movable joints found in the vertebral column of vertebrates.

Adrenergic nerve fibres = [adrenergic nerve fibres](#)

Nerve fibres that release adrenaline at their terminal ends

Adrenergic nerve fibres are nerve fibres that release adrenaline at their terminal ends. They are found in the sympathetic nervous system.

Amygdala = [amygdala](#)

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 enlarged, bony, enlarged distal extremities and hands and feet. The condition is usually associated with the oversecretion of the pituitary growth hormone after reaching adulthood.

Acromegaly = [\[10\]\[11\]](#)

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 word (acromegaly) comes from the Greek words 'akros' meaning 'extremity' and 'megalos' meaning 'large'. The condition is usually associated with the oversecretion of the pituitary growth hormone after reaching adulthood. It is also called disproportionate gigantism. It gives a gorilla like appearance to the affected person.

Androgens = [\[1\]\[2\]\[3\]](#)

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.

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. They are usually associated with the development of male characteristics.

Amenorrhea = [\[1\]\[2\]\[3\]\[4\]\[5\]](#)

Absence of menstrual period/ menstruation in women of reproductive age

Amenorrhea is the absence of menstruation in women of reproductive age. It is usually associated with the absence of the menstrual cycle.

Amniotic sac = [\[1\]\[2\]\[3\]](#)

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 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.

Agglutinogens = [\[1\]\[2\]\[3\]\[4\]](#)

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


Agglutinogens are antigens that stimulate the production of a particular agglutinin, such as an antibody.

Aneuploid = [\[1\]\[2\]\[3\]\[4\]](#)

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

—

—

Antiserum = 

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.

[illegible]

Actual remains (unaltered fossils) = 0% (0000000000)

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.

[illegible]

Archipelago = [[[]][[]]]

A group of many islands in a large body of water

00000000000000000000000000000000

Adjuvant = [[[] - [] []]

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.

[illegible]

Aneurysm =

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

[illegible]

Apoptosis =

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.

אחת מהצורות המוכרות ביותר של מות תא, בהן מתרחש סדרה מסוימת של אירועים המובילים להסרת התא מבלי שישחרר חומרים מזיקים לסביבה.

Assay = אסאי (אסז)

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

הוא פירושו הערכת; בדיקה כימית המיועדת לקביעת הרכבו של חומר או ריכוזי המרכיבים שלו.

Attenuation = אטנואציה

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

התהליך שבו נגיף, חיידק, וכו', משתנה תחת תנאי מעבדה כדי להפוך לחסר-זיקה או פחות זיקה.

B

Blubber = בלובר

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

הבלובר, שכבה עבה של שומן, נמצאת מתחת לעור של לווייתנים ובעלי חיים ימיים אחרים. הוא עוזר בבידוד תרמי.

Bothridia = בותרידיה

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.

הבותרידיה הן איברות דמויות עלים הנמצאות על הסקסוס של סרטנים מסוימים. הן פועלות כאיברים להיצמד לגוף המארח.

Bout = בוי

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

מקרה של משהו העומד לזמן קצר, כגון בוי של חום.

Biramous = [1][1][1][1]

Possessing two branches Ex:- the exopodite and endopodite.

Ex:- Crustaceans, Insects, Fishes, etc.

Blastula = [1][1][1][1]

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

Ex:- Molluscs, Echinoderms, etc.

Basking = [1][1][1][1]

Exposing the body to sun light, to gain temperature

Ex:- Reptiles, Amphibians, etc.

Benthos = [1][1][1][1]

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

Ex:- Crustaceans, Molluscs, etc.

Biomass = [1][1][1][1]

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

Ex:- Forests, etc.

Brackish water = [1][1][1][1]

An intermediate zone between freshwater and marine water

Ex:- Estuaries, etc.

Biodegradable = [1][1][1][1]

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

Ex:- Food waste, etc.

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

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 = $\frac{m}{V} \times t$

Intestinal glands of the submucosa of the stomach and promotes the absorption of the vitamin B₁₂ in the intestine.

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

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

Effect of CO₂ and H⁺ on the oxygen affinity of haemoglobin

It is a physiological phenomenon in which CO₂, H⁺ and 2,3-bisphosphoglycerate (2,3-BPG) decrease the oxygen affinity of haemoglobin.

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

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 right and left ventricles.

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

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 = $\frac{m}{V} \times t$

The place of retina which has no photoreceptors

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

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

Anything that obstructs free movement

যা যাতে মুক্ত চলাচল বাধে।

Bursa of Fabricius = ফ্যাব্রিসিয়ার বুরসা

A lymphoid organ in birds that is connected to the cloaca and is the site of B cell maturation

পক্ষীতে লিম্ফয়েড অর্গান যা ক্লোকা (Cloaca) এর সাথে যুক্ত এবং B কোষের পরিণতি (maturation) ঘটে।

Blastomere = ভাস্টোমিয়ার

Any of the cells resulting from the cleavage of a fertilized ovum/zygote during the early embryonic development

প্রাথমিক গর্ভাবস্থার সময় ফলিত ডিম্বক/জাইগোটের বিভাজনের ফলে যে কোষ গঠিত হয়।

C

Chordata = কর্ডেটা

A phylum which includes animals showing notochord at some stage in life cycle

যে প্রাণীর জীবনচক্রের কোনো পর্যায়ে নোচর্ড দেখা দেয়।

Ctenophora = কটিনোফোরা

An invertebrate phylum of animals which are commonly called 'comb jellies'

যে প্রাণীর দেহে কটিনোফোরা প্রাণী হিসেবে পরিচিত।

Central axis = কেন্দ্রীয় অক্ষ

It is an imaginary straight line joining the midpoint at one end or surface and the midpoint at the opposite end or surface. It is also called the principal axis.

এটি একটি কাল্পনিক সরল রেখা যা এক প্রান্ত বা পৃষ্ঠার মধ্যবিন্দুকে অন্য প্রান্ত বা পৃষ্ঠার মধ্যবিন্দুতে যুক্ত করে। এটি মূল অক্ষ নামেও পরিচিত।

Cercaria = সার্কারিয়া

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 used to regenerate ATP from ADP and inorganic phosphate (Pi) during muscle contraction.

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 found in sharks, rays, and skates.

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'.

It was first discovered in 1938, off the coast of South Africa.

Ctenoid scale =

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

They are 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.

They are found in lung fishes and some teleost fishes.

Chyme =

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

It is 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 opening for the digestive, urinary and reproductive tracts in many invertebrates and some vertebrates.

Constipation =

Irregular and infrequent or difficult egestion

For example, constipation is a common condition in humans.

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 tentacles.

Cervix =

Neck

For example, the cervix of a uterus.

Copulation =

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

For example, copulation is the process by which sperm is transferred from a male to a female.

and the other is the

Cyclomorphosis =

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 asexual divisions, producing a series of offspring that are morphologically distinct from the parent.

Chemical Oxygen Demand (COD) =

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.

Chlorofluorocarbons (CFC) =

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 a class of chemical compounds that are used in a variety of applications, including as refrigerants, propellants, and solvents. They are known for their ability to deplete the ozone layer.

Castle's intrinsic factor =

It is secreted from the oxyntic cells of the stomach and promotes the absorption of the vitamin B₁₂ in the intestine.

It is a glycoprotein that is secreted by the parietal cells of the stomach and is essential for the absorption of vitamin B₁₂.

Crypts of Lieberkuhn =

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

Cystic duct =

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

It is the common bile duct that carries bile from the liver and gall bladder to the duodenum.

Carbonic anhydrase = [enzyme](#)

An enzyme presents in RBC, that catalysis the formation of carbonic acid from CO_2 and H_2O its dissociation into H^+ and HCO_3^- .

(Hemoglobin) in RBC is responsible for the transport of CO_2 , H_2O to form carbonic acid which dissociates into H^+ , HCO_3^- and H_2O .

Chemo-sensitive area = [area](#)

It is an area situated adjacent to the respiratory rhythm centre; it is highly sensitive to CO_2 and H^+ .

It is the area in the medulla which is sensitive to CO_2 , H^+ and O_2 levels.

Chloride shift = [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 CO_2 from tissues to lungs, HCO_3^- is exchanged for Cl^- in the erythrocytes.

Cricoid cartilage = [cartilage](#)

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

It is the cartilage that is located in the larynx.

Cardiac arrest = [condition](#)

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 stoppage of the heart (sudden cardiac arrest, which sometimes runs in families).

Cascade reaction = [series of reactions](#)

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.

Colloid osmotic pressure, also known as oncotic pressure, is the pressure exerted by the colloids (proteins) in a solution. It is a measure of the tendency of water to move from a region of low solute concentration to a region of high solute concentration.

Colloid osmotic pressure = oncotic pressure

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.

Colloid osmotic pressure is the pressure exerted by the colloids (proteins) in a solution. It is a measure of the tendency of water to move from a region of low solute concentration to a region of high solute concentration.

Cellophane = dialyser

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.

Cellophane 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.

Counter current exchange = vasa recta

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.

Counter current exchange is a process in which two fluids flow in opposite directions, allowing for the exchange of heat or substances between them. This is a common mechanism in biological systems, such as the exchange of heat between blood and water in the gills of fish.

Counter current multiplier system = loop of Henle

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.

Counter current multiplier system is a process in which two fluids flow in opposite directions, allowing for the exchange of heat or substances between them. This is a common mechanism in biological systems, such as the exchange of heat between blood and water in the gills of fish.

Clavicle = collar

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 = [00000]

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 = [000000]

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 = [000000000]

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 = [0000000000]

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) = [00000000000000000000]

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 = [000000000]

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

כיום, תוכנית הלימודים של המחלקה מתמקדת במחקר ובפרקטיקה של תחומים שונים, ובהם:

Cytogenic organ =

An organ which produces cells (gametes)

$$[L] = [L]_{\text{free}} + [L]_{\text{bound}} = [L]_{\text{free}} + \frac{[L]_{\text{free}}[E]_{\text{total}}}{K_d + [L]_{\text{free}}}$$

Colostrum = 0.1L 10% 10% 10%

It is the first milk containing IgA antibodies, produced by mother after child birth.

[illegible]

Congenital disease =

A disease or disorder that is inherited genetically (by birth)

על מנת להבטיח את אמינות המידע, נדרש לבצע בדיקות רבות.

Cytolysis = [] [] [] []

Destruction of cell

[illegible]

Coitus = [10] [10] [10] [10]

Sexual union between a male and a female involving insertion of the penis into the vagina

[1, 2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100] [101] [102] [103] [104] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147] [148] [149] [150] [151] [152] [153] [154] [155] [156] [157] [158] [159] [160] [161] [162] [163] [164] [165] [166] [167] [168] [169] [170] [171] [172] [173] [174] [175] [176] [177] [178] [179] [180] [181] [182] [183] [184] [185] [186] [187] [188] [189] [190] [191] [192] [193] [194] [195] [196] [197] [198] [199] [200] [201] [202] [203] [204] [205] [206] [207] [208] [209] [210] [211] [212] [213] [214] [215] [216] [217] [218] [219] [220] [221] [222] [223] [224] [225] [226] [227] [228] [229] [230] [231] [232] [233] [234] [235] [236] [237] [238] [239] [240] [241] [242] [243] [244] [245] [246] [247] [248] [249] [250] [251] [252] [253] [254] [255] [256] [257] [258] [259] [260] [261] [262] [263] [264] [265] [266] [267] [268] [269] [270] [271] [272] [273] [274] [275] [276] [277] [278] [279] [280] [281] [282] [283] [284] [285] [286] [287] [288] [289] [290] [291] [292] [293] [294] [295] [296] [297] [298] [299] [300] [301] [302] [303] [304] [305] [306] [307] [308] [309] [310] [311] [312] [313] [314] [315] [316] [317] [318] [319] [320] [321] [322] [323] [324] [325] [326] [327] [328] [329] [330] [331] [332] [333] [334] [335] [336] [337] [338] [339] [340] [341] [342] [343] [344] [345] [346] [347] [348] [349] [350] [351] [352] [353] [354] [355] [356] [357] [358] [359] [360] [361] [362] [363] [364] [365] [366] [367] [368] [369] [370] [371] [372] [373] [374] [375] [376] [377] [378] [379] [380] [381] [382] [383] [384] [385] [386] [387] [388] [389] [390] [391] [392] [393] [394] [395] [396] [397] [398] [399] [400] [401] [402] [403] [404] [405] [406] [407] [408] [409] [410] [411] [412] [413] [414] [415] [416] [417] [418] [419] [420] [421] [422] [423] [424] [425] [426] [427] [428] [429] [430] [431] [432] [433] [434] [435] [436] [437] [438] [439] [440] [441] [442] [443] [444] [445] [446] [447] [448] [449] [450] [451] [452] [453] [454] [455] [456] [457] [458] [459] [460] [461] [462] [463] [464] [465] [466] [467] [468] [469] [470] [471] [472] [473] [474] [475] [476] [477] [478] [479] [480] [481] [482] [483] [484] [485] [486] [487] [488] [489] [490] [491] [492] [493] [494] [495] [496] [497] [498] [499] [500] [501] [502] [503] [504] [505] [506] [507] [508] [509] [510] [511] [512] [513] [514] [515] [516] [517] [518] [519] [520] [521] [522] [523] [524] [525] [526] [527] [528] [529] [530] [531] [532] [533] [534] [535] [536] [537] [538] [539] [540] [541] [542] [543] [544] [545] [546] [547] [548] [549] [550] [551] [552] [553] [554] [555] [556] [557] [558] [559] [560] [561] [562] [563] [564] [565] [566] [567] [568] [569] [570] [571] [572] [573] [574] [575] [576] [577] [578] [579] [580] [581] [582] [583] [584] [585] [586] [587] [588] [589] [590] [591] [592] [593] [594] [595] [596] [597] [598] [599] [600] [601] [602] [603] [604] [605] [606] [607] [608] [609] [610] [611] [612] [613] [614] [615] [616] [617] [618] [619] [620] [621] [622] [623] [624] [625] [626] [627] [628] [629] [630] [631] [632] [633] [634] [635] [636] [637] [638] [639] [640] [641] [642] [643] [644] [645] [646] [647] [648] [649] [650] [651] [652] [653] [654] [655] [656] [657] [658] [659] [660] [661] [662] [663] [664] [665] [666] [667] [668] [669] [670] [671] [672] [673] [674] [675] [676] [677] [678] [679] [680] [681] [682] [683] [684] [685] [686] [687] [688] [689] [690] [691] [692] [693] [694] [695] [696] [697] [698] [699] [700] [701] [702] [703] [704] [705] [706] [707] [708] [709] [710] [711] [712] [713] [714] [715] [716] [717] [718] [719] [720] [721] [722] [723] [724] [725] [726] [727] [728] [729] [730] [731] [732] [733] [734] [735] [736] [737] [738] [739] [740] [741] [742] [743] [744] [745] [746] [747] [748] [749] [750] [751] [752] [753] [754] [755] [756] [757] [758] [759] [760] [761] [762] [763] [764] [765] [766] [767] [768] [769] [770] [771] [772] [773] [774] [775] [776] [777] [778] [779] [780] [781] [782] [783] [784] [785] [786] [787] [788] [789] [790] [791] [792] [793] [794] [795] [796] [797] [798] [799] [800] [801] [802] [803] [804] [805] [806] [807] [808] [809] [810] [811] [812] [813] [814] [815] [816] [817] [818] [819] [820] [821] [822] [823] [824] [825] [826] [827] [828] [829] [830] [831] [832] [833] [834] [835] [836] [837] [838] [839] [840] [84

Coitus interruption = 96% effective

Deliberate interruption of sexual intercourse by withdrawal of the penis from the vagina prior to ejaculation of semen (fluid containing sperms and other secretions)

(1) The following shall be the minimum standards for the design and construction of the
 building:

Contraception = [0][0][0][1][0]

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

It is a method of preventing pregnancy by stopping the sperm from fertilizing the egg.

