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- Govt. Supplementary Exam (Short Version) Sep-2021 & (Long Version) Sep-2021 Question Paper is given with answers.

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# NOTE FROM PUBLISHER

It gives me great pride and pleasure in bringing to you **Sura's Zoology Guide** for **11th Standard**. It is prepared as per the New Textbook. A deep understanding of the text and exercises is rudimentary to have an insight into the subject. The students have to carefully understand the topics and exercises.

Sura's Zoology 11th Standard Guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

It will be a teaching companion to teachers and a learning companion to students.

- It provides a precise and clear understanding of text and exercises from the examination perspective.
- Chapter Snapshot, Concept Map, Must know Definitions are given in all chapters.
- Exhaustive Additional MCQs, VSA, SA, LA, HOTS questions with answers are given in each chapter.
- These features will help students practice and learn effectively all the sections of the textbooks.

In order to learn effectively, I advise students to learn the subject sectionwise and practice the exercises given.

Though these salient features are available in our Guide, I cannot negate the indispensable role of the teachers in assisting the student to understand the subject thoroughly.

I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

**Subash Raj,** B.E., M.S.
**- Publisher**
**Sura Publications**

*All the Best*

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2022-23 பதிப்பு

புதிய பாடப்புத்தகத்தின்படி தயாரிக்கப்பட்டுள்ளது.

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UNIT - I

Chapter 1

# THE LIVING WORLD

## CHAPTER SNAPSHOT

1.1 Diversity in the Living World
1.2 Need for Classification
1.3 Taxonomy and Systematics
1.4 Three Domains of Life
1.5 Taxonomic Hierarchy
1.6 Nomenclature
1.7 Concept of Species
1.8 Tools for study of taxonomy

# THE LIVING WORLD

## Diversity in the Living world
- Living organisms
- Non-Living organisms

## Three Domains
- **Archaea (Extremophiles)**
  Eg: Methanogens
- **Bacteria**
  Eg: Cyanobacteria
- **Eukarya (Eukaryotes)**
  Eg: Protista

## Nomenclature
The process of assigning scientific names to animals or taxonomic group is called Nomenclature.

## Taxonomical tools
- Taxonomical keys
- Museum
- Zoological Parks
- Marine Parks
- Printed Taxonomical Tools

## Taxonomic Hierarchy

### Kingdom
All living animals belonging to various phyla.

### Phylum
The group of classes with similar distinctive characteristics constitute a phylum.

### Class
It includes one or more related orders with some common characters

### Order
It is a group of closely related families which show few common features

### Family
It inclues a group of related genera with less similarity as compared to genus and species

### Genus
It is a group of closely related species which have evolved from a common ancestor

### Species
It is a Basic unit of Classification

# MUST KNOW DEFINITIONS

| | | |
|---|---|---|
| **Bio-diversity** | : | The presence of a large number of species in a particular ecosystem is called **'Biological diversity'** or in short Bio-diversity. |
| **Taxonomy** | : | It is the process of classifying living organisms into different taxa. |
| **Systematics** | : | The branch of science which deals with different features of species, their diversities, and relationships with other species is referred to as **Systematics**. |
| **Species** | : | Species is the basic unit of **Classification.** |
| **Genus** | : | It is a group of closely related species which have evolved from a common ancestor. |
| **Monotypic genus** | : | In some genus there is only one species which is called as **Monotypic genus.** |
| **Polytypic genus** | : | If there are more than one species in the genus it is known as **Polytypic genus.** |
| **Family** | : | It is a taxonomic category which includes a group of related genera with less similarity as compared to genus and species. |
| **Order** | : | One or more similar families are grouped together to form an order. |
| **Class** | : | This category includes one or more related orders with some common characters. |
| **Phylum** | : | The group of classes with similar distinctive characteristics constitute a Phylum. |
| **Kingdom** | : | All living animals belonging to various phyla are included in the Kingdom Animalia and it is the top most of the taxonomic hierarchy. |
| **Nomenclature** | : | The procss of assigning scientific names to animals or taxonomic group is called **Nomenclature.** |
| **ICZN** | : | International Code of Zoological Nomenclature. |
| **Tautonymy** | : | The practice of naming the animals in which the generic name and speices name are the same is called **Tautonymy.** Eg: ***Naja naja*** (Indian Cobra). |
| **Taxonomical keys** | : | Keys are based on comparative analysis of the similarities and disimilarities of organisms. |
| **DNA Barcoding** | : | Short genetic marker in a organism's DNA which helps in identification. |
| **DNA hybridization** | : | Measures the degree of genetic similarity between pools of DNA sequences. |
| **DNA finger printing** | : | To identify an individual from a sample of DNA by looking at unique patterns in their DNA. |
| **RFLP** | : | Restriction Fragment Length Polymorphisms. |
| **RFLP analysis** | : | Difference in homologous DNA sequences that can be detected by the presence of fragments of different lengths after digestion of the DNA samples. |
| **Polymerase chain Reaction (PCR) Sequencing** | : | To amplify a specific gene, or portion of gene. |
| **ALIS** | : | Automated Leafhopper Indentification System. |
| **DAISY** | : | Digital Automated Identification System. |

| | | |
|---|---|---|
| ABIS | : | Automatic Bee Identification System. |
| SPIDA | : | Species Identified Automatically. Eg: Spiders, Wasp and Bee wing Characters. |
| Draw wing | : | Honey bee wing identification. |
| INOTAXA | : | INtegrated Open TAXonomic Access. |

## EVALUATION

**1. A living organism is differentiated from non-living structure based on**
(a) Reproduction (b) Growth
(c) Metabolism (d) All the above
**[Ans. (d) All the above]**

**2. A group of organisms having similar traits of a rank is**
(a) Species (b) Taxon
(c) Genus (d) Family
**[Ans. (a) Species]**

**3. Every unit of classification regardless of its rank is** *[June-2019]*
(a) Taxon (b) Variety
(c) Species (d) Strain
**[Ans. (a) Taxon]**

**4. Which of the following is not present in same rank?** *[Mar-2019]*
(a) Primata (b) Orthoptera
(c) Diptera (d) Insecta
**[Ans. (d) Insecta]**

**5. What taxonomicaid gives comprehensive information about a taxon?** *[Mar-2020]*
(a) Taxonomic Key (b) Herbarium
(c) Flora (d) Monograph
**[Ans. (d) Monograph]**

**6. Who coined the term biodiversity?**
(a) Walter Rosen (b) AG Tansley
(c) Aristotle (d) AP de Candole
**[Ans. (a) Walter Rosen]**

**7. Cladogram considers the following characters**
(a) Physiological and Biochemical
(b) Evolutionary and Phylogenetic
(c) Taxonimic and systematic
(d) None of the above
**[Ans. (b) Evolutionary and Phylogenetic]**

**8. Molecular taxonomic tool consists of**
(a) DNA and RNA *[Govt.MQP-2018]*
(b) Mitochondria and Endoplasmic reticulum
(c) Cell wall and Membrane proteins
(d) All the above **[Ans. (a) DNA and RNA]**

**9. Differentiate between probiotics and pathogenic bacteria.** *[QY-2018]*

***Ans.***

| S.No. | Probiotic bacteria | Pathogenic bacteria |
|---|---|---|
| 1. | Beneficial bacteria. | Disease Causing bacteria. |
| 2. | Converts Milk into Curd | Causes Disease in plants & animals |
| 3 | **Eg:** Vibrio cholerae (cholera) | **Eg:** Lactobacillus |

**10. Why mule is sterile in nature?**

***Ans.*** Mules are produced by mating of male donkey and female horse. Mules are sterile animals because they cannot produce gametes due to problems in pairing up of chromosomes. They have odd number of chromosomes.

**11. List any five salient features of the family *Felidae*.**

***Ans.*** **Salient features of the family *Felidae* :**

1. They are commonly called as wild cat family. They have adaptations to detect and hunt prey.
2. They are meat eaters (carnivores).
3. They have cutting teeth to shear meat. Canine teeth are large and sharp.
4. Their sizes vary from 2 kgs to 300 kgs.
5. They have acute senses - hearing, smell, vision and touch.
6. They have well padded toes with powerful and flexible bodies. Eg: **Lion, Tigers, Cats.**

**12. What is the role of Charles Darwin in relation to concept of species?**

***Ans.***

1. Charles Darwin visited the Galapagos Islands as a naturalist on a five year voyage around South America. He found 13 types of "Mocking birds" on the same island but in different habitats.
2. He brought back the different types and studied them. He found that only the beak pattern and usage was different in these different varieties.
3. This made him think that adaptation to suit a particular habitat (for food) had brought about such changes in these birds which lived in different habitats.
4. After some time they evolved into different species. The formation of new species or 'speciation' is brought about by Natural selection (Nature being the deciding factor).
5. Hence Darwin gets this credit of attempting to explain how species evolved and role of Natural selection. The birds are referred to as Darwin's finches. In 1859 Charles Darwin in his book **Origin of Species** explains the evolutionary connection of species by the process of natural selection.

**13. Why elephants and other wild animals are entering into human living area?**

***Ans.***

1. Man is destroying forests. Deforestation is increasing due to rapid urbanisation and increase in human population.
2. When habitats are destroyed, the animals living there could not find food and shelter.
3. They tend to wander outside of forest in search of food or shelter and enter into human living area.
4. Decrease in availability of clean water due to pollution.
5. The reality is that we have entered into the habitats of animals.

**14. What is the difference between a Zoo and wild life sanctuary?**

***Ans.***

**Zoo:**

1. A Zoo is a place where animals are held in capitivity and Public is allowed to visit and see the animals. It is a artificially created habitat.
2. A Zoo can sell, buy, breed or trade animals.

**Wild life sanctuary:**

1. A wild life sanctuary is a large area with natural surrounding where the animals are allowed to roam freely.
2. A boundary wall/barrier is in place to ensure that humans cannot enter the area. The animal gets the feel of a natural surrounding.
3. In many cases sanctuaries focus on maintaining and increasing the population of a particular species. Eg: **Kaziranga sanctuary in Assam focuses on Rhinoceros population.**

**15. Can we use recent molecular tools to identify and classify organisms? [OR]**

**Name the molecular taxonomical tool and their application.** ***[QY-2018]***

***Ans.*** Yes, we can.

**Molecular taxonomical tools :**

Technological advancement has helped to evolve molecular taxonomical tools from classical tools to molecular tools. The accuracy and authenticity is more significant in the molecular tools.

**I.** The following methods are being used for taxonomical classification.

a) **DNA barcoding -** Uses short genetic marker in an organism's DNA to identify it as belonging to a particular species.

b) **DNA hybridization -** measures the degree of genetic similarity between pools of DNA sequences.

c) **DNA fingerprinting -** to identify an individual from a sample of DNA by looking at unique patterns in their DNA.

d) **Restriction Fragment Length Polymorphisms (RFLP) analysis -** difference in homologous DNA sequences that can be detected by the presence of fragments of different lengths after digestion of the DNA samples.

e) **Polymerase Chain Reaction (PCR) -** sequencing to amplify a specific gene, or portion of gene.

**II.** Neo taxonomical tools – This is based on Electron Microscopy images to study the molecular structures of cell organelles.

**16. Explain the role of Latin and Greek names in Biology.**

***Ans.***

1. Knowledge of prefixes and suffixes in biology makes it easy to understand unfamiliar words. Biology involve lot of descriptive words and it is easy to adopt names from Greek and Latin.

Many words used in Biology are derived from Greek or Latin.

Eg: 'autos' is greek word which means self.

autophagy, autotroph → Biological terms having 'auto' as prefix

Autophagy means self destruction.

Autotroph means manufacture of own food.

'bis' is a latin word which means twice.

Binary fission, Bicuspid valve are Biological terms based on this.

**Meaning:**

Binary fission - Divide in two

Bicuspid - Two flaps.

2. Usage of Greek and Latin words also finds universal application.

## HOTS (TEXTUAL)

**1. What may be the reasons for the extinction of Dinosaurs? If you know the reasons for their extinction, why Sparrows are listed as endangered species?**

***Ans.*** The extinction of the dinosaurs is an enigma that has captivated scientists for well over a century. We find the fossilized remains of giant reptiles all over the earth. Yet we do not see any of the creatures alive today. If sparrows are not there the population of birds of prey may also be affected. Apart from this, every constitute of an ecosystem is important from an ant to an elephant. We are eliminating species by species which are important links which make the web of life. Today it's these species which are getting extinct.

