# **CLASSIFICATION**

Biology is an important branch of science dealing with the study of life. It is difficult to define life. But it is easy to discriminate living things from non–living things. On this basis life is defined as a physicochemical entity exhibiting growth, movement, irritability and reproduction. Biology includes two branches, namely Botany and Zoology. Botany deals with the study of plants and Zoology deals with the study of animals.

### 1.1 TAXONOMY – THE SCIENCE OF CLASSIFICATION

(i) **Order in Diversity :** In spite of its vastness and diversity, the Animal World is not a disorderly junk or animals, as it appears to us when casually viewed, but it has a definite grading order in its diversity. That is way, we can segregate all animals species into small and large groups, called taxa (singular, taxon), on basis of their comparative similarities and dissimilarities. For example, fishes are of so many diverse varieties or species, yet all possess may important common features and, hence, belong to a common group – Pisces. Similarly, all frog like animals forms belong to Amphibia, all lizard like forms to Reptilia, all birds to Aves, and all animals possessing hairs and mammary glands, like man, to Mammalia, Further, the Pisces, Amphibia, Reptilia, Aves and Mammals are, though, strikingly different groups of animal forms but, because of certain basic similarities, such as possession of a cartilaginous or bony endoskeleton, these groups qualify for a larger common group of taxon – the Vertebrata.

Orderly grouping of species in large and small groups or taxa on basis of similarities and dissimilarities is called classification. Proper characterization and identification of species and assigning them suitable scientific names is necessary pre–requisite for classification. This is called nomenclature of species. The study of nomenclature and classification, including the laws, principles and methods of both, is called Taxonomy or Systematics. The basic unit of taxonomy is species "Father of Taxonomy" Carolus Linnaeus.

(ii) **Objectives of Classification :** Academic convenience has been the foremost objective of classification. None can study all animal types separately but, by studying a given type, one gains a fairly good basic knowledge of the whole group or groups to which this types belongs in the scheme of classification. Another, more important objective of classification is to readily reveal the basic or phylogenetic relationships between the various types of animal forms.

(iii) **Brief History of Taxonomy :** Ancient people used to classify animals on such criteria as harmful or harmless, flying or non flying, edible or non edible, useful or useless, and so on. The famous Greek Philosopher, Aristotle (384-322 B.C), recognized and "Father of Zoology", was the first scientist to classify the known animal forms on basis of natural resemblance and dissimilarities. He divided these into two main groups :

(a) **Anaima :** All animal forms devoid of red blood, such as sponges, cnidaria, mollusca, arthropoda, echinodermata, etc., and

(b) **Enaima :** All animal forms having red blood, viz., the present-day vertebrates. He further divided these into two subgroups

(1) Vivipara : Those that give birth to young ones such as man, dogs, cows, buffaloes, etc., and

(2) Ovipara : Those that lay eggs, such as frogs and toads, lizards, snakes, birds, etc.

**Pliny** (77 years after **Christ** – **A.D.**) classified animals into two categories – those that fly and those that do not fly. Long after this, in the 17th century, the English naturalist **John Ray** (1693) first clearly defined a "species" and introduced this term Eventually, the Swedish Botanist, Carolus Linnaeus. In the tenth edition (1758) of his book. "*Systema Naturae*", he classified the known 4236 animal species, and the system he employed for this laid the foundation of modern classification. In this edition, he also devised a method of "Binomial Nomenclature" for naming the species as described below. Linnaeus is therefore, recognized as "Father of Modern Taxonomy".

(iv) Characterization of Species : Species is the smallest basic unit of classification. Its proper characterization is, therefore, of vital importance for a "Natural" scheme of classification. Identifying species on basis of reproduction, John Ray (1693) considered all individuals produced by parents of the same type as members of the same species. Linnaeus and some others distinguished species merely on the basis of structure. Mayr (1942) defined species as a "population of interbreeding individuals. According to the latest views, a species can be characterized as follows

(a) Each species is a population of interbreeding individuals.

(b) The whole population of each species has a common "gene pool" with a free assortment of genes, *i.e.*, "gene flow".

(c) Populations of a species inhabiting different geographical areas are in a continuous process of adapting to the conditions of their respective environments.

(v) **Nomenclature of Species– Common or Vernacular names :** Animal types, known to common man, are called, in different countries, by local vernacular names. For example, the common house sparrow is called "Goraiya" in India, "Sparrow" in England and America, "Haussperling".

(a) **Binomial nomenclature :** In the tenth edition of his "*Systema Naturae*", **Linnaeus** adopted a new method of naming the species. Just as it is customary in certain castes in our country to add father's name with the names of the sons, **Linnaeus** assigned, for each species, a dual *Latin* name in which the second name was the actual name of the species, while the first one was that of the genus under which he had included related species.

For example, he assigned the name of *Passer domesticus* to house sparrow, *Homo sapiens* to man, *Canis familiaris* to dog and so on. This scheme of nomenclature is known as "**binomial nomenclature**". It was gradually adopted by biologists all over the world, and the specific names, so assigned, were recognized as "International Scientific Names" as against the common or vernacular names. The term Biological nomenclature is applicable to both animals and plants Carolus linnaeus proposed the Binomial nomenclature.

(b) **Trinomial nomenclature :** Biologists observed that different populations of the same species, effectively isolated for a long time due to geographical barriers, gradually drift from each other in certain genetic characteristics, constituting smaller groups, called subspecies, Till the members of different populations can interbreed, they belong to the same species, but when they can no more interbreed, they become separate species. Naming of subspecies is called "trinomial nomenclature", because, in this, a third name is added to the name of the species. For instance, the common crow,

*Corvus splendens,* has local populations in India, Burma and Ceylon, recognized as subspecies and named respectively as *C. splendens splendens, C. Splendens insolens* and *C. splendens protegatus.* 

(c) **International rules of nomenclature :** In order that each species be known by a common scientific name all over the world, and no name be used for more than one species, the *International Congress of Zoology* adopted, in 1901, a set of **International Rules of Zoological Nomenclature** for naming animal species in accordance with the "**Binomial Nomenclature**" of Linnaeus. These rules were later revised in 1961. According to these, the first, generic name in the binomial name of a species, shared by all other related species, should be a single word beginning with a capital letter, while the second, specific name, should be a single or compound word beginning with a small letter; the full name should be latinized and printed in *italics*.

(vi) **Principles of Classification :** After dividing the then known species under several genera, Linnaeus himself segregated all genera under six classes, viz., Mammalia, Aves, Amphibia, pisces, Insecta and Vermes, merely on morphological grounds. As better criteria for classification were adopted during the 18th century, six main grading categories, ranks or taxa were proposed, and these were also later adopted by Linnaeus (1758) :

(1) Species, (2) Genus, (3) Family, (4) Order, (5) Class, (6) Phylum

As is clear from the sequence or hierarchy of these groupings or taxa, two or more related species, evolved from a common ancestor according to the concept of *"Organic Evolution"*, form a common genus related genera constitute a family; related families are combined into an order; orders into a class, and classes into a phylum. Term "Phylum" in animal classification was coined by G.L cuvier.

(vii) Artificial vs. Natural classifications : Since earlier schemes of classification, like the one presented even by Linnaeus, used to be based on superficial resemblance, these were incapable or revealing the natural relationships of the species concerned. Hence, these were artificial schemes of classification. According to the universally accepted concept of "Organic Evolution", all species, existing today, evolved in the remote past, from common ancestors as a result of adaptive radiation or divergence. Hence, all species are related to each other closely or remotely, and can be segregated into larger and smaller groups according to the extent of this phylogenetic relationship. In contrast to artificial classifications, a natural classification, thus, already exists within the framework of the "natural order" of the animal world itself, only waiting to be fully discovered. Evidently, a natural scheme of classification must be based upon criteria which reflect the fundamental or genetic, *i.e.*, blood relationships of the species concerned. To cite a few, the symmetry, organization and segmentation of body, types of body cavities and appendages, sexual characteristics and development, cellular specialization, biochemistry and genetics, habits and habitat, larval stages, etc., are criteria of this category. A scheme of classification based upon these criteria will, thus, be a "Natural, or Phylogenetic, or Genealogical classification".

Features	Non chordata	Chordata
Symmetry	Radial, biradial or lacking	Biradial
Metamerism	True of pseudometamerism or lacking	True metamerism
Post-anal tail	Lacking	Usually present
Grade of organization	Protoplasmic to organ-system	Organ-system
Germ layers	2. (diploblastic), 3 (triploblastic) or lacking	3, triploblastic
Coelom	Acoelomate, pseudocoelomate or truly coelomate	Truly coelomate
Notochord	Notochord or backbone lacking	Present at some stage or replaced by a backbone made of ring like vertebrae
Pharyngeal gill-slits	Absent	Present at some stage of life
Anus	Opens on the last segment or absent	Differentiated and opens before the last segment
Blood vascular system	Open, closed or absent	Closed
Heart	Dorsal, lateral or absent	Ventrally placed
Dorsal blood vessel	Blood flows anteriorly	Blood flows posteriorly
Hepatic portal system	Absent	Present
Haemoglobin	In plasma or absent	In red blood corpuscles
Respiration	Through body surface, gills or tracheae	Through gills or lungs
Nervous system	Solid	Hollow
Brain	Above pharynx or absent	Dorsal to pharynx in head
Nerve cord	Double, ventral, usually bearing ganglia	Single, dorsal, without ganglia
Reproduction	A sexual	Sexual reproduction predominant
Regeneration power	Usually good	Usually poor
Body temperature	Cold-blooded	Cold or warm-blooded

Comparison between Non-chordata and Chordata

### **1.2 OUTLINE CLASSIFICATION OF ANIMAL KINGDOM**

The animal kingdom is subdivided into two sub-kingdoms, namely Protozoa and Metazoa.



**Subkingdom 1. Protozoa :** It includes microscopic, unicellular animals. It contains a single Phylum called protozoa. e.g. Euglena, Amoeba, Paramecium etc.

**Subkingdom 2. Metazoa** : This sub kingdom includes multicellular animals. e.g. Porifera to Chordata. The subkingdom Metazoa is divided into three branches, namely Mesozoa, Parazoa and Eumetazoa.

**Branch 1. Mesozoa :** It is intermediate between Protozoa and Metazoa. It includes endoparasitic animals. e.g. Dicyema, Rhopalura etc.

Branch 2. Parazoa : It includes sponges.

**Branch 3. Eumetazoa :** It includes true multicellular organisms. They have organ and organ system grade of organization. e.g. Coelenterata to Chordata. Eumetazoa is further divided into two grades, namely Radiata and Bilateria.

Grade A. Radiata : It includes radially symmetrical animals. e.g. Coelenterata.

**Grade B. Bilateria** : It includes bilaterally symmetrical animals. e.g. Platyhelminthes to Chordata The grade Bilateria is further divided into two divisions namely proterostomia and deuterostomia.

**Division 1. Proterostomia** : In this group of animals, the blastopore develops into the mouth. e.g. It is further divided into 3 sub division.

**Sub division 1. Accelomata** : In this group of animals, a coelom (Cavity lying between the gut and the body wall) is absent. e.g. Platyhelminthes

**Sub division 2. Pseudocoelomata** : In this group of animals, a false coelom (cavity not lined with coelomic epithelium) is present. e.g. Aschelminthes or Nematoda.

**Sub division 3. Schizocoelous Coelomata** : In this group, a true coelom is present. e.g. Annelida to chordata.

**Division 2. Deuterostomia** : In this group of animals, the blastopore develops into the anus. It consist of one sub division.

**Sub division 1. Enterocoelous coelomata :** Coelom is enterocoel which originates as pouches of embryonic gut (archenteron)

(i) **Character of Non Chordata (Invertebrates) :** The animals which lack a notochord are called invertebrates. e.g. Amoeba, sponges, Hydra, worms, insects, etc., Invertebrates are characterised by the following salient features –

(1) The vertebral column is absent.

(2) the nerve cord is solid in nature.

(3) The nerve cord is present on the ventral side and never on the dorsal side.

(4) When alimentary canal is present, it lies dorsal to the nerve cord.

(5) Invertebrates may be accelomate or pseudocoelomate or true coelomate.

(6) They have either asymmetry or radial symmetry or bilateral symmetry.

(7) The circulatory system is open type or closed type.

(8) They exhibit all possible type of reproduction.

The invertebrates are grouped into about 30 phyla. These phyla are of two types, namely major phyla and minor phyla.

(a) **Major Phyla :** (1) Protozoa (2) Porifera (3) Coelenterata (4) Platyhelminthes (5) Aschelminthes (6) Annelida (7) Arthropoda (8) Mollusca, and (9) Echinodermata.

(b) Minor Phyla : (1) Mesozoa (2) Nemertinea (3) Endoprocta (4) Acanthocephala (5) Rotifera
(6) Gastrotricha (7) Kinorhyncha (8) Nematomorpha (9) Ectoprocta (10) Brachiopods (11) Phoronida
(12) Chaetognatha (13) Priapulida (14) Sipunculida (15) Echiuroidea (16) Pogonophora etc.

### 1.3 PHYLUM PROTOZOA

(i) **Introduction** : All unicellular (or acellular) eukaryotic animals : Most primitive (Gr. *Porots* = first + zoon = animal) organisms considered animals because of heterotrophic nutrition and motility. Although the whole body is a single minute cell. About 50,000 species (30,000 present and 20,000 extinct) are so far known.

(ii) **Brief History :** Protozoans were first studied by **Leeuwenhoek** (1677). The name "**Protozoa**" was coined by **Goldfuss** (1817). The branch of their study is called **Protozoology.** 

### (iii) Salient Features

(1) Protozoans are the simple and primitive organisms

(2) They are free living or parasitic

(3) All the free living forms are aquatic

(4) They are asymmetrical or radially symmetrical or bilaterally symmetrical

(5) They are unicellular (acellular)

(6) They have protoplasmic grade of organization.

(7) Locomotion is effected by flagella, cilia or pseudopodia.

(8) Nutrition is holophytic, holozoic, saprozoic or parasitic.

(9) Digestion is intracellular

(10) Excretion & Respiration occurs by diffusion

(11) In fresh water protozoans osmoregulation is carried out by the contractile vacuoles.

(12) Encystment is a common phenomenon

(13) Reproduction occurs by asexual and sexual methods.

### (iv) Classification of Protozoa

### (a) Class 1. Flagellata or Mastigophora

(1) The body is covered by a thin pellicle or cuticle.

(2) The locomotory organs are flagella.

(3) The contractile vacuoles are present in fresh water forms with accessory vacuoles.

(4) Chloroplast are found in some forms.

(5) They may be free living or parasitic.

The class flagellata has been divided into eight orders. They are as Chrysomonadina, Cryptomonadina, Euglenoidea, Phytomonadina, Dinoflagellata, Cystoflagellata, Protomonadina and Polymastigina

Examples : Chrysamoeba, Cryptomonas, Euglena, Volvox, Chlamydomonas, Noctiluca, Mastigamoeba, Monal, Bado, Trypanosoma, Leishmania, Proterospongia etc.,



Euglena is a connecting link between Animal & Plant.

□ Trychonymph (symbiotic) live in alimentary canal of termite that is digest to cellulose.

- (b) Class 2. Rhizopoda
- (1) There is no definite cell wall or pellicle
- (2) There is no definite shape
- (3) The locomotory organs are pseudopodia
- (4) There is no permanent mouth or anus.
- (5) The contractile vacuoles are present in the fresh water forms.

The rhizopoda has been divided into five orders. They are as Lobosa, Filosa, Foraminifera, Heliozoa and Radiolaria.

Examples : Amoeba, E..histolytica, E.coli etc.,

## (c) Class 3. Ciliophora

- (1) The body is covered by thin pellicle
- (2) They have a fixed permanent shape
- (3) The locomotory organs are cilia
- (4) Tentacles are present

The class ciliophora is divided into two sub-classes, namely Ciliata and Suctoria.

Sub-class 1. Ciliata.

- (1) Cilia are present throughout life.
- (2) Tentacles are absent
- (3) Mouth and cytopharynx are usually present. Cytopyge is a temporary anal aperture.
- (4) Contractile vacuoles are present.
- (5) Trichocysts, organs of offense and defence are present in certain forms.
- Examples : Paramecium, Stylonchia Vorticella, etc., Paramecium is filter feeder
- □ In a paramecium two contractile vacuole present. Posterior contractile vacuole is highly active. Sub-class 2. Suctoria
- (1) Cilia are present only in the young conditions and adults are devoid of them.
- (2) Tentacles are present in the adult
- (3) One to many contractile vaculoes are present

Examples : Acineta, Dendrocometes, Dendrosoma, etc.,

## (d) Class 4. Sporozoa

- (1) They are exclusively endoparasitic
- (2) The body is covered by pellicle.
- (3) Reproducion takes place by spore formation

The class is divided into two sub-classes, namely, Telosporidia and Neosporidia

## Sub-class 1. Telosporidia

(1) The spores do not contain polar capsules or filaments

(2) The life history ends with the formation of spores.