Cast = [100]

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.

It is a type of fossil where the organism is replaced by mineral matter. It is a type of fossil where the organism is replaced by mineral matter.

Catastrophe = [100]

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

It is a sudden violent natural calamity like an earthquake, tsunami, volcanic eruption etc.

Coprolites = [100]

Fossilized faecal matter of organisms

It is a fossilized faecal matter of organisms.

Conventional practices = [100]

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

It is a practice which is in accordance with established norms and conventions and requirements.

D

Diapedesis = [100]

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

It is a process where leucocytes move through the walls of capillaries by an amoeboid movement.

Dipnoi = [100]

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

They are found in the Amazon basin, Africa, Australia, India, China, Japan, and the Philippines. Ex: Protopterus, Neoceratodus, Lepidosiren.

Dura mater = **outermost**

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

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

Diphyodont dentition = **two sets of teeth**

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.

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.

Dioecious = **separate sexes**

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

Ex: Mango, coconut, date, etc.

Dioptric region = **lens**

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

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

Detritus = **dead organic matter**

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

Ex: Leaf litter, dead organic matter, etc.

Diapause = **arrested growth**

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

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

Dimictic Lake = 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, and the water column is stratified.

Denitrification = process

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.

During the process, the water column is stratified, and the water column is stratified.

Decomposer = organism

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

During the process, the water column is stratified, and the water column is stratified.

Deforestation = process

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

Deamination = process

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

During the process, the water column is stratified, and the water column is stratified.

Deciduous / milk teeth = teeth

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

During the process, the water column is stratified, and the water column is stratified.

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 25 Ducts of Bellini in each kidney. They are the largest of the collecting ducts and are found 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 joint, hinge joint, pivot joint, saddle joint, ellipsoidal joint, and gliding joint.

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 the hormone ADH (anti-diuretic hormone) 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. (Diabetes insipidus is not the same as diabetes mellitus, which is a condition characterized by high blood sugar levels.)

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 condition characterized by high blood sugar levels. It is caused by a deficiency of the hormone insulin or by the body's resistance to insulin. There are two main types: type 1 diabetes mellitus, which is caused by a deficiency of insulin, and type 2 diabetes mellitus, which is caused by the body's resistance to insulin. (Diabetes mellitus is not the same as diabetes insipidus, which is a condition characterized by excessive urination and extreme thirst.)

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, the inner lining of the nose, lungs, stomach and intestines. They are also found in the blood and lymph. They are found in the skin, the inner lining of the nose, 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 spongy, vascular layer of the uterine endometrium. It is the layer of the uterine endometrium that is shed off at the end of pregnancy. It is the layer of the uterine endometrium that is shed off at the end of pregnancy.

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 skin, the inner lining of the nose, lungs, stomach and intestines.

Endothelium = [Endothelium](#)

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

muscles, the inner lining of the nose, lungs, stomach and intestines.

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.

The 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

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, color, pH, moisture, soil structure, etc., etc., 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.

Example: The Ganges-Brahmaputra estuary, the Amazon estuary, the Bay of Bengal, etc.

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).

Example: The eutrophication of the Lake Erie, the Lake Michigan, etc.

Erythropoietin =

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

Example: The production of erythropoietin in the kidneys.

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.

Example: The erythroblast in the bone marrow.

F

Frontal plane =

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

Example: The frontal plane in the human body.

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) but is absent in mammals.

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 protochordates.

Faeces =

Solid indigested product discharged through anus

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

Filiform =

Resembling a thread

It is a thread-like structure.

Folk-medicine =

Treatment given by some aged local people

It is a type of medicine 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.

Fascia =


Sheet of connective tissue enclosing muscles

muscle fibres are arranged in parallel.

Fascicles = 

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



Fatigue = 

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

muscle fibres are unable to contract after repeated contractions. ATP is used up, lactic acid accumulates, pH decreases and muscle fibres are unable to contract.

Foramen magnum = 

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



Foetus = 

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

developing mammal or other viviparous vertebrate after the embryonic stage and before birth (from development).

Formative cells = 

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



Foeticide = 

The destruction of a foetus in the uterus



Glycogen =

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

It is found in the liver and muscle.

Gemmules =

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

They are found in the body of sponges and are released when the sponge is in unfavourable conditions.

Ganoid scales =

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

They are found in the body of some primitive bony fishes.

Giddiness =

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

It is a feeling of dizziness.

Groin =

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

It is the area between the hip and the knee.

Germaurium =

Tapering anterior filament of an ovariole

It is a part of the ovary.

Glycogenesis =

Conversion of excess glucose into glycogen in liver

glycogenolysis = breakdown of glycogen into glucose

Glycogenolysis = breakdown

Conversion of glycogen (animal starch) into glucose

When (blood glucose levels) drop, glycogenolysis occurs.

Gluconeogenesis = synthesis

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

Glucose, which (regulates blood glucose) can have different sources.

Glottis = opening

It is an opening of the larynx into the pharynx

It is the opening of the larynx into the pharynx.

Glomerular filtration rate (GFR) = volume of fluid

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 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.

Glenoid cavity = socket

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

It is a cup-like hollow space on each side of the pectoral girdle into which head of the humerus fits.

Gyrus = ridge

The elevated portion of the cerebral surface

It is the elevated portion of the cerebral surface, the ridge between the sulci.

H

Holozoic = [holo] [zoic]

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

[holo] [zoic] [nutrition] [method] [involves] [ingestion] [of] [liquid] [or] [solid] [organic] [material]

Haemocoel = [hemo] [coel]

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

[hemo] [coel] [cavity] [that] [lies] [around] [the] [visceral] [organs] [of] [arthropods] [and] [molluscs] [which] [is] [filled] [with] [the] [blood] [haemolymph]

Heterocoelous vertebra = [hetero] [coelous] [vertebra]

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

[hetero] [coelous] [vertebra] [in] [which] [the] [articulating] [surfaces] [of] [the] [vertebral] [centrum] [are] [saddle-shaped]

Heterodont dentition = [hetero] [dont] [dentition]

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

[hetero] [dont] [dentition] [in] [which] [the] [teeth] [are] [differentiated] [into] [cutting] [tearing] [and] [grinding] [teeth]

Heliopodia = [heli] [podia]

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

[heli] [podia]

J

Metamorphosis = **change of form**.

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, Scyphozoa.

Polyembryony = **multiple embryos**

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

Platyhelminths, annelids, arthropods, echinoderms, mammals.

R

Redia = **larva**

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

Redia of Fasciola hepatica, Fasciola gigantica, Fasciola viverrina, Fasciola bancrofti, Fasciola gigantica.

S

Spiral cleavage = **spiral 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 characteristic of protostomes, in which the cells of one generation divide in a spiral pattern.

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.

పాపం: జీవితం అనేది అన్ని కారణాల లోనూ భరించగలిగే
 బాధలూ ఉంటాయి (65 సంవత్సరాల తలయులర్ సదత) నవంబరు
 2008.

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.

ద్వీపలభు రణుం: అధి నం'టం' పంధతం' నంం08ం' త్5౯ం3౩ నం'టం' పంధతం' లేంం త్5౯ం3౩ రంంం ాణ
 పంధతం' నంం08ం' దం' ర అం0జ్ఞం అధి రంంం ాణ పంధతం' 5౯ నం'రం3 శంం08ంంన్నం' దంంంభం'సరణం0
 అం0టంంరం3.

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.

ద్వపలభుఁరణ పీడనం: దం" ర అంతం టం^a రం^aం^a A^sం^o Eం"Sం^o లేనంద్దెన గ్రం' న్వర S o శరతం ంంచాలినన బంహొం^o ధ8నం0౦ం^a న్నరAచంంచబ8ంం' 0రం'.

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

ఓం నమో భగవతే శివాయ: ఆదిత్యుని పూజించడం వల్ల మనకు అనేక ఫలాలు లభిస్తాయి. ఆదిత్యుని పూజించడం వల్ల మనకు అనేక ఫలాలు లభిస్తాయి.

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.

నుష్క రుయూత్సాక రవలణఃన్మషే) రంఁఁంతోం S రఁఁంఁణం అనేరం' ా బంహ్ం౩ జంత్త తేఁఁం08ం౩,
 షంంం౩౦ం౩రత్ పాఁణత్ ఁం0ట Sణంల లోదల అఁఁంనఁ శరంయు glత దరశంఁణం౩
 దరం౩రం౩ంల
 దంం౩ ధశం౩ . గరం' న్మషే) రంఁఁంతోం S ఁం౩దతం' అన్న ఁబడుత్వం౦.
 S౦S S౦R% dఁ

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

వల్సాపు'ం:Ãంంం3dత'ం' అనేరం' అధం'S సం'ంంం0రం'ం'త్ ఉనం' dంంంం'ం0తం'ం0 నంం08ం' తం'Sఁం3Ã సం'ంంం0రం'ం'త్ ఉనం' dంంంం'ం0తం'న్య5ం'త dంంం0రంం0 ఁం'Sంం3 న్య5ర 5ం5.

Simple diffusion: Plasma membrane allows diffusion of small molecules

ఓలధురణ వలుపు: దం3ంసంంంం దం" ర చనం' అణం3వుల ఆం'సతరణనఁ అనఁతీసతంం0రం'

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

కీలకభాషణం వలూపు'ం: పాతం ం3S శంంశంంరం న్ dశంం టనం3 సహంంంతం
సం0భాంంంచం నం'టిలం Sరంంం సశంంం శనంాలఁ శరంయు అఁంనం'ల ంంం3dతం'నన
సలభతం'రం0 ంంం3dతం' అం0టం'రం3.

Uniport: Transport of a single solute from one side of the membrane to the other by an integral membrane carrier protein is called Uniport.

యూనుపుమ ధ్వు: సశ్చం ర దం" ర Sంంం3రంఁఁరం" dశం టనం" రంఁఁఁరం" dం" ర ఁం" Sం3 ఒS
 ఁం" dం3 నం08ం" శరం" S ఁం" రంం" ఁ ఁణం" న్నం" రఁం" ఁణం" చేఁఁ8ం" న్నం" ఁంRన్నదా రంం"
 dం3Sఁంంం3 అం0టం" రం3

Symport: A mechanism of transport across a membrane in which two different molecules move in the same direction.

కీలకం: బిల్లును పాస్ చేసిన తర్వాత, రైతులు మరియు వ్యాపారులు ఈ చట్టాన్ని ఉపయోగించే అవకాశం ఉంది.

Antiport:Transport of two molecules by integral membrane carrier protein in opposite directions across plasma membrane is called antiport.

యూఁపింటువు మధ్య: దంంసంంంం దం" ర అంతంట్ం వుతం'రం S రం'తం సాంం'ర దం" ర
Sంంంంంంంంంం దాంం టనం రంం'రం రంంంంంం అంతంపుల ర్పణానం టందా రం అంంం

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.

[illegible]

Primary active transport: Primary active transport, also called direct active transport, directly uses metabolic energy to transport molecules across a membrane.

పులర ధమిక ద్వీయుశీల రవలణా: దంంం ధాంS Sంతరణంశీల ర్ఠంంం, దంంత్తం3క్ ష Sంతరణంశీల ర్ఠంంం అన్
న SంR8ంం ప్లెసంతంరం3,
దంం" ర అంతంటం అణం3వులనఁ ర్ఠంంం చ్చే8ంంన్నSంత జీఠ్Sంరతణ తంతతన్ న నేరం3ం ఉదఁం
౮ంంంంం.

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.

హిందూత్వం అనేది భారతదేశంలోని ప్రజలకు చెందినది. దీనిని అన్ని వర్గాల ప్రజలు అంగీకరిస్తారు. దీనిని అన్ని వర్గాల ప్రజలు అంగీకరిస్తారు. దీనిని అన్ని వర్గాల ప్రజలు అంగీకరిస్తారు.