## GOVERNMENT EXAM QUESTIONS

### Bio-Zoology (Short version)

## CHOOSE THE CORRECT ANSWERS 1 MARK

**1. The seven kingdom system of classification was proposed by _____.** *[First Mid-2018]*

(a) Coral Woese (b) R.H. Whittakar
(c) John ray (d) Cavalier Smith

**[Ans. (b) R.H. Whittakar]**

**2. The mind map Cladogram was introduced by** *[QY-2018]*

(a) Aristotle (b) R.H. Whittaker
(c) Earnest Hackel (d) Carlous L nnaeus

**[Ans. (a) Aristotle]**

**3. The beneficial bacterias are known as** *[HY-2018]*

(a) pathogens (b) probiotic
(c) cyanobacteria (d) plasmid

**[Ans. (b) probiotic]**

**4. The cross between male lion and female tiger results in the production of** *[QY-2019]*

(a) Hinny (b) Mule
(c) Tigon (d) Liger **[Ans.(d) Liger]**

**5. Three domain classification was proposed by :** *[Mar-2019]*

(a) Cavalier Smith (b) R.H. Whittaker
(c) Carolus Linnaeus (d) Carl Woese

**[Ans. (d) Carl Woese]**

**6. The zoological name of National Bird is:** *[June-2019]*

(a) *Pavo Cristatus* (b) *Zoothera Salimalii*
(c) *Columba livia* (d) *Chalcophaps indica*

**[Ans. (a) *Pavo Cristatus*]**

**7. Match the following:** *[Mar-2020]*

| | | | |
|---|---|---|---|
| (1) | Parathyroid hormone | (i) | Addison's disease |
| (2) | Glucocorticoid hormone | (ii) | Endemic goitre |
| (3) | Thyroxine hormone | (iii) | Tetany |
| (4) | Growth hormone | (iv) | Acromegaly |

(a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)
(b) (1) - (iii), (2) - (iv), (3) - (ii), (4) - (i)
(c) (1) - (iv), (2) - (i), (3) - (ii), (4) - (iii)
(d) (1) - (i), (2) - (iii), (3) - (iv), (4) - (ii)

**[Ans. (a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)]**

**8.** According to Aristotle, animal without red blood is called as : *[Sep-2020]*

(a) Enaima (b) Anaima
(c) Erythima (d) Polycythemia

**[Ans. (b) *Anaima*]**

## VERY SHORT ANSWERS 2 MARKS

**1. Expand the abbreviations DAISY and ABIS.** *[Govt.MQP-2018]*

***Ans.*** DAISY → **D**igital **A**utomated **I**dentification **S**ystem.
ABIS → **A**utomatic **B**ee **I**dentification **S**ystem.

**2. What are methanogens?** *[HY-2018]*

***Ans.*** The domain includes single celled organisms, the prokaryotes which have the ability to grow extreme conditions like polar ice caps, volcano vents, etc., Some of them produced methane is called methanogens.

**3. What is Trinomen classification?** *[QY-2019]*

***Ans.*** 1. This naming system was proposed by Huxley and stricklandt, Trinomen means, three names: generic name, species name and sub-species name.

2. When members of any species which have large variations then trinomial system is used.

**4. What is the connection between taxonomy and publishing of book "Origin of Species"?** *[HY-2019]*

***Ans.*** Charles Darwin in his book "Origin of species" explains the evolutionary connection of species by the process of natural selection.

**5. Why do we call Carolus Linnaeus as the 'Father of modern taxonomy'?** *[Mar-2020]*

***Ans.*** Carolus Linnaeus is the founder of modern systematics developed a scientific system of taxonomy and binomial nomenclature which is still in use. So Carolus Linnaeus is called the father of modern taxonomy.

## Short Answers — 3 MARKS

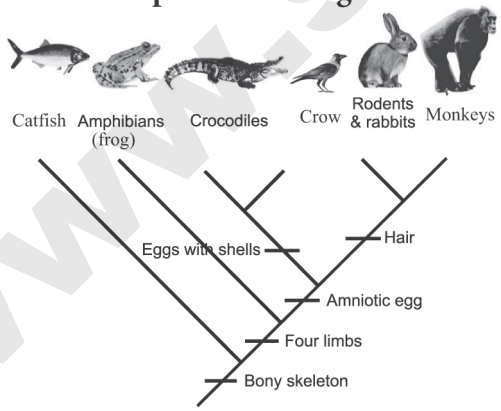
**1. Construct a Cladogram with the given examples. (Catfish, Frog, Crocodile, Crow, Rabbit and Monkey)** *[Govt.MQP-2018]*

**(OR)**

**What is cladogram? Draw a model cladogram.** *[QY-2019; Sep-2021]*

***Ans.*** Ernst Haeckal introduced the method of representing evolutionary relationships with the help of a tree diagram known as cladogram.

Example of a Cladogram




## Long Answers — 5 MARKS

**1. How do you distinguish shark fish from cat fish?** *[Govt.MQP-2018]*

***Ans.***

| No | Shark fish | Cat fish |
|---|---|---|
| 1. | It is a cat laginous fish and belongs to the class chondrichthyes | It is a bony fish and belongs to the class osteichthyes. |
| 2. | The skeleton is made of cartilage | The skeleton is made of calcified bones. |
| 3. | Upper Jaw of shark is not attached to the skill and moves independently. | Some bony fishes also have a second set of jaws (Pharyngeal Jaws) |
| 4. | The gill slits of shark are visible and not protected | The gills are covered by a bony plate. |
| 5. | Presence of third eyelid to protect the eye. | The eye has no protective coverings. |

**2. What are the rules of Nomenclature?** *[QY-2018]*

***Ans.*** **Rules of Nomenclature :**

1. The scientific name should be italicized in printed form and if handwritten, it should be underlined separately.
2. The generic name's (Genus) first alphabet should be in uppercase.
3. The specific name (species) should be in lowercase.
4. The scientific names of any two organisms are not similar.
5. The name or abbreviated name of the scientist who first publishes the scientific name may be written after the species name along with the year of publication.
6. **Eg:** Lion-Felis leo Linn., 1758 or Felis leo L., 1758.
7. If the species name is framed after any person's name the name of the species shall end with i, ii or are.
8. **Eg:** A new species of a ground-dwelling lizard (Cyrtodactylus) has been discovered and named after Scientist Varad Giri, Cyrtodactylus varadgiri.

**3. *Naja Naja* is an example for a particular type of nomenclature. Identify and define the nomenclature type.** *[Mar-2020]*

***Ans.*** The practice of naming the animals in which the generic name and species name are the same, is called Tautonymy.

**Eg: *Naja naja*** (The Indian Cobra).

Chapter 2

UNIT - I

# KINGDOM ANIMALIA

## CHAPTER SNAPSHOT

2.1 Basis of Classification
- 2.1.1 Levels of organisation
- 2.1.2 Diploblastic and Triploblastic organisation
- 2.1.3 Patterns of Symmetry
- 2.1.4 Coelom
- 2.1.5 Segmentation and Notochord

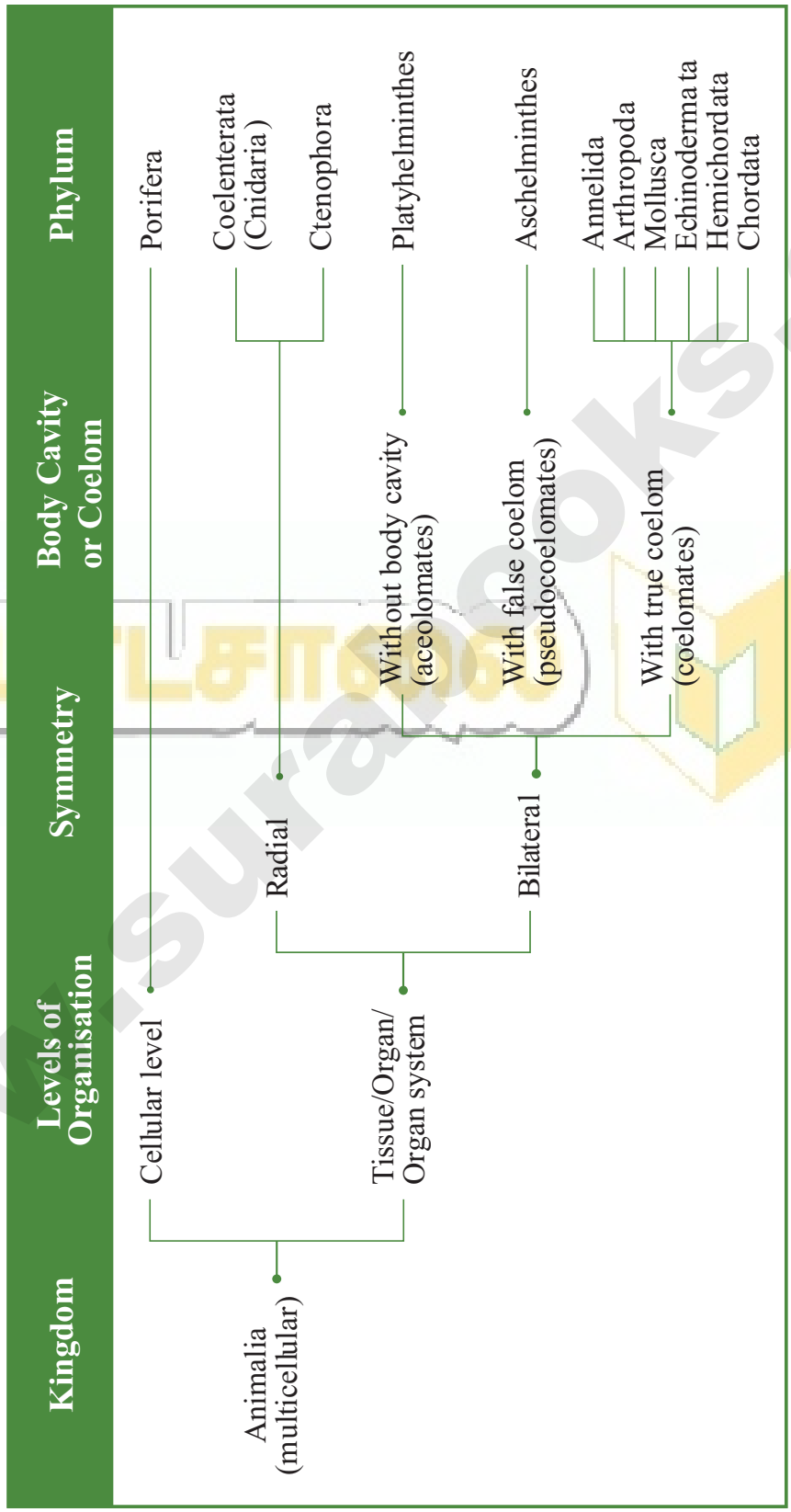
2.2 Classification of Kingdom Animalia

2.3 Non-Chordates (Invertebrata)
- 2.3.1 Phylum : Porifera
- 2.3.2 Phylum : Cnidaria
- 2.3.3 Phylum : Ctenophora
- 2.3.4 Phylum : Platyhelminthes (Flatworms)
- 2.3.5 Phylum : Aschelminthes (Round worms)
- 2.3.6 Phylum : Annelida (Segmented worm)
- 2.3.7 Phylum : Arthropoda
- 2.3.8 Phylum : Mollusca
- 2.3.9 Phylum : Echinodermata
- 2.3.10 Phylum : Hemichordata

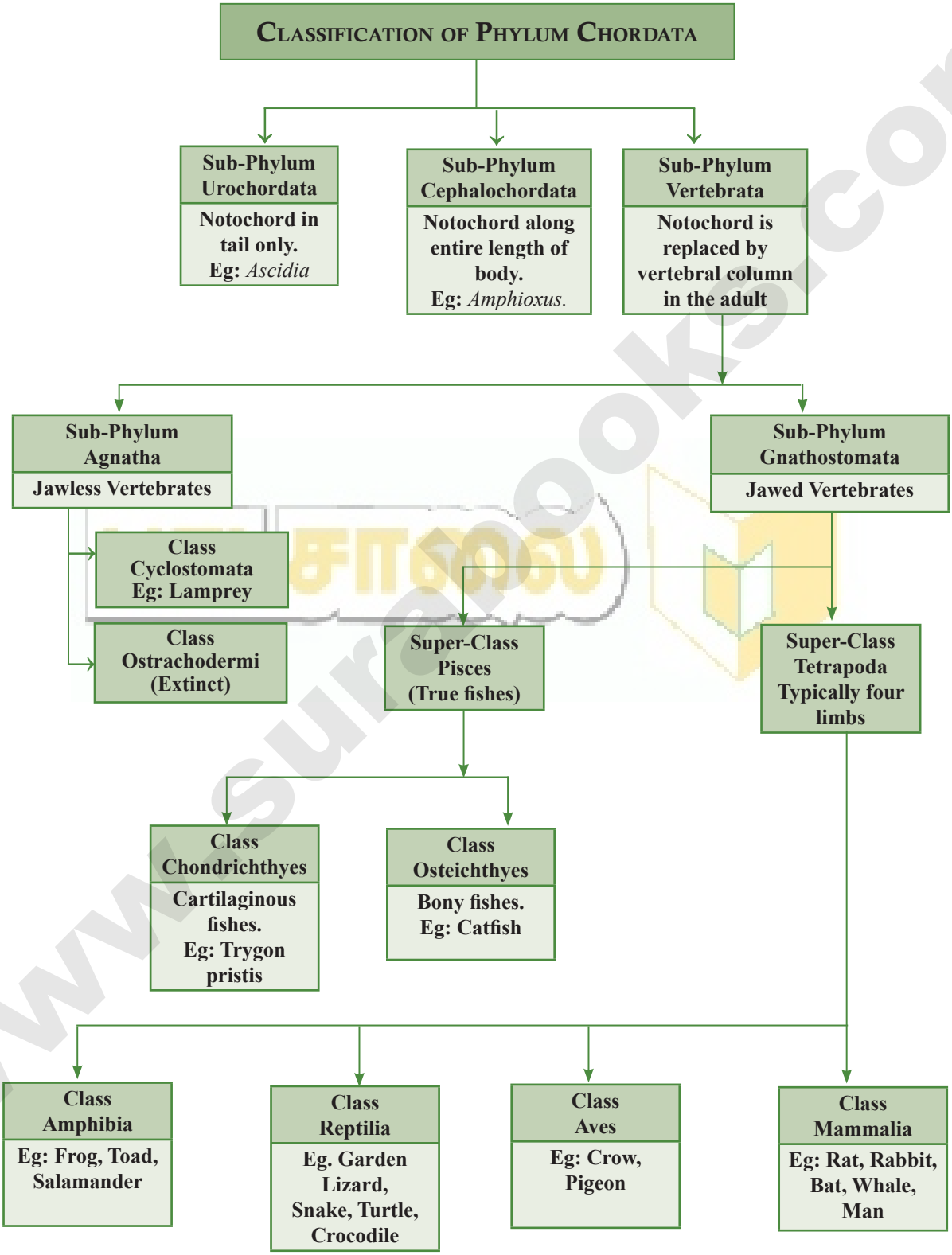
2.4 Phylum : Chordata
- 2.4.1 Subphylum : Urochordata or Tunicata
- 2.4.2 Subphylum : Cephalochordata
- 2.4.3 Subphylum : Vertebrata
- 2.4.4 Class : Cyclostomata
- 2.4.5 Class : Chondrichthyes
- 2.4.6 Class : Osteichthyes
- 2.4.7 Class : Amphibia
- 2.4.8 Class : Reptilia
- 2.4.9 Class : Aves
- 2.4.10 Class : Mammalia