(3) The spore cases are simple and contain many spores

Examples : Monocystis, Gregarina, Isopora, Eimeria, Plasmodium, Babesia, etc.,

Sub class 2. Neosporidia

(1) The trophozoite is amoeboid multinucleated

(2) Spore cases are complex usually having a single germ

Examples : Nosema, Myxidium, Globidium, etc.,

### **1.4 PHYLUM PORIFERA**

(i) **Introduction :** Lowest multicellular animals or metazoans without true tissues, *i.e.*, at "*Cellular level*" of body organization. Familiar as sponges, these animals are well-known for their ability to absorb and withhold fluids. The word "Porifera" means pore bearers (Gr., *porus* = pore; *ferre* = to bear); Their body wall has numerous minute pores, called ostia, through which a continuous current of outside water is drawn into the body. About 5,000 species are known.

(ii) **Brief History :** Robert Grant (1825) finally proved that sponges are animals, and coined the name 'Porifera' for these. Schulze (1878), Butschli (1884), Sollas (1884) and Delage (1898) separated sponges from other metazoans on basis of embryological studies, and suggested a separate group, "Parazoa" for these.

(iii) **Salient features :** Phylum porifera has the following salient features :

(1) All the sponges are Aquatic, Sedentary, Asymmetrical or Radially, First multicellular organisms and have cellular grade of organization.

(2) They are diploblastic. Ectoderm is formed by pinachocyte and endoderm is formed by choanocyte. Both layers are called pinachoderm and choandoderm.

(3) The body is perforated by numerous minute pores called ostia.

(4) The ostia open into a large cavity called spongocoel.

(5) The spongocoel opens to the outside by a large opening called osculum.

(6) The sponges possess an endoskeleton in the form of calcareous spicules.

(7) Excretion and respiration occur by diffusion.

(8) They have greater power of regeneration.

(9) Reproduction takes place by asexual or sexual methods.

(10) Development is indirect or direct.

The common larval are parenchymula, amphiblastula, etc.

### (a) Class 1. Calcarea

(1) Skeleton is formed of Calcareous spicules.

(2) Radially symmetrical.



Sycon



Hyalonem

(3) Choanocyte cells are large and conspicuous

Examples : Clathrina, Leucosolenia, Sycon, etc.,

• Euplectela is the sponge which is given as a Gift in Japan.

□ Leucosolenia is a smallest sponge.

□ Ectorderm is formed by pinachocyte and endoderm is formed by choanocyte. Both layer is called pinachoderm and choanoderm.

### (b) Class 2. Hexactinellida

(1) Skeleton is formed of six rayed triaxon, silicious spicules,

(2) Canal system is branched or unbranched.

(3) Radially symmetrical.

(4) These are also known as glass sponges.

Examples : Pheronema, Hyalonema, etc.,

□ Hylonema is a Glass rope sponge.

(c) Class 3. Demospongia

Euspongi

(1) Skeleton either absent or present. When present it is either formed of spongin fibres or combination of spongin fibres and silicious spicules.

(2) The silicious spicules when present are never six rayed

(3) The canal system is complicated Rhagon type

(4) These sponges are of great economic importance

Examples : Cliona, Spongilla, Chalina, Euspongia, Hippospongia, Oscarella, etc.,

□ Spongilla is a fresh water sponge.

## 1.5 Phylum Cnidaria (= Coelenterata)

(i) **Introduction :** "Tissue grade" eumetazoans with a radial symmetry. The term "Coelenterata" signifies the presence of a single internal cavity called coelenteron, or gastrovascular cavity, combining functions of both digestive and body cavities. The term "Cnidaria" indicates the presence of stinging cells (Gr., *knide* = nittle or stinging cells). About 9,000 species known.

(ii) **Brief History :** Peyssonel (1723) and Trembley (1744) proved these to be animals. Hence, Linnaeus (1758), Cuvier (1796) and Lamarck (1801) included these under '*Zoophyta*', together with sponges. Leuckart (1847) included sponges and cnidarians under his phylum Coelenterata. Finally, Hatschek (1888) divided "Coelenterata" into three phyla–Spongiaria (= Porifera), Cnidaria and Ctenophora.

(iii)Salient Features : Phylum coelenterata has the following salient features -

(1) Coelenterates are multicellular organisms

- (2) They have tissue-grade of organization
- (3) The body is radially symmetrical. Radial symmetry is the symmetry of a wheel
- (4) All the members of this phylum are aquatic

(5) They are solitary or colonial

(6) Two types of individuals occur in the life cycle. They are polyps and medusa

(7) The body wall is diploblastic. It is made up of two layers of cells, namely the ectoderm and the endoderm with a non–cellular layer called mesogloea in between.

(8) Nematocysts or stinging cells are present

(9) Coelom is absent; Hence coelenterates are acoelomate animals

(10) A gastrovascular cavity or coelenteron is present. It can be compared to the gut of higher animals.

(11) Mouth is present; but anus is absent

(12) Digestion is extracellular as well as intracellular

(13) Respiratory, excretory and circulatory system are absent

(14) Nervous system is diffuse-type, formed or nerve-nets.

(15) Reproduction is by asexual and sexual methods

(16) Development is indirect as there are one or two larval forms

(17) Life history has alternation of generations or metagenesis.

(iv) Classification of coelenterata : Phylum coelenterata is divided into three classes.

(a) Class 1. Hydrozoa

(1) Hydrozoa are solitary and fresh water or mostly colonial and marine, sessile and free-swimming forms.

(2) They exhibit tetramerous or polymerous radial symmetry



(3) Body wall consists of an outer ectoderm and an inner endoderm separated by a non–cellular gelatinous mesogloea.

(4) Gastrovascular cavity without stomodaeum, septa or nematocysts bearing gastric filament

(5) Skeleton or horny structure is horny perisarc in some forms, while coenosarc secretes a skeleton of calcium carbonate forming massive stony structure or coral in other forms.

(6) They exhibit polymorphism. There are two main types of zoods, the polyp and medusa. Medusa is provided with true muscular velum.

(7) Many hydrozoa exhibit alternation of generation

(8) Reproductive products of sex cells are usually ectodermal in origin and discharged externally.

(9) Cleavage is holoblastic, embryo ciliated planula.

Examples : Hydra, Tubularia, Bougainvillea, Hydractinia, Eudendrium, Pennaria, Obelia, Sertularia, Plumularia Companularia, Millepora, Stylaster, Geryonia, Physalia, Porpita, Velella, Pericolpa, Periphylla, Aurelia, Cynaea, Rhizostoma or Pilema Cassiopeia, etc.,

□ Physalia is commonly known as Portuguese man of war. Aurelia is commonly known as Jellyfish.

(b) Class 2. Scyphozoa

(1) Scyphhozoa include large jellyfishes or true medusae.

(2) They are exclusively marine.

(3) Medusae are large, bell or umbrella-shaped and without true velum. They are free swimming or attached by an aboral stalk

(4) Marginal sense organs are tentaculocysts

(5) Polypoid generation is absent or represented by small polyp, the scyphistoma which gives rise to medusae by strobilization or transverse fission.

(6) Gastrovascular system is without stomodaeum, with gastric filaments and it may or may not be divided into four inter-radial pockets by septa.



(7) Mesogloea is usually cellular

(8) Gonads are endodermal and the sex cells are discharged into the stomach.

Class scyphozoa is divided into five orders, namely Stauromedusae, Cubomedusae, Coronatae, Semaeostomeae and Rhizostomeae

Examples : Lucernaria, Haliclytus

(c) Class 3. Anthozoa

(1) These are solitary or colonial exclusively marine forms

(2) They are exclusively polypoid. Medusoid stage is altogether absent

(3) Body is cylindrical with hexamerous, octomerous or polymerous biradial or radiobilateral symmetry

(4) The oral end of the body is expanded radially into an oral disc bearing hollow tentacles surrounding the mouth in the centre.

(5) The stomodaeum is often provided with one or more ciliated grooves, the siphonoglyphs.

(6) Gastrovascular cavity is divided into compartments by complete or incomplete septa or mesenteries.

(7) Mesenteries bear nematocysts at their free edges

(8) Mesogloea contains fibrous connective tissue and amoeboid cells.

### Subclass 1. Alcyonaria (Octocorallia)

(1) These are colonial marine forms

(2) Polyps are long or short cylinders terminating orally into a flat circular oral disc having the oval or elongated mouth in the centre

(3) Polyps always bear eight pinnate, hollow tentacles

(4) Eight complete mesenteries are present.

(5) Single ventral siphonoglyph is present

(6) Endoskeleton is the product of mesogloeal cells comprised of calcareous spicules either calcareous or horny in nature.

(7) Polyps are dimorphic in some forms.

Examples : Tubipora, Calvularia, Alcyonium, Xenia, Heliopora, Gorgonia, Corallium, etc.,

**U** Tubipora is commonly know as organ pipe coral.

### Subclass 2. Zoantharia (Hexacorallia)

(1) These are solitary or colonial marine forms

(2) Tentacles simple, rarely branched, hollow cone shaped, numerous arranged in the multiple of five and six but never eight

(3) Mesenteries are numerous arranged in the multiple of five or six, may be complete or incomplete

(4) Two siphonoglyphs are commonly present

(5) Endoskeleton when present is calcareous, derived from ectoderm

(6) Polyps are usually monomorphic.

Examples : Actinia, Metridium, Adamsia, Edwardsia, Astraea, Fungia, Zoanthus, Antipathes

□ Metridium & Adamsia is commonly known as sea anemone.

### **1.6 CTENOPHORA**

(i) **Introduction :** Ctenophora is a small phylum. It contains only about 80 species. It includes a set of marine animals commonly called comb jellies or sea walnuts. These animals exhibit the characters of Coelenterata and platyhelminthes. Formerly this phylum was placed under Coelenterata.but HATSCHEK (1889) placed it under a separate phylum called Ctenophora. The following are the important Ctenophore animals. Pleurobachia, Coeloplana, Ctenoplana, Velamen, hemiphora, Beroe, etc.,

(ii) Salient features : Phylum Ctenophora shows the following salient features

- (1) All the ctenophores are marine.
- (2) They are solitary and pelagic.
- (3) They are transparent.
- (4) They have tissue-grade of organization.
- (5) They have biradial symmetry.
- (6) They are acoelomate animals.
- (7) They are unsegmented.
- (8) They body-wall is diploblastic.
- (9) The mesogloea contains cells.
- (10) Nematocysts are absent.
- (11) Special adhesive cells called colloblasts are present in all ctenophores.
- (12) The gastrovascular system is well developed.
- (13) Two anal openings are present.
- (14) Skeletal system is absent.
- (15) Excretion and respiration are carried out by diffusion.
- (16) The nervous system is in the form of nerve net.



Metridiu



- (17) An aboral sense organ in present in the form of statocyst.
- (18) Cilia are used for locomation.
- (19) They are hermaphrodites.
- (20) Development is indirect. It includes a cydippid larva.

## (iii) Classification of Ctenophora

## (a) Class 1. Tentaculata

- (1) The body is simple, rounded or oval or ribbon-like.
- (2) Two long aboral tentacles are present.
- (3) Mouth is narrow and pharynx is small.

## Order 1. Cydippida

- (1) Body is oval or rounded
- (2) Two long branched tentacles are present and they can be retracted into sheaths
- (3) Branches of gastro-vascular system are terminating blindly

Examples : Hormiphora, Pleurobrachila, etc.,

## Order 2. Lobata

- (1) Body is laterally compressed
- (2) Two large oral lobes or lappets and four pointed processes or auricles are present
- (3) Tentacles are many, non-retractile without sheaths.
- (4) Stomodaeal and meridional vessels unite with one another

Examples : Deiopea, Bolinopsis, etc.,

## Order 3. Cestida

- (1) Body is laterally compressed and ribbon-like
- (2) Two main tentacles and may lateral tentacles are present
- (3) Four rows of rudimentary comb plates are present
- (4) Meridonal and stomodaeal vessels anastomose

Examples : Cestum, Velamen, etc.,

## Order 4. Platyctenea

- (1) Body is worm-like and compressed in oral-aboral axis
- (2) Tentacles with sheaths are present
- (3) Comb rows or swimming plates are present only in larva
- (4) Meridional canals are absent, but there is a system of branching peripheral system
- (b) Class 2. Nuda
- (1) Body is large thimble-shaped or conical
- (2) Tentacles are absent
- (3) Mouth is wide and pharynx is large

(4) The meridional vessels are produced into a complex system of anastomosing branches Example : Beroe

## **1.7 PHYLUM PLATYHELMINTHES**

(i) **Introduction :** Bilateral and protostominal "organ grade" eumetazoans without a body cavity (acoelomates). "Platyhelminthes" means flatworms (Gr., *platys* = flat; *helmins* = worms); their body is dorsoventrally flattened. About 10,000 species known.

(ii) **Brief History :** Aristotle mentioned tapeworms, but scientific studies of flatworms began only in the 18th century. It was Gegenbaur (1859) who placed these in a separate group and suggested the present name of the phylum.

### (iii) Salient feature

(1) They are dorso ventrally flattened like a leaf

(2) They show organ grade of organization

(3) They are acoelomate animals. The cavity in platyhelminthes is filled with mesenchyme or parenchyma

(4) They are triploblastic animals. The cells of the body wall are arranged in three layers. They are the ectoderm, the mesoderm and the endoderm

(5) They are bilaterally symmetrical animals. The body of the animal can be divided into two equal similar halves through only one plane. Animals with this symmetry have definite polarity of anterior and posterior ends.

(6) Some members have segmented body. The segmentation in platyhelminthes is called pseudometamerism

(7) Many of the parenchyma cells give rise to muscle fibres. The muscle fibres are arranged in circular, longitudinal and vertical layers.

(8) The digestive system is completely absent from Cestoda and Acoela. The alimentary canal is branched in Turbellarians. The anus is absent from them.

(9) The respiratory organs are absent. In parasites respiration is anaerobic

(10) There is no circulatory system

(11) The excretory system is formed of protonephridia (flame cells)

(12) The nervous system is well developed. It is formed of longitudinal nerve cords with ganglia. A pair of anterior ganglia form the brain. The longitudinal nerve cords are connected together by transverse connectives.

(13) They are hermaphrodites, *i.e.*, both male and female reproductive organs are present in the same animal

(14) Fertilization is internal in them. Self or cross fertilization takes place in them.

(15) Their development is direct or indirect. Endoparasites show usually indirect development with many larval stages. Their life cycle is completed in one or two hosts.

(16) They are free living or parasitic. In parasitic worms adhesive organs like hooks, spines, suckers and adhesive secretions are present.

(iv) Classification of Platyhelminthes

### (a) Class 1. Turbellaria

(1) Most of the turbellarians are free living but some of them are ecotocommensal or parasitic

(2) The body epidermis is either cellular or syncytial and covered with cilia. Epidermis contains rhabdites

(3) Segmentation is absent

(4) Digestive system is present except in a few

(5) Suckers are absent

(6) Life cycle is simple

Example : Dugesia, Notoplana, Bipalium

(b) Class (2) – Trematoda

(1) Ecto or endoparasites of vertebrates; commonly called flukes.

(2) Body mostly oval, unsegmented.

(3) Body wall without cilia, but covered by a thick, resistant, syncytial tegument.

(4) Suckers, and often hooks and spines, present for attachment to host tissues.

(5) Sense organs usually absent in adults.

(6) Digestive system well developed with terminal mouth, but no anus.

(7) Mostly hermaphrodite. Life cycle simple or complicated.

Examples : Polystomum, Fasciola, Schistosoma (blood fluke of man and other mammals).

(c) Class (3) – Cestoda

(1) All endoparasites. Mostly in alimentary canal of vertebrates; commonly called tapeworms.

(2) Body long and slender, tape-like, usually divided into small segments (= proglottids).

(3) Body wall non-ciliated, with a thick tegument.

(4) Anterior end with suckers and other attachment organs.

(5) No mouth; digestive system absent ; digested liquid food is absorbed from host tissues by diffusion through body wall.

(6) Sense organs absent.

(7) Each proglottid contains one or two complete sets of hermaphrodite (bisexual) reproductive organs.

(8) Life-cycle usually complicated with alternation of hosts. Embryo hooked.

Examples – Taenia, Echinococcus, Hymenolepis.





### **1.8 PHYLUM NEMATODA (= NEMATHELMINTHES)**

(i) **Introduction :** Bilateral and protostomial "organ grade" eumetazoans in which the space between body wall and alimentary canal is a false body cavity, or pseudocoel, derived from embryonic blastocoel. The term "Nematoda" literally means "threadworms" or "roundworms" (Gr., *nema* = thread + *eidos* = form). About 12,000 species known.

(ii) **Brief History :** Ancient people were familiar with certain large-sized nematode parasites of domestic animals. Minute nematodes were discovered only after the invention of microscope. Linnaeus (1758) included these in *"Vermes"* Rudophi (1793, 1819) included these under "Nematoidea" Gegenbaur (1859) ultimately proposed "Nemathelminthes" for these.

### (iii) Salient features

(1) Many endoparasites of various animals and plants; others free-living and widely distributed in all sorts of water and damp soil.