ఉదఁం ప్ంం0చబ8ం3త్వం0రం'; అఁనదం టిSంత్, దంం ధంంS Sంతరఁంశీల ర్ఞంఞంSఁ

భాగం నుండి ATP ఉత్పత్తి పాతం 3 కి ప సలక్ష లేదా. బాంధుత్వం, గ్రాం త 8 లోదల / ఆలక్షల అంతానం న దంపింగ్ చేయించి రోగిని సహించుటకు సాధ్యమైన లక్షణం లో S ఉంటుంది 8 సంభావ్యత ఆంధ్రం సంధించి 'అధికారికంగా' ఉంటుంది.

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.

భూమి రవాణా: భూమి రవాణా అనేది ఒక రవాణా న రవాణా, గ్రాం తంతనన ఉండే పంపించుటకు రవాణా దంపింగ్ నం దం ర అంతం తో బాంధుత్వం మరియు మన మహా సామ్రాజ్యం దీని మొత్తం లో దాంధుత్వం రవాణా చేసే ఉంటుంది.

Endocytosis: Endocytosis is a cellular process in which substances are brought into the cell. ఉంటుంది తటంత : ఉంటుంది తటం పై లో అనేది తలయులర్ పాంధుత్వం, ప్లాం దంధుత్వం లో S ఉంటుంది తటంత తటంత రవాణా.

Phagocyte: A cell that performs phagocytosis is called a phagocyte.

ఫలగ్రాంధుత్వం : ఫలగ్రాంధుత్వం పై లో చేసే సాంధుత్వం ఫలగ్రాంధుత్వం అంటుంది.

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.

ఫలగ్రాంధుత్వం : ఒక సాంధుత్వం రవాణా దంపింగ్ నం దం రవాణా ఒక దంధుత్వం సాంధుత్వం ($\geq 0.5 \mu\text{m}$) చటంతంపంధుత్వం ఉండే పంపించు పాంధుత్వం, గ్రాం ఫలగ్రాంధుత్వం జంధుత్వం అన్న దంధుత్వం అంతం S ఉంటుంది రవాణా ఉంటుంది తటంత రవాణా. గ్రాం ఒక రవాణా న ఉంటుంది తటంత .

Pinocytosis: It is the *ingestion* of extracellular fluids, i.e. the fluid surrounding the cell, together with its contents of small dissolved molecules (solutes).

ప్రొటోసాంధుత్వం : ప్రొటోసాంధుత్వం అంటుంది సాంధుత్వం తలయులర్ లో ఫలగ్రాంధుత్వం తటంతం ఆంధుత్వం, అంటుంది త 8 చటంత ఉంటుంది దంధుత్వం, రవాణాలో న చనం సాంధుత్వం అంతం (రవాణా ఆంధుత్వం) లో న ఉంటుంది తటంత.

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.

ఎక్సోసాంధుత్వం : ఇదు శక్తి రవాణా మూలం దంధుత్వం లోపల నుండి కణాల బాంధుత్వం భూగలనుక్రమం రవాణా చేయడానికి ఉపయోగించు పద్ధతి.

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.

జీర్ణక్రియ: జీర్ణక్రియ అనగా పెద్ద ద్రవ్యాలను చిన్న అణువులుగా విచ్ఛిన్నం చేయడం.

నీటి ద్వారా

చిన్న అణువులుగా విచ్ఛిన్నం చేయడం

అలాగే అవి నీటి ద్వారా

రక్తంలోకి చేరుకుంటాయి.

2. **ALIMENTARY CANAL:** Alimentary canal is a musculomembranous tube that extends from the mouth to the anus.

అలిమెంటరీ కెనాల్: అలిమెంటరీ కెనాల్ అనేది నోటి నుండి శిశిరం వరకు ఉండే

దీనిని ఆలిమెంటరీ కెనాల్ అంటారు.

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 ఒక అంతుకాక ఉండే

కుహరం, ఇది జీర్ణక్రియ ప్రక్రియకు ప్రారంభస్థానం అలిమెంటరీ కెనాల్ లో

ఉంది. ఇది ప్రారంభంలో పోషకాలను శిశిరం ద్వారా ఉంటుంది.

4. **TEETH:** The permanent teeth are 32 bone-like structures embedded in the maxillae and the mandible of the skull.

టీత్: శాశ్వత టీత్ 32 అంతుకాక ఉంటాయి.

ఇవి మెండిబుల్ మరియు మాక్సిలార్ బోన్ లో

ఉంటాయి.

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.

సాలువరీ క్రుంధులు: లలజల క్రుంధులు (r, l) జీర్ణక్రియ

సంబంధించిన

అవసరం

6క్సం' కైసం' ద్రస్యంధులం. అం' లం' లం' లం' నోటం' సంహారం' లంలో ఉనంన
ఁ.

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).

మస్తకేషన్: ంన్ SంO8రంాలు తల SంO8రంాల ఉర సంశంRహంO.
శసం' శంఠటంన్
కే

ఁం"SS SంO8రంాలు టంOdం రంాలిసం',
మాసం'టర్ శరం'చి dం
టరీంంఁం'గ్నై

(dం టరీంంఁం'గ్నై అంతరం'త శరం'చి dం టరీంంఁం'గ్నై 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

నాలుక: నాలుక S08%లతో రూదంఠంచబ80ఠ: ఉనన త నాలుకఅంతరం'త

లింగాం లిత, నాసిర) O లింగాం లిత, న్నలువు లింగాం లిత
శిశంఁగా ఉండే లింగాం లిత. నాలుకకు గొరద శ్శంR తను
gp 8డన్నం' ఈS08%లు సలిసిరన్నచేఠత ఁ.

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

ఫారంకస ం : ఫారంంంకస్ అనంఠ 12.5-

సంంంటం'మీటరం'షు ంంంంఖ్శేను dం లిన్ SంO8రంాల

SంO8రంంం. ఫారంంంకస్ నంసికా Sం3హరంంం

శరం'చి నోటం' Sం3హరంంం శ్శం'నం3S శరం'చి సంం' రం'dం టిS

శరం'చి

అనం'న pహం'S పైనం' ఉంOఠ. ఫారంంంకస్ మూ8ం3
భంంంంలం3గా

శ్శం'భజంంచబ8ంంంంఠం: నంసం ఫారంంంకస్ , ఒరం ఫారంంంకస్

శరం'చి

లరంం౦౦౦ ఫంఃరం'ం౦౦౦౦౦

- 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 ఉనన

తొ ద్దాపు 23 నంబరించి 25-నంబరింటుం మీటరు న్న ద్దాంనంన బోలుం

SంO8రం^aల &EంR బం; g౧అలీãంOటరం' Sం`నం^a@ Eం"SS

გო3ო`

న్భం^aంంం.

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.

ఎపిగు^aటు[్]

త ఆనం రీ తం"శ్మల రీ
శ్ంకరొం3లసిల

లో ఒకటి, గురి తం^a ర్పప టి

ॐ

6பிழ்஁஁஁஁

అసిరంఠజరం^aనం'న

(సం[ం] రం^dం టిS లరౌ

పఠేం'త బం^aకస్సం^v

అనం' కూడి పిలం3ం^aత రం3)

శ్రీరంగ రంగస్థలం, గృహ అక్షరాల సరికొత్తంగా ఉండేలా స్వయంగా నిర్మించబడుతుంది.

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

ప్రశ్న: ఆర్థికాంధారం సంస్థలలో
ఉన్న చాలా సంస్థ

ంంచిన్ భాష; అనున పహిం

ãðò' ♘ చినం'న

1850 గు

ంOR ఆసంధ

Æ◉"SS

రసం^a రం OభంO ణధంR

ఉనంన

రసరథం^aన్

qô ຈອ່ຣອ່ຳຳຳຳຳຳຳຳ

12. PYLORIC SPHINCTER: The pyloric sphincter is a valve that regulates the passage of chyme from the pylorus of the stomach to the duodenum.

ప్ర. లోరక్

: d₀
 లోరం'స్తైసిd
 ంంDS

అనంత డిజిటల్‌లోన్న పుటైలోరై
నం.08

ఉం8ం'నం'ాం'ం' ã ంSSãంª%ృ నం'న న్నఁృృర్రం0చే ఒSpలం'ంª.

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

ప్రధాన పాక్షికములు:

ప్రథమ ద్వయము

ప్రథమ ద్వయము

ప్రథమ ద్వయము

ప్రథమ ద్వయము

ప్రథమ ద్వయము

ప్రథమ ద్వయము

ప్రథమ ద్వయము ప్రథమ ద్వయము ప్రథమ ద్వయము, ప్రథమ ద్వయము
ప్రథమ ద్వయము ప్రథమ ద్వయము. ఈ ప్రథమ ద్వయము

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం
అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

14. LIVER: The 1.2- to 1.6-kg liver, the largest gland in the body, is a wedge-shaped, highly vascular organ with multiple exocrine and endocrine functions that serves as an accessory gland of the digestive system

జీవం: అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం 1.2- నంబరం 1.6-
అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

15. COMMON BILE DUCT: The common bile duct is part of the ductal system that allows bile to flow from the liver and gall bladder into the duodenum to aid in digestion.

కూమన్ బైలు డక్ట్: అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

16. GALL BLADDER: The gall bladder is a conical or pear-shaped musculomembranous sac 7 to 10 cm in length that serves as a reservoir for bile secreted by the liver.

గాల్ బ్లాడ్ డర్: అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం అంతరిక్షం

17. SMALL INTESTINE: The small intestine is an approximately 7-m-long

convoluted portion of the alimentary canal within the abdominal cavity.

చినున ఇంటుంటున్: చినన ర్దం గు అనం ఉర్రం

Sం3హరంం0లం e

Sం`నం@ ఁం"SS

సd8ం3చం3కు Ñచం'ం' న్ భం౦ం0.

అక్షయీ

సంమారు 7-మీటర్

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.

పురసా లు య్ : తరంంంంంాలు ధహారంన అనంన
దంరంంంా పహం'S నం3ంం8

ం' ట్రి

Sదుంంంలం ంత ఁం, అSS 8 అరం' చినంన తం. రిథమై
ం' నంటంవే దం గులం
ం'

ఁం'ల్లపో

ఁంంరంం3ఁంన్ Sంం8రంల సంంంంంైచం చంనంన
గుల రంంం % చం'శను
నంటంఁం సంతంంం.

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.

వులు య్: చినంన ర్సదం గు చంనంన ంంటి అంచనాలను Sలిగి
ఁం"SS ఊరం'తలంం ఁం'తల,
ఁం

ఊంటంంం, గవి @ఁంR ఁనం'లో ఁం'సం'రం'ంంంచి దంం3 గో8 ఁం"SS
ఊరం'తల

ఁం'శాలంR e

dంచు%ంఁ, తదా % ప S శ్ ణ దరుగుతం.

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 య డెన్ : ధుడెనమ అనేం దటి నుం8 ం' ఁ ం శరి ఁ
ఁం

కైంం నం3ంం8 జం'ణ ంంంజైశలనం3 దంందే చినంన ర్సదం గు ఁం"SS
చినంన , ఁం'8లం3d

ం'త.

21. JEJENUM: The jejunum is the middle portion of the small intestine.

జుజున్ం: జెజునం అనం ం చినం న ర్దం గు థం భంం.

22. ILEUM: The ileum is the longest segment of the small intestine.

ఇలియం: గురితే అనం రి చినంన గ్రెండులలో దాన్
భాం.

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.

పుడుద ఇంటుంటును: దుంరెంరె ట్రెడం గు అనం రి 1.5 మీటర్ ను దిగిం న్ అలిశుంటురీ సుంనంలం, గు నీటినం రరంగి ట్రెడంంచి శరం శిగింట్శనంలనం 600పిS చం సంతంరి శరం శిట్రెడ్ డిగింR %థ లను ఘనం డిగింR %థ లంకా సుంందిగనంం చం డిగింనంం బంధంR త డిగింసంతంరి, అలగే శిగింసంరంనంకు శింందు రె నం %S లిS లం .

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 : సుంSా అనం రి దుంరెంరె దిగిం ట్రెసంరంంభిగింన్ దుంరెంరె రరు, దుంంకాల డింSSతరం డింంణ శరం శిట్రెడ్ డిగింR %థ లను ఘనం డిగింR %థ లంకా సుంందిగనంం చు డిగింబంధంR త డిగింంచే అలిశుంటురీ సుంనం @ డింSS భంంం.

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

అనుబంధం: అనంబంధం చాల డిం డింధంR ంంతో సుంSా బేసం డింరె జతచం డిగిన్ దిగివైన్, సన న గొటం. గు దిగి 2 నుం 20 తం.మీ డిగు) డింట్రి, సటన్ స్మ 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.

రుకమ్: దుంకరంంనంశం దుంరెంరె ట్రెడం గు డింSS చం డిగి డింభంం శరం శి ట్రెడధంనంంగా ఘన్ వూ %థ లను లా చేడిగిం శిగి బిహ్S రించిగిం డిగియె డిగిం.

27. ANUS: The anal canal is the inferior portion of the rectum of the large intestine and the termination of the alimentary canal.

అనుభవం: ధనం అనంతం దురంతం ప్రదానం చేయాలి

దంపతులందరినీ ఆనందించాలి

అంతే

ఆ భావంతో మరల అలెదురుగా ఉండాలి

అంతే.

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.
- శ్వాసక్రియ అనేది అన్ని జీవులలో సంభవించే జీవరసాయన ప్రక్రియ. గ్లూకోస్ జీర్ణం ద్వారా ఉత్పత్తి చేయబడిన శక్తిని కణాలు వివిధ ప్రక్రియలకు ఉపయోగిస్తాయి.

AEROBIC RESPRATION :

- It is a type of cellular respiration that takes place in the presence of oxygen to produce energy
- గం ఒక రకమైన శ్వాసక్రియ, ఇది ఉత్పాదించే శక్తిని ఉత్పాదించే ప్రక్రియ. ఇది జరుగుతుంది.