# CONCEPT MAP

**Classification of Kingdom Animalia based on common fundamental features**



# CONCEPT MAP



# MUST KNOW DEFINITIONS

| | | |
|---|---|---|
| **Diploblastic Animals** | : | Animals in which the cells are arranged in two embryonic layers, the external ectoderm, and internal endoderm are called **Diploblastic animals.** |
| **Triploblastic Animals** | : | Animals in which the developing embryo has three germinal layers are called **Triploblastic animals.** |
| **Symmetry** | : | **Symmetry** is the body arrangement in which parts that lie on opposite side of an axis are identical. |
| **Asymmetrical** | : | Do not display a symmetry or body plan. Eg: **Sponges.** |
| **Radial Symmetry** | : | When any plane passing through the central axis of the body divides an organism into two identical parts, it is called **radial symmetry.** |
| **Biradially symmetrical** | : | Animals which possess two pairs of symmetrical sides are said to be **Biradially symmetrical.** |
| **Bilateral symmetry** | : | In some animals body can be divided into identical left and right halves in only one plane. This is called bilateral symmetry. |
| **Coelom** | : | The presence of **Body cavity.** True coelom develops within mesoderm. |
| **Acoelomates** | : | Animals which do not posses a body cavity are called **Acoelomates** Eg: **Flatworms.** |
| **Pseudocoel** | : | In some animals, the body cavity is not lined by the mesoderm, but the mesoderm is present as scattered pouches between the ectoderm and endoderm. Such a body cavity is called a **pseudocoel**. Animals that posses a pesudocoel are called **Pseudocoelomates** Eg: **Round worms**. |
| **Schizocoelomates** | : | The body cavity is formed by splitting of mesoderm. Eg. **Annelids, Arthropods**, **Molluscs.** It is a true coelom. |
| **Enterocoelomate animals** | : | The body cavity is formed from the mesodermal pouches of archenteron. Eg: **Echinoderms, Hemichordates and Chordates**. It is a true coelom. |
| **Segments** | : | In some animals, the body is externally and internally divided into a series of repeated units called **segments**. |
| **Chordates** | : | Animals which possess notochord at any stage of their development are called **Chordates**. |
| **Cleidoic eggs** | : | Eggs laid on land have a protective shell around them. They are described as Cleidoic. **Eg:** Hen's egg. |

# EVALUATION

**1. The symmetry exhibited in cnidarians is**
(a) Radial (b) Bilateral
(c) Pentamerous radial (d) Asymmetrical
**[Ans. (a) Radial]**

**2. Sea anemone belongs to phylum** *[Sep-2021]*
(a) Protozoa (b) Porifera
(c) Coelenterata (d) Echinodermata
**[Ans. (c) Coelenterata]**

**3. The excretory cells that are found in platyhelminthes are**
(a) Protonephridia (b) Flame cells
(c) Solenocytes (d) All of these
**[Ans. (b) Flame cells]**

**4. In which of the following organisms, self fertilization is seen.**
(a) Fish (b) Round worm
(c) Earthworm (d) Liver fluke
**[Ans. (d) Liver fluke]**

**5. Nephridia of Earthworms are performing the same functions as** *[HY-2019]*
(a) Gills of prawn
(b) Flame cells of Planaria
(c) Trachea of insects
(d) Nematoblasts of Hydra
**[Ans. (b) Flame cells of Planaria]**

**6. Which of the following animals has a true coelom ?**
(a) *Ascaris* (b) *Pheretima*
(c) *Sycon* (d) *Taenia solium*
**[Ans. (b) *Pheretima*]**

**7. Metameric segmentation is the main feature of**
(a) Annelida (b) Echinodermata
(c) Arthropoda (d) Coelenterata
**[Ans. (a) Annelida]**

**8. In *Pheretima* locomotion occurs with the help of**
(a) circular muscles
(b) longitudinal muscles and setae
(c) circular, longitudinal muscles and setae
(d) parapodia
**[Ans. (c) circular, longitudinal muscles and setae]**

**9. Which of the following have the highest number of species in nature?**
(a) Insects (b) Birds
(c) Angiosperms (d) Fungi
**[Ans. (a) Insects]**

**10. Which of the following is a crustacean?**
(a) Prawn (b) Snail
(c) Sea anemone (d) Hydra
**[Ans. (a) Prawn]**

**11. The respiratory pigment in cockroach is**
(a) Haemoglobin (b) Haemocyanin
(c) Haemoerythrin (d) None of the above
**[Ans. (d) None of the above]**

**12. Exoskeleton of which phylum consists of chitinous cuticle?**
(a) Annelida (b) Porifera
(c) Arthropoda (d) Echinodermata
**[Ans. (c) Arthropoda]**

**13. Lateral line sense organs occur in** *[Govt.MQP-2018; Sep-2021]*
(a) Salamander (b) Frog
(c) Water snake (d) Fish **[Ans. (d) Fish]**

**14. The limbless amphibian is**
(a) Icthyophis (b) Hyla
(c) Rana (d) Salamander
**[Ans. (a) Icthyophis]**

**15. Four chambered heart is present in**
(a) Lizard (b) Snake
(c) Scorpion (d) Crocodile
**[Ans. (d) Crocodile]**

**16. Which of the following is not correctly paired?**
(a) Humans – Ureotelic
(b) Birds – Uricotelic
(c) Lizards – Uricotelic
(d) Whale – Ammonotelic
**[Ans. (a) Humans – Ureotelic]**

**17. Which of the following is an egg laying mammal?**

(a) *Delphinus* (b) *Macropus*
(c) *Ornithorhynchus* (d) *Equus*

**[Ans. (c) *Ornithorhynchus*]**

**18. Pneumatic bones are seen in**

(a) Mammalia (b) Aves
(c) Reptilia (d) Sponges

**[Ans. (b) Aves]**

**19. Match the following columns and select the correct option.**

| Column – I | Column – II |
|---|---|
| (p) Pila | (i) Devil fish |
| (q) Dentalium | (ii) Chiton |
| (r) Chaetopleura | (iii) Apple snail |
| (s) Octopus | (iv) Tusk shell |

(a) p – (ii), q – (i), r – (iii), s – (iv)
(b) p – (iii), q – (iv), r – (ii), s – (i)
(c) p – (ii), q – (iv), r – (i), s – (iii)
(d) p – (i), q – (ii), r – (iii), s – (iv)

**[Ans. (b) p – (iii), q – (iv), r – (ii), s – (i)]**

**20. In which of the following phyla, the adult shows radial symmetry but the larva shows bilateral symmetry?**

(a) Mollusca (b) Echinodermata
(c) Arthropoda (d) Annelida

**[Ans. (b) Echinodermata]**

**21. Which of the following is correctly matched?**

*[Sep-2020]*

(a) Physalia – Portugese man of war
(b) Pennatula – Sea fan
(c) Adamsia – Sea pen
(d) Gorgonia – Sea anemone

**[Ans. (a) Physalia – Portugese man of war]**

**22. Why are spongin and spicules important to a sponge?**

***Ans.*** The body of sponges is supported by a skeleton made up of calcareous and siliceous spicules or spongin or both.

**23. What are the four characteristics common to most animals?**

***Ans.***
1. On the basis of germ layers all animals will be diploblastic (ectoderm and endoderm) or triploblastic (outer ectoderm, middle mesoderm and inner endoderm).
2. Animals show symmetry. They may be radially symmetrical or bilaterally symmetrical. Few animals like sponges lack symmetry.
3. Most animals posses a body cavity between the body wall and alimentary canal and is lined with mesoderm. This is called **coelom**. Some animals lack coelom (acoelomate) or have false coelom (Pseudocoelomate).
4. Reproduction is a character seen in all animals. (asexual/sexual or both).

**24. List the features that all vertebrates show at some point in their development.**

***Ans.*** Vertebrates posses notochord during embryonic stage only. The notochord is replaced by a cartilaginous or bony vertebral column in the adult.

**25. Compare closed and opened circulatory system.**

***Ans.***

| | Opened type | Closed type |
|---|---|---|
| 1. | The blood remains filled in tissue spaces due to the absence of blood capillaries. | The blood is circulated through blood vessels of varying diameters (arteries, veins, and capillaries) |
| 2. | **Eg:** Arthropods, Molluscs, Echinoderms, and Urochordates | **Eg:** Annelids, Cephalochordates and Vertebrates. |

**26. Compare Schizocoelom with Enterocoelom.**

***Ans.*** *[Govt. MQP-2018, June-2019, Mar-2020]*

| | Schizocoelomate | Enterocoelomate |
|---|---|---|
| 1. | The body cavity is formed by splitting of mesoderm. | The body cavity is formed from the mesodermal pouches of archenteron. |
| 2. | ✦ Annelids<br>✦ Arthropods<br>✦ Molluscs | ✦ Echinoderms<br>✦ Hemichordates<br>✦ Chordates |

**27. Identify the structure that the archenteron becomes in a developing animal.**

***Ans.***
1. In the developing embryo during the process of gastrulation, the primary gut that is formed is called the **archenteron** or digestive tube.
2. It develops into the endoderm and mesoderm of an animal.

**28. Observe the animal below and answer the following questions.**

a. **Identify the animal**
b. **What type of symmetry does this animal exhibit?**
c. **Is this animal Cephalized?**
d. **How many germ layers does this animal have?**
e. **How many openings does this animal's digestive system have?**
f. **Does this animal have neurons?**

***Ans.*** a. Sea Anemone
b. Bilateral symmetry
c. No.
d. Diploblastic - Two germ layers with outer ectoderm, inner endoderm and Jelly like mesoglea in between the two layers.
e. The coelenteron or central vascular cavity which serves for digestion opens out by a single opening called mouth.
f. No. Neurons are absent.

**29. Choose the term that does not belong in the following group and explain why it does not belong?**

**Notochord, cephalisation, dorsal nerve cord and radial symmetry.**

***Ans.*** 'Radial symmetry' is the term that does not belong to the group.
**Reason:** Notochord, Cephalization, dorsal nerve cord are characteristic features of Phylum chordata. This Phylum comprises of animals with bilateral symmetry. Hence the term radial symmetry does not belong to the group.

**30. Why flatworms are called acoelomates?**

***Ans.*** 1. Flatworms are called acoelomate animals. They do not possess a body cavity or **coelom**.
2. Since there is no body cavity in these animals their body is solid without a perivisceral cavity. This restricts the free movement of internal organs. Eg. **Flatworms.**

**31. What are flame cells?** *[Sep-2020]*

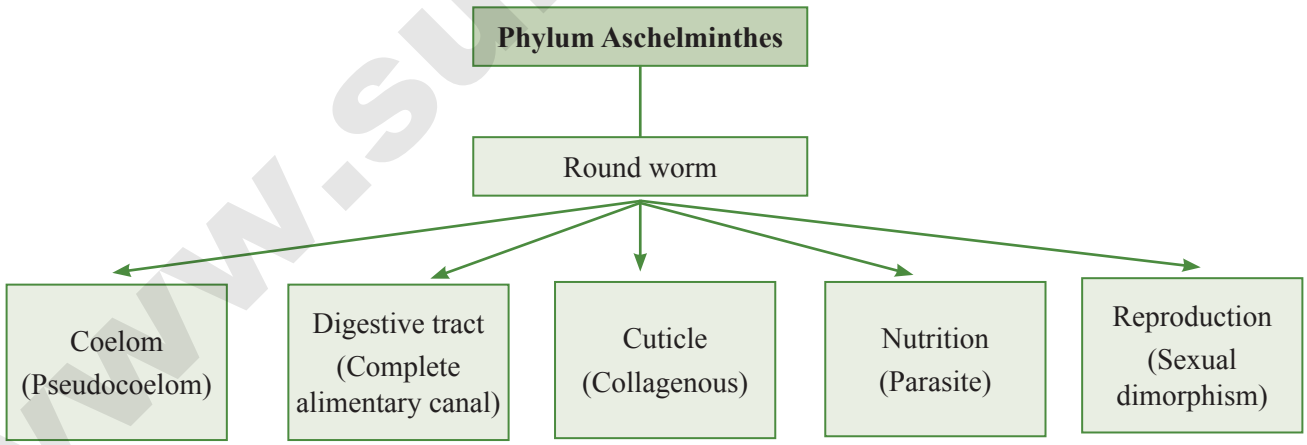
***Ans.*** Specialised excretory cells called **flame cells** are seen in Phylum platyhelminthes. These cells help in osmoregulation and excretion. They have flickering cilia or flagella for driving the absorbed excretory products.