(2) Mostly minute or small; some large (1 mm to 25 cm); some upto several metres long.

(3) Slender, cylindrical, elongated body usually tapering towards both ends, and unsegmented.

(4) Body wall formed of a thick, tough and shiny cuticle, a syncytial hypodermis beneath cuticle, and innermost layer of peculiar, large and longitudinally extended muscle cells arranged in four quadrants.

(5) The false body cavity, or pseudocoel is spacious, with a fluid but no free cells

(6) Straight alimentary tract with terminal mouth and anus

(7) Circulatory system and respiratory organs absent. A simple excretory system, comparatively simpler or complicated sensory organs, and a well–developed nervous system present

(8) Reproductive system well-developed. Usually unisexual with sexual dimorphism.

(9) Many kinds of Nematodes are parasites of useful plants and domestic animals. Some of these are pathogenic to their hosts, causing serious diseases. Even man is a host for more than 50 species, of

which *Ascaris lumbricoides* and enterobius vermicularis (pin worm) are very common. Other common human nematodes are Wuchereria which causes Filaria, Trichinella causing trichinosis, and Ancylostoma causing hookworm disease.

(iv) **Classification of Nematoda :** On basis of the presence of absence of some specialized sense organs and caudal glands, and characteristics of excretory system, nematodes are classified into two classes:

### (a) Class (1) – Phasmidia or Secernentea :

- (1) Mostly parasitic.
- (2) Possess a pair of unicellular, pouch-like sense organs, called phasmids, near hind end of body.
- (3) Another pair of reduced, pore–like sense organs, called amphids, present near anterior end.
- (4) Excretory system with paired lateral canals.
- (5) Caudal glands absent. Examples Ascaris, Enterobius, Ancylostoma, Wuchereria, etc.

## (b) Class (2) – Aphasmidia or Adenophorea :

- (1) Mostly small, free-living.
- (2) No phasmids.
- (3) Amphids spiral, cord like or disc like, seldom pore like.
- (4) No lateral excretory canals.
- (5) Caudal glands present. Examples Tichinella, Capillaria, etc.



**1.9 PHYLUM ANNELIDA** 

(i) **Introduction :** Bilateral and protostomial eucoelomate eumetazoans whose long, narrow and worm like body is divided into ring-like, true or metameric segments (Gr., *annelus* = little ring), and the skin usually bears unjointed, chitinous appendages, termed setae. Commonly known as "segmented worms". About 9,000 species known.

(ii) **Brief History : Linnaeus** (1758) included all soft-bodied worms in "*Vermes*". Lamarck (1801) established phylum annelida for higher types of worms.

## (iii) Salient features

(1) Annelids are bilaterally symmetrical animals

(2) They have organ-system grade of organization

(3) They are coelomate animals

(4) They have triploblastic body wall

(5) The muscle layers are thick in the body wall. Hence the body wall is said to be dermomuscular

(6) The body is divided into a numerous segments called the metameres. The segmentation is known as metamerism

(7) The body is covered with a thin cuticle.

(8) Locomotory organs are setae.

(9) Digestive system is well developed

(10) Blood vascular system is a closed type

(11) Excretory system is formed of segmentally arranged nephridia.

(12) Nervous system is formed of a pair of cerebral ganglia (brain) and a double ventral nerve cord

(13) Mostly annelids are hermaphrodites

(14) The gonoducts are formed from coelom (coelomoducts). The coelomoducts have connection with nephridis.

(15) Regeneration is common character in this phylum

(16) Their development is direct or indirect.

## (iv) Classification of annelida

(a) Class 1. Polychaeta

(1) Polychaeta are marine and carnivorous.

(2) Body is elongated and segmented.

(3) Head consists of prostomium and peristomium and bear eyes, tentacles, cirri and palps, etc.

(4) Setae are numerous and are borne up on lateral prominances of the body wall known as parapodia

(5) Clitellum is absent

(6) Cirri or branchiae or both may be present for respiration

(7) Coelom is spacious usually divided by inter segmented septa

(8) Alimentary canal is provided with an eversible buccal region and protrusible pharynx.

(9) Excretory organs are segmentally paired nephridia

(10) Saxes are separate

(11) Fertilization is external; free swimming larval stage is trochophore

(12) Asexual reproduction occurs by budding.

Examples : Nereis, Aphrodite, Polynae, Chaetopterus

□ Trochophore larva present in polychaeta (Neries). Aphrodite is commonly known as Sea mouse.

### (b) Class 2. Oligochaeta

(1) They are mostly terrestrial or some fresh water forms.

(2) Body has conspicuous external and internal segmentation.

(3) Dsitinct head, eyes and tentacles are absent.

(4) Parapodia are absent.

(5) Setae are usually arranged segmentally.

(6) Clitellum is usually present.

(7) Pharynx is not eversible and without jaws.

(8) They are hermaphrodites.

(9) Development is direct and takes place within cocoons secreted by clitellum.

(10) No free larval stage

Examples : Tubifer, Pheretima, (All earthworms).

### (c) Class 3. Hirudinea

(1) This class includes mostly ectoparasitic and fresh water forms, while few are marine, feeding upon fishes and other animals.

(2) Body is elongated usually flattened dorso-ventrally or cylindrical

(3) Body consists or definite number of segments, each segments breaks up into 2 to 4 rings or annuli

(4) Parapodia and setae are absent

(5) Body is provided with an anterior and a posterior sucker, both situated ventrally

(6) Mouth opens on the ventral surface in the anterior sucker, while anus opens dorsal to the posterior sucker

(7) Hermaphrodite *i.e.*, sexes united

(8) Reproduction sexual. Asexual





reproduction is not known

(9) Eggs are usually laid in cocoons.

(10) Development is direct without free swimming larval stage

Examples : Acantaobdella, Glossiphonia (All leeches)

### (d) Class 4 Archiannelida

(1) They are exclusively marine forms

(2) Body elongated and worm-like

(3) Setae and parapodia are usually absent

(4) External segmentation is slightly marked by faint while internal segmentation is marked by coelomic septa

(5) Prostomium bears two or three tentacles

(6) Unisexual or hermaphrodite

(7) Larva is typical trochopore

Examples : Polygoridus, Protodrillus, Nerilla, Saccocirrus, etc.

### 1.10 PHYLUM ARTHROPODA

(i) **Introduction :** Bilateral and protostomial eucoelomate eumetazoa with metamerically segmented body and each segment bearing a pair of jointed locomotory appendages. "Arthopoda" literally means animals bearing jointed feet (Gr., *arthron* = jointed + *podos* = foot). These are extremely successful animals due to a protective exoskeleton and jointed appendages. That is why, more than  $8\frac{1}{2}$  lac arthropod species are known as against about  $2\frac{1}{2}$  lac species of the remaining animals.



(ii) **Brief History :** Aristotle described a few crabs and other arthropods. Linnaeus included all such animals in his group "Insecta". Lamarck divided this group into there classes – Crustacea, Hexapoda and Archnida. Finally, Vonsaibold (1845) established the phylum Arthropoda for these animals.

### (iii) Salient features

(1) Occur widely on land, in air, and in all sorts of water, form snowy tops of high mountains to the depths of ocean. Many are parasites of other animals and plants. Hence, the phylum is of great economic importance.

(2) Bilateral, triploblastic body segmented and also divided into head, thorax and abdomen. Segmentation marked only externally; number of segments or somites fixed and each has its separate exoskeleton of thick and hard, chitinous cuticle secreted by epidermis of body wall. Head somites always fused.

(3) Each segment basically bears a pair of lateral jointed appendages adapted for food ingestion, locomotion, respiration, copulation, etc.

(4) Muscular system well-developed; muscle fibres always striated.

(5) Digestive tract complete. Most head appendages from mouth parts with lateral jaws for chewing or sucking. Anus terminal

(6) Coelom reduced to small cavities in excretory and reproductive organs; replaced elsewhere by blood sinuses which merge together to form a large perivisceral cavity – the haemocoel–around viscera. Sinuses form an "open blood vascular system" filled with haemolymph which may contain haemocyanin. Haemocoel communicates with a long tubular and pulsatile, mid–dorsal heart.

(7) Respiration by gills (aquatic forms), or tracheae or book lungs (terrestrial forms); by diffusion through body surface in some

(8) Excretion by coelomoducts or specialized green or coxal glands, or by malpighian tubules

(9) Nervous system basically similar to the typical annelid plan; head with a brain-ring which is connected to a double ventral nerve cord, having paired segmental ganglia which represent true metamerism. Well–developed sensory organs of various types.

(10) Sexes mostly separate with sexual dimorphism

(11) Fertilization typically internal, in female's body. Eggs megalecithal. Oviparous or viviparous

(12) Life-cycle includes one or more larval stages that metamorphose into adults.

(iv) **Classification of Arthropoda :** On basis of body shape, degree of segmentation and regionation, and presence or absence of certain appendages (antennae, mandibles and chelicerae), phylum Arthropods is divided into three subphyla : Biggest phylum in regard to the number of species is Arthropoda

### (a) Subphylum Trilobita

(1) Most primitive, extinct, marine arthropods of Cambrian to Permian rocks.

(2) 10 to 675 mm. Long body covered by a hard segmented shell; distinct head of four fused somites bearing a pair of antennae, four pairs of appendages and often a pair of eyes.

(3) Trunk divided, by two longitudinal furrows, into 3 lobes.

(4) Abdominal region of 2 to 29 somites and a fused caudal plate or pygidium.

(5) Each segment, except the last one, bears a pair of biramous jointed appendages.

Example – Triarthrus.

## (b) Subphylum Chelicerata

(1) Mostly terrestrial, free-living and small-sized.

(2) Body distinguished into head, thorax and abdomen (= opisthosoma). Head and thorax fused to form a cephalothorax or prosoma.

(3) Cephalothorax with eyes and six pairs of appendages – One pair of clawed and jointed chelicerae in place of mandibles, one pair of pedipalps, and four pairs of walking legs. Antennae absent. Abdomen with or without appendages, but distinguished into a large and broader mesosoma, a small metasoma and a long and narrow, tail–like telson.

(4) Respiration by gills book–lungs or tracheae.

(5) Excretion by malpighian tubules or coxal glands, or both.

(6) Sexes mostly separate; females oviparous; development direct or through a larval stage. Divided into three classes on the basis of respiratory organs

## Class (1) – Merostoma

(1) They are Marine.

(2) Respiration by gills.

(3) Cephalothroax with lateral compound eyes and six pairs of usual appendages.

(4) Abdomen with 5 to 6 pairs of gill-bearing appendages.

(5) Hind end forms a long bayonet–like telson.

Example- Limulus (The king-crab). Limulus is a living fossil.

## Class (2) – Arachnida

(1) Mostly terrestrial; spiders, scorpions, mites, ticks, etc.

- (2) Respiration by book–lungs of tracheae.
- (3) Eyes simple
- (4) Abdomen without appendages.
- (5) Many with poison glands and poison fangs, jaws of stings.

(6) No gills.

(7) Life–cyle without metamorphosis.

Examples – Palamnaeus (scorpion), Lycosa (the common web-spinning spider; web-spinning glands are situated in posterior part of abdomen). Spiders and scorpions are includes in class Arachnida.

## Class (3) – Pycnogonida or Pentapoda

(1) Small-sized marine sea-spiders.

- (2) Cephalothorax 3-segmented; forms major part of body; abdomen vestigial.
- (3) Suctorial mouth on top of a long proboscis.
- (4) Head usually with 4 pairs of appendages and 4 eyes.
- (5) 5, 6 or 12 pairs of long walking legs.
- (6) No special respiratory and excretory organs.

(7) Unisexual; females oviparous. Eggs carried by males.

Example – Nymphon.

## (c) Subphylum Mandibulata or Antennata

(1) Body divided into head and trunk, or head, thorax and abdomen.

(2) Segmentation distinct.

(3) 1 or 2 pairs of antennae, 1 pair of mandibles in place of chelicerae, one or more pairs of maxillae and 3 or more pairs of walking legs.

(4) Eyes mostly compound.

(5) Respiration by gills or tracheae.

(6) Excretion by malpighian tubules or antennal glands.

(7) Unisexual; life cycle usually with larval forms. Divided into six classes

## Class (1) – Crustacea

(1) Mostly aquatic.

(2) Body divided into cephalothroax and abdomen.

(3) Dorsally, cephalothorax covered by a thick exoskeletal carapace.

(4) Head of 5 segments, with 2 pairs of antennae, one pair of mandibles and 2 pairs of maxillae; thorax of 2 to 60 distinct or variously fused somites; abdominal somites usually distinct with a posterior telson.

(5) Appendages mostly biramous.

(6) Respiration through body surface or by gills.

(7) Excretion by special coxal glands in antennae or maxillae.

(8) Mostly unisexual; genital ducts and pores paired; females oviparous.

(9) Life-cycle usually with larval forms.

Examples -Palaemon (prawn), Cancer(Crab), Cyclops (Water-flea), Crayfish.

## Class (2) – Insecta

(1) Aquatic, terrestrial or aerial.

(2) Body divided into head, thorax and abdomen.

(3) Segments 6 in head, 3 in thorax and 11 or less in abdomen.

(4) Legs typically 3 pairs (Hexapoda); aerial forms with one or two pairs of wings.

(5) Head with 1 pair of large, compound eyes, 1 pair of antennae and variously modified mouth-parts.

(6) Respiration by branched tracheae.

(7) Excretion by specialized malpighian tubules.

(8) Unisexual; females oviparous.

(9) Life-cycle simple or complicated.

Examples – periplaneta (Cockroach), Musca (house-fly), Mosquitoes, locusts butterflies, bees, wasps, termites, silverfish (Lepisma), beetles, etc. Insects are of great economic importance to mankind. Silverfish is not a fish.

## Class (3) – Diplopoda (Millipedes)

(1) Terrestrial.

(2) Body long, cylindrical, worm–like.

(3) 5-segmented head with 1 pair each of short antennae, mandibles and maxillae; 2 groups of simple eyes.

(4) Thorax of 4 segments, each except the first with a pair of joined legs.

(5) Abdomen of 9 to 100 or more segments, but each apparent segment formed by fusion of two and, hence, bears 2 pairs of legs, spiracles, ostia and nerve ganglia.

(6) Respiration by tracheae.

(7) Excretion by malpighian tubules.

(8) Unisexual; gonad single; females oviparous.

Example – Thyroglutus (millipede)

## Class (4) – Chilopods (Centipedes)

(1) Terrestrial.

(2) Body long, worm–like, somewhat dorso–ventrally flattened and divided into head and trunk.

(3) Segments 15 to 181; not fused in pairs; each with a single pair of legs; first pair of legs claw like and each contains a poison gland.

(4) Head with a air each of long antennae and mandibles, and 2 pairs of maxillae.

(5) Respiration by tracheae.

(6) Unisexual; females oviparous or viviparous. Genital openings mid ventral on last but one segment.

(7) Excretion by malpighian tubules.

Example – Scolopendra (centipede).

## Class (5) – Symphyla

(1) Terrestrial.

(2) Body upto 6 mm. Long; divided into head and trunk.

(3) Head like that of insects, but without eyes.

(4) Trunk of 15 to 22 somites; bears 10 to 12 pairs of legs.

(5) Genital pores mid ventral between legs of 4th pair.

Example – Scutigerella (the garden centipede).

## Class (6) – Pauropoda

(1) Terrestrial.

(2) Minute, soft and cylindrical, worm like body divisible into head and trunk.

(3) Head with one pair each of branched antennae and unbranched mandibles and maxillae; no eyes.

(4) Trunk of 11 or 12 somites which are dorsally fused in pairs.

(5) Legs 9 to 10 pairs.

(6) Genital pores ventral on 3<sup>rd</sup> trunk segment.

Example – Pauropus.

### 1.11 PHYLUM MOLLUSCA

(i) **Introduction :** Basically bilateral and protostomial eucoelomate eumetazoans whose soft body (L., *mollis* or *molluscum* = soft) is unsegmented and enclosed within a skin–fold (mantle) which usually secretes a calcareous shell.

About 80,000 existing and 35,000 extinct species known. Aquatic or terrestrial. Snails and mussels found along banks of freshwater bodies and the oysters, shanks (shose conch-shell is commonly blown in religious ceremonies) and cowries of the sea are common molluscs. Malacology or Conchology is the branch of study of molluscs and their shells. Molluscs are of some economic importance; man uses some as food; shells of some are used for making buttons, beads, etc.

(ii) **Brief History :** Aristotle described a number of molluscs. Johnston (1650) proposed the name of the phylum.