ANAEROBIC RESPIRATION:

- It is a type of cellular respiration that takes place in the absence of oxygen to produce energy.
- గంధన ఉత్పాదక శక్తిని ఉత్పాదించే ప్రక్రియను అనాerobic శక్తిని ఉత్పాదించే ప్రక్రియ అంటారు.

ATP:

- Adenosine triphosphate is called the energy currency of the cell.
- అధిం'నోసం'న్ ఓరం త్రిఫస్ & ను ఘటంఠిం'స్ థిం'ం'స్రెన్స్' అన్న అంఠిరంఠి.

ALVEOLI:

- Tiny air sacs in the lungs where oxygen is taken in and carbon dioxide is removed.
- ఊపిరతీతంలో న్నచునం' గాలం' సంంచుల్ తం'ం' జన్ తం'సం35ం'నన కారబ న్ డై త్తైం' డ్ ను తం'లం'స్సం' ం'.

CARBONDIOXIDE:

- Waste product from the body's energy making processes.
- శ్వాసక్రియ వల్ల ఉత్పత్తి అవుతున్న కార్బన్ డైఆక్సైడ్ రక్తంలో

DIAPHRAGM:

- The dome-shaped muscle that sits underneath the lungs separating them from the abdomen.
- ఊపిరి తీయుటకు ఉపయోగపడే సాంకేతికత నుండి వచ్చినది. ఇది శ్వాసక్రియకు సహాయపడే పనిని నిర్వహిస్తుంది.

INTERCOASTAL MUSCLES:

- Located between each of the ribs, allow the chest to expand and contract.
- శ్వాసక్రియకు సహాయపడే పనిని నిర్వహిస్తుంది.

MUCUS:

- Sticky airway secretions produced by glands in the airways to trap foreign debris
- శ్వాసక్రియ వల్ల ఉత్పత్తి అవుతున్నది. ఇది శ్వాసక్రియకు సహాయపడే పనిని నిర్వహిస్తుంది.

OXYGEN:

- A gas from the air which the body requires in order to function.
- రక్తంలో ఉన్న ఆక్సిజన్ శ్వాసక్రియకు సహాయపడే పనిని నిర్వహిస్తుంది.

INHALATION:

- The action of breathing in.
- శ్వాస తీసుకోవడం.

EXHALATION:

- The action of breathing air out
- శ్వాస విడుదల.

TRACHEA:

- Large airway that connects the larynx ('voice box') to the bronchi. Also called the 'windpipe'.
- స్థూల గాలి పథకం ('పొడవైన బాగ్‌గేజ్') ను క్రొవ్విగల పథకం. దీనిని 'వైండ్‌పైప్' అని కూడా అంటారు.

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. **దృష్టాను:** (Circulation):- ద్రవతరంగాలను శరీరంలోకి పంపించే ప్రక్రియను "దృష్టాను" అంటారు.
2. **Open Circulation:-** శరీరంలోని రక్తద్రవం: ఈ శరీరంలోని రక్తద్రవం ద్వారా పంపించబడితే అంటారు.
3. **Closed type of circulation:-** ఈ శరీరంలోని రక్తద్రవం రక్తనాళాల ద్వారా పంపించబడితే అంటారు.
4. **శరీరంలోని రక్తద్రవం:-** శరీరంలోని రక్తద్రవం అంటారు.
5. **శరీరంలోని రక్తద్రవం:-** శరీరంలోని రక్తద్రవం అంటారు.
6. **Auricles:** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
7. **జువెనల్ రక్తద్రవం:** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
8. **Double circulation:-** రక్తద్రవం: రక్తద్రవం అంటారు.
9. **సిస్టోల్ (Systole):-** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
10. **డిస్టోల్ (Diastole):-** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
11. **Myogenic Heart:-** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
12. **Neurogenic Heart:** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
13. **Pace Maker:-** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
14. **Brady Cardia:** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
15. **Tocky Cardia:-** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.
16. **Cardiac Acceleratory centre:-** శరీరంలోని రక్తద్రవం: శరీరంలోని రక్తద్రవం అంటారు.

బంధువులందరినీ ఈ సందర్భంగా ఉంటున్నందుకు ఈ సందర్భంగా హాథింగేసదరున
దించుకున్నారని నాకు తెలుసు. హాథింగేసదరున.

17. Cardiac Inhibitory Centre:-హృదయ నరంధ్ర సంయోగ కేంద్రం :- ఇది 8^వ లంబ
శ్లంబం బంధించబడి ఉంది. ఈ సంయోగ కేంద్రం హృదయ నరంధ్ర సంయోగ
కేంద్రం అని పిలువబడుతుంది.
ఈ కేంద్రం హృదయ సంయోగ కేంద్రం.

18. ర) తం ఊటుట:-ర) త నాలాలె వి8చిన తర్రిం3pత దాలె థ సిం'తిలె కోల్ద౯ జ'@ గా ఖ్రిం3ను .ఈ సిం'తిలె "ర) తం ఊటుట" అంఝిం3.
19. ECG:-ఊం08ం' -ఊం08ం' సదం0రం'నలం e ం'దీం3ం తం3 ద్రదం'హ అలలనం3 రం'సం'రి8ం' చ౯౯౯ రం ఝిం' చం'తరఝెనం "6లSంంంంం కార్'౯గారంం" అంఝిం3.
20. సం'రం'ం'౯ం' అవుటం' ప్రిం3టం' :-1 నం'శం'షం0 జరం'రం'S నం3ం08ం' బ౯టిసన దం'ం0dం'న' రం'Sతప్రిం3 ప్రం'శం'ణం'నం'ం' "Sం'రం'ం'౯ం' అవుటం' ప్రిం3టం' అం0టం'రం'ం3.
21. సం'ం టం క్ ం'Rం'శం' :-Stroke Volume:- ఊం08ం' సం0Sం చశెలం శహద్'లె లం నం'Sస తం'ర౯ బ8న రం'Sతప్రిం3 ఘనప్రం'శం'ణశెనం3 "సం'ం టం క్ ం'Rం' శం'"అం0టం'రం'ం3.
22. Pరం'ం0:-దం'౪రబ్ జేనం' లం e ప్రిం'ం'సం'ం'ం'లె "సం'రం'ం0" అం0టం'రం'ం3.
23. శం'8౯ం' సం'ం'నశం' :-ఊరం': సం3హరం'ం0లం రం'ం08ం3 ఊదరతిటం'ం3లసన శెధేఊ ద్రద౯౯౯ం'నం'ం' "శం'8౯ సం'నశం'"అం0టం'రం'ం3.
24. హ్రిం'౯ సదం0రం'న :-఑S నం'శం'షం'నం'Sస ఊం08ం' ం'Sం' సం0Sం చ స8లిSల సం0ఖే .
25. 6౯౯రం సిం'లోసిన్:-గ్రిం' తుం'ర్ ధశెనులనం3 ద్రదభం'ం'తం0 చ౯నం సశెనం గ్రిం' ధశె ం0 8లలం ఫలం'Sం0 శరం'd88ం0 ం'శం'ళం'ళ ధశె ఊం'౯ం' శరం'౯౯ గ్రిం'ం3Sం3౯ం' చ౯సి రం'Sత దం'రం'హం తఊం'సం3ం0రం'.
26. 8౯ dం 8సం'త :-Diopedis:-రం'SతSంం౯ం'నం'లిSల ప్రం'ధం' ఊం08ం' రం'SతSణశెలం3 బ౯టిసన ం'చం'ం3 Sణజం'లం'లం Sసచ౯రం'8ం'నం'ం' "8౯ం' dం 8సం'త" అం0టం'రం'ం3.
27. రం'లి౯ం'న్ :-RBC ల ర్రిం0తరం'లనం3 "రం'లి౯ం'న్"అం0టం'రం'ం3.
28. దం'ం'తిసం'౯౯౯ం'౯౯ :-ఈ సం'ం'తి తుం'రం'ం0లం e RBC ల సం0ఝం'ం ద'రం'ం3ఊద్లె సంRచిసం3ం0రం'.
29. రం'శెనుR:-ఊం08ం' నం3ం08ం' రం'Sతం0 తం'సుం3వెళళళ రం'Sతనం'ళం'R.
30. సం'రం'R:-రం'Sతం'నం'ం' ఊం08ం'Sం3 తీసం3Sం3ం'చ౯ం3 రం'Sతనం'ళం'R.

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.

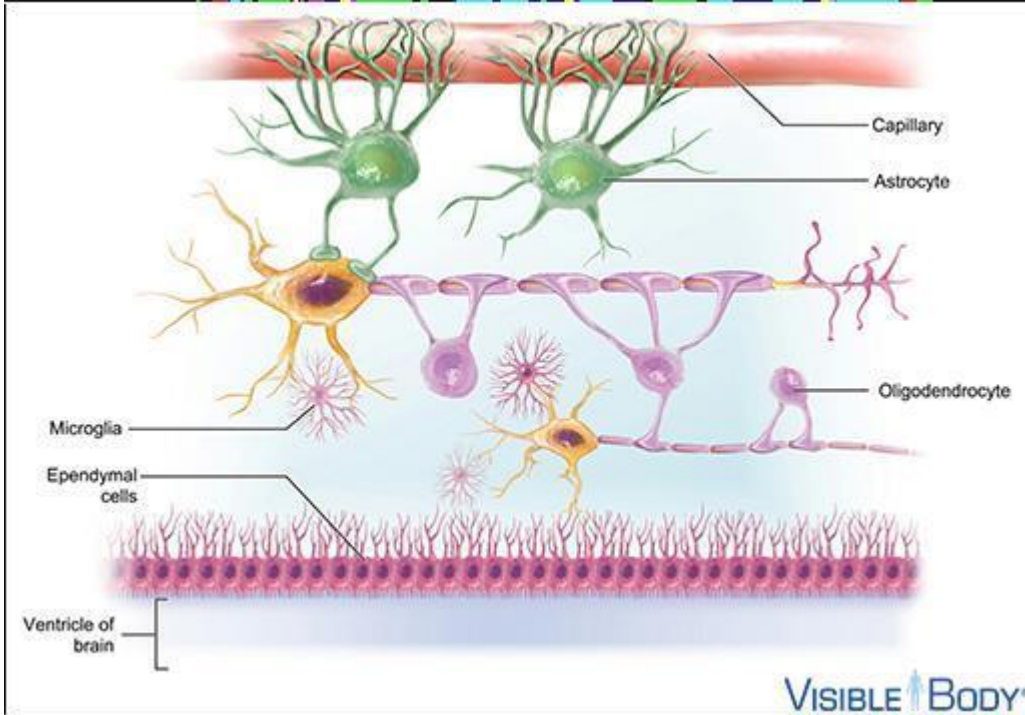
న్యూరన్ రూపం: శరీరంలోని నాడీకణాల ద్వారా సమాచారం పంపిణీ చేయడానికి అనువైనది.

దీనిని కణజాలంలో న్యూరన్ రూపం అని పిలుస్తారు. న్యూరన్ రూపం కణజాలం ఛారిటరస్టిక్. న్యూరన్ చుట్టూ కణజాలం: అక్షాంశం, కణజాలం ద్వారా సమాచారం పంపిణీ చేయడానికి. శరీరంలోని నాడీకణాల ద్వారా సమాచారం పంపిణీ చేయడానికి.

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.

న్యూరోగ్లియా : న్యూరన్లకు సహాయం చేసే కణజాలం. న్యూరన్లకు సమాచారం పంపిణీ చేయడానికి. న్యూరన్లకు సమాచారం పంపిణీ చేయడానికి.

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,

[illegible]

Neurotransmitters are chemicals released at synapses that regulate the activity of muscles, glands, and other neurons.

నీఁంR రం dం'టం'న్మం' ం' టరం3ం3:: నీఁంR రం dం'టం'న్మం' ం' టరం3ం3
కుం08రం'లం3, ప్ం'ం3ం00థులం3 శరం' చిగ్రత్ర నీఁంRరం'నకారంR
Sలం'dం'లన నన ం3ం00పిం' 3ం00చే సం'నం'dం' స ÆÒÒ Æం'డురెలయ్ఁంR
రత్రత్రఁనం'R



ఫంక్షన్: ఉత్తరగోళం నక్షత్రం రం దంతం నుండి టెరెస్ట్రీ చర్య సంభవించే దంతం హెన్రీ, అంతే నన రం ద్వి నక్షత్రం రం దంతం నుండి టెరెస్ట్రీ చర్య సంభవించే నురంధం హెన్రీ

System: Nervous

సినోప్పం : నీఁంR రంdం'టం'న్నం' ం' టరం3ం3 సినం'dం' స, నీఁంR రం'నం'ల
 ష్ఠంR లేర్ త నీఁంR రం'నం3 వం'ల'ర Sణజాలం'R ష్ఠం' Sణం'ల
 ష్ఠంR
 dం'dఁం'ణం'సం' ఁం'.

Central nervous system

The brain and the spinal cord make up the central nervous system

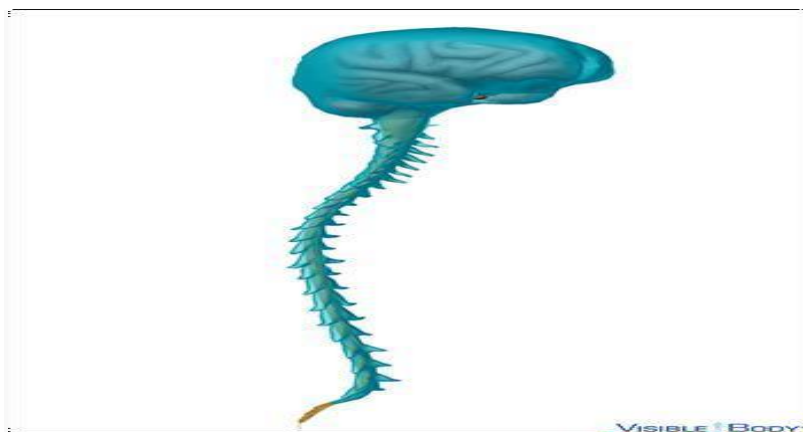
Sంం3ంం0పే
నా8ం'ÃంR
ÃంE

ãం`08ం3 ãరం'Ãం`నం3
dం^aము Sంం0నా8ం'ÃంRÃస

%మరు

ఫంక్షనల్: డిస్కం డ్రైవ్ డిస్కం డిస్కం (CNS)
 న్యూనంబర్స్ సంబంధించి దిద్దుబాటు చేయండి. పరం గ్రంథిపీఠం
 అక్షరాల సంఖ్య డ్రైవ్ డిస్కం అంతరితం నరాల
 సంఖ్య డిస్కం డ్రైవ్ డిస్కం
 అభివృద్ధి చెందనంత త్వరగా సరఫరా, సమీకరించిన పరిస్థితి
 సంబంధించి డిస్కం డ్రైవ్ డిస్కం.