**32. Concept Mapping - Use the following terms to create a concept map that shows the major characteristic features of the phylum nematoda:**

**Round worms, pseudocoelomates, digestive tract, cuticle, parasite, sexual dimorphism.**

***Ans.*** Previously called Nematoda, this phylum is now named as Aschelminthes .

**Concept Mapping:**




**33. In which phyla is the larva trochopore found?**

***Ans.*** Phylum Mollusca and Phylum Annelida.

**34. Which of the chordate characteristics do tunicates retain as adults?**

***Ans.*** 1. The larval stage of the tunicate possesses all the features characteristic of chordates, a notochord, a dorsal hollow nerve cord, pharyngeal slits and a post anal tail.
2. In the adult stage the notochord, nerve cord and tail disappear.

**35. List the characteristic features that distinguish cartilaginous fishes with living jawless fishes.**

**Ans.**

| S.No | Living Jawless fishes | Cartilaginous fishes |
|---|---|---|
| 1. | These belong to class Cyclostomata under subphylum vertebrata, Phylum chordata. | These belong to class Chondrichthyes. under subphylum vertebrata, Phylum chordata. |
| 2. | These are Jawless fishes. Mouth is circular and suctorial. | Mouth is located ventrally and Jaws are very powerful. |
| 3. | They have true teeth. | Teeth are modified placoid scales which are backwardly directed. |
| 4. | They have pouch like gills. | They have lamelliform gills without operculum. |
| 5. | **Eg:** Petromyzon, lamprey | **Eg:** Trygon (stingray) |

**36. List three features that characterise bony fishes.**

***Ans.*** Bony fishes includes both marine and freshwater living with bony endoskeleton and spindle shaped body.

**Characteristics of bony fishes:**

1. Their endoskeleton is bony.
2. They have swim bladder.
3. Gills are covered by opercula.
4. They are found in sea and fresh water.

**37. List the functions of air bladder in fishes.**

***Ans.*** **Functions of air bladder:**

In fishes air bladder regulates buoyancy and helps them to float in water. If air bladders are absent, the animals need to swim constantly to avoid sinking.

**38. Write the characteristics that contributes to the success of reptiles on land.**

***Ans.***

1. They are mostly terrestrial animals and their body is covered by dry and cornified skin with epidermal scales which checks loss of water.
2. Most reptiles lay cleidoic eggs with extra embryonic membranes like omnion, chorion, allantois, and yolk sac, Shell around the egg checks dessication.
3. Embryonic membranes enclose the embryo and provide watery environment. Internal fertilization method helps them to survive on land.

**39. List the unique features of bird's endoskeleton.**

***Ans.***

1. The endoskeleton is fully ossified (bony).
2. The long bones are hollow with air cavities (pneumatic bones).
3. It helps to fly in air with low weight. (2nd point continuation)

**40. Could the number of eggs or young ones produced by an oviparous and viviparous female be equal? Why?**

***Ans.*** **Oviparous animals :**

1. Animals which lay eggs are called **oviparous animals**. They produce more number of eggs since the eggs are exposed to environmental conditions and predators.
2. They have to pass through several developmental stages before becoming on adult. They face less chances of survival.
3. Hence they produce more number of eggs to ensure continuation of race.
4. Further the eggs are released from the parent and develop with the help of yolk stored in the egg.
5. Parental care is not seen.

**Viviparous animals :**

1. Animals which give birth to young ones are called **viviparous animals**.
2. One or few eggs are produced by the female since the mother has to undergo gestation period and nurture the young ones in her womb until they are born. Reproduction cycle requires more time.
3. But the embryo is protected from environmental conditions and predators. Chances of survival are very high.
4. Therefore the number of eggs / young ones in a viviparous animal will be less as compared to an oviparous animal.

## HOTS (TEXTUAL)

**1. Animals such as sponges lack nervous tissue and muscle tissue, what does this tell you about sponges?**

***Ans.***

1. Absence of nervous and muscular tissue indicates that sponges must have been one of the earliest forms in the course of evolution.
2. Absence of tissues indicate that the body organisation would have been at cellular level only without cells forming compact tissues.
3. Further this also indicates that sponges do not show locomotion since they have no means of gauging the surrounding because they lack muscular tissue.
4. They are sedentary since they lack muscular tissue.

UNIT - II

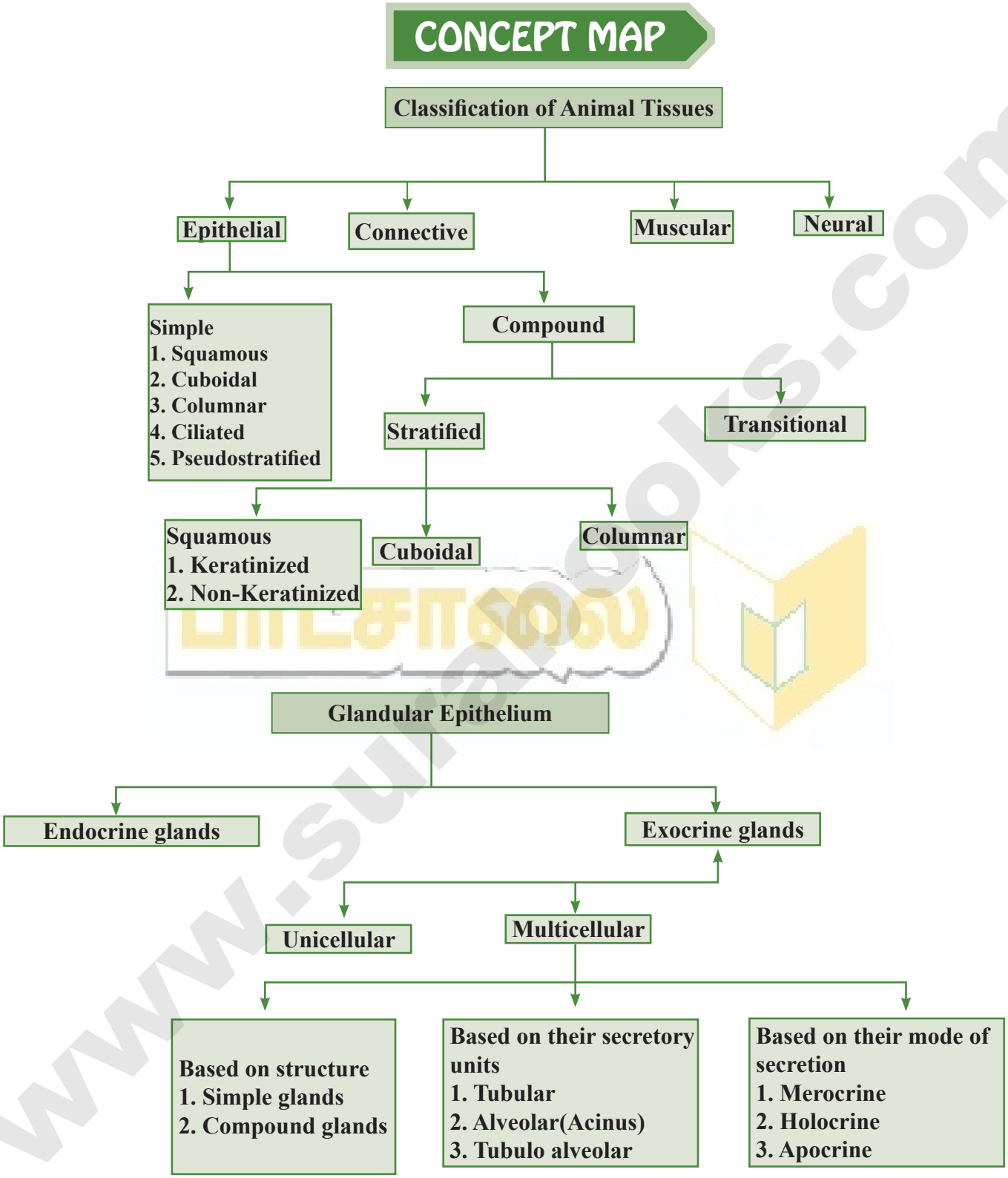
Chapter 3

# TISSUE LEVEL OF ORGANISATION

## CHAPTER SNAPSHOT

3.1 Animal Tissue
3.2 Epithelial Tissue
3.3 Connective Tissue
3.4 Muscle Tissue
3.5 Neural Tissue

# CONCEPT MAP



**Connective Tissues**

- **Loose Connective Tissues**
  1. Areolar Tissue
  2. Adipose Tissue
  3. Reticular Tissue
- **Dense Connective Tissues**
  1. Dense Regular
  2. Dense Irregular
  3. Elastic
- **Specialised Connective Tissues**
  1. Cartilage
  2. Bone
  3. Blood

## MUST KNOW DEFINITIONS

| | | |
|---|---|---|
| Tissue | : | Group of cells that are similar in structure and perform common functions. |
| Epithelium | : | Covering or lining tissue. |
| Simple Epithelium | : | Single layer of cells. |
| Squamous Epithelium | : | Single thin layer of flattened cells with irregular boundaries. |
| Cuboidal Epithelium | : | Single layer of cube like cells. |
| Columnar Epithelium | : | Single layer of tall cells. |
| Goblet cells | : | Modified columnar epithelial cells which secrete mucus. |
| Cilitated Epithelium | : | Columnar epithelial cells with cilia. |
| Pseudo-Stratified epithelium | : | Columnar cells of unequal size and appears to be multilayered. |
| Glandular epithelium | : | Cuboidal or Columnar epithelial cells specialised for secretion. |
| Compound epithelium | : | Epithelium made of more than one layer and mainly provides protection. |
| Cell junctions | : | Structural and functional link between individual cells. |
| Connective tissue | : | Has three main components (fibres, ground substance and cells. |
| Specialised connective tissue | : | This includes cartilage, bone and blood. |
| Muscular tissue | : | Made of many long cylindrical fibres composed of fine myofibrils. |
| Cardiac muscle | : | Contractile tissue present only in heart. |

# EVALUATION

**1. The main function of the cuboidal epithelium is**
(a) Protection (b) Secretion
(c) Absorption (d) Both (b) and (c)
**[Ans. (d) Both (b) and (c)]**

**2. The ciliated epithelium lines the**
(a) Skin (b) Digestive tract
(c) Gall bladder (d) Trachea
**[Ans. (d) Trachea]**

**3. What type of fibres are found in connective tissue matrix?**
(a) Collagen (b) Areolar
(c) Cartilage (d) Tubular
**[Ans. (a) Collagen]**

**4. Prevention of substances from leaking across the tissue is provided by** *[Sep-2021]*
(a) Tight junction (b) Adhering junction
(c) Gap junction (d) Elastic junction
**[Ans. (a) Tight junction]**

**5. Non-shivering thermogenesis in neonates produces heat through**
(a) White fat (b) Brown fat
(c) Yellow fat (d) Colourless fat
**[Ans. (b) Brown fat]**

**6. Some epithelia are pseudostratified. What does this mean?**

***Ans.***
1. Epithelium is said to be pseudo - stratified when the cells are columnar but unequal in size.
2. Although the epithelium is single layered yet it appears to be multilayered because the nuclei lie at different levels in different cells.

**7. Differentiate White adipose tissue from Brown adipose tissue.** *[Sep-2020; Sep-2021]*

***Ans.***

| S.No | White adipose Tissue | Brown adipose Tissue |
|---|---|---|
| 1. | The adipose tissue which is found in subcutaneous tissue surrounding the kidneys, eyeball, heart etc is called 'white fat' or white adipose tissue. | The adipose tissue which contains abundant mitochondria is called 'Brown fat' or Brown adipose tissue. |
| 2. | It stores nutrients. | It is used to heat the blood stream to warm the body. |

**8. Why blood is considered as a typical connective tissue?**

***Ans.***
1. Blood is a fluid connective tissue derived from the mesoderm.
2. Further like connective tissues it has a matrix (Plasma) with cells such as RBC, WBC and Platelets.
3. It circulates in the body and takes part in transport of substances and Respiratory gases.
4. Hence it is considered as a connective tissue.

**9. Differentiate between elastic fibres and elastic connective tissue.**

***Ans.***
1. **Elastic connective** tissue is a type of Dense connective tissue and contains a high proportion of elastic fibres. It allows recoil of tissues following stretching. **Eg:** The wall of large arteries.
2. **Elastic Fibres** are the fibrous component of all types of dense connective tissues. The stretching property of elastic connective tissue is because of the presence of elastic fibres. The proportion of elastic fibres is less in Dense regular and Dense irregular connective tissues when compared to elastic connective tissue.

**10. Name any four important functions of epithelial tissue and provide at least one example of a tissue that exemplifies each function.** *[Mar-2020]*

***Ans.*** The functions of epithelial tissues are :

a) **Protection :**
The compound epithelium is multilayered and gives protection to the underlying tissues against chemical and mechanical stresses. Eg: Stratified squamous epithelium which forms the dry epidermis of the skin.

b) **Absorption and Secretion:**
The goblet cells found in the epithelial lining of the digestive tract in the stomach secrete the protective lubricating mucus. This epithelium helps in absorption and secretion.

c) **Filtration:**
The squamous epithelium found in the glomeruli in the kidneys form a diffusion boundary and aids filtration.

d) **Sensory reception:**
The ciliated epithelium occurs in the inner lining of trachea (Wind Pipe). By ciliary movement they help to trap microbes and dust particles.