### (iii) Salient Features

- (1) Molluscs are multicellular organisms
- (2) They have a bilateral symmetry, but snails are asymmetrical
- (3) They are triploblastic animals.
- (4) They are coelomate animals. True coelom is reduced the haemocoel is well developed in them.
- (5) They have organ system grade of organization.
- (6) The body is soft and unsegmented.
- (7) The soft body is covered by a fleshy fold of the body wall. It is called mantle.
- (8) The molluscs are provided with one or two calcareous shells. The shells may be external or internal.
  - (9) Respiration is carried out by the gills or pulmonary chambers.
  - (10) The digestive system is well developed. It contains a radula and a hepatopancreas.
  - (11) The circulatory system is of an open type.
  - (12) The excretory organ is the kidney.
  - (13) The nervous system is well developed.
  - (14) The sensory organs are eyes, statocysts and osphradia.
  - (15) Sexes are separate in them, or they are hermaphrodites.
  - (16) The development in their case in either direct or indirect

### (iv) Classification of Mollusca

### **Class 1. Aplacophora or Solenogasters**

- (1) The body is worm–like, bilaterally symmetrical and cylindrical.
- (2) The head, mantle, foot, shell and nephridia are absent.
- (3) The body is covered with spicule–bearing cuticle.
- (4) The digestive tract is straight with radula.
- (5) A mid dorsal longitudinal keel or crest is often present .

### Example : Neomenia, Chaetoderma, etc.,

### **Class 2. Monoplacophora**

- (1) The body is bilaterally symmetrical and segmented.
- (2) The shell is formed of a single valve.
- (3) The head is without eyes and tentacles.
- (4) The gills are external and serially arranged.



Neopilina

(5) The nephridia are five pairs.

Example : Neopilina galatheae

□ Neopilina is a living fossil and connecting link between Annelida and Mollusca.

## Class 3. Polyplacophora

(1) These molluscs are bilaterally symmetrical, and dorsoventrally flattened.

(2) The shell is composed of a longitudinal series of 8 plates.

(3) The foot is flat and ventral.

(4) The radula is well developed.

Example : Chiton, Cryptochiton, etc.

## Class 4. Gastropoda

- (1) It seems that these animals are moving on their stomach. Hence the name gastropoda.
- (2) Gastropods are marine, fresh water or

terrestrial animals. A few are parasitic.

- (3) The body is unsegmented and asymmetrical.
- (4) The shell is univalve and spirally coiled.

(5) The head is distinct. It bears tentacles,

eyes and a mouth.

- (6) The foot is ventral and muscular.
- (7) The buccal cavity is provided with a radula.
- (8) The circulatory system is open.

(9) The sexes are mostly separate, while some forms are hermaphrodite.

(10) The development includes veliger and trochophore larvae.

Examples : Haliotis, Cypraea (Cowrie)

Pila (apple snail), Murex (rock shell)

Aplysea (sea hare etc),

Doris (Sea Lemon)

## **Class 5. Scaphopoda**

(1) The foot is boat–shaped.

(2) The eyes, the tentacles and

ctenidia are absent.

(3) Marine, bilaterally symmetrical molluscs.

Examples : Dentalium, Siphonodentalium and Pulsellum

Dentalium is commonly called tusk shells.



Sepia

### Class 6. Pelecypoda

- (1) Pelecypoda are aquatic in habit.
- (2) The body is bilaterally symmetrical and

laterally compressed.

- (3) The shell is formed of two distinctive shell plates.
- (4) The head is not distinct.
- (5) The alimentary canal shows a crystalline style.
- (6) The gills, excretory organs and the other

structures are paired.

- (7) The sexes are separate or united.
- (8) The development is indirect having a glochidium larva.

Example : Mytilus, Unio, Tredo.

Pearl oyster belongs to the class pelecypoda.

### Class 7. Cephalopoda

- (1) The body is bilaterally symmetrical.
- (2) The foot is modified into arms and funnel.
- (3) The shell may be either absent or rudimentary; it may be internal or external.
- (4) The odonotophore with a radula is present.
- (5) The ink–gland is present.
- (6) The sexes are separate.
- (7) The development is direct hence no metamorphosis and larval stage.

Example : Nautilus, Loligo Sepia, Octopus

### 1.12 PHYLUM ECHINODERMATA

(i) **Introduction :** Bilateral and deuterostomial eucoelomate eumetazoa with rough, tough and leathery skin due to dermal skeleton of usually spiny, calcareous ossicles; and the basic bilateral symmetry of larva modified, in the adult, to a pentamerous radial symmetry.

The term "Echinodermata" means spiny skin (Gr., echinos = spiny + dermatos = skin). About 6,000 living and 20,00 extinct species known.

(ii) **Brief History :** Although Jacob Klein (1738) had earlier coined the name "Echinodermata", yet Linnaeus included these animals under "Mollusca", and Lamarck under his class "Radiata" as "Echinodermes". Finally, Leuckart (1847) raised the group to the status of a separate phylum.

### (iii) Salient features

(1) Echinoderms are exclusively marine beings.

(2) They are triplobalstic and coelomate animals.

(3) They have radially symmetrical body. The radial symmetry is due to sedentary or sessile mode of life and it is a secondary character in echinoderms.

(4) They have organ system grade of organization.



(5) They have well developed endoskeleton formed of calcareous ossicles and spines.

(6) They have a water-vascular system with tube-

feet for locomotion, feeding and respiration.

(7) Circulatory system is of the open-type.

(8) The sensory organs are poorly developed.

(9) The excretory organs are absent.

(10) They have pedicellariae.

(11) Development is indirect.

(12) The larval forms are bilaterally symmetrical.

(13) Regeneration power is well developed in Echinoderms.

(14) Water vascular system found in echinodermata

### (iv) Classification of Echinodermata

(a) **Subphylum I. Eleutherozoa :** Free-living echinoderms.

### **Class 1. Asteroidea**

(1) Starfishes or sea stars.

(2) Arms 5 or more and not sharply marked off from the central disc.

(3) Tube feet in orally placed ambulacral grooves; with suckers.

(4) Anus and madreporite aboral.

(5) Pedicellariae present.

(6) Free-living, slow-creeping, predaceous and scavengerous.

Examples : Astropecten, Luidia, Goniaster, Oreaster (= Pentaceros), Asterina, Solaster, Pteraster, Echinaster.

### **Class 2. Ophiuroidea**

(1) Brittle-stars and allies.

(2) Body star-like with arms sharply marked off from the central disc.

(3) Pedicellariae absent.

(4) Stomach sac-like; no anus.

(5) Ambulacral grooves absent or covered by ossicles; tube feet without suckers.

(6) Madreporite oral.

Examples : Ophiura, Ophiothrix, Ophioderma, Ophiopholis, Gorgonocephalus (basket star), Asteronyx.

### Class 3. Echinoidea :

(1) Body not divided into arms; globular (sea urchins), or flattened disc-like (sea-cakes).

(2) Mouth at lower pole, covered by 5 strong and sharp teeth, forming a biting and chewing apparatus called "Aristotle's Lantern".

(3) Tube-feet slender with suckers.

(4) Skin ossicles fused to form a rigid globular, disc like, or heart-shaped shell or test with movable spines.

(5) 3-jawed pedicellariae present in skin.

(6) Gut long, slender and coiled. Anus present.



Star-fish

(7) Larval forms pluteus and Echinopluteus.

Examples – Sea urchins and sand dollars.etc.

□ Echinoderms also known as Floating stone.

### **Class 4. Holothuroidea**

(1) Body massive, long and cylindrical like a cucumber; elongated in oral-aboral axis; no arms.

(2) Mouth at anterior and anus at posterior ends.

(3) Mouth surrounded by many hollow retractile tentacles.

(4) Tube feet usually present; sucker-like.

(5) Skin leathery, but relatively soft, without spines or pedicellariae; may have an endoskeleton of miniute calcareous ossicles.

(6) Respiration and excretion by two long and highly branched tubes (= respiratory tree) extending into coelom from cloaca.

(7) Larval form Auricularia.

Examples – Holothuria, Cucumaria etc.

(b) **Subphylum II. Pelmatozoa :** Stalked, sedentary echinoderms.

### **Class 5. Crinoidea**

(1) Body flattened and pentamerous; distinguished into a small and circular central disc and five or more (in multiples of five) long, then, branched and flexible arms radiating from the disc.

(2) Disc enclosed in a hard, cup–shaped calyx formed of calcareous plates; calyx attached to a substratum by a stalk or simply by its aboral surface.

(3) Mouth in middle and anus excentral upon a cone, both upon oral surface. 5 ambulacral grooves run from mouth upto the tips of the arms.

(4) Tube feet sucker–like; restricted to central disc; can help in food–collection.

(5) Some forms (sea-lilies) permanently sessile and attached to sea-bottom by a long stalk; others (feather stars) free-swimming, but have flexible cirri for gripping objects in water.

(6) Spines and pedicellariae absent in skin.

Examples – Sea lilies and Feather stars (Antedon)

### 1.13 CHORDATA

### (i) General Characters of Phylum Chordata

(1) Aquatic, aerial or terrestrial. All free-living with no fully parasitic forms.

(2) Body small to large, bilaterally symmetrical and metamerically segmented.

(3) A post anal tail usually projects beyond the anus at some stage and may or may not persist in the adult.

(4) Exoskeleton often present; well developed in most vertebrates.

(5) Body wall triploblastic with 3 germinal layers : ectoderm, mesoderm and endoderm.

(6) Coelomate animals having a true coelom, enterocoelic or schizocoelic in origin.

(7) A skeletal rod, the notochord, present at some stage in life cycle.

(8) A cartilaginous or bony, living and jointed endoskeleton present in the majority of members (vertebrates).

(9) Pharyngeal gill slits present at some stage; may or may not be functional.

(10) Digestive system complete with digestive glands.

(11) Blood vascular system closed. Heart ventral with dorsal and ventral blood vessels. Hepatic portal system well developed.

- (12) Excretory system comprising proto-or meso- or meta-nephric kidneys.
- (13) Nerve cord dorsal and tubular. Anterior end usually enlarged to form brain.
- (14) Sexes separate with rare exceptions.





Sub-division of the phylum chordata

Group A. Acrania (Protochordata) or	Group B. Craniata (Euchordata) or Higher
Lower Chordata	Chordata
Exclusively marine, small-sized chordates	Aquatic or terrestrial, mostly large sized vertebrates
No appendages, cephalization and exoskeleton	Usually 2 pairs of appendages, well-developed head and exoskeleton present
Coelom enterocoelic, budding off from embryonic archenteron.	Coelom schizocoelic, arising by splitting of mesoderm
Notochord persistent. No skull, cranium and	Notochord covered or replaced by a vertebral

verterbral column	column. Skull and cranium well developed.
Phyrynx with permanent gill clefts. Endostyle	Phraryngeal gill clefts persist or disappear
present	Endostyle absent
Heart chamber less when present. No. red	Heart made of 2, 3 or 4 chambers. Blood
blood corpuscles in blood	contains R.B.C
Kidneys protonephridia	Kidneys meso- or metanephric
Sexes separate or united. Reproduction asexual as well as sexual. Gonoducts usually	Sexes separate. Only sexual reproduction, Gonoducts always present
absent	
Development indirect with a free-swimming	Development indirect or direct, with or
larval stage	without a larval stage

Division I. Agnatha	Division II. Gnathostomata
Without true jaws	True jaws present
Paired appendages absent	Appendages paired (pectoral & pelvic)
Inner ear with 2 semi-circular canals.	Inner ear with 3 semi-circular canals
Notochord persistent in adults	Notochord persists or replaced by vertebrae

(ii) **Classification of chordata :** Phylum chordata can be divided into two groups: Acrania (Protochordata) and Craniata (Euchordata) having contrasting characters.

**Group A. Acrania (Protochordata) :** (Gr. *a*, absent; kranion, head, or, Gr. protos, first; chorde, cord). All marine, small, Primitive or lower chordates. Lacking a head, a skull or cranium, a vertebral column, jaws and brain. About 2,000 species. The Acrania is divided into three subphyla: *Hemichordata, Urochordata* and *Cephalochordata*, chiefly on the character of notochord present.

**Subphylum I. Hemichordata :** (Gr. *hemi*, half; *chorde*, cord). Body divided into 3 regions: Proboscis, collar and trunk. Notochord doubtful, short, confined to proboscis and non-homologous with that of chordates.

**Class 1. Enteropneusta :** (Gr. *enteron*, gut; *pneustos*, breathed). Body large and worm-like. Gill slits numerous. Intstine straight. Acorn or togue worms. 70 species. Balanoglossus, Saccoglossus.

**Class 2. Pterobranchia :** (Gr. *pteron*, feather; *branchion*, gill). Body small and compact. Gillslits one pair or none. Intstine U–shaped. Pterobranchs. 20 species. Cephalodiscus, Rhabdopleura.

**Subphylum II. Urochordata or Tunicata :** (Gr. *oura*, a tail; L. *chorda*, cord). Notochord and nerve cord only in tadpole-like larva. Adult sac-like, often sessile and encased in a protective tunic. Tunicates.

**Class 1. Ascidacea :** Sessile tunicates with scattered muscles in tunic. Solitary, colonial or compound. Gill-clefts numerous. Ascidians or sea squirts. 1,200 species. *Herdmania, ciona, Molgula*. Retrograssive metamorphosis present in Herdmania.

**Class 2. Thaliacea :** Free-swimming or pelagic tunicates with circular muscles in tunic. Sometimes colonial. Salps or chain tunicates. 30 species. Salpa, Doliolum, Pyrosoma.

**Subphylum III. Cephalochordata :** (Gr. kephale, head; L. chorda, cord). Notochord and nerve cord present throughout life along entire length of body.

**Class Leptocardii :** Body fish-like, segmented with distinct myotomes and numerous gill-slits. Free swimming and burrowing. Lancelets. 30 species. Branchiostoma (= Amphioxus), Asymmetron.

**Group B. Craniata (Euchordata) :** Aquatic or terrestrial, usually large-sized, higher chordates or vertebrates with distinct head, a vertebral column, jaws and brain protected by a skull or cranium. The Craniata includes a single subphylum, the vertebrata.

**Subphylum IV. Vertebrata :** (L. vertebratus, backbone). Notochord supplemented or replaced by a vertebral column or backbone composed of overlapping vertebrae. Body divisible into head, neck, trunk and tail. Usually dioecious. Vertebrates, largest chordate subphylum including about 46,500 species. The subphylum Vertebrata is divided into two divisions: Agnatha and Gnathostomata, with contrasting characters as follows;

**Division I. Agnatha :** (Gr. *a*, not; gnathos, jaw). Jaw less primitive fish-like vertebrates without true jaws and paired limbs.

**Class 1. Ostracodermi.** (Gr. ostrakon, shell; derma, skin). Several extinct orders of ancient primitive heavily armoured, Palaeozoic, world's first vertebrates, collectively called the ostracoderms. Caphalaspis, Drepanaspis.

**Class 2. Cyclostomata.** (Gr. cyklos, circular; stoma, mouth). Body eel-shaped, without scales, jaws and lateral fins. Mouth rounded and suctorial. Gills 5–16 pairs. Parasites and scavengers. 45 species. Lampreys (Petromyzon) and hagfishes (Myxine).

**Division II. Gnathostomata :** (Gr. gnathos, jaw; stoma, mouth). Jawed vertebrates having true jaws and paired limbs.

For convenience, some taxonomists further divide Gnathostomata division into two super classes. All the fishes like aquatic gnathostomes are placed in the superclass Pisces, whereas all the four-footed terrestrial gnathostomes in the superclass Tetrapoda. Their contrasting features are as follows:

Superclass 1. Pisces	Superclass 2. Tetrapoda		
Exclusively aquatic gnathostome	Aquatic or terrestrial. Some arboreal and aerial		
vertebrates.			
Paired limbs, if present, as fins.	Paired pentadactyle limbs present		
Median fins present	Median fins absent		
Skin usually moist and scaly	Skin usually dry and cornified		
Respiration aquatic, by gills	Respiration aerial, by lungs		
Sense organs functional in water	Sense organs functional in air.		
It consist of fishes only.	It consist of classes Amphibia, Reptilia, Aves		
	and Mammals.		



### Class 1. Chondrichthyes (Cartilaginous Fishes)

### (i) General characters.

(1) Mostly marine and predaceous.

(2) Body fusiform or spindle shaped.

(3) Fins both median and paired, all supported by fin rays. Pelvic fins bear claspers in male. Tail heterocercal.

(4) Skin tough containing minute placoid scales and mucous glands.

(5) Endoskeleton entirely cartilaginous, without true bones (Gr. chondros, cartilage + ichthys, fish). Notochord persistent. Vertebrae complete and separate. Pectoral and pelvic girdles present.

(6) Mouth ventral. Jaws present. Teeth are modified placoid scales. Stomach J-shaped. Intestine with spiral valve.

(7) Respiration by 5 to 7 pairs of gills. Gill-slits separate and uncovered. Operculum absent. No air bladder and lungs.

(8) Heart 2–chambered (1 auricle and 1 ventricle). Sinus venosus and conus arteriosus present. Both renal and portal systems present. Temperature variable (poikilothermous).

(9) Kidneys opisthonephric. Excretion ureotelic. Cloaca present.

(10) Brain with large olfactory lobes and cerebellum. Cranial nerves 10 pairs.

(11) Olfactory sacs do not open into pharynx. Membranous labyrinth with 3 semicircular canals. Lateral line system present.