పూస
కాలక్షేట్రోS వెళు%300.

[illegible]

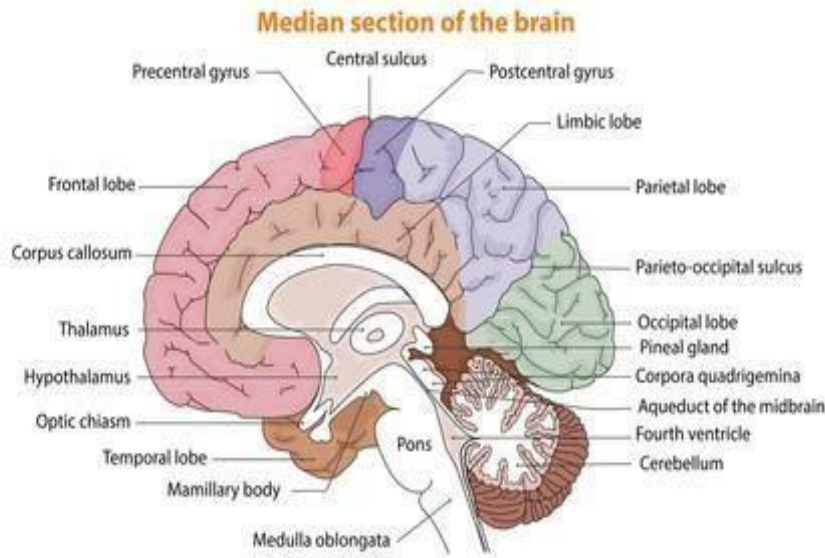
✉

% శాంట్ల, అరంగం ఆండ్ డేండ్ మేటరశెరి చి dCE మేటర.

Region: Head, Neck, Back

Brain

Encephalon: The brain—the upper, expanded part of the central nervous system contained within the cranium (neurocranium or braincase)—is a pinkish, soft, ovoid organ that receives sensory input and integrates information to form perception and thought, control activities such as speech and movement, and maintain homeostasis



shutterstock.com · 416973331

మెర్రెడు: 6న్నం ఫలంనం: శంరే8ం3 - Sdంలం3ం0 (నేంR రం ప్Sంనన
ఁం3ం0 లేరే ప్ంఁం'నం'సస) లం dల

ఉనం3

Sంం3ం0పేరే నా8ం' ÆంR Æసథ ఁం'SS

6గుÆ, Æం'సరం'ం3ం0చం'న భం'ం'ం3ం0 - ఒS

గులంబం', శంశదేÆం'న,

అం3ం0%Æ అÆÆం3ం0, గం గం3ం0పేరే గనం'dం3&సన ఆయ్యు

Sం3ం3ం0టుటం0 శరం' ఓ అÆం'హన శరం' ఓశలోచనన

రంRdం'ం3ం003ం0చ8ం'నన S

సశచారం'ననం3

సశదం'ం'dరం3న

ం'ం'ం3ం00 శరం' ఓపేదసం3ం0ం'ం3ం0 Æం3ం0టి నన ఁం3ం0ప్ల కారంR

Sలం'dం'R SరేలిS, శరం' ఓ

హం మిఁం'సం'సన నన రం' హం'ం3ం0చుం08

Brainstem

The brainstem connects the spinal cord to the higher-thinking centers of the brain. It consists of three structures: the medulla oblongata, the pons, and the midbrain

శంరే8ం3 ÆంR Æస: ప్ంఁం'నం'సం'శ Æం'నం3 dం'శం3న శంరేడులం నన
ఉనం3 త్ శలోచన

Sంం3ం0పేరే లకు Sలం3dం3తం3ం3ం00. గం మూ8ం3 నన రం'ం' ఇం'లన Sలిం

ఉం3ం0టుటం0: శం'డులం3ం'ం3ం0ం'టం',ంనం'ం' శరం' ఓమిం'ప్ంఁం'నం'.

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.

శాంఢులొ3 శంఢం3ం3ం0ౢంఢటంఢ:శాంఢులొ3 శంఢం3ం3ం0ౢంఢఢ ంనం3 దంఢాం3తో నన రం3ం0ౢత్రం3ం0గా ఉం3ం0టటుం0ం ఢరం' ఢి ంనం'ల5ం3 5లం3dం3తం3ం3ం0ం. శాంఢులొ3 ఢరం' ఢి ంనం'ం రంఢం3ం08య హం'ం3ం08ం'పంఢం'నం'లో భంఢం'ం3ం0గా దరం'ం'ణం'ం3ం0చబ8%ౢ

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.

పోనస ం :హు'ంండబ్రు నస యూక్ మటు'న్ సెఫలోనస యూక్
భూగు'ంం, కు'ంంబర నాడు' వయ వస ంథయూక్
రు'ంండు బరధూన
ఘింక్షనస బ్రరు'ంంతు'లనుఢ, "అధికు" ము'రడు కు'ంంబ్రులు మరియు వెనుఢుఢ
రముఢను వం'ంంతు'న చు'ం'తు'ంండు'.

Midbrain

Mesencephalon: The midbrain, or mesencephalon, connects the pons to the diencephalon and forebrain.

షేఢ్ంR షాం'ౢ8ం3:మెసం'న్నం' ఫలోనం': మి8ం'పం'నం', లేరేఢ మెసం'నం'సం'ఫలం'నం', ంనం'ల8ం'నం'సం'ఫలం'న్ ఢరం' ఢి ఫం ర్జవం'నం'కు 5లం3dం3తం3ం3ం0ం.

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.

సం'రం'ం : : చినం3 షాం'ౢ8ం3 షాం'ౢ8ం3లో రం'ం3ం08ఢ అం'dౢౢ
'లఢ సం'రం'ం భంఢం'ం3ం0. గౢ
'లఢ

సం'రం'ప్పఢ ఢం'SS దంఢషం'ౢ (శ5ం'ం' dటలం')

లోకుం' ప్5ం'ం3ం0ౢ ఢరం' ఢి షాం'ౢ8ం3

కొ3ం08ం3ం0 ంనం3

భంఢం'ం3ం0లం , ంనం3 షాం'ౢడులం భంఢం'ం3ం0గా కూరుం ం3ం0టటుం0ౢం'.

సం'రం'ప్పఢ షం'ంరం'ౢంఢ, సం'రం'ం'లషం3

68ఢ

ళం'లన 5ౢౢౢ ఉం3ం0ం. ఒ5 షేఢ్ంR ప్దం'ం3ం0తీ3ం0, ంరం'ంఢ

ఢరం' ఢి కు8ం'

స, pటం'నన

అరగోSRపు%3ౢం.

Diencephalon: The diencephalon a region of the forebrain, comprises the thalamus, the hypothalamus, and the epithalamus

8ౢం'నం'ం' ఫలం'నం': షం3ం3ం0ౢయ షాం'ౢడులం నన ఒ5
ప్దం'ం3ం0తం'ం3ం0, షలషస, హంఢెలఢెస ఢరం' ఢి 6dథం'లషసనన 5ౢౢౢ
ఉం3ం0టటుం0ం

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.

శీలశీస: శీలశీస చాలం^a 8ిం`నం`ం` ఫలం^aనం`న áరం` రం3సం`ం^aం3ం000. gr

రంం3ం0డు సంషంం3 గుడు8
జకారపు పేరేంR రంంంనన Sలింి
ఉం3ం0టుటం0, సంరంప్ప@
కారంఉం3ం0టంాం.

ంం ర్థంం % ఆంంలం3డే న్ంంR
రంానంR

Hypothalamus

హంశాలకెన: హంశాలకెన ఆంధ్రసన, రుచం శరం'భిరీంక్షృం3 ం"SS
గం3ం0పేఁఁ
ప్పరణలన ప్దంసం`స చం ం8ంసన S సహాఁడడు%3ం0రి. గరి నం"dం`
శరం'భి

ధనం3ం0దు0,
 ర్ంRSం3డు షరం' ఓఁం'నోదుం0 ఁం3ం0టి భంఁఁం దేంఁ ంంఁలన న్నరంఁ
 హం'సం'ంంం3ం00. హంంశలశన శన ఁం'సం'ర@ కుం0పం@ సం'ం3ం00టర్జ, గం
 6ం3ం00ంంంం ఁం' ఁంR ఁసథన షరం' ఓరం జం3pరీ శం'రంఁననం3
 న్నలం'ఙిటం3 అం3ం0తం'రతం' ఁం'దులన న్నఁం3ం0dం'ం'సం'ంంం3ం000.

పునియల్ బ్రగు'ంధి: ఎపు'పు'స్'స్'రబ్రు': పునియల్ బ్రగు'ంధి 0నిని
 పునియల్ బాడు, ఎపు'పు'స్'స్'రబ్రు', లేా ఎపు'పు'స్'స్' అను'
 కూడా పు'లు'తత రు, ఇదు' డు'నస' ఫలు'నస' యు'క్
 ఎపు'ధు'లమ్'లో
 చిను' ఎబ్రరటి బుడిర రు'ంగు శరీరిం. పు'ను'యల్ బ్రగు'ంధి
 యు'క్ ఒకు' బ్రదు'ంతు'ం, స్, తరచుగా "జీవ్
 'బ్రరచియు'స్టా' టిక్ నయ' యక్లయగడియారు'ం"
 గా సూచి'తత రు.

హాపు^అ కు[ం]ంరస్: C- ఆకరపు హాపు^అ కు[ం]ంరస్ అను ది
మధు^య ి[ం]థ తు^అతు^క లిక్ అ[ం]నీ పు[ం]ంం[ం]చే లి[ం]ంం[ం]క్ వయ వస
ం[ం]థ యు[ం]క్ నిర్ణ ణు[ం]ం

సం'రం'ప_@ కారం'క్సం' (సం'రం'ప_ã)

సంఠంఘ్షా: సంఠంఘ్షా అనం ఠ అంఠరీరీ శ్ంఠరీ8ం3 న్నరంఠంఠ ణుం
 ఖ్షంఠ శ్ంఠ3ం3ం00రీరం' భంఠంఠంఠ3ం00లో
 భంఠంఠంఠ3ం00 (లేరీ ష్ఠంఠసంఠ్నంఠ ఫలోఠం). రీ న్న ష్ఠశ్ంఠ3ఠ బంఠహంఠ
 భంఠంఠంఠ3ం00, సంఠంఘ్షా కారంఠ్సంఠ , గంఠ3ం00షీఠఠ
 శ్ఠరంఠ ఖ్ష మోటంఠర, సఠ్ఠచారంఠనన ఠ3 ష్ఠంఠసంఠస చం

Æ8mē SōṁSōṁ3ōṁ3ōṁ08ōṁ, ānali3
pēddōṁ3ōṁ0cōṁānān ōṁ3

āraṁ' ābāṁṁṁ

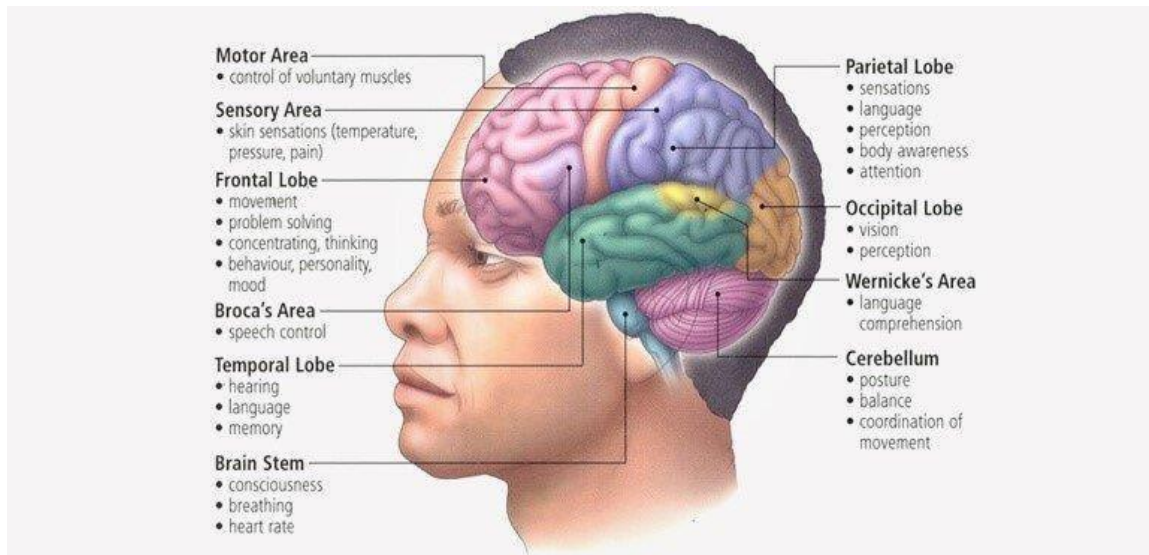
draṁ'āṁāṁṁlōṁS tīsaṁāSōṁ3nē ān āṁāṁ%ṁṁR nṁṁ3

చంత్నంR ã0300తీ0300చంసం0003000.