**11. Write the classification of connective tissue and their functions.** *[QY-2019 ; Sep. 2020]*

***Ans.*** Connective tissues are classified into

I. Loose connective tissue
II. Dense connective tissue
III. Specialized connective tissue

**Connective tissues**

| Loose Connective tissues | Dense Connective tissues | Specialised Connective tissues |
|---|---|---|
| 1. Areolar Tissue | 1. Dense Regular | 1. Cartilage |
| 2. Adipose Tissue | 2. Dense irrregular | 2. Bone |
| 3. Reticular Tissue | 3. Elastic | 3. Blood |

### I. Loose connective tissues:

The cells and fibres are loosely arranged in a semi fluid ground substance. They are classified as

**1. Areolar connective tissue:**

It lies beneath the skin

**Functions :**

Acts as a support for epithelium. Acts as reservoir of water and salts for the surrounding body tissues. Hence it is called tissue fluid.

**2. Adipose Tissue :**

Found below the skin. 90% of the tissue contains Adipocytes or fat cells.

**Functions:**

Richly vascularised and supplies energy to the body while fasting.

(i) **White fat :** (White adipose tissue) Found in subcutaneous tissue surrounding kidneys, eye ball etc.

**Functions:** Store nutrients.

(ii) **Brown fat :** (Brown adipose tissue) contains abundant mitochondria.

**Functions:** Used to heat the blood stream to warm the body.

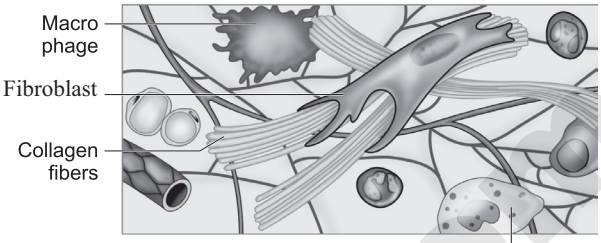
**3. Reticular connective tissue :**

Matrix is filled with fibroblasts called reticular cells.

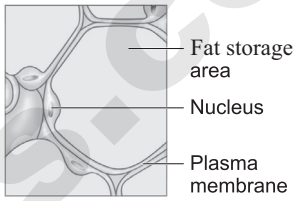
**Functions:**

Forms an internal framework that supports the blood cells in the lymph nodes, spleen and bone marrow.

**Loose connective tissues:**




**Areolar tissue**




**Adipose tissue**

### II. Dense connective tissues :

Fibres and fibroblasts are compactly packed based on orientation of fibres it is divided into:

**1. Dense regular connective tissues :**

Primarily collagen fibres are arranged in rows between parallel bundles of tissues and few elastic fibres.

Fibroblast is the major cell type.

**Functions:**

Present in tendons that attach skeletal muscles to bones and ligaments.

Bones are attached to one another by ligaments. The tissue withstands tensile strength when pulling force is applied in one direction.

**2. Dense irregular connective tissues :**

Have bundles of thick collagen fibres and fibroblasts arranged irregularly. Fibroblast is the major cell type.

**Functions:**

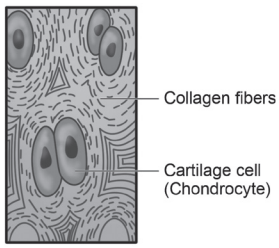
The tissue can withstand tension exerted in many directions. Some elastic fibres are also present.

**3. Elastic connective tissue:**

It contains high proportion of elastic fibres and allows recoil of tissues following stretching. Eg: Walls of arteries.

**III. Specialised connective tissues :** Classified as cartilage, bones and blood.

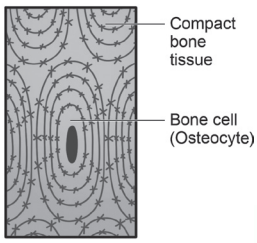
**1. Cartilage :**




Intercellular material is solid and pliable and resists compression. Cells of this tissue (Chondrocytes) are enclosed in small cavities within the matrix secreted by them.

Eg: Cartilage in ear pinna, Tip of nose etc.

**2. Bones :**

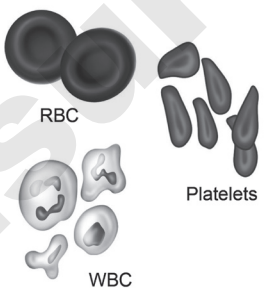



Hard and non pliable ground substance rich in calcium salts and collagen fibres which gives strength. Bone cells or osteocytes are present in spaces called lacunae.

**Functions:**

Bones support and protect softer tissues and organs. **Bone marrrow** is site of production of blood cells.

**3. Blood :**




Fluid connective tissue containing plasma, RBC, WBC and platelets.

**Functions:**

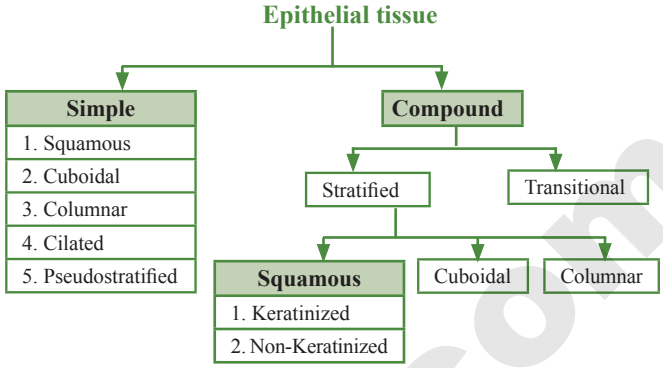
Transport medium for the cardiovascular system carrying nutrients, wastes, respiratory gases throughout the body.

**12. What is an epithelium? Enumerate the characteristic features of different epithelia.** *[Mar-2020; Sep-2021]*

***Ans.*** Epithelial tissue is a sheet of cells that covers the body surface or lines the body cavity. It occurs in the body as a covering, as a lining epithelium and as glandular epithelium.

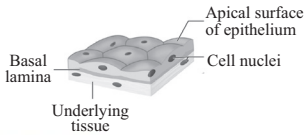
**Functions:** Protection, absorption, filtration, excretion, secretion and sensory reception.

Based on structural modification of the cells, epithelial tissues are classified as follows :




**I. Simple Epithelium :** Single layer of cells found in organs of absorption, secretion and filtration. They are classified into :

**1. Squamous epithelium :** Single thin layer of flattened cells with irregular boundaries.

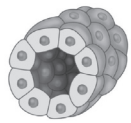


Simple squamous epithelium (air sacs of the lung)

**Function:**

It forms a diffusion boundary and help in filtration.

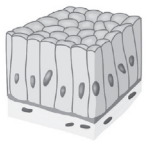
**2. Cuboidal epithelium :** Single layer of cube like cells.


Simple cuboidal epithelium (kidney)

**Function:**

Main function is secretion and absorption.

**3. Columnar epithelium :** Composed of single layer of tall cells with round to oval nuclei at base.


Simple columnar epithelium (intestine)

**Function:**

Functions are absorption, secretion of mucus etc.

**4. Ciliated epithelium:** Propels mucus by ciliary actions and occur in bronchi, uterus etc. Non-ciliated type is seen in gall bladder.


Pseudostratified ciliated columnar epithelium (respiratory tract)

**5. Pseudo-stratified epithelium :** Columnar cells but unequal in size. Although epithelium is single layered, it appears to be multilayered because the nuclei lie at different levels in different cells.


Simple squamous epithelium (esophagus)

**Function:**

Functions are protection, secretions, movement of secretions from glands etc.

UNIT - II

Chapter 4

# ORGAN AND ORGAN SYSTEMS IN ANIMALS

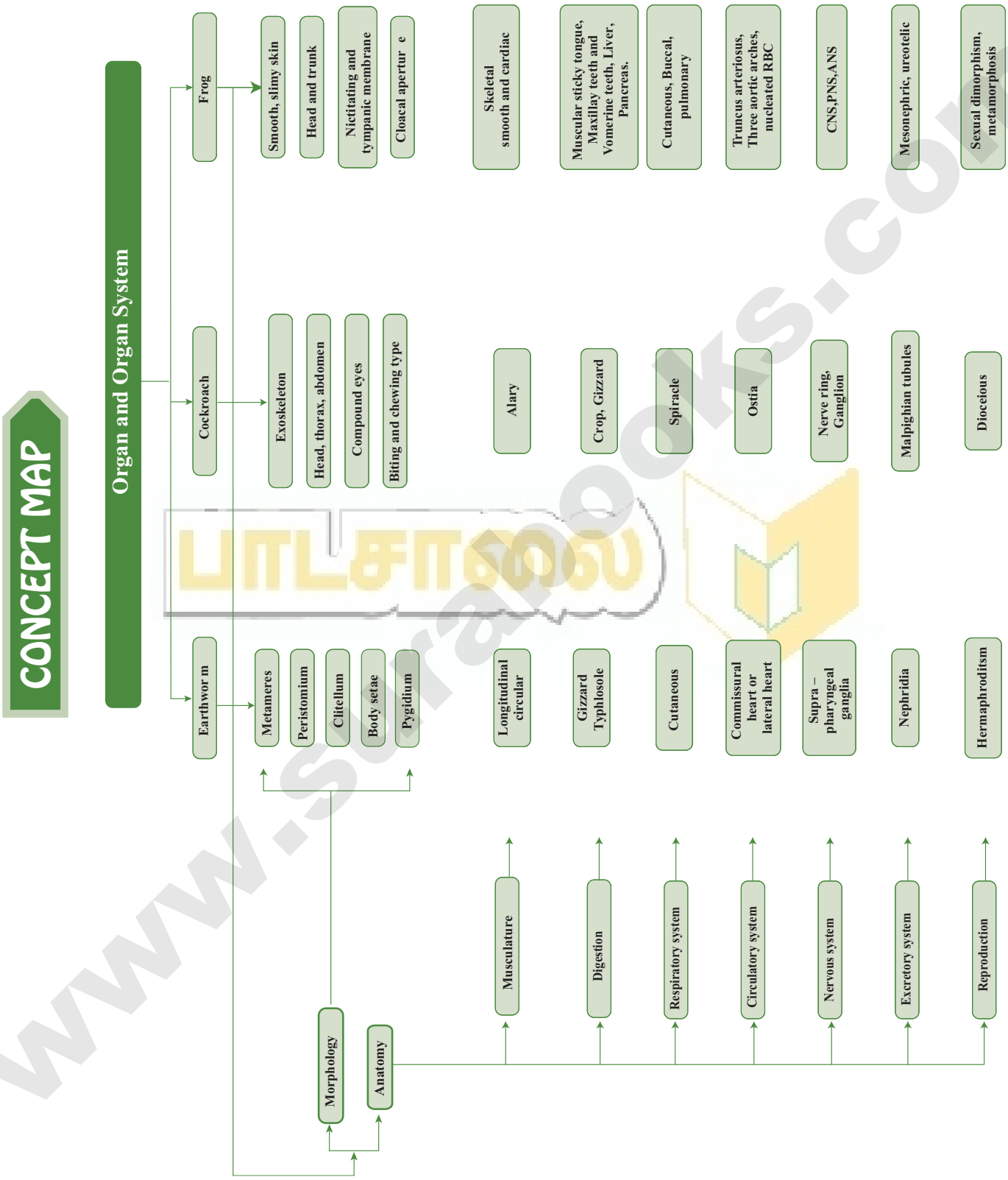
## CHAPTER SNAPSHOT

4.1 Earthworm - *Lampito mauritii*

4.2 Cockroach - *Periplaneta americana*

4.3 Frog - *Rana hexadactyla*

## CONCEPT MAP



# MUST KNOW DEFINITIONS

| | | |
|---|---|---|
| **Clitellum** | : | Thickening of the skin in segments 14-17 of earthworm. |
| **Peristomium** | : | First segment of earthworm. |
| **Pygidium** | : | Last segment of earthworm. |
| **Typhlosole** | : | Folding in the intestine of earthworm to increase absorptive surface. |
| **Nephridia** | : | Excretory organs of earthworm. |
| **Spermatophores** | : | Sperm bundles (Earthworm). |
| **Vermicompost** | : | Compost produced using earthworms. |
| **Compound eyes** | : | Eye of cockroach made up of units called ommatidia producing a mosaic vision. |
| **Elytra/Tegmina** | : | Fore wings of cockroach. |
| **Gizzard** | : | Part of digestive system of cockroach which helps to grind the food. |
| **Malpighian tubules** | : | Excretory organs of cockroach. |
| **Spiracles/Stigmata** | : | Respiratory openings in cockroach. |
| **Haemocoel** | : | Body cavity of cockroach filled with colourless blood(haemolymph). |
| **Alary muscles** | : | Muscles which aid in blood circulation in cockroach. |
| **Supra oesophageal ganglion** | : | Brain of cockroach. |
| **Ootheca** | : | Egg case of cockroach. |
| **Nymph** | : | Young one of cockroach. |
| **Cloaca** | : | Urinogenital aperture in frog. |
| **Nictitating membrane** | : | Third eyelid in frog. |
| **Cutaneous respiration** | : | Skin acts as respiratory organ(frog). |
| **Sinus venosus** | : | A large, thin walled triangular chamber present on the dorsal side of heart of frog. |
| **Ureotelic organism** | : | The excretory waste product consists of urea. Eg: Frog. |
| **Metamorphosis** | : | The different stages of development seen in the life cycle of an organism as it grows into an adult. |