(12) Sexes separate. Gonads paired. Gonoducts open into cloaca. Fertilization internal. Oviparous or ovoviviparous. Eggs large, yolky. Cleavage meroblastic. Development direct, without metamorphosis.

### (ii) Classification of Chondrichthyes

(a) Subclass I. Selachii : (Gr., selachos, a shark)

(1) Multiple gill slits on either side protected by individual skin flaps.

(2) A spiracle behind each eye.

(3) Cloaca present.

Examples : True sharks. About 250 living species. Dogfishes (Scoliodon, Chiloscyllium, Mustelus, Carcharinus), spiny dogfish (squalus) seven gilled shark (Heptanchus), Zebra shark (stegostoma), hammer-headed (Sphyrna), whale shark (Rhineodon). Skates and rays. About 300 species. Skate (Raja), stingray (Trygon), electric ray (Tropedo), eagle ray (Myliobatis), guitar fish (Rhinobatus), sawfish (Pristis)

Electric organ are found in Torpedo

(b) Subclass 2. Holocephali : (Gr., holos, entire + kephale, head)

(1) Single gill opening on either side covered by a fleshy operculum.

(2) No spiracles, cloaca and scales.

(3) Jaws with tooth plates.

(4) Single nasal opening.

(5) Lateral line system with open groove.

Examples : Rat fishes or chimaeras. About 25 species. Hydrolagus (= Chimaera).

### Class 2. Osteichthyes (Bony fishes)

### (i) General Characters

(1) Inhabit all sorts of water-fresh, brackish or salt; warm or cold.

(2) Body spindle-shaped and streamlined.

(3) Fins both median and paired, supported by fin rays of cartilage or bone. Tail usually homocercal.

(4) Skin with may mucous glands, usually with embedded dermal scales of 3 types; ganoid, cycloid or ctenoid. Some without scales. No placoid scales.

(5) Endoskeleton chiefly of bone (Gr., osteon, bone + ichthyes, fish). Cartilage in sturgeons and some other. Notochord replaced by distinct vertebrae Pelvic girdle usually small and simple or absent. Claspers absent.

(6) Mouth terminal or sub terminal. Jaws usually with teeth. Cloaca lacking, anus present.

(7) Respiration by 4 pairs of gill on body gill arches, covered by a common operculum on either side.

(8) An air (swim) bladder often present with or without duct connected to pharynx. Lung-like in some (Dipnoi).

(9) Ventral heart 2-chambered (1 auricle + 1 ventricle). Sinus venosus and conus arteriosus present. Aortic arches 4 pairs. Erythrocytes oval, nucleated. Temperature variable (poikilothermous).

(10) Adult kidneys mesonephric. Excretion ureotelic.

(11) Brain with very small olfactory lobes, small cerebrum and well developed optic lobes and cerebellum. Cranial nerves 10 pairs.

(12) Well developed lateral line system. Internal ear with 3 semicircular canals.

(13) Sexes separate. Gonads paired. Fertilization usually external. Mostly oviparous, rarely ovoviviparous or viviparous. Eggs minute to 12 mm. Cleavage meroblastic. Development direct, rarely with metamorphosis.

### (ii) Classification of Osteichthyes

(a) Subclass I. Sarcopterygii : (Gr., sarcos, fleshy + pterygium, fin)

(1) Paired fins leg-like or lobed. With a fleshy, bony central axis covered by scales.

(2) Dorsal fins 2. Caudal fin hreterocercal with an epichordal lobe.

(3) Olfactory sacs usually connected to mouth cavity by internal nostrils or choanae, hence the previous name of subclass, choanichthyes (Gr., choana, funnel + ichthyes, fish).

(4) Popularly called fleshy or lobe-finned, or air breathing fish. Divided into 2 superorders or orders: Crossopterygii and Dipnoi.

Order 1. Crossopterygii – (Gr., crossoi, a fringe + pteryx, fin)

(1) Paired fins lobate. Caudal fin 3–lobed.

(2) Premaxillae and maxillae present.

(3) Internal nares present or absent. Spiracles present.

(4) Air bladder vestigial.

Example- Primitive fleshy-finned extinct fishes. Single living genus Latimeria.

Order 2. **Dipnoi** – (Gr., di, double + pnoe, breathing)

(1) Median fins continuous to form diphycercal tail.

(2) Premaxillae and maxillae absent.

(3) Internal nares present and spiracles absent.
(4) Air bladder single or paired, lung-like

Examples – Lung fishes. Only 3 living genera : Epiceratodus (Neoceratodus), Protopterus and Lepidosiren

(b) **Subclass II. Actinopterygii** – (Gr., actis, ray + pteryx, fin)

(1) Paired fins thin, broad, without fleshy basal lobes, and supported by dermal fin rays.

(2) One dorsal fin, may be divided.

(3) Caudal fin without epichordal lobe.

(4) Olfactory sacs not connected to mouth cavity.

(5) Popularly called ray-finned fishes. Divided into 3 infaclasses or superorders: Chondrostei, Holostei and Teleostei.

Superorder A. Chondrostei – (Gr., chondros, cartilage + osteon, bone)

(1) Mouth opening large.

(2) Scales usually ganoid.

(3) Tail fin heterocercal.

(4) Primitive ray-finned fish or cartilaginous ganoids.

Examples – Acepenser (Sturgeon), Polyodon (paddlefish)

Superorder B. Holostei – (Gr., holos, entire + osteon, bone)

(1) Mouth opening small.

(2) Ganoid or cycloid scales.

(3) Tail fin heterocercal.

(4) Intermediate ray-finned fish, transitional between Chondrostei and Teleostei

Examples –Lepisosteus (garpike)

Superorder C. Teleostei – (Gr., teleos, complete + osteon, bone)

(1) Mouth opening terminal, small.

(2) Scales cycloid, ctenoid or absent.

(3) Tail fin mostly homocercal.

(4) A hydrostatic swim bladder usually present.

(5) Advanced or modern ray-finned fishes

Examples – Harpodon (Bombay duck) Cyprinus (carp), Labeo rohita (rohu), Catla, Botia, Carassius (Goldfish), Clarius (Magur), Heteropneustes or Saccobranchus (singhi), Wallago (lachi), Mystus (tengra), Electrophorus (electric eel) Anguilla (freshwater eel), Muraena (moray) Hemirhamphus (half beak), Belone (garfish), Hippocampus (sea horse), Syngnathus (pipe fish), Fistularia (flute fish) Ophiocephalus or channa (snake head) Amphipbnous, Symbranchus (eels). Mastacembelus, Macrognathus, Pterois (scorpion fish), Pleuronectes, Synaptura, Solea, Echeneis or Remora (sucker fish), (porcupine fish), Tetrodon (globe fish)

# 1.15 CLASS AMPHIBIA

# (i) General characters

(1) Aquatic or semi aquatic (freshwater), air and water breathing, carnivorous, cold-blooded, oviparous, tetrapod vertebrates.

(2) Head distinct, trunk elongated. Neck and tail may be present or absent.

(3) Limbs usually 2 pairs (tetrapod), some limb less Toes 4-5 (pentadactyle) or less. Paired fins absent. Median fins, if present, without fin rays.

(4) Skin soft, moist and glandular. Pigment cells (chromatophores) present.

(5) Exoskeleton absent. Digits claw less. Some with concealed dermal scales.

(6) Endoskeleton mostly bony. Notochord does not persist. Skull with 2 occipital condyles.

(7) Mouth large. Upper or both jaws with small homodont teeth. Tongue often protrusible. Alimentary canal terminates into cloaca.

(8) Respiration by lungs, skin and mouth lining. Larvae with external gills which may persist in some aquatic adults.

(9) Heart 3–chambered (2 auricles + 1 ventricle). Sinus venosus present. Aortic arches 1-3 pairs. Renal and hepatic portal systems well developed Erythrocytes large, oval and nucleated. Body temperature variable (poikilothermous).

(10) Kidneys mesonephric. Urinary bladder large. Urinary ducts open into cloaca. Excretion ureotelic.

(11) Brain poorly developed. Cranial nerves 10 pairs.

(12) Nostrils connected to buccal cavity. Middle ear with a single rod-like ossicle, columella. Larval forms and some aquatic adults with lateral line system.

(13) Sexes separate. Male without copulatory organ Gonoducts open into cloaca. Fertilization mostly external. Females mostly oviparous.

(14) Development indirect. Cleavage holoblastic but unequal. No extra–embryonic membranes. Larva a tadpole which metamorphoses into adult

(ii) **Classification of Amphibia :** The living amphibians belong to only 2,500 species, a very much smaller number than that of other principal classes of vertebrates. Ranging from mid-Palaeozoic (Devonian) to early Mesozoic (Triassic). They dominated the World during Carboniferous, but most of them have become extinct since long. The classification most generally followed nowadays was provided by G. Kingsley Noble (1924).

(a) **Subclass I. Stegocephalia (Extinct)** – Limbs pentadactyle. Skin with scales and bony plates. Skull with a solid bony roof leaving openings for eyes and nostrils. Permian to Triassic.

Order 1. Labyrinthodontia – Oldest known tetrapods called stem Amphibia. Carboniferous to Triassic.

Example – Eryops.

Order 2. **Phyllospondyli** – Small salamander-like. Carboniferous to permian.

Example – Branchiosaurs (Ichthyostega).

Order 3. Lepospondyli – Small salamander or eel-like.Carboniferous to Permian.

Examples – Diplocaulus, Lysorophus.

(b) **Subclass II. Lissamphibia (living)** – Modern Amphibia lacking dermal bony skeleton. Teeth small, simple

Order 1. **Gymnophiona or Apoda** – (Gr., gymnos, naked + ophioneos, serpet-like) or (Gr., a, without + podos, foot)

(1) Limb less, blind, elongated worm like, burrowing tropical forms known as caecilians.

(2) Tail short or absent, cloaca terminal.

(3) In some dermal scales embedded in skin which is transversely wrinkled.

(4) Skull compact, roofed with bone.

(5) Limb girdle absent.

(6) Males have protrusible copulatory organs,

Examples – About 55 species. Ichthyophis, Uroaeoryphlus. Ichthyophis is a Limb less amphibian. Order 2. **Urodela or Caudata** – (Gr., Ura, tail + delos, visible) or (L., cauda, tail)

(1) Lizard-like amphibians with a distinct tail.

(2) Limbs 2 pairs, usually weak, almost equal.

(3) Skin devoid of scales and tympanum.

(4) Gills permanent or lost in adult.

(5) Males without copulatory organs.

(6) Larvae aquatic, adult-like, with teeth.

(7) About 300 species in 5 suborders.

Examples – Cryptobranchus, Megalobatrachus, Ambystoma, Salamandra (salamander), Desmognathus, Amphiuma (congo eel), Plethodon. Siren (mud eel), pseudobranchus.

Order 3. Salientia or Anura – (L., saliens, leaping) or (Gr., an, without + nura, tail)

(1) Specialized amphibia without tail in adults.

(2) Hind limbs usually adapted for leaping and swimming.

(3) Adults without gills or gill openings.

(4) Eyelids well-formed. Tympanum present.

(5) Skin loosely-fitting, scale less; mandible toothless.

(6) Pectoral girdle bony. Ribs absent or reduced. Vertebral column very small of 5–9 pre sacral vertebrae and a slender urostyle.

(7) Fertilization always external.

(8) Fully metamorphosed without neotenic forms.

(9) About 2,200 species of frogs and toads in 5 suborders.

Examples – Alytes (midwife toad), Bombinator, Discoglossus, Pipa, Xenopus, Pelobates, Scaphiopus, Bbufo (common toad), Rhinoderma, Dendrobates, Hyla (tree toad), Gastrotheca (marsupial frog), Rana (common frog), Polypedates or Rhacophorus (tree frog). The main difference between gymnophena and urodela is that urodela have smooth moist skin.

# 1.16 CLASS REPTILIA

(i) **General Characters :** Reptiles represent the first class of vertebrates fully adapted for life in dry places on land. They have no obvious diagnostic characteristics of their own that immediately separate them for other classes of vertebrates. The characters of reptiles are in fact a combination of characters that are found in fish and amphibians on one hand and in birds and mammals on the other. The class name refers to the mode of locomotion (L., repere or reptum, to creep or crawl), and the study of reptiles is called Herpetology (Gr., herpeton, reptiles).

(1) Predominantly terrestrial, creeping or burrowing, mostly carnivorous, air-breathing, cold-blooded, oviparous and tetrapodal vertebrates.

(2) Body bilaterally symmetrical and divisible into 4 regions-head, neck, trunk and tail.

(3) Limbs 2 pairs, pentadactyle. Digits provided with horny claws. However, limbs absent in a few lizards and all snakes.

(4) Exoskeleton of horny epidermal scales, shields, plates and scutes.

(5) Skin dry, cornified and devoid of glands.

(6) Mouth terminal. Jaws bear simple conical teeth. In turtles teeth replaced by horny breaks.

(7) Alimentary canal terminates into a cloacal aperture.

(8) Endoskeleton bony. Skull with one occipital condyle (monocondylar). A characteristic T-shaped inter clavicle present.

(9) Heart usually 3-chambered, 4-chambered in crocodiles. Sinus venosus reduced. 2 systemic arches present. Red blood corpuscles oval and nucleated. Cold-blooded.

(10) Respiration by lungs throughout life.

(11) Kidney metanephric. Excretion uricotelic.

(12) Brain with better development of cerebrum than in Amphibia. Cranial nerves 12 pairs.

(13) Lateral line system absent. Jacobson's organs present in the roof of mouth.

(14) Sexes separate. Male usually with a muscular copulatory organ.

(15) Fertilization internal. Mostly oviparous. Large yolky meroblastic eggs covered with leathery shells, always laid on land. Embryonic membranes (amnion, chorion, yolk sac and allantois) appear during development. No metamorphosis. Young resemble adults.

(16) Parental care usually absent

(ii) **Classification of Reptilia** : According to Bogert, there are more than 7,000 living and several extinct species of reptiles, grouped into approximately 16 orders of which only 4 are living.

(a) **Subclass I Anapsida** – Primitive reptiles with a solid skull roof. No temporal openings.

Order 1. Chelonia or Testudinata : (Gr., chelone, turtle; L., testudo, turtle)

(1) Body short, broad and oval.

(2) Limbs clawed and or webbed, paddle-like.

(3) Body encased in a firm shell of dorsal carapace and ventral plastron, made of dermal bony plates. Thoracic vertebrae and ribs usually fused to carapace.

(4) Skull anapsid, with a single nasal opening and without a parietal Foramen. Quadrate is immovable.

(5) No sternum is found.

(6) Teeth absent. Jaws with horny sheaths.

(7) Cloacal aperture a longitudinal slit.

(8) Heart incompletely 4-chambered with a partly divided ventricle.

(9) Copulatory organ single and simple.

(10) About 400 species of marine turtles, freshwater terrapins and terrestrial tortoises.

Examples – Chelone, Chrysemys, Testudo, Trionyx, Dermochelys.

(b) **Subclass II Euryapsida (extinct) :** Skull with a single dorso-lateral temporal opening on either side bounded below by postorbital and squamosal bones.

(c) **Subclass III Parapsida (extinct) :** Skull with a single dorso-lateral temporal opening on either side bounded below by the supra temporal and post frontal bones.

(d) **Subclass IV Synapsida (extinct) :** Skull with a single lateral temporal opening on either side bounded above by the postorbital and squamosal bones.

(e) **Subclass V Diapsida :** Skull with two temporal openings on either side separated by the bar of postorbital and squamosal bones.

Order 2. **Rhynchocephalia :** (L., rhynchos, snout + Gr., kephale, head)

(1) Body small, elongated, lizard-like.

(2) Skull diapsid. Parietal foramen with vestigeal pineal eye present. Quadrate is fixed.

(3) Vertebrae amphicoelous or biconcave. Numerous abdominal ribs present.

(4) Teeth acrodont. Cloacal aperture transverse.

(5) Heart incompletely 4-chambered.

(6) No copulatory organ is male.

Example – Represented by a single living species, the "tuatara" or sphenodon punctatum of New Zealand.

Order 3. Squamata : (L., squama, scale or squamatus, scaly)

(1) Advanced, small to medium, elongated.

(2) Skull diapsid. Quadrate movable.

(3) Vertebrae procoelous. Ribs single - headed.

(4) Heart incompletely 4-chambered.

(5) Cloacal aperture is transverse.

Order 4. Crocodilia : (G., krokodeilos, Crocodile)

(1) Skin thick with scales bony plates and scutes.

(2) Skull diapsid. Quadrate immovable. No parietal foramen. A pseudopalate present.

(3) Ribs bicephalous. Abdominal ribs present.

(4) Heart completely 4-chambered.

(5) Cloacal aperture is a longitudinal slit.

Examples - Crocodylus, Gavialis, Alligator

# 1.17 CLASS AVES

# (i) General Characters

(1) Feather-clad, air-breathing, warm-blooded, oviparous, bipedal flying vertebrates.

(2) Limbs are two pairs. Forelimbs are modified as wings for flying. Hind limbs or legs are large, and variously adapted for walking, running scratching, perching, food capturing, swimming or wading, etc.