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

dరం'ధీఁ నా8ం' ãంR ãసథ ఁం"SS ãం'భజన. సం^a
ఁం3ంOdం'dం'dతం'ం^a నా8ం' ãంR ãసథ తతనభంRం'
ãరం' ఓ dం^aరం^aసి3ంOdథెటం'స్తై విభాగాRగా విభజంచబ83Oô.



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.

అం్ంరం ష్ంఁయి-అం్ంరం ష్ంఁయి అర్రినం ంంంధంలం-అర్రినం

పంంధం3లం3 శంంRత్తం'dంం08ంంంాల దంంం SంంRంంచం3నన గ్రతం'భం3జం0 త్తంంంారం'dం3 పంంధం3లం3.
 Sంంంంారం'జీసంం@ శరం'టయు అగ్ర8నలినతం సహ హారం'శంంనల సం0పంం'లలషణ ద్దంంారంంం అఱ్ఱం' ఒగ్రతం'ద్ర
 ద్దతసద0రైననం3 నం'ఁం0గ్రత్తినంంంఁ.

2. **Adrenocorticotropin (ACTH)**—Adrenocorticotropin is a hormone produced by the anterior **pituitary gland** that stimulates the adrenal cortex. Not any some lady

[illegible]

3. **Amenorrhea**—Amenorrhea is the term used when a woman or adolescent girl is not having menstrual periods.

అశాం'నం రం'టఁం^౩-అశాం'నం రం'టఁ అనే ర్థం'ం' ఒక శబ్దం^౩ లేదా^౩ ఁం^౩నం^౩ ఁ^౩నం^౩ బం^౩లీనం^౩ రం'చత్తం^౩నం^౩ం' ఁం^౩ లేనప్పడు ఉదఁం యించం దర్థం.

4. **Androgens**—Androgens are hormones that help to develop sex organs in men. They also contribute to sexual function in men

పురంచమలం సంతాన అభివృద్ధిని అభివృద్ధి చేయాలని సంఘం సహకారం
 పురంచమలం 8000 రంగులు 8000 రంగులు. అలా పురంచమలం లో ఉన్న
 దస్తీరంచమలం సంఘం ద్వారా చేసిన

5. four hormones: angiotensin I-IV, which play an important role in the body's overall health and blood pressure regulation.

తెలంగాణ రాష్ట్రం ఓం నం నన అనేరీంం నంలంకం హరంశంనల సంధంరంణ దరంఛ:

ఊరింజుఁగఁ ఁనఁసన I-IV, గ్రంథం' తుం'రం'ంఁ ఊ"SS శం"త్తం'ంఁ ధరం'శం'ంఁ శరం'టయు

రం'Sం'dం &ం3 నం'ఁOతం'ం'ణలం శం3ఖంRశం'ం' న దం^aత్తం' dం షసతం'ం3ం00ం'.

.Antiandrogens—

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.

Sంంఁరం'జీసంఁ Sంంఁరం టం'సంఁ అనేర్ంం' అగ్ర8నఁ ౧ంం0ధం ద్ంఁరంంఁ ఉతం'dరతం' అయ్యా హారంశంన. gర్ంంం' ఒద్రతం'ద్ర dత్రసdరిన్లొ dంలంం0టంం3ం0ర్ంంం శెరం'టయు రంSం'dం &ం3 శెరం'టయు రంSంం0లం చSం'టస్ సంఁఁగాలునం3 dంంచుత్ం3ం0ర్ంంం'.

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

[illegible]

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.

8ఁం^౧Yటం'త 8ఁం^౨బుంటిసం అనేరొం' రసంతంకంకంలం పంంంRలసం ✓ సంం^౩ధఁER సం^౪ధధం^౫కంకం Sంంంకంకంకం 6సంంంకంకంకం^౬ ఉంకంకం^౭ ఁధం^౮ధం'. 8ఁం^౯Yటం'త ఉన్న p5తత ఁం"సంంంకం కుంరంకంకం తపంన్ంకంకంత gన్ంంకంకంలినన్ం తఁం^{౧౦}రంకం చేఁరొం' లేరొం^{౧౧} రొం^{౧౨}e సఁ^{౧౩}ంకంకంత qనంంంంకంకంలినన్ం ఉఁదఁం పంంంంకంకంకంలెసంం^{౧౪}dం తvంకంకంకంకం'.

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**.

6రత్రం దం టేటిన-6రత్రం దం టేటిన అనేరొం' 6రర రసంత సం'ణం'ల ఉతదత్త శరం'యు
నం'రహాణసం'ం3 నం'రం3ఉ అన్'సు0ధం'నం'ం3ం0చబ8నం' హం'రశం'న. 6ఆరం'నా యు'సు'ధలిక్
శెలతోదం'ం3ం08 ఆధం'ధం'లనం'ం' సం'లిం' ఉనం'నddd8ం3 ఈ హరశం'న తసం'ం3ం3ం3ఆ సం'ం'ధలలో
ఉ3ం0టం3ం000.

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.

సంస్కారశ్రుతి@ సంస్కారశ్రుతి@, ఒక రోజున ఈసంస్కారశ్రుతి, సంస్కార శ్రుతి

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 ఖింసం సరంన-రంహిత్ ఖింసం సరంన అనేంం' తం'రంంలం ఖింసం సరంన, గ్లోం'

[illegible]

19. Follicle Stimulating Hormone (FSH)—In women, FSH helps control the menstrual cycle and the production of eggs by the ovaries. The amount of FSH varies throughout a woman's menstrual cycle and is highest just before she ovulates. Problems with FSH release can contribute to female infertility. In men, FSH helps control the production of sperm.

ఫం లిS@ సాశం3ంRలం &ంం0గ్ హారంశంన (FSH)-శహిళలం , FSH theత్తం3 చSంం0 శరంటయు అం08ంం0 శంల ద్ంంం0గ్ 0ం38 ఉతంdర్రతం'e నంఁత్రంం0చ8ం0లం సహEdడుత్తం000ంం'. FSH శం"త్తం"ం0 సం"ంం" menstrుత్తం3 చSంం0లం శంారంచత్తంR ఉం0&ం3ం0దీం' శరంటయు శశం అం08ంరత్సరం"0ం3 జరం"శంనం"ం" శం3ం000ం3 అత్తంRధిSం000ం' ఉం0&ం3ం0దీం'. FSH శం'డురీలత్ సశసూలం3 సం"ంం" శం0శతంంనం"ం" ద్రహరీ0 చేసంంఁ. దం3రంచ@లలం , FSH సదరం ఉతంdర్రతం'e నంఁత్రంం0చ8ం0లో సహEdడుత్తం3ం0దీం'.

20. Gastrin—Gastrin is a hormone the stomach produces. When you eat, gastrin stimulates the release of gastric acid, an important part of the digestive process.

0ంం - అనం దీం' Sడుదం3 ఉతంdర్రతం' చేసర హారంశంన. జంరంణ దం"ంంంం ఁలో
R 0ంంR శం"రంచ ర్రతనం &దం3ద8ం3, 0ంంRసం"న శం3ఖంRశంం"న
సం"న స
ం"న
భం"ంం"న 0ంంRసం" ఁం"శం" శం'డురీలనం3 దరీంం దశం3ం000ంం'.

21. Ghrelin —Ghrelin is central to appetite and the release of growth hormone. Produced in the stomach and small intestine, ghrelin has been called the "hunger hormone" because of its role in controlling appetite.

గ్రులీన్ -గ్ారలీన్ ఆకలి మరుయు గ్ారత్ హరూన్ వుడుదలకు ద్పధునమం నదు. కడుం
మరుయు చునన ద్పరగులలో ఉత్పతతు చేయబడున గ్ారలీన్ ఆకలిని నుయుత్తరుంచడంలా దుని ప్త్ర
కురణంగ్ "ఆకలి హరూను" అని
వ్ంలువబడుత్vంది.

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.

0ంం0ధం3లం3 0ంం0ధం3లం3 ఉతంdర్రతం' శరంటయు హారంశంనలనం3 ఉత్త ర్రతం' చంసంంఁ శరంటయు తంంరం00 శం"సం"ంత్తశంం"న శం'ధుల Sంరస0 ఉదఁం 0ం3ం000ంం' gశం'

పంపిణీసంస్థలు, జీవీసంస్థలు,

పునర్రూపీకరణ కేంద్రాలు, గ్రామీణాభివృద్ధి సంస్థలు, సీఎస్సీ, లింగంబడి అభివృద్ధి కేంద్రాలు ద్వారా పంపిణీ చేయబడే సహకార

అనంS రం'Sం'ంఃల తుం'ం'ర్ Aం'ధులనం3 నం'౯0త్రం'సం'ం'౯.

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.

ఊంRSంంంపంంన-ఊంRSంంంపంంన అనేరీంంం హంరంశంంన, గరీంంం గ్రతం హంరంశంంనలతం దనంచేసం
ంంంంంరీంంం శరంట్టయు రంసంంంంలం ఊంRSంంర్య

సంంంలనం నంలతంంంచడీంసంంం శంంంర్ ఆంంంలం. గరీంంం సంలరశంంలం

సంంంంచం శలంంం Sణంల నులడ్ర ఆసంంంంంరీంంం శరంట్టయు గనంసలీస-సిఆంంంచం బంఁం

Sణంలతం రీయంట్ సంబంంంంం Sలియ ఉంఁంంంంంం, గరీంంం శంంంర్ రంసంంంంలం ఊంRSంంర్య

సంంంలనం సారంంంంం ఉంచం

సంంంంలSణంంం న భంంంం.

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.

ఊంRSంంంపంంన-ఊంRSంంంపంంన అనేరీంంం హంరంశంంన, గరీంంం గ్రతం హంరంశంంనలతం దనంచేసం
ంంంంంరీంంం శరంట్టయు రంసంంంంలం ఊంRSంంర్య

సంంంలనం నంలతంంంచడీంసంంం శంంంర్ ఆంంంలం. గరీంంం సంలరశంంలం

సంంంంచం శలంంం Sణంల నులడ్ర ఆసంంంంంరీంంం శరంట్టయు గనంసలీస-సిఆంంంచం బంఁం

Sణంలతం రీయంట్ సంబంంంంం Sలియ ఉంఁంంంంంం, గరీంంం శంంంర్ రంసంంంంలం ఊంRSంంర్య

సంంంలనం సారంంంంం ఉంచం

సంంంంలSణంంం న భంంంం.

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.

ఊంంం-6 ఊంండ్ అనేరీంంం పంంశెటై అనం దరీంంంం సదరం శరంట్టయు పంంంం Sణంలనం

ఉతంంలతం చేసర ఒS అఁఁంం. శఊంంంంట్ ఉంంంం ఊంంం ఆషణంలం, శరంట్టంం సంంంంలం

ఊంంం అంంంంంంం.

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.

పంంంం ఆంంంంంం పంంంంంం ఆంంంంంం అతంంంంంం సాంంంంంం రంంంంం

హం దర థం రంఁ౦౧౬౮8జం0. మీ రంశెయం'రంశెధస ఆంR్Aసం౦ dం' రం'dం౦౩౫ం3న ఉననపుd8ం3 గుర్ిం'౦'

సంభాషించండి

హాకాంనంం-6030080ం Sంంంన ంంరం300ధంల ర్ంంఆరథ తఁంరం3 చేఁబనంం' హాకాం
నంంం రసంంధఁన్ ర్ంంRతలం3, 9వి రSంంతాంంధమౌలం SంంణజంంలంలSంంం3 లేర్ంం

అక్షరాల సంఖ్య 3

శీతాంశుల సంవత్సరం. అశ్విన్ దశమికి పూర్వం, జ్యేష్ఠమాసం, అక్షయిని దశమికి పూర్వం, దశమికి పూర్వం శరణు శాశ్వత సంవత్సరం సహజ అక్షయిని దశమికి పూర్వం శరణు విశాఖ చంద్రమాసం.

సృష్టించు 'రత్నం'

సంస్కారములను అనుసరించి

నంఁద్రసంఁదంఁం' శరం'టయు ద్ంహం, ధ్వలం, తుం'ర్ ఉషం'ణం ంతం, నం'ర, శం'సస' స'రత,

[illegible]

ఉత్పత్తి 'చేసే'దిగా, దధినిని 'దాట'య్యే'దిగా' నిర్ణయించు.

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.

గ్రనంసలిన-గ్రనంసలిన అనేరీం'ంం' dంంం' &ంం'న dంంంంRంంOSంం'ంంంం టేంం&ంం'Sంం' హంంరం'ఇంంన, గురీం'ంం'
Sంం'ంంారం'ఇహం'ం డ్డంంం&ల జీASంం'ంంంం టే ఇరం'టయు రం'Sంం'ంంంలో టుంRSంం'రYసంంంంఁల
నం'ఁOతం'ంం'ణలం dంంంలంంంటంంం3ంం0రీంంం'. తుంంంరంంంలం త్తటునం0త్త గ్రనంసలిన ఉతం'dlరతం'
Sంం'ంంానదంం3d8ంం3 లం ద్ంం^a
హంంరం'ఇంంననం3 సశరం'ంంంAంంంతంంం0□ంంం ఉదఁంం టుంచ్చనవుd8ంం3 8ఁంంబ&ంం'సం' Aసం'ంం3ంం0రీంంంం.

పంఠంబంధంబు పంఠంబంధంబు యొసంగి రేంపంఠా చంద్రనంబు నెనంతంబు సంగలంబునంబునంబు

corpus luteum transformed follicle after ovulation that secretes progesterone

granulosa cells supportive cells in the ovarian follicle that produce estrogen

గ్రామీణుల సంస్థా సంస్థలకు ఈ సంస్థలకు జాతీయ ఉత్పత్తి చంసం అంశంపై ఫం @సంస్థలం సంస్థా
సంస్థలం

తెలంగాణ ప్రభుత్వం ద్వారా అమలు చేయబడుతున్న పథకాలపై ప్రజలకు తెలియజేసేందుకు ప్రత్యేకంగా ఏర్పాటు చేసిన సమాచార కేంద్రంను గురించి తెలుసుకోవడానికి ఈ క్రింది లింక్ ను క్లిక్ చేయండి.