# EVALUATION

**1. The clitellum is a distinct part in the body of earthworm *Lampito mauritii*, it is found in?**
(a) Segments 13 - 14 *[Sep.2021]*
(b) Segments 14 - 17
(c) Segments 12 - 13
(d) Segments 14 - 16 **[Ans. (b) Segments 14 - 17]**

**2. Sexually, earthworms are**
(a) Sexes are separate
(b) Hermaphroditic but not self - fertilizing
(c) Hermaphroditic and self – fertilizing
(d) Parthenogenic **[Ans. (b) Hermaphroditic but not self - fertilizing]**

**3. State whether the statement is true or false.**
**To sustain themselves, earthworms must guide their way through the soil using their powerful muscles. They gather nutrients by ingesting organic matter and soil, absorbing what they need into their bodies. State wheather the statement is true or false: The two ends of the earthworm can equally ingest soil.**
(a) True
(b) False **[Ans. (b) False]**

**4. The head region of Cockroach _____ pairs of _____ and _____ shaped eyes occur.**
(a) One pair, sessile compound and kidney shaped
(b) Two pairs, stalked compound and round shaped
(c) Many pairs, sessile simple and kidney shaped
(d) Many pairs, stalked compound and kidney shaped **[Ans. (a) One pair, sessile compound and kidney shaped]**

**5. The location and numbers of malpighian tubules in *Periplaneta*.**
(a) At the junction of midgut and hindgut, about 150.
(b) At the junction of foregut and midgut, about 150.
(c) Surrounding gizzard, eight.
(d) At the junction of colon and rectum, eight.
**[Ans. (a) At the junction of midgut and hindgut, about 150]**

**6. The type of vision in Cockroach is _____ .** *[Sep-2020]*
(a) Three dimensional
(b) Two dimensional
(c) Mosaic
(d) Cockroach do not have vision **[Ans. (c) Mosaic]**

**7. How many abdominal segments are present in male and female Cockroaches?**
(a) 10, 10 (b) 9, 10 (c) 8, 10 (d) 9, 9
**[Ans. (a) 10, 10]**

**8. Which of the following have an open circulatory system?**
(a) Frog (b) Earthworm
(c) Pigeon (d) Cockroach
**[Ans. (d) Cockroach]**

**9. Buccopharyngeal respiration in frog** *[HY-2019]*
(a) is increased when nostrils are closed
(b) Stops when there is pulmonary respiration
(c) is increased when it is catching fly
(d) stops when mouth is opened.
**[Ans. (a) is increased when nostrils are closed]**

**10. Kidney of frog is** *[Govt.MQP-2018; Sep-2021]*
(a) Archinephros (b) Pronephros
(c) Mesonephros (d) Metanephros
**[Ans. (c) Mesonephros]**

**11. Presence of gills in the tadpole of frog indicates that**
(a) fishes were amphibious in the past
(b) fishes evolved from frog -like ancestors
(c) frogs will have gills in future
(d) frogs evolved from gilled ancestor
**[Ans. (d) frogs evolved from gilled ancestor]**

**12. Choose the wrong statement among the following:**
(a) In earthworm, a pair of male genital pore is present.
(b) Setae help in locomotion of earthworms.
(c) Muscular layer in the body wall of earthworm is made up of circular muscles and longitudinal muscles.
(d) Typhlosole is part of the intestine of earthworm.
**[Ans. (c) Muscular layer in the body wall of earthworm is made up of circular muscles and longitudinal muscles]**

# ADDITIONAL

## CHOOSE THE CORRECT ANSWERS 1 MARK

### I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW QUESTIONS:

**1. Identify the feature of frog which is absent in human beings**

(a) Aorta is present.
(b) Circulatory system is closed type.
(c) Sinus venosus is a triangular chamber present in the heart.
(d) Blood contains RBC. **[Ans. (c) Sinus venosus is a triangular chamber present in the heart]**

**2. Which helps in digestion in cockroach?**

(a) Malpighian tubules (b) Hepatic caecae
(c) Rectum (d) Crop
**[Ans. (b) Hepatic caecae]**

**3. Which is not a sense organ in cockroach?**

(a) Antenna (b) Maxillary palp
(c) Anal style (d) Labial palp
**[Ans. (c) Anal style]**

**4. Which is not found in female cockroach?**

(a) Colleterial gland (b) Gonapophyses
(c) Spermathecae (d) Conglobate gland
**[Ans. (d) Conglobate gland]**

### II. CHOOSE THE CORRECT OPTIONS FOR THE BELOW FILL IN THE BLANKS:

**1. Blood glands are seen in _____ .**

(a) Earthworm (b) Cockroach
(c) Frog (d) None of the above
**[Ans. (a) Earthworm]**

**2. The _____ is the tongue of cockroach.**

(a) labrum (b) labium
(c) hypopharynx (d) maxilla
**[Ans. (c) hypopharynx]**

**3. The number of hepatic caecae in cockroach is _____**

(a) 6 (b) 8 (c) 10 (d) 12
**[Ans. (b) 8]**

**4. The excretion in cockroach is said to be _____.**

(a) Ammonotelic (b) Ureotelic
(c) Uricotelic (d) None of the above
**[Ans. (c) Uricotelic]**

**5. Toads differ from frogs in having _____ .**

**A. teeth** **B. webbed feet**
**C. laying eggs** **D. hind limbs**
(a) A and B (b) B and C
(c) A and D (d) A and C
**[Ans. (a) A and B]**

**6. In earthworm the female genital aperture lies on the ventral side in the _____ segment.**

(a) $15^{th}$ (b) $14^{th}$ (c) $10^{th}$ (d) $12^{th}$
**[Ans. (b) $14^{th}$]**

**7. In earthworm the _____ acts as the skeleton.**

(a) skin (b) coelomic fluid
(c) setae (d) nephridia
**[Ans. (b) coelomic fluid]**

**8. There are _____ pairs of lateral hearts in earthworm.**

(a) 6 (b) 8 (c) 10 (d) 12
**[Ans. (b) 8]**

**9. In cockroach the Elytra arises from _____**

(a) prothorax (b) mesothorax
(c) metathorax (d) labium
**[Ans. (b) mesothorax]**

**10. The sternum of _____ segment is boat shaped in female cockroach.**

(a) $8^{th}$ (b) $6^{th}$
(c) $10^{th}$ (d) $7^{th}$ **[Ans. (d) $7^{th}$]**

**11. In the mouth parts of cockroach _____ helps in grinding of food.**

(a) maxilla (b) labium
(c) mandible (d) labrum
**[Ans. (c) mandible]**

**12. _____ are described as tubular blind processes.**

(a) Hepatic caecae (b) Malpighian tubules
(c) Nephridia (d) Colleterial gland
**[Ans. (a) Hepatic caecae]**

**13.** **There are _____ pairs of spiracles in cockroach.**

(a) 12 (b) 10 (c) 13 (d) 8

**[Ans. (b) 10]**

**14.** **The heart of cockroach has _____ chambers.**

(a) 10 (b) 12 (c) 13 (d) 8

**[Ans. (c) 13]**

**15.** **The receptors which respond to earth borne vibrations are found in _____ in cockroach.**

(a) tarsal segments of legs
(b) anal cerci
(c) labial palp
(d) anal style **[Ans. (b) anal cerci]**

## III. Identify the correct Statements:

**1.** **Identify the correct statements from the below about "*Lampito mauritii* ".**

(I) It has a long and cylindrical narrow body.
(II) Light brown in colour, with purplish tinge at the anterior end.
(III) It consists of about 100-105 segments.
(IV) Colour of the earthworm is mainly due to the presence of porphyrin pigment.

(a) I, II and III only (b) I, II and IV only
(c) II, III and IV only (d) I, III and IV only

**[Ans. (b) I, II and IV only]**

**2.** **Identify the correct statements from the below about "*Respiratory system of earthworm*".**

(I) The earthworm has no special respiratory organs like lungs or gills.
(II) Respiration takes place through the body wall.
(III) Oxygen diffuses through the skin into the blood.
(IV) The skin is kept moist by mucous and coelomic fluid.

(a) I, II and III only
(b) I, II and IV only
(c) II, III and IV only
(d) I, II, III and IV **[Ans. (d) I, II, III and IV]**

**3.** **Identify the correct statements from the below about "*Cockroach*".**

(I) Cockroach is a typical cosmopolitan insect
(II) They are known as "friends of farmer"
(III) *Periplaneta* is cursorial (swift runner) animal.
(IV) They carry with them harmful germs of various bacterial diseases.

(a) I, II and III only
(b) I, II and IV only
(c) I, III and IV only
(d) I, II, III and IV **[Ans. (c) I, III and IV]**

**4.** **Identify the correct statements from the below about "*Earth worm*".**

(I) *Lampito mauritii* begins its life cycle, from the fertilized eggs.
(II) The eggs are held in a protective cocoon.
(III) These cocoons have an incubation period of about 14-18 days
(IV) The life cycle of *Lampito mauritii* takes about 60 days to complete.

(a) I, II and III only
(b) I, II and IV only
(c) I, III and IV only
(d) I, II, III and IV **[Ans. (d) I, II, III and IV]**

## IV. Identify the wrong statements :

**1.** **Identify the wrong statement from the below about "Cockroach".**

(a) The body of the cockroach is compressed dorso-ventrally.
(b) The adult cockroaches are about 2 to 4 cm in length.
(c) About 2 cm in width.
(d) Bilaterally symmetrical segmented.

**[Ans. (c) About 2 cm in width]**

**2.** **Identify the wrong statement from the below about "Nervous system of cockroach".**

(a) The nervous system of cockroach consists of a nerve ring.
(b) The nerve ring is present around the oesophagus in the head capsule.
(c) The brain is mainly a sensory and an endocrine centre.
(d) Formed by the supra-oesophagial ganglion called the 'Muscle'.

**[Ans. (d) Formed by the supra-oesophagial ganglion called the 'Muscle']**

**3. Identify the wrong statement from the below.**

(a) Cockroaches are one of the fastest moving land insects.

(b) Anal cerci are seen in male and female cockroaches.

(c) The abdomen of female cockroach consists of 9 segments.

(d) The upper lip of cockroach is called labrum.

**[Ans. (c) The abdomen of female cockroach consists of 9 segments]**

**4. Identify the wrong statement from the below.**

(a) In earthworm gland cells of clitellum form the cocoon.

(b) Cocoons are deposited in the soil.

(c) Each cocoon produces baby earthworms.

(d) A larva is formed during development.

**[Ans. (d) A larva is formed during development]**

**5. Identify the wrong statement from the below**

(a) Brown (or) grey coloured skin of the earthworm is due to presence of pigment haemocyanin.

(b) Chloragogen cells are yellow cells conserved with storage of reserve food deamination of proteins, formation of urea and also excretory.

(c) Setae and contraction of muscles help in digestion.

(d) Dorsal blood vessels are distributive in segments.

**[Ans. (d) Dorsal blood vessels are distributive in segments]**

## V. Match the following:

**1.**

| | | | |
|---|---|---|---|
| 1. Buccal Cavity | - | (i) | 6th segments |
| 2. Muscular pharynx | - | (ii) | 1st & 2nd segments |
| 3. Oesophagus | - | (iii) | 3rd and 4th segments |
| 4. Gizzard | - | (iv) | 5th segments |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| (a) | iv | iii | ii | i |
| (b) | iii | iv | i | ii |
| (c) | ii | iii | iv | i |
| (d) | i | ii | iii | iv |

**[Ans. (c) 1-ii, 2-iii, 3-iv, 4-i]**

**2.**

| | | | |
|---|---|---|---|
| 1. Photo receptors | - | (i) | Sense of taste |
| 2. Gustatory | - | (ii) | Sense of light |
| 3. Olfactory receptors | - | (iii) | Sense of touch |
| 4. Tactile receptors | - | (iv) | Sense of smell |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| (a) | iv | iii | ii | i |
| (b) | iii | iv | i | ii |
| (c) | ii | i | iv | iii |
| (d) | i | ii | iii | iv |

**[Ans. (c) 1-ii, 2-i, 3-iv, 4-iii]**

**3.**

| | | | |
|---|---|---|---|
| 1. Penial setae | - | (i) | Ciliary rosettes |
| 2. Seminal funnels | - | (ii) | Copulation |
| 3. Germ cells | - | (iii) | Seminal receptacles |
| 4. Spermathecae | - | (iv) | Spermatogonia |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| (a) | iv | iii | ii | i |
| (b) | iii | iv | i | ii |
| (c) | i | ii | iii | iv |
| (d) | ii | i | iv | iii |

**[Ans. (d) 1-ii, 2-i, 3-iv, 4-iii]**

**4.**

| | | | |
|---|---|---|---|
| 1. Oviduct | - | (i) | Urinogenital duct |
| 2. Testis | - | (ii) | Ovisac |
| 3. Kidney | - | (iii) | Cloaca |
| 4. Urinary bladder | - | (iv) | Mesonephric |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| (a) | ii | i | iv | iii |
| (b) | i | ii | iv | iii |
| (c) | ii | i | iii | iv |
| (d) | i | iv | ii | iii |

**[Ans. (a) 1-ii, 2-i, 3-iv, 4-iii]**

## VI. Identify the correct assertion and reason:

**1. Assertion (A) : Cockroaches can survive without a head.**

**Reason (R) : A cockroach can live for a week without its head. Due to their open circulatory system, and the fact that they breathe through little holes on each of their body segments.**

(a) (A) is correct but (R) is wrong

(b) Both (A) and (R) are wrong

(c) (A) is correct and (R) explains (A)

(d) (R) is correct but (A) is wrong

**[Ans. (c) (A) is correct and (R) explains (A)]**

**2. Assertion (A) : First 20 segments are most important organ for the earthworms.**

**Reason (R) : If earthworm gets cut after the 20th segment, the anterior half can regenerate,**

**while the posterior half shall disintegrate after some time. So first 20 segments are important for the earthworms**

(a) (A) is correct and (R) explains (A)
(b) Both (A) and (R) are wrong
(c) (A) is correct but (R) is wrong
(d) (R) is correct but (A) is wrong

**[Ans. (a) (A) is correct and (R) explains (A)]**

**3. Assertion (A) : Maxillary teeth are found in upper jaw of frog.**

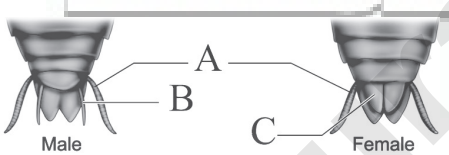
**Reason (R) : Vomerine teeth are seen in lower jaw of frog.**

(a) Both (A) and (R) are wrong
(b) (R) does not explain A
(c) (A) is right and (R) is wrong
(d) (R) explains (A).