(3) Exoskeleton is epidermal and horny.

(4) Skin is dry and devoid of glands except the oil or preen gland at the root of tail.

(5) Pectoral muscles of flight are well developed.

(6) Skull smooth and monocondylic, bearing a single occipital condyle. Cranium large and domelike. Sutures indistinct.

(7) Vertebral column short. Centra of vertebrae heterocoelous (saddle-shaped).

(8) Sternum large, usually with a vertical, mid ventral keel for attachment of large flight muscles.

(9) Ribs double-headed (bicephalous) and bear posteriorly directed uncinate processes.

(10) Both clavicles and single inter clavicle fused to form a V-shaped bone, called furcula wishbone.

(11) Heart completely 4–chambered. There are neither sinus venosus or truncus arteriosus. Only right aortic (systemic) arch persists adult. Renal portal system vestigial. Blood corpuscles nucleated.

(12) Birds are the first vertebrates to have was blood. Body temperature is regular (homoiothermous).

(13) Respiration by compact, spongy, distensible lungs continuous with thin air-sacs.

(14) Larynx without vocal cords. A sound box or syrinx, producing voice, lies at or near the junction of trachea and bronchi.

(15) Kidneys metanephric and 3–lobed. Uterus open into cloaca. Urinary bladder absent. Birds are urecotelic. Excretory substance of urates eliminated with faeces.

(16) Sexes separate. Sexual dimorphism of tern well marked.

(17) Fertilization internal, preceded by copulation and courtship. Females oviparous.

(18) Eggs develop by external incubation. Cleavage discoidal, meroblastic. Development direct, Extra-embryonic membranes (amnion, chorion, allantois and yolk-sac) present.

(19) Parental care is well marked.

(ii) **Classification of Aves :** Birds show less diversification than any other group of vertebrate animals. About 9,000 living species of birds are known at present. 25 to 30 avian orders are recognized depending on the taxonomist. Class Aves is first divided into two subclasses.

(a) **Sub-Class I. Archaeornithes :** Gr., archios, ancient + ornithos, bird)

(1) Extinct, archaic, Jurassic birds of Mesozoic Age, about 155 million years ago.

(2) Wings primitive, with little power of flight.

(3) Vertebrae amphicoelous.

(4) Sternum without a keel.

(5) Thoracic ribs slender, without unicinate processes. In Archacopteryx beak in toothed.

This sub-classes includes a single order

**Order Archaeopterygiformes :** Example – Archaeopteryx lithographica, from Jurassic or Bavaria, Germany; one specimen lying in the British museum, London, the other lying in the Berlin.

(b) Sub-class II. Neornithes : (Gr., neos, modern+ ornithos, Birds)

(1) Modern as well as extinct post-Jurassic birds.

(2) Wings usually well-developed and adapted for flight, with few exceptions.

(3) Teeth absent except in some fossil birds.

- (4) Vertebrae heterocoelous in living forms.
- (5) Sternum usually with a keel.
- (6) Thoracic ribs usually with uncinate processes.
- (7) Abdominal ribs absent

This sub-class is divisible into 4 super-orders:

Super-order 1. Odontognathae : (Gr., odontos, teeth)

(1) Extinct, Upper Cretaceous birds.

(2) Jaws bear teeth, "so advantageous for catching fish".

#### Order 1. Hesperornithiformes

Example - Hesperornis, Enaliornis, Baptornis, etc.,

#### Order 2. Ichthyornithiformes

Examples – Ichthyornis, Apatornis.

Super-order 2. Palaeognathae or Ratitae : (Gr., palaios old + gnathos jaw; L., ratis, raft).

(1) Modern big-sized, flightless, running birds, without teeth.

(2) Wings vestigial or rudimentary; feathers devoid of interlocking mechanism.

(3) Rectrices absent or irregularly arranged.

(4) Oil gland is absent, except in Tinamus and Kiwi.

(4) Skull is dromaeognathous or palaeognathous that is, vomer is large and broad and interpolated between palatines.

(5) Sternal keel vestigial, absent or flat, raft-like.

(6) Uncinate processes are vestigial or absent.

(7) Clavicles are small or absent.

(8) Pectoral muscles poorly developed.

(9) Syrinx is absent

The flightless birds or ratites are not represented in India. They are grouped in 7 orders as follows;

Order 1. Struthioniformes : (Gr., struthio, ostrich + form)

(1) Legs strongly developed, each with two toes (3rd and 4th) with stunted nails.

(2) Pubes form a ventral symphysis.

Examples - True ostriches (Struthio camelus) of Africa and western Asia (Arabia)

Order 2. **Rheiformes :** (Gr., Rhea, mother of Zeus + form)

Examples – American ostriches or common rhea (Rhea americana) represented by two species in South American pampas; Darwin's rhea (Pteroncemia pennata).

#### Order 3. Casuariformes

Examples- Cassowaries (Casuarius) of australia, and New Guinea and Emus (Dromaius novaehollandiae) of New Zealand

#### Order 4. Apterygiformes

Examples- Kiwis (Apteryx) or New Zealand.

#### Order 5. Dinornithiformes

Examples - Moas (Dinornis maximus) of New Zealand

Order 6. Aepyornithiformes

Examples –Giant Elephant-birds of Africa and Madagascar. Aepyornis titan, Mulleornis.

Order 7. Tinamiformes

Examples - Tinamou (Tinamus), Eudromia

#### Super-order 3. Impennae

#### Order 1. Sphenisciformes

Examples - Penguins (Aptenodytes) Southern Hemisphere.

(1) Most modern, usually small-sized. Flying birds.

(2) Wings well-developed ; feathers with interlocking mechanism.

(3) Rectrices present and arranged regularly.

(4) Pterylae are regular.

(5) Oil gland is present.

(6) Skull is neognathous, that is, vomer is short allowing palatines to meet.

(7) Sternum with a well-developed keel.

(8) Uncinate processes are present.

Pygostyle is present

**Super order 4. Neognathae :** The super-order Neognathae includes several orders. For the sake of study they may be grouped into at least 6 homogeneous ecological groups, as follows :

**Group A. Arboreal Brids :** Under this group may be placed the majority of birds spending most of their lives in and around shrubs and trees.

Order 1. Passeriformes : (L., passer, sparrow + form)

This is the largest of all the bird orders including half the known species. Feet are adapted for perching, while beaks are adapted for cutting.

Examples : Common house sparrow (Passer domesticus), common house crow (Corvus splendens) common myna (Acridotheres ttristis)

Order 2. **Piciformes :** (L., picus, wood pecker + form) It includes woodpeckers, toucans, sapsuckers and their allies.

Examples : Yellow fronted pied woodpecker (Dendrocopos mahrattensis).

Order 3. Columbiformes: (L., columba, dove + form) It includes doves and pigeons

Examples : Blue rock pigeon (Columba livia). Green pigeon (Crocopus), extinct dodo (Raphus)

Order 4. **Psittaciformes :** (L., psitacus, parrot + form)

It includes parrots, parakeets, cockatoos, macaws, love-birds, etc., denizens of the equatorial jungles.

Examples : Large Indian parakeet (Psittacula eupatria), green parrot (psittacula krameri)

Group B. Terrestrial Brids : These birds are perfectly able to fly but spend most of their time walking or running on ground.

Order 5. **Galliformes :** (L., gallus, a cock + form) It includes gamebrids notable for their palatability, massive scratching feet, short and powerful flight and largely graminivorous diet.

Examples : Red jungle fowl (Gallus), peafowl (Pavo cristatus),

Order 6. Cuculiformes : (L., cuculus, cuckoo + form) It includes cuckoos and their allies

Examples : Cuckoo (Cuculus canorus), Koel (Eudynamis scolopaeous), Crow-pheasant (Centropus sinensis)

#### Group C. Swimming and Diving Birds

Order 7. **Anseriformes :** (L., anser, goose + form) Aquatic birds such as geese, swans and ducks belong to this order.

Examples : Wild duck or mallard (anas), kcommon teal (nettion crecca), bar-headed goose (Anser indica)

Order 8. Coraciiformes : (Gr., korax, crow or raven + form) It includes kingfishers and their allies.

Examples : White breasted kingfisher (Halcyon smyrnensis), pied kingfisher (Ceryle rudis)

Order 9. **Gaviformes :** (L., gavia, sea mew = form) It includes marine birds, called loons (gavia) represented by only four species.

Order 10. Podicipediformes or

**Colymbiformes** (Gr. kolymbos, diving bird) It includes grebes (Podicipes), often called divers because of their habits.

Order 11. Procellariformes : (L., Procella, a tempest + form)

It includes tube-nosed, long and oily winged seabirds such as albatrosses (Diomedea), Petrels (Procellaria), shearwaters.

Order 12. **Pelecaniformes :** (L., pelicanus, pelican + form) It includes pelicans, darters, gannets and cormorants.

Examples : Pelicans (Pelecanus), little cormorant (Phalacrocorax niger)

#### Group D. Shore Birds and Wading Birds

These aquatic birds seldom swim or dive beneath the water to any great extent.

Order 13. **Charadriiformes :** (NL., charadrius, genus of plovers + form) This order includes a rather diverse group of water frequenting shore birds characterized by long wading legs, webbed toes and mudprobing beaks.

Examples : Red wattled lapwing (Lobivanellus indicus)

Order 14. Ciconiiformes : (L., ciconia, a stork + form)

It includes long–legged, marshy wading birds with long snake-like neck and javelin or pincer-like beak for piercing their aquatic prey.

Examples : Cattle egret (Bubulcus ibis), heron (Ardea herodias), spoonbil (Platalea leucorodia), strok (Ciconia), flamingo (Phonicopterus).

Order 15. **Gruiformes :** (L., grus, crane + form) It includes crane-like wading birds with long legs and partially webbed feet.

Examples : Common coot (Fulica atra),

**Group E. Birds of Prey** 

Order 16. **Falconiformes :** (L., falco, falcon + form)

The diumal birds of prey with sharp hooked beaks and strong curved claws.

# 1.18 CLASS 4 MAMMALIA

#### (i) General characters

(1) Hair-clad, mostly terrestrial, air-breathing, warm blooded, viviparous, tetrapod vertebrates.

(2) Limbs 2 pairs, pentadactyle, each with 5 or fewer digits. Hind limbs absent in cetaceans and sirenians.

(3) Exoskeleton includes lifeless, horny, epidermal hairs, spines, scales, claws, nails, hoofs, horns, bony dermal plates, etc.

(4) Skin richly glandular containing sweat, sebaceous (oil) and sometimes scent glands in both the sexes. Females also have mammary glands with teats producing milk for suckling the young.

(5) Endoskeleton thoroughly ossified. Skull dicondylic having 2 occipital condyles. Cranium large. A single zygonmatic arch present. Pterygoids msall, scale-like. Otic bones fused into periotic which forms tympanic bulla with tympanic. Each half of lower jaw made of a single bone, the dentary, articulating with squamosal of skull Vertebrae with terminal epiphyses and flat centra (acoelous). Cervical vertebrae usually 7. Ribs bicephalous. Coracoid vestigial.

(6) Teeth are of several types (heterodont), borne is sockets (thecodont) and represented by two sets (diphyodont).

(7) Respiration always by lungs (pulmonary). Glottis protected by a fleshy and cartilaginous epiglottis. Larynx contains vocal cords.

(8) Heart 4-chambered with double circulation.

(9) Kidneys metanephric.

(10) Brain highly evolved. Both cerebrum and cerebellum large and convoluted. Optic lobes small and 4 in number called corpora quadrigemina. Corpus callosum present connecting both cerebral hemispheres. Cranial nerves 12 pairs.

(11) Senses well developed. Eyes protected by lids, the upper of which is movable. External ear opening protected by a large fleshy and cartilaginous flap called pinna. Middle ear cavity with 3 ear ossicles-malleus, incus and stapes. Cochlea of internal ear spirally coiled.

(12) Sexes separate.

(13) Fertilization internal preceded by copulation.

(14) Except egg-lying monotremes, mammals are viviparous, giving birth to living young ones.

(15) Development uterine.

# (ii) Classification of Mammal

(a) **Subclass I prototheria :** (Gr., protos, first + therios, beast). Primitive, reptile-like, oviparous or egg-lying mammals.

Order 1. **Monotremata.** (Gr., monos, single + trema, opening), Cloacal opening present Confined to Australian region.

Examples : Monotremes. Platypus or duckbill (ornith orhynchus) spiny anteater (Tachyglossus = Echidna)

(b) Sub class II. Theria : (Gr., ther, Theria are subdivided into 2 living infraclasses)

Infraclass 1. Metatheria : (Gr., meta, between or after).

Pouched and viviparous mammals without or with a rudimentary yolk sac placenta. Confined mostly to Australian region.

Order 2. Marsupialia : (Gr., marsypion, pouch).

Born in a very immature state, and complete their development attached to teats or nipples in the abdominal pouch or marsupium. Usually 3 premolars and 4 molars in each jaw on either side. Vagina double

Examples : Marsupials. Opossum (Didelphis). Kangaroo (macropus), koala (phascolarctos)

Kangaroo in the native of Australia

Infraclass 2. Eutheria : (Gr., eu, true + therios + beast)

Higher viviparous placental mammals without marsupium. Young born in a relatively advanced stage. Dentition never exceeds  $\frac{3.14.3}{3.14.3} = 44$  Eutherians constitute the vast majority of living mammals arranged in 16 orders. (The general characters of class mammalia infact, represent the characters typically of the infraclass Eutheria)

Order 3. Insectivora : (L., insectum, insect + vorare, to eat)

Small mammals with long pointed snout. Feet plantigrade, usually 5-toed, with claws. Molars with pointed, peg-like cusps for insect feeding.

Examples : Mole (Talpa), common shrew (Sorex), Solenodon (Solenodon), hedgehogs (Erinaceus, Paraechinus)

Order 4. Chiroptera : (Gr., Cheiros, hand + pteron, wing)

Flying mammals or bats in which forelimbs are modified into wings. Hind legs short and included in wing membrane

Order 5. **Dermoptera :** (Gr., derm, skin + pteron, wing). Nocturnal in trees. A gliding mammal called flying lemur, resembling a flying squirrel

Examples : One living genus Cynocephalos (= Galaeoithecus) with 2 species from South eastern Asia.

Order 6. **Edentata :** (L., edentatus, toothless) Teeth absent or reduced to molars. Without enamel Examples : Giant antcater (Mryrmecopha) armadillo (Dasypus),

Order 7. **Pholidota :** (Gr., pholis, a scale) Body covered with large overlapping scales with sparse hair in between. No teeth. Long and protrusible, used to capture insects.

Examples : Single genus of scaly anteaters pangolins (Manis)

Order 8. Tubulidentata : (L., tubulus tube like + dens, tooth)

Examples : Single genus of pig-like aardvark or Cape anteater (Orycteropus) of South Africa

Order 9. Primates : (L., primus, of the first rank)

Generalized or primitive mammals except for the great development of brain. Mostly arboreal. Anthropoidea. The suborder Anthropoidea is further subdivided into two divisions or infraorders : Platyrrhina and Catarrhina. Order 10. **Rodentia :** (L., rodo, gnaw) Largest order including usually small gnawing mammals. Each jaw with one pair of long, rootless, chisel-like incisors growing throughout life. No canines.

Examples : Rat (Rattus), Mouse (Mus) squirrel (Funambulus)

Order 11. Lagomorpha : (Gr., logos, hare + morphe, form)

With a second pair of small upper incisors behind first pair of large chisel like incisors. No canines.

Examples : Rabbit (Oryctolagus), hare (Lepus), Pika (Ochotona)

Order 12. Cetacea : (Gr. ketos or L., cetus, a whale)

Large marine fish-like mammals well adapted for aquatic life pectoral limbs modified into broad paddle-like flippers. Tail divided in two broad horizontal fleshy flukes with a notch, used in propulsion. No claws, no hind limbs and no external ears. The living Cetacea are divided into two suborders Odontoceti (toothed whales) and Mysticeti or Mystacoceti (whalebone whales).

Order 13. **Sirenia :** (Gr., siren, sea nymph). Large, clumsy herbivorous, aquatic mammals with paddle-like forelimbs, no hindlimbs and a flattened tail with horizontal lateral fleshy flukes with or without a notch. No external ears. Muzzle blunt. Hairs few. Stomach complex. Inhabit estuaries and coastal sea.

Examples : Manatee (Trichechus), dugong (Dugong = Halicore), recently extinct Steller's sea-cow (Rhytina)

Order 14. **Carnivora :** (L., caro, tlesh + vorare, to eat) Small to large predatory, flesh-eating mammals.

Examples : Dog (Canis familiaris), Wolf (C. lupus), Jackal (C. aureus), Walrus (Odobenus), common seal (Phoca)

Order 15. Hyracoidea : (Gr., hyrax, shrew + eidos, form)

Small, guinea-pig like mammals distantly related to elephants. No canines. Cheek teeth lophodont.

Example : Conies (Hyrax = Procavia) from S. Africa, Syria and Arabia.