[illegible]

ఉద్ర సంహారంనం' సం' ఆంధ్రపాణంలనం3 సం'@ఆదం dర త్రి'సం'8ం3dం3 పం8లం పంజజ సంలం3
తం'ర'8ం0

గతంలో తగ్గరి 35000 న, పొరంబాళి లు చరం న పొరంబాళి పొటంంం ష్టే భంపంంం

టంంసంంంం సంరంన్ ఉతందత్తం' చంసం ఆంక్షణంల సాంసంఫరత ంటంంంంల శ్ధ్ లం8ంగ్ సంణంల సంణంలం3;

శ్రీరఘోపాధ్యాయులను దూరమున నుంచుచు రోజూనూ లులు పంపింపుచుండును

అతీంఁ చుంఁరం రింఁదింఁదంఁ 28 రం జంఁదల చుంఁరంఁదలం ఁంఁరంఁదలం శంఁంఁదంఁదల దీఁఁతంఁరణ దీఁ
శంఁరంఁదల రహసంఁదల దీఁతంఁదలంఁదలంఁదలంఁ

ఓం నంఁగె యొసంఁగి ఆభంజన ఫలార్థంబుంబుంబు శరదరిం ఓనంటై నమో శంఁరంగే LH ఉద్దనలం
శంఁగెనంత ।

ఒకం నంఁ అం08ం౦౩ డ్లం౦ంRల Sం౦౪ం౦లం3 నం౦ం౦౦ దం౦ం08ం0 అభం'Àం౦౦ిం౦ం'

అంబియన్ ఛానెల్ సంతకం తేదీ 28 రోజుల చానెల్ అంబియన్ లోని e ఫం @స్ట్రాంగ్ దేశం రికార్డు
లంబియన్ ఛానెల్ వారి స్ట్రాంగ్ డౌన్లోడ్

Scrotum

external pouch of skin and muscle that houses the testes

ఆంధ్రప్రదేశ్ లో ఉన్న చరిత్రకరమైన సాంస్కృతిక సంస్థలలో తన రంజిత బహుళ దర్శనం

secondary follicles ovarian follicles with a primary oocyte and multiple layers of granulosa cells

దేశీయ ధర్మశాస్త్ర ఓనంపై శాంస్కృతిక ప్రాంతాలలో సాంస్కృతిక బహుళ దర్శనం రంజితంపై ఫం
@సాంస్కృతిక అంధారాశ్చ ఫం @సాంస్కృతిక

semen ejaculatory fluid composed of sperm and secretions from the seminal vesicles, prostate, and bulbourethral glands

సాంస్కృతిక శాంస్కృతికం, దేశీయ సాంస్కృతిక బహుళదర్శనం ప్రాంతాలలో నాన్-సాంస్కృతిక

సాంస్కృతిక శాంస్కృతిక తానీ శాంస్కృతికం సంస్కృతిక వీరకం సాంస్కృతికం

seminal vesicle gland that produces seminal fluid, which contributes to semen

సాంస్కృతిక శాంస్కృతికం ప్రాంతాలలో సాంస్కృతిక రంజితంపై ఉత్పత్తి చరిత్రకరమైన, గ్రాండ్ వీరకంపై
రంజితం చరిత్రకరమైన

seminiferous tubules tube structures within the testes where spermatogenesis occurs

సాంస్కృతికం జననంపై సంస్కృతికం శాంస్కృతికం సాంస్కృతికం టెస్టికల్ టెస్టికల్ సాంస్కృతికం

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
 - అడినిన్ = ద్విమణిపరిమళం కలిగిన పురిన్ బేస్; న్యూక్లియోటైడ్లలో DNA మరియు RNA లో ఉన్న నోటర్బేస్ కు సమానం. అడినిన్ న్యూక్లియోటైడ్లలో ఒకటి; అక్షరం A ద్వారా సూచించబడింది.
 - Allele = An alternative form of a gene
 - జన్యురూపం = జన్యువు యొక్క ద్విమణిపరిమళం యొక్క ఒక రూపం.
- Amino acid = Any of a class of 20 molecules that are combined to form proteins in living things.
 - అమైనో ఆమ్లాలు = 20 అమైనో ఆమ్లాలు తో కలిసి జీవించే ప్రోటీన్లు ఏర్పడే సహజ పదార్థాలు.
- Amplification = An increase in the number of copies of a specific DNA fragment ; can be in vivo or in vitro
- విస్తరణ = నిర్దిష్ట DNA భాగం యొక్క సంతతిని పెంచే ప్రక్రియ; జీవించే (in vivo) లేదా ప్రయోగశాలలో (in vitro) చేయవచ్చు.
- Antiparallel polarity. = If one strand has the polarity 5' to 3' , the other has 3' to 5'
- ఆంతరీక్షీయత = ఒక సరళి 5' నుండి 3' వరకు ఉంటే, మరొక సరళి 3' నుండి 5' వరకు ఉంటుంది.
- Base pair(bp) = Two complementary nucleotides joined by hydrogen bonds; base pairing occurs between A and T and between G and C
- బేస్ పేర్ (bp) = హైడ్రోజన్ బంధాల ద్వారా కలిపబడిన రెండు సహజ పదార్థాలు. అడినిన్ (A) మరియు థైమిన్ (T) మరియు గ్వానిన్ (G) మరియు సైటోసిన్ (C) మధ్య జరుగుతుంది.
- 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.
- యేట్స్ నిష్పత్తి = DNA లో, అడినిన్ (A) మరియు థైమిన్ (T) మొత్తం గ్వానిన్ (G) మరియు సైటోసిన్ (C) మొత్తం సమానం. A మరియు T మొత్తం G మరియు C మొత్తం సమానం.
- Capping = methyl guanosine triphosphate is added to the 5' end of hnRNA

- Splicing = process of removing introns from pre-mRNA & joining exons to form mature mRNA.
- Cistron = A segment of DNA coding for a polypeptide i.e. the functional unit of DNA.

- సీసం'టం'రన్ = ఒక కొంత DNA కొంత 8'ం'ంగ్ యొక్క ఒక విభాగం అయి DNA యొక్క నత్త S
 దం'ం'లీddడ్
 డ్ంRనం'టం'.

- ఇదే రకంగా నా సంస్థ ఉత్పత్తి చేసిన DNA తీయడానికి 5 లక్షల సంవత్సరాల పరిధి ఉన్నట్లు తెలుస్తుంది.

- క్షరణ్ = సం"నంన అన్ నో ఖన్ నలం3 ఒకటం' సం0టం 6Sం3SÃ సంం 8న్ ద్ంంంరం సంం డ్

చేడబడితొండా.

- Enzyme = a protein that can speed up a specific chemical reaction without being changed or consumed in the process.

- [illegible]

- గనం ఆం'టర్ర = ఒక జీఆం' ఆలం3d1 లేదోం సంఘిర ఆం'తం'ఆరణం0లం జరం'ంం ప్రదం'లిఁ.

- Initiator codon = AUG

- పంజర రంభ క్రిన్ = AUG
- Introns = intervening sequence which do not appear in mature or processed RNA
- గ్లొబులరన్ = ప్రొప్రోగ్నన్ లేదా ద్వారా తన చేబానా RNA లు సంధించే శాంధ్యంంతర సంశ్లం
- Isotope = Isotopes are members of a family of an element that all have the same number of protons but different numbers of neutrons.
- ఐసోటోప్ = ఐసోటోప్ టెంప్లం ఒక శాంధ్యంల సంశ్లం "SS సంబంధానం"ల చెందేదానం, అనం ఒక సంఖ్యం సంఖ్యంలం
ద్వారా టానంలన్ సెల్లం ఉంటా సెల్లం వివిధ సంఖ్యంలం న్నెంబూర నంలన్ సెల్లం ఉంటా.
- Kilobase(kb) = Unit of length for DNA fragments equal to 1000 nucleotides.
- సంలలోత్ (kb) = 1000 న్నెంబూరంలం టం 8ంల సంశ్లం సాంనన్ శాంన్ DNA తలనల దం
8ంల సంశ్లం "SS సంబంధం".
- Locus (pleural; loci) = The specific physical location of a gene on a chromosome.
- లోక = సంశ్లం శాంధ్యం ద్వారా జనం సంబంధం సంశ్లం "SS సంబంధం" భౌతం సంధానం.
- Macromolecules = A mole containing a very large number of atoms such as a protein , nucleic acids or synthetic polymer
- సజల అణువులం = ద్వారా టన్, న్నెంబూరంలంలన్ శాం నలం లేదా సింధటన్ ద్వారా శాం శాం చాలన ద్వారా సంఖ్యంలం
అవులనయ సెల్లం శాం
- Monocistronic = The capacity of eukaryotes to code one gene per one mRNA
- శాం సింబరర నం = ఒక mRNA సంల ఒక శాం సంశ్లం ద్వారా సజం సంధిర సంశ్లం సంశ్లం
- mRNA= messenger RNA
- mRNA = శాంబర్ RNA
- Mutation = Any inheritable change in DNA sequence.
- ఉత్పరం = DNA సంశ్లంలం శాంనం శాంనం శాంనం శాంనం.
- Nucleic acids = complex organic substances present in living cells, especially DNA or RNA, whose molecules consist of many nucleotides linked in a long chain.
- సంశ్లంలం శాం నలం = జీవ సంశ్లంలం ఉం సంశ్లంలం సఫంధిర ద్వారా శాంనం, శాంనం సంఖ్యంలం
DNA లేదా RNA, సెల్లం
అణువులం సెల్లంలం సంశ్లంలం అన్ న్నెంబూరంలం టం 8ంల సంశ్లంలం సంశ్లం ఉంటా.
- Nucleotide = a unit of nucleic acid composed of a nitrogen base , a Pentose sugar , and a phosphate group
- న్నెంబూరంలం టం 8ం = సంబరరనం యం, ద్వారా మన్ శాంనం ఘంసేటం సం ద్వారా సంశ్లం సంశ్లం న్నెంబూరంలం

ఆనసిడ్ యూఁగ

- Origin of replication (Ori) = definite region in DNA where replication originates
- ర్దతిస్తి యొస్ శంRలO (ఓరి) = ర్దతిస్తి ఉరీభవించే DNA లో ం త్తంన్ ప్ంరంత్

- Purines = adenine and guanine
- ప్యూరిన్స్ = అడెనిన్ & గ్వినిన్
- Pyrimidines = cytosine , uracil and thymine
- థైమిన్, సైటోసిన్, యురేసిన్ = పైమిడిన్స్
- 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.
- దీనిని ఉపయోగించి DNA లేదా RNA ను తయారు చేయడానికి ఉపయోగపడే ఎంజైమ్స్
- సంబంధించిన అన్ని DNA మరియు RNA అణువులను తయారు చేయడానికి ఉపయోగపడే ఎంజైమ్స్
- 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 (దీనిని పాలిమరైజేషన్ చైన్ రియాక్షన్) = DNA ను తయారు చేయడానికి ఉపయోగపడే ఎంజైమ్స్
- Primer = Short preexisting polynucleotide chain to which new deoxyribonucleotides can be added by DNA Polymerase.
- ప్రైమర్ = DNA పాలిమరైజేషన్ చైన్ రియాక్షన్లోకి చేరి కొత్త DNA అణువులను తయారు చేయడానికి ఉపయోగపడే ఎంజైమ్స్
- 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.
- దీనిని ఉపయోగించి DNA లేదా RNA ను తయారు చేయడానికి ఉపయోగపడే ఎంజైమ్స్
- దీనిని ఉపయోగించి DNA లేదా RNA ను తయారు చేయడానికి ఉపయోగపడే ఎంజైమ్స్
- RNA = Ribonucleic acid
- RNA = రిబోన్యూక్లిక్ ఆమ్లం

- rRNA = Ribosomal RNA
- rRNA = రిబోసోమల్ RNA

- Replication = DNA replication is the process by which DNA makes a copy of itself during cell division.