**[Ans. (c) (A) is right and (R) is wrong]**

## VII. Identify the correct option for the parts of the Diagram :

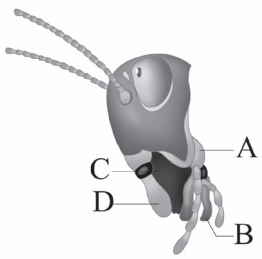
**1. Identify the parts marked as A, B and C for the below diagram**




| | A | B | C |
|---|---|---|---|
| (a) | Anal cercus | Anal style | Ovipostior valve |
| (b) | Anal Style | Anal cercus | Ovipostior valve |
| (c) | Anal cercus | Antenna | Ovipostior valve |
| (d) | Antenna | Anal style | Ovipostior valve |

**[Ans. (a) A - Anal cercus, B - Anal style, C - Ovipostior valve]**

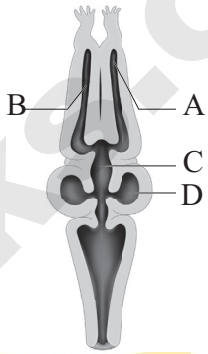
**2. Identify the parts marked as A, B, C and D for the below diagram**




| | A | B | C | D |
|---|---|---|---|---|
| (a) | Maxilla | Mandible | Labrum | Labium |
| (b) | Maxilla | Labrum | Mandible | Labium |
| (c) | Maxilla | Labium | Mandible | Labrum |
| (d) | Maxilla | Labium | Labrum | Mandible |

**[Ans. (c) A - Maxilla, B - Labium, C - Mandible, D - Labrum]**

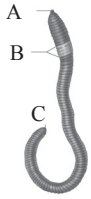
**3. Identify the parts marked as A, B, C and D for the below diagram**




| | A | B | C | D |
|---|---|---|---|---|
| (a) | Olfactory ventricle | Third ventricle | Optic Ventricle | Lateral ventricle |
| (b) | Olfactory ventricle | Lateral ventricle | Third ventricle | Optic ventricle |
| (c) | Third ventricle | Optic ventricle | Olfactory ventricle | Lateral ventricle |
| (d) | Lateral ventricle | Lateral ventricle | Third ventricle | Olfactory ventricle |

**[Ans.(b) A - Olfactory ventricle, B - Lateral ventricle, C - Third ventricle, D - Optic ventricle]**

**4. Identify the parts marked as A, B and c for the below diagram.**




| | A | B | C |
|---|---|---|---|
| (a) | Anus | Prostomium | Clitellum |
| (b) | Prostomium | Clitellum | Anus |
| (c) | Prostomium | Clitellum | Anus |
| (d) | Clitellum | Prostomium | Anus |

**[Ans. (b) A - Prostomium, B - Clitellum, C - Anus]**

UNIT - III

Chapter 5

# DIGESTION AND ABSORPTION

## CHAPTER SNAPSHOT

5.1 Digestive System
- 5.1.1 Structure of the alimentary canal
- 5.1.2 Histology of the Gut
- 5.1.3 Digestive glands

5.2 Digestion of food and role of digestive enzymes

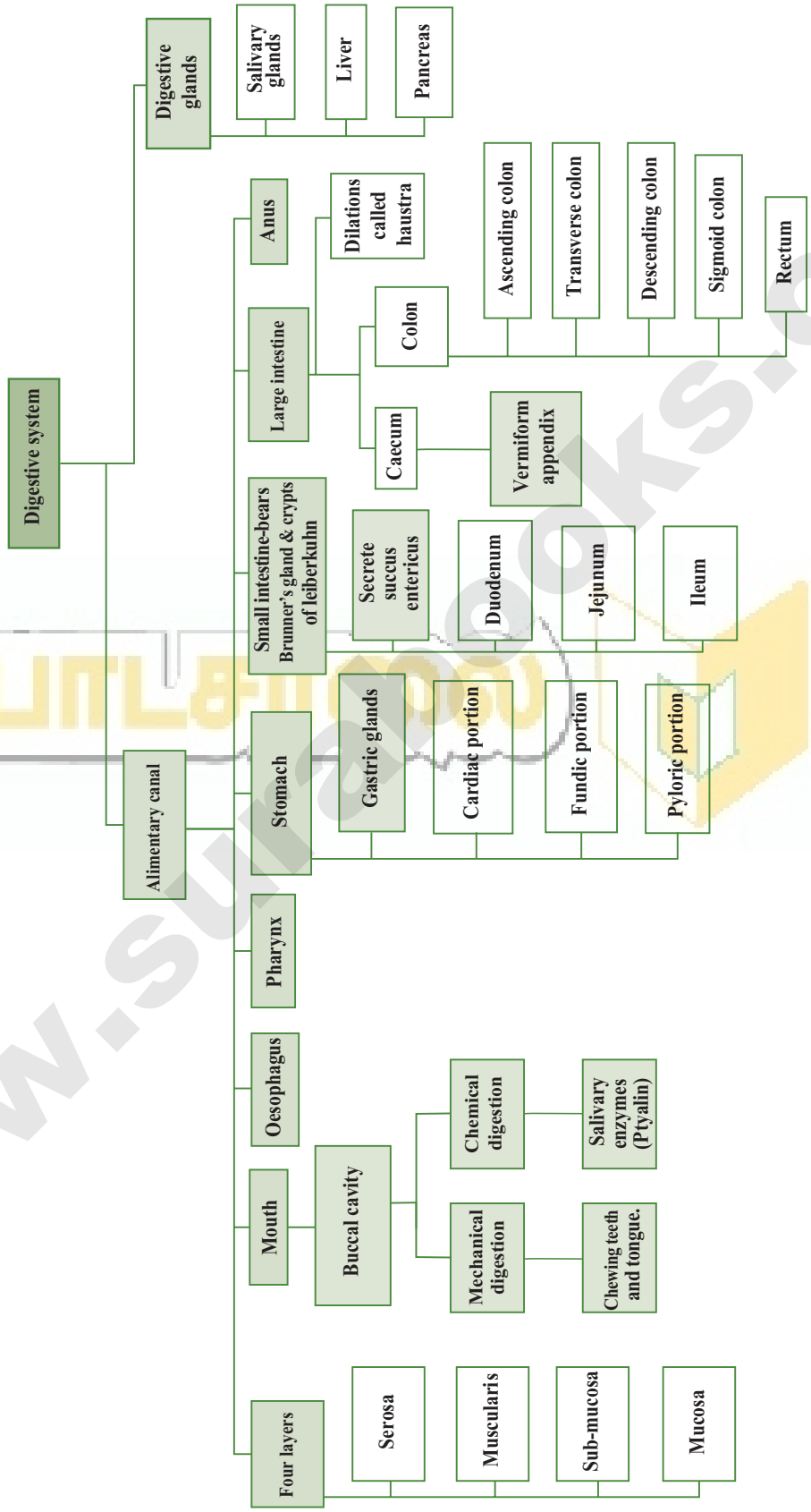
5.3 Absorption and assimilation of proteins, carbohydrates and fats.

5.4 Egestion

5.5 Caloric value of carbohydrates, proteins and fats.

5.6 Nutritional and digestive disorders

## CONCEPT MAP



# MUST KNOW DEFINITIONS

| | | |
|---|---|---|
| **Physiology** | : | Study of functioning of organs and organ systems. |
| **Gastric rugae** | : | The inner wall of stomach has many folds called **Gastric rugae**. |
| **Digestive glands** | : | Digestive glands are exocrine glands which secrete biological catalysts called **enzymes**. |
| **Gastric glands** | : | The wall of the stomach is lined by gastric glands. |
| **Balanced diet** | : | A diet which can provide all the metabolic requirements of the body in a right proportion is called **balanced diet**. |
| **PEM** | : | Protein Energy Malnutrition |
| **Appendicitis** | : | It is the inflammation of the vermiform appendix. |
| **Peptic ulcer** | : | It refers to an eroded area of the tissue lining (mucosa) in the stomach or duodenum. |
| **GERD** | : | Gastero Oesophagus Reflex Disorder |
| **Peyer's patches** | : | Lymphoid tissue present in ileum. |
| **Piles/Haemorrhoids** | : | Enlargement of anal column. |
| **Thecodont dentition** | : | Each tooth is embedded in a socket. |
| **Diphyodont** | : | Two sets of teeth seen in human beings and mammals during their life time. |
| **Heterodont dentition** | : | The permanent teeth are of four different types. |
| **Epiglottis** | : | Cartilaginous flap which prevent entry of food into glottis. |
| **Oxyntic cells** | : | Cells in stomach wall which produce HCl. |
| **Deglutition** | : | The act of swallowing. |
| **Chyme** | : | Food mixed with gastric juices forming a creamy liquid called chyme. |
| **Succus entericus** | : | Intestinal juice which contains enzymes for digestion. |
| **Absorption** | : | Process by which end product of digestion passes into blood and lymph. |
| **Egestion** | : | Removal of digestive waste from the body. |

# EVALUATION

**1. Choose the incorrect sentence from the following:**

(a) Bile juice emulsifies the fat.

(b) Chyme is a digestive acidic food in stomach.

(c) Pancreatic juice converts lipid into fatty acid and glycerol.

(d) Enterokinase stimulates the secretion of pancreatic juice. **[Ans. (d) Enterokinase stimulates the secretion of pancreatic juice]**

**2. What is chyme.....?**

(a) The process of conversion of fat into small droplets.

(b) The process of conversion of micelles substances of glycerol into fatty droplet.

(c) The process of preparation of incompletely digested acidic food through gastric juice.

(d) The process of preparation of completely digested liquid food in midgut.

**[Ans. (c) The process of preparation of incompletely digested acidic food through gastric juice]**

**3. Which of the following hormones stimulate the production of pancreatic juice and bicarbonate?**

(a) Angiotensin and epinephrine

(b) Gastrin and insulin

(c) Cholecystokinin and secretin

(d) Insulin and glucagon

**[Ans. (c) Cholecystokinin and secretin]**

**4.** **The sphincter of Oddi guards**
(a) Hepatopancreatic duct
(b) Common bile duct
(c) Pancreatic duct
(d) Cystic duct
**[Ans. (a) Hepatopancreatic duct]**

**5.** **In small intestine, active absorption occurs in case of**
(a) Glucose (b) Amino acids
(c) $Na^+$ (d) All the above
**[Ans. (d) All the above]**

**6.** **Which one is incorrectly matched?** *[Sep-2021]*
(a) Pepsin – stomach (b) Renin – liver
(c) Trypsin – intestine (d) Ptyalin – mouth
**[Ans. (b) Renin – liver]**

**7.** **Absorption of glycerol, fatty acids and monoglycerides takes place by**
(a) Lymph vessels within villi
(b) Walls of stomach
(c) Colon
(d) Capillaries within villi
**[Ans. (a) Lymph vessels within villi]**

**8.** **First step in digestion of fat is**
(a) Emulsification
(b) Enzyme action
(c) Absorption by lacteals
(d) Storage in adipose tissue
**[Ans. (a) Emulsification]**

**9.** **Enterokinase takes part in the conversion of**
(a) Pepsinogen into pepsin
(b) Trypsinogen into trypsin
(c) Protein into polypeptide
(d) Caseinogen into casein
**[Ans. (b) Trypsinogen into trypsin]**

**10.** **Which of the following combinations are not matched?**

| | Column I | | Column II |
|---|---|---|---|
| (a) | Bilirubin and biliverdin | i) | Intestinal juice |
| (b) | Hydrolysis of starch | ii) | Amylases |
| (c) | Digestion of fat | iii) | Lipases |
| (d) | Salivary gland | iv) | Parotid |

**[Ans. (a) Bilirubin and biliverdin-Intestinal juice]**

**11.** **Match column I with column II and choose the correct option**

| | Column I | | Column II |
|---|---|---|---|
| (P) | Small intestine | i) | Largest factory |
| (Q) | Pancreas | ii) | Absorption of water |
| (R) | Liver | iii) | Carrying electrolytic solution |
| (S) | Colon | iv) | Digestion and absorption |