Order 16. Proboscidea : (Gr., pro, in front + boskein, to eat)

Largest living land animals having large heads, massive ears, thick practically hairless skins (pachyderm), bulky straight legs and 3 to 5 toes with small, nail like hoofs. Conspicuous feature is the nose and upper lip modified as an elongated flexible proboscis or trunk. 2 upper incisors elongated as ivory tusks. Cheek teeth lophodont.

Examples : Indian or Asiatic elephant (Elephas maximus), African elephant (Loxodonta africana)

Order 17. **Perissodactyla :** (Gr., perissos, odd + dactylos, toes)

The odd-toed hoofed mammals or ungulates have an odd number of toes (1 or 3) incisors present in both jaws.

Examples : Horse (Equus cabalus), wild ass (Equus asinus), Zebra (Equus zebra)

Order 18. Artiodactyla : (Gr., artios, even + dactylos digit)

The even-toed hoofed mammals having an even number of toes (2 or 4)

Incisors and canines in upper jaw usually lacking. Stomach 4 – chambered. Many with antlers or horns.

Examples : Pig (Sus), common hippopotamus (Hippopotamus amphibius), camel (Camelus), deer (Cervus), musk deer (Moschus), sheep (Ovis).

# **ASSIGNMENT**

# TAXONOMY - THE SCIENCE OF CLASSIFICATION

#### **Basic Level** Which animal is "Non-chordate-protochordata" 1. (b) Balanoglossus (c) Branchiostoma (d) Botryllus (a) Herdamania The blind sac body plan is found in the animals of 2. (a) Coelenterata (b) Gastropoda (c) Flatworms (d) (a) and (c) both Cell aggregate body plan is found in the 3. (a) Volvox (b) Colonial protozoans (c) Porifera (d) (a) and (c) both When only single opening is present in the alimentary canal, then the body plan is 4. (b) Blind sac (c) Cell aggregate (d) Tube in tube (a) Open The tube in a tube plan is not present in the 5٠ (a) Taenia (b) Pheretima (c) Leech (d) Ascaris Secondarily asymmetrical type of symmetry is present in 6. (a) Unio (b) Snail (c) Holothuria (d) Star fish Enterocoelic type of coelom is present in the 7. (a) Echinodermata (d) Chordata (b) Mollusca (c) Arthropoda Schizocoelic type of coelom is present in the 8. (c) Nematodes (a) Protochordata (b) Echinoderms (d) Annelids Acoelomate group is 9. (a) Coelenterata only (b) Porifera only (c) Platyhelminthes (d) All of the above Which one of the following is the connecting link between chordata and non-chordata 10. (d) Sphenodon (a) Tachyglossus (b) Amphioxus (c) Balanglossus An animal with unsegmented coelom, superficial radial symmetry and bilateral symmetrical larva 11. belongs to (c) Echinodermata (d) Annelida (a) Arthropoda (b) Mollusca Which of the following is represented by the largest number of species 12. (a) Insects (b) Protozoans (c) Mammalia (d) Aves Diploblastic acoelomate condition is found in 13. (a) Planaria (c) Rotifer (b) Ascaris (d) Sea anemone Which of the following group is Deuterostome 14. (a) Annelida, Arthropoda, Mollusca (b) Echinodermata, Hemichordata, Chordata (c) Annelida, Mollusca. Chordata (d) Arthropoda, Mollusca, Echinodermata The animals, giving birth to young ones, are called 15. (a) Coelomate (c) Amphibious (b) Viviparous (d) Triploblastic Sometimes parasites themselves are parasitised by other organism, such parasites known as 16. (b) Endoparasites (a) Symbionts (c) Ectoparasites (d) Hyperparasites

17.	Which one of the follo symmetry	owing pairs of animals is	s correctly matched wit	h the kind of their body	
	(a) <i>Hydra</i> and shark – H	Bilateral symmetry	(b) Tapeworm and octo	opus – Radial symmetry	
	(c) Amoeba and sea urc	hin – Asymmetry	(d) Jellyfish and starfis	h – Radial symmetry	
18.	Which one feature is co	ommon to Amphioxus, fro	og, sea horse and crocodile		
	(a) Pharyngeal gill slits	. at least in the developme	ental stages		
	(b) A three-chambered	heart			
	(c) Dorsal solid nerve c	hord	(d) Skeleton formed of	cartilage and bones	
10	Given below are four m	natchings of an animal and	l its kind of respiratory of	organ	
19.	1 Silver Fish – trachea	2 Scorpion – book lun	$\sigma$ 3 Sea squirt – pharvi	ngeal gills 4 Dolphin –	
	skin				
	(a) 3 and 4	(b) 1 and 4	(c) 1, 2 and 3	(d) 2 and 4	
20.	A coelom (body cavity)	) derived from blastocoel	is known as		
	(a) Enterocoel	(b) Schizocoel	(c) Haemocoel	(d) Pseudocoelom	
21.	Maximum diversity is f	found in which phylum			
	(a) Chordata	(b) Arthropoda	(c) Protozoa	(d) Annelida	
22.	Bilaterally symmetrical	but acoelomate animal is			
	(a) Liver fluke	(b) Jelly fish	(c) Round worms	(d) Crab	
23.	The covering of tunicat	es is made up of			
	(a) Tunicin	(b) Cellulose	(c) Chitin	(d) All of these	
24.	Choose the correct com	bination of the following			
	(a) Annelida and porife	ra-phyla	(b) Aves and chordata-classes		
	(c) Mollusca and hydro	zoa-classes	(d) Oligochaeta and art	hropoda-phyla	
25.	When embryo develops	s in the body of female but	t it does not obtain nutrie	ents from the mother	
	(a) Ovo-viviparous	(b) Viviparous	(c) Oviparous	(d) None of these	

**26.** Match the animals list with names under Column-I with the animals listed with regular zoological name given under Column-II; choose the answer which gives the correct combination of the alphabets of the two columns.

	Column-I		Column-II
	(Animals with		(Animals with
	common name)		zoological name)
Α	Starfish	р	Sepia
В	Jellyfish	q	Astropecten
С	Devilfish	r	Aurelia
D	Cuttlefish	S	Octopus

(a) A = r, B = s, C = p, D = q
(c) A = q, B = r, C = s, D = p

(b) A = r, B = p, C = s, D = q
(d) A = q, B = p, C = s, D = r

27.	Genus is a group of sin	nilar and related		
	(a) Order	(b) Genera	(c) Families	(d) Species
28.	In which of the following	ng notochord is absent		
	(a) Adult <i>Herdmania</i> a	nd Balanoglossus	(b) Adult <i>Herdmania</i> a	nd adult Branchiostoma
	(c) Larva of <i>Herdmani</i>	a and Branchiostoma	(d) Larva of <i>Herdmani</i>	a and Balanoglossus
29.	Animals of which grou	p are not fresh water		
	(a) Crustacea	(b) Insecta	(c) Echinodermata	(d) Sponge
30.	Which of the following	g is a species		
	(a) Mammalia	(b) Canis familaris	(c) Caninae	(d) Carnivora
31.	Who is/are known as '	Father of Taxonomy'?		
	(a) C. Darwin	(b) Lamarck		
	(c) Carolus Linnaeus	(d) Bentham and Hooker		
32.	A species is defined a	as "the group of actually	or potentially inter-bre	eding natural population
	producing fertile offs	pring and reproductively	isolated from such ot	her groups". The above
	statement is given by			
	(a) Carolus Linnaeus	(b) Mayr	(c) J.B. lamarck	(d) Charles Darwin
33.	Which set is correct			
	(a) Euglena–cılıa	(b) <i>Paramecium</i> –Flagella	a (c) Snail–Foot	(d) <i>Amoeba</i> –Foot
34.	The echinoderms, her ancestral form	nichordates and chordates	s had which of the foll	lowing larva as common
	(a) Tornaria	(b) Trochophore	(c) Dipleurula	(d) Bipinnaria
35.	Which phylum belongs	s to Duterostomia		
	(a) Echinodermata	(b) Mollusca	(c) Arthropoda	(d) Annelida
36.	Metazoans without tiss	sue grade organization are	called as	
	(a) Parazoa	(b) Protozoa	(c) Eumetazoa	(d) Deuterostomia
37.	Which one of the follo	wing is not a correct pair		
	(a) Trochophore-Annel	lida (b)Bipinnaria-Echino	dermata	
	(c) Tornaria-Arthropod	la (d)Planula-Coelenter	ata	
38.	Among the following of	organisms point out a com	pletely non-parasitic for	m
	(a) Sea anemone	(b) Leech	(c) Tape worm	(d) Mosquito
39.	A common characteris	tic of all vertebrates witho	ut exception is	
	(a) The possession of t	wo pairs of functional app	endage	
	(b) The presence of we	ll-developed skull		
	(c) The division of bod	ly into head, neck, trunk ar	nd tail	
	(d) Their body is cover	ed with an exoskeleton		
40.	On the basis of body of	rganization, animals are gr	ouped as	
	(a) Metazoa and eumet	azoa	(b)Protozoa and parazo	Da
	(c)Parazoa and metazo	a	(d) Protozoa and metaz	zoan
1				

41.	Binomial nomenclature	e means writing the name	of animals in two words	which are
	(a) Genus and species	(b) Order and family	(c) Genus and variation	n (d) Family and genus
42.	Systema Naturae is con	ncerned with	× /	
	(a) Solar system		(b) Ecosystem	
	(c) Classification of pla	ants and animals	(d) Natural selection	
43.	Phylogeny tells about			
10	(a) Life history of anim	nals		(b) Group of phyla
	(c) Evolutionary histor	y of a species from its and	estors	(d) Castes of files
44.	Which of the following	g classes has largest numb	er of animals	
	(a) Mammalia	(b) Pisces	(c) Insecta	(d) Reptilia
45.	An animal that transfor	rms from bilateral to radia	l symmetry in its life his	story is
	(a) Hydra	(b) Obelia	(c) Starfish	(d) Sponge
46.	In which group, all the	animals does not belong t	to same phylum	
-	(a) Hirudo, Blatta, Earthworm (b) Man, Panthera, Amphioxus			phioxus
	(c) Both (a) and (b) (d) None of these			
47.	Which of the following	g does not have any alime	ntary canal	
	(a) Earthworm	(b) Frog	(c) Taenia	(d) Ascaris
48.	Founder of "Taxonom	y'' is		
	(a) Aristotle	(b) John Ray	(c) Haeckel	(d) Linnaeus
49.	Animals of which set b	belongs to same phylum		
	(a) Scorpion, cockroac	h, prawn	(b) Scorpion, cockroac	h, and earthworm
	(c) Leech, oyster, scorp	pion	(d) Earthworm, leech,	cancer
50.	The meaning of taxon	in the classification of ani	mals	
	(a) A group of same sp	ecies		
	(b) A group of animals	on the basis of number of	chromosomes	
	(c) A group of same ty	pe of animals	(d)A group of similar g	genera
51.	Which of the following	g is not found in vertebrate	es	
	(a) Bilateral symmetry	(b) Gill opening	(c) Body scales	(d) Cnidoblasts
52.	Which one of the foll	owing is a matching set	of the class and some of	of its main distinguishing
	features			
	(a) Sporozoa – Infectio	on by sporozoites, transmis	sion by intermediate hos	t and a contractile
	vacuole			
	(b) Trematoda – Well o	developed suckers, flat un	segmented body	
	(c) Arachnida – 3 pairs	s of legs, chitinous exoske	leton and poisonous stin	g
	(d) Insecta – Compoun	d eyes, segmented body a	nd nephridia	
53.	Most important criteria	used for the present day	classification of living of	rganisms is based on
	(a) Presence and absen	ce of notochord	(b) Resemblances in ex	sternal features
	(c) Breeding habits		(d) Anatomical and ph	ysiological characteristics

54.	Which one of the following groups belongs to one category				
	(a) Polychaeta, hirudinea, oligochaeta and onychophora				
	(b) Holothuroidea, opl	niuroidea, asteroidea, echi	noidea and hirudinea		
	(c) Turbellaria, tremat	oda and cestoda			
	(d) Cephalopoda, gast	ropoda, thysanura and lan	nelibranchiata		
55.	The organisms attached	ed to the substratum gener	ally possess		
	(a) Radial symmetry		(b) Cilia on the surfac	e to create water current	
	(c) One single opening	g of the digestive canal	(d) Asymmetrical bod	У	
56.	Intracellular digestion	is found in the			
	(a) Protozoans only		(b) Porifera only		
	(c) In some coelentera	ta only	(d) All of the above		
57.	Radial symmetry is us	sually exhibited in animals	s which		
	(a) Have one opening	of alimentary canal	(b) Have ciliary mode	of feeding	
	(c) Are attached to the	e substratum	(d) Live in water		
58.	Absence of excretory	organs, great power of re	generation and exclusive	ely marine animals belong	
	to the phylum				
	(a) Mollusca	(b) Echinodermata	(c) Fishes	(d) Arthropoda	
<b>59</b> .	Select the correct state	ement			
	(a) Birds are poikiloth	ermic	(b) Flatworms are coe	lomic animal	
	(c) Earthworm is meta	merically segmented	(d) Fishes are radially	symmetrical	
60.	Characteristic features	s such as four-chambered	heart, feather and pneur	natic bone is applicable to	
	the class of vertebrate				
	(a) Cyclostomata	(b) Aves	(c) Reptilia	(d) Mammals	
61.	Which of the followin	g animals is predaceous			
	(a) Pheretima	(b) Nereis	(c) Hirudinaria	(d) None of these	
62.	Taxon is the				
	(a) Name of a taxonor	ny journal			
	(b) Name of a branch	of taxonomy			
	(c) A rank of classific	ation as phylum, class, or	der, species		
	(d) Group of similarly	constituted organisms			
63.	Which of the followin	g is the oldest living fossi	1?		
	(a) Architeuthis	(b) Neopilina	(c) Nautilus	(d) Limulus	
64.	The non-nucleated, un	nicellular organisms of W	'hittaker's (1969) classif	ication are included in the	
	kingdom				
	(a) Protista	(b) Monera	(c) Animalia	(d) Plantae	
65.	Animals which have a	well marked digestive ca	vity are put under		
	(a) Parazoa	(b) Enterozoa	(c) Metazoa	(d) Bryozoa	
66.	The suffix ' <i>idae</i> ' refers	s to			
	(a) Family	(b) Genus	(c) Order	(d) Division	

67.	57. Which of the following is an unmatching group			
	(a) Cockroach, king cral	o, spider, silver fish	(b) Whale, bat, seal	otter
	(c) Cray fish, cuttle fish	, saw fish, hag fish	(d) Starfish, sea urch	in, sea cucumber, sea lily
68.	Segmentation of body is	not represented in		
	(a) Cray fish	(b) Frog	(c) Grasshopper	(d) Star fish
69.	Members of which phyl	um exhibit adaptations t	to widely varied enviro	nmental conditions
	(a) Annelida	(b) Platyhelminthes	(c) Echinodermata	(d) Mollusca
70.	Alternation of generatio	n is exhibited by		
	(a) Porifera	(b) Protozoa	(c) Platyheminthes	(d) Nemathelminthes
71.	Physiological division of	f labour is almost not sh	nown by the animals be	longing to
	(a) Anthozoa	(b) Hydrozoa	(c) Protozoa	(d) Aurelia
72.	Which of the following	has no segmentation		
	(a) Hydra	(b) Earthworm	(c) Cockroach	(d) Centipede
73.	Radial symmetry is seen	ı in		
	(a) Molluscs	(b) Star fishes	(c) Sponges	(d) Fishes
74.	Which is correct matchi	ng set		
	(a) Annelida, insecta, m	ammalia are classes	(b) Arthropoda, mol	usca, pisces are phyla
	(c) Protozoa, rhizopoda,	chordata are phyla	(d) Calcarea, oligochaeta, aves are class	
75.	Which is common in co	ckroach and earthworm		
	(a) Dorsal nerve cord	(b) Ventral nerve cord	(c) Cocoon	(d) Ommatidia
76.	Sexual dimorphism is fo	ound in		
	(a) Ascaris	(b) Amoeba	(c) <i>Pheretima</i>	(d) All of these
77.	Which one group contai	ns an hermaphrodite ani	imals	
	(a) Ascaris, hydra, phere	etima	(b) Hydra, homo sap	iens, hirudinaria
	(c) Fasciola, hydra, pala	emon	(d) Hirudinaria, pher	etima, taenia
78.	Linnaeus had the credit	for		
	(a) Discovery of blood of	circulation	(b) Theory of biogen	lesis
	(c) Discovery of micros	cope	(d) Binomial nomen	clature
7 <b>9</b> .	Mark the correct one			
	Phylum	Class	Example	
	(a) Annelida	Oligocheta	Nereis	
	(b) Mollusca	Pelecypoda	Cuttle fish	
	(c) Reptillia	Ophidia	Lizard	
	(d) Echinodermata	Holothuroidea	Cucumaria	
80.	Which one of the follow	ving sets of animals show	ws a close taxonomic re	elationship
	(a) Jelly fish, Cuttle fish	, Cat fish	(b)Honey bee, Crayf	ish, Spider
	(c) Alligator, Nautilus,	l'urtle	(d) Kangaroo, Octop	us, Salamander
1				