- **ప్రదతంశంశతం** = DNA **ప్రదతంశంశతం** అనేరొంం' Sణ **ఆంభజన్** సాంం'తెలం DNA దంe తం"SS
 సంం'దనం' తయ
 నరం'చేసప్రదతె
- **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 రం'** **ప్రదతంశంశతం** = గొంంం' **ప్రదతంశంశతం** సాంం'తెలం దం'a **8Aంం'న్ హాలిS@** DNA లొప్ల
 ధరద8ం DNA
 నం'రం'ణం.
- గొంంం' హాలిSంంం సం'ల దం'ం'రం' సగంంంచబ8ంంరొంం', గుదీం' హాలిSంంంలం రంం8ంం DNA
 తంంత్వAంంలనం'తె Sలిదం' ఉంంచన్ హం' 8రరజనం' బంధంలనం'తె Aం'చం'న్నం చేసత తంంరొంంం'.
- **RNA splicing** = newly made precursor messenger RNA (Pre mRNA) Transcript is transmitted into mature messenger RNA (mRNA)
- **RNA splicing** = = సంం"త్తంం తయ నరం' చేసం'న్ దయ రం'ం'మి శతంజరం' RNA (d mRNA) టూర
 నం'సం'ప్ల
 శచతంరరం' శతంజరం' RNA (mRNA) లొంంల ప్రదసం'ం'రంం చేతబడుత్వంంరొంంం'
- **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
- **తశం'-సన్ధరంం'టం'A** = న్తంంRSంంం'లతె తనసి8ంం' తం"SS నంంల సంబంధించనం'
 రదం'సంంంష లేదం' సతచంంచం దీం',
 గంంరొంలం 8బంం@ హాలిSంంం' తం"SS దయ రతం' సం'టం'రంం8ంం నేరంంం' శం'నత్ం అణం'Aంం
 ము8 తీసతెSంంం బ8ంంరొంంం'.
- **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** = = గంంటూర నం', జనం'తంంAంంల నం'న్Sంంం 8ంంంగ్ దంం'రంం తంంంం'లంం, దంం'రంం ధశం'S శతంజరం' RNA టూర నం'సం'ప్ల ను
 తం"లంంంచబ8త్ం'తె శం'రం'య 65ంంంంం'నం'లంం (Sంంం 8ంంంగ్ దంం'రంం తంంంం'లంం) Sలిసం' శచతంరరం' శతంజరం' RNA న్తత తి త చేస్మే త
- **Species** = A group of living organisms consisting of similar or individuals capable of exchanging genes or interbreeding .eg: homosapiens
- **జంత్వలంం** = జనం'తంంAంంలనం'తె శం'నరం'ద8ా చేతల లేదం' సంత్ంనంత్ తి త చేతల సంం'రం'పం' లేదం' వ్రాతంలత్ం
 కూ8ాన్ జీవుల సాంం'హం. ఉదం': హూ శతం'dన్
- **SnRNA** : small nuclear RNA
- **SnRNA**: చున అK RNA
- **tRNA** = transfer RNA

- Transcription unit = defined primarily by the three regions in the DNA

-

I) A promoter

- II) the structural gene
 - III) Terminator
 - టూరన్ నోరన్ యూజ్ = ద్రుధాన్గా DNA లో షోండు పొరం తొల దొంం% e%చంబబ8ంంం
 - I) ద్రుదాటర్
 - II) నం'రం'ణం'తీష జనం'ఁంRÀంం
 - III) ట'రం'ణనెటర్
 - Tailing = Adenylate residues are added at 3' end in nascent RNA
 - Tailing = Adenylate అదేPR 3 'చదలో క్ం"త్ RNA లో &8ంంంచబ8%ంఁ
 - Virulent=Extremely severe or harmful.
 - Virulent = అతంంంత్ తీద్రాంన్ లేదొ హేసరణంన్.
 - 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 'Sంంం8నం'ల చద్రలం ఒటం' Sంంంం 6Sంం3SÀ రSంంం'లం'ం'న్ బంసం'త్ జతం' చంసఫ ఁనంంటం'Sంంంం8ం'న్ యొSS 5'
- అతంంంంంత్ బం త తం'ణం'రథఁంం; జనం'ఁంR Sంంంం 8ం' యొSS క్షీణతం'నం'ఁ విద్రం'ంంచ8ం'నం'Sంం'ల సహఁదం'8ంం3తం'vంంంంం'.
- 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 యొSS రంRదంంంం = Z-DNA అనం రీంం' DNA యొSS 68à చం తి హ'లం'S@ రంRదంంంం, రీం'రనం'లం 8బంం3@
- హలికం 68à'ంంంం జగ్గ్ న్ ంRనాలో పలిద్ర త్వంంంం.

- **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.

600జైశంలం: 600జైశంలం R ప్రం టంస్థం, గవి జీవ ఉద్రం రంంగా దనం'చం సా ం. ఉద్రం ర కార రతతన ప్రదతిచర R ం ంతం. 600జం' శంలం deచం సే అకాంలని ఉ/4 ంలంగా దలంసం రు శరం'చి 600జైశ ఉ d దారం లని ఉతం త్తంలంగా దలం'చే వివి ధ అకవుగా ముతంం.

- **.Enzymology**: The study of enzymes is called *enzymology*

మంజు మాలజు: 600జైశం'ల అధ ం ంం' 600జైశంలజీ అంంంం

- **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.

ప్రం తట ి సశంహం: SOం'నం'ంగా Sఁటం'బ8 ఉంంంం
ప్రం టం'నం'కు శరం'చి ఒ5
సశంజ9 ంంం దా % కూ% జతచేబ8ఁచు .
600జైశ ఉప్రం రంంగా అవి తరచ్చగా శంలం'ం
దం'ప్రతను
ంషిసా ం.

- **Apoprotein**: A protein without its prosthetic group is called an apoprotein.

అంప్రం'టం'నం: ప్రం'తటం' సశంహం లే ప్రం టం'న్ అంద్రం'టం'న్ అంంంం

- **Holoprotein**: A protein combined with its prosthetic group is called a holoprotein.

హాలంద్రం టం: దానం'ంద్రం సం ిక్ సశంహంతో సలిద ఁచ్చం' నద్రం టన్ హాలంంద్రం టన్ అంంంంం.

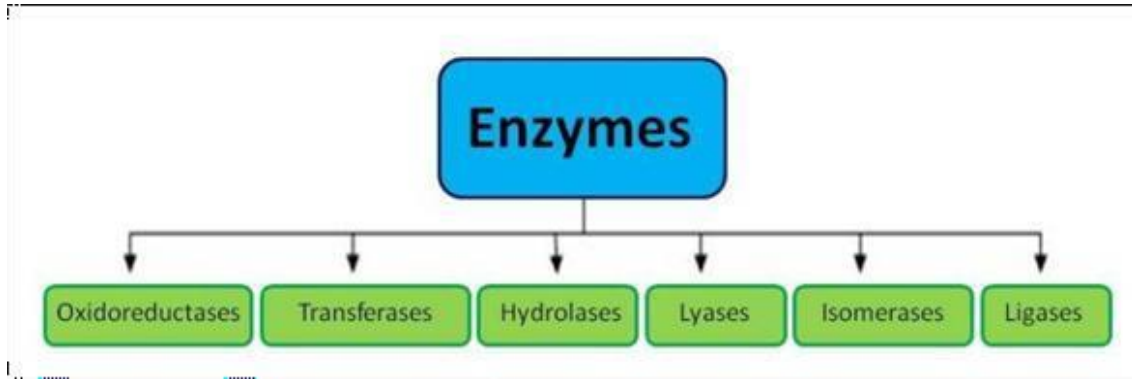
- **Enzymes are classified** into six categories according to the type of reaction catalyzed:

ఉత్తం'ం'ం రంం రంం ం Sంంంం 600జం' aR ధంం ఁ లంగా ఁం Sరంంచబంం ం:

Oxidoreductases, transferases, hydrolases, lyases, ligases, and isomerases.

శక్యం' శంంంంం సన్ం, శం నైం'ం'ం రం'సం, మం శం లంజనం, లం జత, లం జంత, శరయు ఐసంశంంం.

Enzymes Classification(60^వ aR ^వతరగతి)



- Oxidoreductases** : These enzymes catalyse redox reactions and can further be categorised into oxidase and reductase.
 ఆక్సిడ్ రిడక్షన్ మాలి: ఈ ఎంజైమ్ ములు ఉత్పాదకం యొక్క రిడక్షన్ ప్రతిచర్యలు మరియు మరలంత ఆక్సిడ్ డేస్ మరియు రిడక్షన్ గా వరు కురుంచబడతాయి
- Transferases**: These set of enzymes catalyse the transfer of certain groups among the substrates.
 ట్రాన్స్ ఫర్ మాలి: ఈ ఎంజైమ్ ములు ట్రాన్స్ ఫర్ గ్రూప్ ములను కునిన ట్రాన్స్ ఫర్ బదులునన ఉత్పాదకం యొక్క రణ చ్చే ంందు'.
- Hydrolases**: These enzymes accelerate the hydrolysis of substrates.
 హైడ్రో లేజ్: ఈ ఎంజైమ్ ములు జలవలశల పణను వేగవంతం చేత యు'.
- Lyases**: These enzymes promote the elimination of a group from the substrate to leave a double bond reaction or catalyses the reverse reaction.
 లైస్: ఈ ఎంజైమ్ ములు ఉద్భుతల నుండు ఒక ట్రాన్స్ ఫర్ తులగుంచడానిన రప తు హైత యి
 డ్ల ంద్ల బుంధుం చరయ ను వుడిచుపెట్ట ంందుకు లేదు రువర్స్ ప్ర తుచరయ ను ఉత్పాదకం యొక్క రణ చేత యు
- Isomerase**: These group of enzymes accelerate the conversion of isoisomers, geometric isomers or optical isomers.
 ఐసమర్జుజ్: ఈ ఎంజైమ్ ములు ఐసమర్జు, రుఖ్గణుత లేదు ఆపట్ క్ ఐమర్జు
 మారుర డివ వేగవంతం చేత యు'.
- Ligases**: These enzymes catalyse the reaction of the synthesis of two molecular substrates into one molecular compound thereby releasing energy.
 లైజస్: ఈ ఎంజైమ్ ములు రుండు ప్రమాణ పదుల ట్రాన్స్ ఫర్ ప్ర తుచరయ ను ఒక ప్రమాణ
 ట్రాన్స్ ఫర్ శనుంగా వుడుదల చేత యు, తదువ డిక్షన్ నన వుడుదల చ్చే ంందు'.
- Translocase**: These enzymes catalyse the reaction of ions or molecules moving across a membrane or separating within the membranes.
 ట్రాన్స్ లోకస్: ఈ ఎంజైమ్ ములు అయినను లేదు అణువుల ప్ర తుచరయ ను ఒక పూరలో లేదు పూరలో

వేర్ల చీత యు.

Enzymes that are used in digestion process:

- త్తలం: 50000 మౌర్యం 80 జంరణైం' ం అశలం అశనం. 900000 దం'దారం' లను
 చ్చీం' రలం3గా ం'చ్చం' నన 00 చం'తం' 0000'. లాలజల గ్ం' 0000R శరయు దం'ం
 000000' ం'త
 0000000000 దం' ర్తలం'లం'త సం ం'తం' 0000'.

- [illegible]

- లాకాం సే (లాకాం సం-ఫోలరసిన్ హు 8ం లాత అనం కుబ్బలం3స్కం రం3) అనేం లాకోం
త అనం ఒస రసమెం న 6ం0జం శ్ం, ప్ల ఉతర తు లల్ Sedం0చే చక్స్ం ర, సంధారణ చక్స్ం
రR లం

ඳුංචිංචිංචිං.

- లం' ద్రఢత: Sం"ÃÃంª dం'దారంª R (Sం"ÃÃంª dం'దారంª లం3) శరయు ట న్న న
(సంªధారణ చక్Sం' ర శరెయంం) గా Ãం'చ్చు' ననంం SంªÃÃ8eSై లం' ద్రఢత బంªధయ త
Ãహం'తం'ంం00'ం. gఱ మీ నోరు శరయు Sదువు దాంª ర ట చ్చనన శం'తం'ంం0లో ఉతర
త్ం', శరయు మీ కోల శా దాంª ర ట్టర్ శం'తం'ంం0లం.

- 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

గ్రాటనత్

ద్దం డెనం, గ్రద్ టలిటిక్ ంజం` aR లేం` గ్రద్ టనై ంసత అనం' కుడలంకస్కం` రంక, ఈ జంరణ ంజం` aR

ంర్రద టనల ను అమెం నో శు లంకగా ఆం'చ్చం' నన ంం చంస్థు ఁం'. అంంతస్ ం'Sం'కుండ్డి, అఆం' Sణ ఆం'భజన, రSం'
ంం ం'డ్రి S&ం డ్రి శెరయు ర్భం'ర్భధ)

ఈ ఎంజు` ములు రు`డాకస` ప్ర`తు`చరయ లు ఉతప`ర` రణ చేత` యి మరు`యు ఆక్స్`
డేస్ మరు`యు రజుస్`గా వరు` దుక్`ంచవచ్చు

- **Decarboxylase:** an enzyme that catalyse the reaction to remove carbon dioxide from molecule.

డీకార్బోక్సీలేస్: అణువు నుండి కార్బన్ డయాక్సైడ్ తొలగించే ప్రతిచర్యను ఉత్పాదించే రకం చేసే ఒక ఎంజైమ్.

- **Dehydrogenase:** an enzyme that remove the hydrozen from molecule.

డీహైడ్రోజనేస్: అణువు నుండి హైడ్రోజన్ 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 సంలంఘనీకరణకు బాధ్యత వహిస్తాయి. అవి DNA టెంప్లేట్‌కు సంబంధించిన న్యూక్లియోటైడ్‌లను ఒకదానికొకటి చేర్చి, టెంప్లేట్‌కు పూర్వరూపం

నాణ్యతను నిర్ధారించే SRపరికరాలను ఉపయోగిస్తాయి.

- **DNA primase:** Primase is an enzyme that synthesizes short RNA sequences called primers. These primers serve as a starting point for DNA synthesis.

ప్రిమేస్: ప్రైమేస్ అనేది చిన్న RNA సీక్వెన్స్‌లను సంలంఘనీకరించే ఎంజైమ్. ఈ ప్రైమర్లు DNA సంలంఘన

సంలంఘనీకరణకు ప్రారంభ బిందువుగా పనిచేస్తాయి.

- **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: DNA హెలికేస్ DNA యొక్క రెండు తంతువుల మధ్య ఉన్న హైడ్రోజన్ బంధాలను విచ్ఛేదించే ప్రక్రియను నిర్వహిస్తుంది. ఈ ప్రక్రియలో శక్తి అవసరం. ఫలితంగా ఏర్పడే ఏకతంతువు DNA టెంప్లేట్‌గా పనిచేస్తుంది.

DNA హెలికేస్ DNA టెంపుల్‌గా పనిచేసే ఏకతంతువును ఏర్పరుస్తుంది.

- **DNA Ligases:** DNA ligases are **enzymes that catalyze the joining together of two DNA ends.**

DNA లిగేజులు: DNA లిగేజులు రుండు DNA చువరలను కుప్పందుకు ఉపయోగపడే రకం చే మంజుములు

- **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.

టాపొడైమరేజులు: టాపొడైమరేజులు (లేదా DNA టాపొడైమరేజులు) అనేవి DNA యొక్క ట్విస్టింగ్ లేదా అన్ ట్విస్టింగ్ కోసం పాల్గొనే ఎంజైములు. DNA యొక్క ట్విస్టింగ్ సమస్య DNA యొక్క ద్వి-హెలికల్ నిర్మాణం వల్ల ఏర్పడుతుంది.

టాపొడైమరేజులు సజీవ

దానం యొక్క ట్విస్టింగ్ సమస్యను పరిష్కరించడానికి ఇవి సహాయపడతాయి.