(a) ( P-iv ) ( Q -iii ) ( R- i ) ( S - ii )
(b) ( P-iii ) ( Q -ii ) ( R- i ) ( S - iv )
(c) ( P-iv ) ( Q -iii ) ( R- ii ) ( S - i )
(d) ( P-ii ) ( Q -iv ) ( R- iii ) ( S - i )
**[Ans. (a) ( P-iv ) ( Q -iii ) ( R- i ) ( S - ii )]**

**12.** **Match column I with column II and choose the correct option**

| | Column I | | Column II |
|---|---|---|---|
| (P) | Small intestine | i) | 23 cm |
| (Q) | Large intestine | ii) | 4 meter |
| (R) | Oesophagus | iii) | 12.5 cm |
| (S) | Pharynx | iv) | 1.5 meter |

(a) ( P-iv ) ( Q -ii ) ( R- i ) ( S - iii )
(b) ( P-ii ) ( Q -iv ) ( R- i ) ( S - iii )
(c) ( P-i ) ( Q -iii ) ( R- ii ) ( S - iv )
(d) ( P-iii ) ( Q -i ) ( R- ii ) ( S - iv )
**[Ans. (a) ( P-iv ) ( Q -ii ) ( R- i ) ( S - iii )]**

**13.** **Match column I with column II and choose the correct option** *[June-2019]*

| | Column I | | Column II |
|---|---|---|---|
| (P) | Lipase | i) | Starch |
| (Q) | Pepsin | ii) | Cassein |
| (R) | Renin | iii) | Protein |
| (S) | Ptyalin | iv) | Lipid |

(a) ( P-iv ) ( Q -ii ) ( R- i ) ( S - iii )
(b) ( P-iii ) ( Q -iv ) ( R- ii ) ( S - i )
(c) ( P-iv ) ( Q -iii ) ( R- ii ) ( S - i )
(d) ( P-iii ) ( Q -ii ) ( R- iv ) ( S - i )
**[Ans. (c) ( P-iv ) ( Q -iii ) ( R- ii ) ( S - i )]**

**14.** **Which of the following is not the function of liver?** *[Sep-2021]*
(a) Production of insulin (b) Detoxification
(c) Storage of glycogen (d) Production of bile
**[Ans. (a) Production of insulin]**

**15. Assertion (A): Large intestine also shows the presence of villi like small intestine.**
**Reason (B) : Absorption of water takes place in large intestine.** *[Sep-2020]*

(a) Both A and B are true and B is the correct explanation of A
(b) Both A and B are true but B is not the correct explanation of A
(c) A is true but B is false
(d) A is false but B is true

**[Ans. (d) A is false but B is true]**

**16. Which of the following is not true regarding intestinal villi?**

(a) They possess microvilli.
(b) They increase the surface area.
(c) They are supplied with capillaries and the lacteal vessels.
(d) They only participate in digestion of fats.

**[Ans. (d) They only participate in digestion of fats]**

**17. Why are villi present in the intestine and not in the stomach?** *[Sep-2020]*

***Ans.***
1. The villi are the units of absorption consisting of the lacteal duct in the middle surrounded by a fine network of blood capillaries.
2. Digestion is completed in the small intestine and maximum absorption takes place in the small intestine only.
3. Hence, the villi are found only in small intestine. A very small amount of substance is absorbed from the stomach.

**18. Bile juice contains no digestive enzymes, yet it is important for digestion. Why?** *[Sep-2020; Sep-2021]*

***Ans.***
1. Bile is produced by the **Liver.** The Bile duct from the liver joins the pancreatic duct and pours its secretions into the duodenum.
2. The bile contains bile pigments **(bilirubin** and **biliverdin)** as the break down products of haemoglobin of dead RBCs, bile salts, cholesterol and phospholipids but has no enzymes.
3. Bile helps in emulsification of fats. Bile salts reduce the surface tension of fat droplets and break them into small globules. Bile also activates lipases to digest lipids.
4. Thus the bile is very important for digestion through it does not contain any enzyme.

**19. List the chemical changes that starch molecule undergoes from the time it reaches the small intestine.**

***Ans.***
1. When the food reaches the first part of the small intestine i.e. the duodenum, pancreatic juices and bile juice act on it.
2. Enzymes for starch digestion are present in the pancreatic juice. Pancreatic amylase converts glycogen and starch into maltose.
3. The enzymes in the intestinal juice (succus entericus) act further on the products of pancreatic digestion. *Maltase, Lactase, Sucrase* act on the sugars.

Maltose $\xrightarrow{Maltase}$ Glucose + Glucose
Sucrose $\xrightarrow{Sucrase}$ Glucose + Fructose
Lactose $\xrightarrow{Lactase}$ Glucose + Galactose

4. As a result of digestion, all macromolecules of food are converted into their corresponding monomeric units.

Carbohydrates $\longrightarrow$ Monosaccharides
(Glucose, Fructose, Galactose)

The simple substances thus formed are absorbed in the jejunum and ileum region of the small intestine.

**20. How do proteins differ from fats in their energy value and their role in the body?**

***Ans.***

| S. No. | Proteins<br>Energy value | Fats<br>Energy value |
|---|---|---|
| 1. | The caloric value and physiological fuel value of 1 gram of protein is 5.65 Kcal and 4 Kcal respectively. | Fat has a caloric value of 9.45 Kcal and a physiological fuel value of 9 Kcal per gram. |
| | **Role in the body** | **Role in the body** |
| 1. | Proteins are required for growth and repair of body cells. | Fats are their derivatives are the best reserve food stored in our body which is used for production of energy. |
| 2. | They are stored in the body only to a certain extent. The body requires 65 - 75 gm of proteins per day. | The body requires 60 - 70 gm of fats per day. |

**21. Digestive secretions are secreted only when needed. Discuss.**

***Ans.*** The activities of the gastro-intestinal tract are carried out by the neural and hormonal control for proper coordination of different parts. Gastric and intestinal secretions are stimulated by neural signals. Hormonal control of the secretion of digestive juices is carried out by local hormones produced by the gastric and intestinal mucosa. Only presence of food in the alimentary canal triggers the corresponding neural and hormonal controls.

# ADDITIONAL

## CHOOSE THE CORRECT ANSWERS 1 MARK

### I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW QUESTIONS:

1. **What is length of the duodenum?**
   (a) 27 cm (b) 30 cm
   (c) 25 cm (d) 2.4 m
   **[Ans. (c) 25 cm]**

2. **Identify the part which is well developed in a herbivorous animal.**
   (a) haustra (b) caecum
   (c) jejunum (d) colon **[Ans. (b) caecum]**

3. **Which enzyme is active in infants only?**
   (a) Pepsin (b) Lysozyme
   (c) Ptyalin (d) Rennin **[Ans. (d) Rennin]**

### II. CHOOSE THE CORRECT OPTIONS FOR THE BELOW FILL IN THE BLANKS:

1. **The _____ teeth are chisel shaped.**
   (a) Incisor (b) Canine
   (c) Premolar (d) Molar **[Ans. (a) Incisor]**

2. **Peyer's patches are seen in the _____**
   (a) mouth (b) stomach
   (c) ileum (d) duodenum **[Ans. (c) ileum]**

3. **Brunner's glands are seen in the _____**
   (a) ileum (b) jejunum
   (c) large intestine (d) duodenum
   **[Ans. (d) duodenum]**

4. **Deglutition refers to _____**
   (a) swallowing (b) assimilation
   (c) absorption (d) egestio
   **[Ans. (a) swallowing]**

5. **Sphincter of Oddi is seen between _____**
   (a) ileum and jejunum
   (b) small intestine and large intestine
   (c) bile duct and duodenum
   (d) pancreatic duct and bile duct
   **[Ans. (c) bile duct and duodenum]**

6. **The breakdown products of haemoglobin are found in _____.**
   (a) Succus entericus (b) Saliva
   (c) Gastric Juice (d) Bile **[Ans. (d) Bile]**

7. **Digestion of starch begins from the _____.**
   (a) Buccal cavity (b) Stomach
   (c) Duodenum (d) Large Intestine
   **[Ans. (a) Buccal cavity]**

8. **The disease _____ is commonly referred to as 4D syndrome.**
   (a) Dermatitis (b) Pellagra
   (c) Bitot's spot (d) Keratomalacia
   **[Ans. (b) Pellagra]**

9. **Reverse peristalsis refers to _____.**
   (a) Swallowing (b) Egestion
   (c) Vomiting (d) Coughing
   **[Ans. (c) Vomiting]**

10. **Deserted liver refers to _____.**
    (a) Gall stones (b) Liver Cirrhosis
    (c) Hiatus hernia (d) Appendicitis
    **[Ans. (b) Liver Cirrhosis]**

11. **HCl is secreted by _____.**
    (a) Goblet cells (b) Parietal cells
    (c) Mucus cells (d) Gastric cells
    **[Ans. (b) Parietal cells]**

12. **The pH of saliva is maintained by _____**
    (a) Bicarbonates (b) HCl
    (c) Na+ (d) lipases
    **[Ans. (a) Bicarbonates]**

13. **Nutrients like amino acids, glucose and electrolytes are absorbed into the blood by _____.**
    (a) Active transport (b) Passive transport
    (c) Diffusion (d) Osmosis
    **[Ans. (a) Active transport]**

14. **Hiatus hernia is not caused by _____.**
    (a) heart burn
    (b) pressure around the stomach
    (c) lifting heavy object
    (d) vomiting **[Ans. (a) heart burn]**

**15.** _____ **is a easily available probiotic supplement which can be taken every day.**

(a) Juice (b) Fruits
(c) Curd (d) Milk **[Ans. (c) Curd]**

**16.** _____ **is a vestigial organ in the alimentary canal of man.**

(a) Vermiform appendix
(b) Colon
(c) Islets of Langerhans
(d) Salivary gland **[Ans. (a) Vermiform appendix]**

## III. Identify the correct Statements:

**1. Identify the correct statements from the below.**

(I) Oesophagus is a thin long muscular tube.
(II) A cardiac sphincter (gastro oesphageal sphincter) regulates the opening of oesophagus into the stomach.
(III) The oesophagus and the trachea (wind pipe) open into the pharynx.
(IV) Two masses of lymphoid tissue called tonsils are also located at the sides of the pharynx.

(a) I, II and III only (b) I, II and IV only
(c) II, III and IV only (d) I, II, III and IV
**[Ans. (d) I, II, III and IV]**

**2. Identify the correct statements from the below about "salivary glands".**

(I) Four pairs of salivary glands in the mouth.
(II) Largest parotids gland in the cheeks.
(II) The sub-maxillary/sub-mandibular in the lower jaw and the sub-lingual beneath the tongue.
(IV) Daily secretion of saliva from salivary glands ranges from 1000 to 1500ml.

(a) I, II and III only (b) I, II and II only
(c) II, III and IV only (d) I, II, III and IV
**[Ans. (c) II, III and IV only]**

**3. Identify the correct statements from the below about "pancreas".**

(I) Second largest gland in the digestive system is the pancreas
(II) It is a Red coloured.
(III) It is situated between the limbs of the 'U' shaped duodenum.
(IV) The pancreatic duct directly opens into the duodenum.

(a) I, II and III only (b) I, III and IV only
(c) II, III and IV only (d) I, II, III and IV
**[Ans. (b) I, III and IV only]**

**4. Identify the correct statements from the below about "Carbohydrates".**

(I) Carbohydrates are sugar and starch.
(II) These are the major source of cellular fuel which provides energy.
(III) The caloric value of carbohydrate is 4.1 calories per gram
(IV) Physiological fuel value is 8 Kcal per gram.

(a) I, II and III only (b) I, III and IV only
(c) II, III and IV only (d) I, II, III and IV
**[Ans. (a) I, II and III only]**

## IV. Identify the wrong statements :

**1. Identify the wrong statement from the below about "Function of liver".**

(a) Destroys aging and defective blood cells.
(b) Stores fat soluble vitamins and iron.
(c) Involves in the synthesis of essential amino acids.
(d) Detoxifies toxic substances.
**[Ans. (c) Involves in the synthesis of essential amino acids.]**

**2. Identify the wrong statement from the below about "Digestion in the stomach".**

(a) Food remains in the stomach for 8 hours.
(b) The gastric secretion is partly controlled by autonomic reflexes.
(c) The gastric juice contains HCl and proenzymes.
(d) The secretion of gastric juice begins when the food is in the mouth.
**[Ans. (a) Food remains in the stomach for 8 hours]**

**3. Identify the wrong statement from the below**

(a) Saliva is produced by the three pairs of salivary glands in man.
(b) Saliva secreted in to the oral cavity contains electrolytes like $Na^+$, $K^+$, $Cl^-$, $HCO_3^-$ and enzymes etc.,
(c) Salivary amylase helps in the hydrolysis of 70% of starch.
(d) PH of salivary amylase is 6.8
**[Ans. (c) Salivary amylase helps in the hydrolysis of 70% of starch]**

**4. Identify the wrong statement from the below**

(a) Protein digestion is the major digestion in stomach.
(b) Carboxy peptidase removes amino acids from peptides.
(c) CCK is responsible for the release of pancreatic juice.
(d) Nucleases are present in intestinal juice and pancreatic juice.
**[Ans. (c) CCK is responsible for the release of pancreatic juice.]**