81.	Animals floating passiv	vely at water surface are c	alled	
	(a) Nektonic	(b) Neritic	(c) Planktonic	(d) Pelagic
82.	Who advanced an artif	icial system of classificati	on	
	(a) Linnaeus	(b) Darwin	(c) Lamarck	(d) Wallace
83.	Two or more species of	ccupying identical or over	lapping areas are known	as
	(a) Sympatric species	(b) Allopatric species	(c) Sibling	(d) Subspecies
84.	The term 'New system?	atics' was introduced by		
	(a) Adolf Engler	(b) Karl prantl	(c) George Bentham	(d) Julian Huxley
85.	Which is a matching se	et in taxonomy		
	(a) Leech, locust, sea u	rchin, lobster	(b) Star fish, jelly fish,	cuttle fish, octopus
	(c) Milliped, crab, cent	ipede, cockroach	(d) Nereis, planaria, ro	und worm, earthworm
86.	Which of the folloiwng	g animals has a nervous sy	stem but no brain	
	(a) Pheretima	(b) Hydra	(c) Amoeba	(d) Periplaneta
87.	Below are the names of	f four sub-classes and thei	r typical characteristics.	Which is incorrect
	(a) Turbellaria – Rhabo	dites		
	(b) Monogenoidea – Rhopter			
	(c) Aspidogastrea – Ventral surface with elongated adhesive disc			
	(d) Cestodaria – Progle	ottides		
88.	Studies under karyotax	onomy are based upon		
	(a) Nature of DNA		(b) Shape of the nucleu	IS
	(c) Structure or number	r of chromosomes	(d) Contents of karyop	lasm
89.	Which of the following	g is correct		
	(a) Mollusca – bivalvia	a–pila	(b) Annelida – hirudine	ea – silver fish
	(c) Mollusca – cephalo	poda – octopus	(d) Arthropoda – arach	nida – grasshopper
90.	A group of closely rela	ted, structuraly and functi	onally simillar organism	s is known as
	(a) Genus	(b) Species	(c) Sibling species	(d) Subline species
91.	Which one of the follow	wing is a matching set in a	animal classification of s	ame phylum
	(a) Liver fluke, tapewo	orm, round worm, guinea v	worm	
	(b) Oyster, shipwom, o	ctopus, cuttle fish		
	(c) Sea urchin, sea fan,	sea lilly, sea pen	(d) Prawn, nereis, crab	, millipede
92.	According to latest know	owledge the most accepted	l species concept is	
	(a) Typological species	s concept	(b) Nominalistic specie	es concept
	(c) Genetic species con	ncept	(d) Polytypic species c	oncept
93.	Who proposed the 'Bin	nomial nomenclature'		
	(a) Huxley	(b) Hutchinson	(c) Carolus Linnaeus	(d) Aristotle
94.	The third name of the t	rinomial nomenclature is	of	
	(a) Sub-genus	(b) Species	(c) Sub-species	(d) Type
1				

95.	Which one of the follow	wing phylums is character	ized by the absence of a	true coelom
	(a) Echinodermata	(b) Mollusca	(c) Annelida	(d) Nematoda
96.	Most efficient reproduc	ctive system is present in t	he animals of	
	(a) Coelenterata	(b) Nematoda	(c) Some annelida	(d) Platyhelminthes
<b>9</b> 7.	Triploblastic acoeloma	te animals are		
	(a) Nematodes	(b) Platyhelminthes	(c) Some arthropods	(d) Both (a) and (b)
98.	Histological differentia	tion is absent in		
	(a) Amoeba	(b) Hydra	(c) Cockroach	(d) Earthworm
99.	The animal which are f	ixed at a place have		
	(a) Radial symmetry	(b) Bilateral symmetry	(c) Both (a) and (b)	(d) None of these
100.	The animals which con	ne out during night and hid	de during day are called	
	(a) Diurnal	(b) Nocturnal	(c) Arborial	(d) Cursorial
101.	Which one of the follow	wing is a giant invertebrat	e animal	
	(a) Cyania archtica	(b) Architeuthis	(c) Balenoptera	(d) Laxodonta
102.	Which animal exhibits	sexual dimorphism		
	(a) Lobosa	(b) Ciliata	(c) Sporozoans	(d) Radiolarians
103.	In which book has "bin	omial nomenclature" been	n used for the first time	
	(a) Histoire naturelle	(b) Systema naturae	(c) Historia naturalis	(d) Historia plantarum
104.	Who developed the "ke	ey" for identification of an	imals	
	(a) John Ray	(b) Goethe	(c) Georges Cuvier	(d) Theophrastus
105.	What is the name of the	e book written by Aristotle		
	(a) Historia Animalium	n (b) Histoire Naturelle		
	(c) Systema naturae	(d) Philosophic zoologiq	ue	
106.	Who is the "Father of z	zoology"		
	(a) Aristotle	(b) Theophrastus	(c) Lazzaro spallanzani	(d) Carolus linnaeus
107.	Karyotaxonomy is the	modern branch of classific	cation which is based on	
	(a) Number of chromos	somes	(b) Bands found on chro	omosomes
	(c) Organic evolution		(d) Trinomial nomencla	iture
108.	Body cavity surroundir	ng alimentary canal but it i	s not lined by cellular la	yer in which of the
	following			
	(a) Nematodes	(b) Platyhelminthes	(c) Annelids	(d) Echinoderms
109.	Who wrote the book "S	Systema naturae"		
	(a) Charles Darwin	(b) Carolus linnaeus	(c) Aristotle	(d) Julian Huxley
110.	The categorical level of	f various taxa is called		
	(a) Key	(b) Taxonomy		
	(c) Hierarchy	(d) Vertical classification	1	

111.	Binomial system of nomenclature in classification was devised by Carolus Linnaeus. It provides				
	the names pertaining to	)			
	(a) One scientific and o	one popular	(b) The two given by ta	axonomist	
	(c) One generic and on	e specific epithet	(d) International identif	ying catalogue	
112.	The basic unit of taxon	omy is			
	(a) Genus	(b) Species	(c) Order	(d) Class	
113.	The replacement of two	o kingdoms grouping by fi	ive kingdom classificatio	on was proposed in the	
	year				
	(a) 1859	(b) 1758	(c) 1919	(d) 1969	
114.	As per classification w	hich of the following is co	orrect		
	(a) Ascaris, Pheretima,	Grasshopper	(b)Hydra, Pteriod, Leu	cosolenia	
	(c) Starfish, Grasshopp	er, Solen	(d) Pila, Dentalium, Oc	topus	
115.	Aristotle classified the	animals into two groups.	Mark the correct one		
	(a) Vertebrata and inve	ertebrata	(b) Chordata and non-chordata		
	(c) Protozoa and metaz	zoa	(d) Enaima and anaima		
116.	In bioluminesence stor	age, energy changes into			
	(a) Light energy	(b) Radiant energy	(c) Chemical energy	(d) Mechanical energy	
117.	Scientific name of anir	nal is written			
	(a) Underlined	(b) In capital letters	(c) Itallicised	(d) All of the above	
118.	The binomial nomencle	ature laid the foundation o	f		
	(a) Artificial classificat	tion	(b)Ancient classifiction	1	
	(c)Modern classification	on	(d) Natural classification		
119.	The language used in v	vriting the name of animal	s is		
	(a) French	(b) Latin	(c) German	(d) English	
120.	The recent branch of ta	axonomy is			
	(a) Karyotaxonomy	(b) Cytotaxonomy	(c) Morphotaxonomy	(d) Taxidermy	
121.	"Law of priority" says	that the valid name of an o	organism is		
	(a) Most popular name		(b) Name given in Latin		
	(c) Oldest used name		(d) Oldest name modifi	(d) Oldest name modified by new workers	
122.	Interbreeding natural p	opulation of animals are re-	eferred to as belonging to	o the same	
	(a) Family	(b) Species	(c) Genus	(d) Variety	
123.	Natural system of class	sification has the basis of			
	(a) Morphology		(b) Phylogeny		
	(c) Both morphology a	nd phylogeny	(d) Ontogeny		
124.	Which of the following	g is a species			
	(a) Mammalia	(b) Carnivora	(c) Dipnoi	(d) Canis familiaris	

125.	Best definition of a spe	cies is		
	(a) A group of animals	that can live together	(b) Animals/plants that	can interbreed
	(c) Animals/plants that	cannot interbreed	(d) None of the above	
126.	The correct sequence of	f the various taxons while	naming an organism is	
	(a) Order, class, family	(b) Class, order, family	(c) Family, class, order	(d) Order, family, class
127.	In zoological name of a	n organism the first work	will be	
	(a) Generic name	(b) Specific name	(c) Name of the order	(d) Family name
128.	International code of "H	Biological nomenclature"	is applicable to	
	(a) Plants		(b) Animals	
	(c) Both animals and pl	ants	(d)None of the above	
129.	The total number of spe	ecies included in the animatic	al kingdom are about	
	(a) 1 million	(b) 2 million	(c) 10 million	(d) 1 billion
130.	The term "phylum" in a	animal classification was o	coined by	
	(a) E. Haeckel	(b) John Ray	(c) G.L. Cuvier	(d) Carolus linnaeus
131.	Mostly hermaphrodite a	animals are present in		
	(a) Coelenterata	(b) Nematoda	(c) Annelida	(d) Platyhelminthes
132.	The first true organ sys	tem grade body organisati	on is developed in	
	(a) Platyhelminthes	(b) Coelenterata	(c) Annelida	(d) Arthropoda
133.	Schizocoelic coelom, h	aemoglobin dissolved in p	plasma and segmental neg	phridia are present in the
	animal is		· · · ·	
	(a) Cockroach	(b) Pheretima	(c) Ascaris	(d) Aurelia
134.	characteristics of	celeton of chitinised cuticl	e and presence of haemo	ocoel are the
	(a) Annelida	(b) Arthropoda	(c) Mollusca	(d) None of these
135.	For seeing a haemocoel	l which animal you will se	elect	
	(a) Earthworm	(b) Hydra	(c) Sponge	(d) Scolopendra
136.	Which of the following	are 'multicellular grade'	organisms	
	(a) Sponges	(b) Coelenterates	(c) Prokaryotes	(d) Vertebrates
137.	In which of the following	ng the segmentation is bes	st represented	
	(a) Ascaris	(b) Fish	(c) Leech	(d) Scorpion
138.	Triploblastic, organ sys	stem grade body, coelomat	te and unsegmented anin	hals are of
	(a) Coelenterata	(b) Echinodermata	(c) Mollusca	(d) Arthropoda
139.	Open type of blood vas haemocyanin respirator	cular system, presence of v pigment are the charact	auricle and ventricle and ers of	l presence of
	(a) Mollusca	(b) Arthropoda	(c) Echinodermata	(d) Annelida
140.	Respiration by gills and	l lungs or pulmonary sac i	s present in	
	(a) Annelida	(b) Arthropoda	(c) Mollusca	(d) Echinodermata
1				

		11 1 . 1		
141.	I ripioblastic and radia	ily symmetrical animals a	re	(1) A 1' 1
	(a) Molluscans	(b) Arthropods	(c) Echinoderms	(d) Annelids
142.	Absence of head, unseg	gmented body and endosk	teleton of dermal calcare	ous plate are the
	(a) Mollusca	(b) Arthropoda	(c) Echinodermata	(d) None of these
140	(a) Wollusca	(0) Annopoua	(c) Lemnouermata	(d) None of these
143.	(a) <b>Dorifer</b> a	(b) Coelepterate	(c) Platybelminthes	(d) Namathalminthas
144	(a) I official Which of the following	(b) Coelemerata	(c) I latylicillillules	(u) Nemamentinitutes
144.	(a) Annelida Mollusca	phylum are meruded in e	(b) Echinodermata He	michordata Porifera
	(c) Mollusca Arthropo	nda Hemichordata	(d) Porifera Mollusca	Arthropoda
145	A student has identifie	d a triploblastic coelomate	e segmented animal as ar	arthropod Which
145.	additional character the student should have varified before identifying that animal as an			
	arthropod			
	(a) Presence of wings	(b) Presence of antenna	(c) Type of coelom	(d) Type of symmetry
146.	True coelom appeared	first in the course of evolution	ution in	
	(a) Echinodermata	(b) Annelida	(c) Chordata	(d) Aschelminthes
147.	Which one of the follo	wing is not correctly mate	ched	
	(a) Flame cells – Platy	helminthes	(b) Sting cells – Coeler	nterata
	(c) Metameric segmentation – Mollusca (d) Gill slits – Chordata			a
148.	An animal phylum hav	ving radially symmetrical	adults but bilateral symm	netrical larvae is
	(a) Porifera	(b) Coelenerata	(c) Echinodermata	(d) Annelida
149.	Bilateral symmetry, me	etameric segmentation coe	elom and open circulator	y system are the
	characters of			
	(a) Annelida	(b) Arthropoda	(c) Mollusca	(d) Echinodermata
150.	The science of cytotax	onomy is based upon		
	(a) Cell organelles		(b) Shape and size of c	ell
	(c) Chemical composit	tion of cytoplasm		
	(d) Classification based	d on somatic chromosome	es	
151.	The biologcial species	concept was given by		
	(a) K. Jordan (1905)	(b) John Ray (1693)	(c) Linnaeus (1758)	(d) Ernst Mayer (1963)
152.	The main purpose of c	lassification is		
	(a) To locate animals		(b) To study facts of ev	volution
	(c) To establish relatio	nships	(d) To study ecology o	f animals
153.	Which of the following	g show relationship of ech	inoderms and chordates	
	(a) Balanoglossus	(b) Archaeopteryx	(c) Peripatus	(d) None of these
154.	Which one of the follo	wing features is found in	chordates but not in non-	chordates
	(a) Gills	(b) Spiracles		
	(c) Post anal tail	(d) Chitinous exoskeleto	on	
1				

- 155. In which of the following sets, groups are not correctly matched phylum wise
  - (a) Crustacea, Myriapoda, Arachnida
  - (c) Gastropoda, Rhizopoda, Scaphopoda
- (b) Polychaeta, Hirudinea, Oligochaeta
- (d) Hydrozoa, Scyphozoa, Anthozoa
- **156.** Which is the correct order of evolution
  - (a) Leucosolenia Hydra Amoeba Ascaris
  - (c) Amoeba Leucosolenia –Hydra –Ascaris

# 157. Biosystematics aims at

- (a) Identification and arrangement of organisms on the basis of their cytological characteristics
- (b) The classification of organisms based on broad morphological characters
- (c) Delimiting various taxa of organisms and establishing their relationships
- (d) The classification of organisms based on their evolutionary history and establishing their phylogeny on the totality of various parameters from all fields of studies

# **158.** Species are considered as

- (a) Real units of classification devised by taxonomists
- (b) Real basic units of classification
- (c) The lowest units of classifcation
- (d) Artificial concept of human mind which cannot be defined in absolute terms
- **159.** Which one of the following is a matching pair of an animal and a certain phenomenon it exhibits
  - (a) Taenia Polymorphism (b) Pheretima Sexual dimorphism
  - (c) Musca Complete metamorphosis (d) Chamaeleon Parthenogenesis
- **160.** Assertion (*A*) : Systematics is the branch of biology that deals with classification of living organism

**Reason** (R) : The aim of classification is to group the organisms in an orderly manner of these statements

- (a) If both the A and R are true and the R is a correct explanation of the A % A
- (b) If both the A and R are true but the R is not a correct explanation of the A % A
- (c) If the A is true but the R is false
- (d) If both the A and R are false
- **161.** In which one of the following groups an animals are hermaphrodite
  - (a) Hydra, Ascaris, Pheretima (b) Hydra, Homo sapiens, Leech
  - (c) Tapeworm, Toad, Starfish (d) Hydra, Leech, Tapeworm
- **162.** The zoological name of common hare found in northern India is
  - (a) Oryctolagus cuniculus (b)Lepus ruficaudatus (c) Dasypus sexcinctus (d) Alactaga indica

(b) Ascaris – Amoeba – Leucosolenia – Hydra(d) None of these

# <u>PROTOZOA</u>

Basi	ic Level				
163.	The class of phylum p	rotozoa to which 'noctiluc	a' belongs, is		
	(a) Rhizopoda	(b) Sporozoa	(c) Mastigophora	(d) Ciliata	
164.	The main basis of clas	sification of phylum proto	ozoa is		
165.					
	(a) Size	(b) Locomotory organel	le(c) Shape	(d) Number of nuclei	
166.	In protozoa contractile	vacuole is generally abse	nt in the class		
	(a) Rhizopoda	(b) Sporozoa	(c) Ciliata	(d) Flagellata	
167.	The class of Trichonyn	npha is			
	(a) Calcaria	(b) Scyphozoa	(c) Sporozoa	(d) Mastigophora	
168.	Which is not the chara	cteristic of phylum protoz	oa.		
	(a) Pseudopodia		(b) Binary fission		
	(c) Contractile vacuole	2	(d) Cell membrane as	body covering	
169.	Which of the following	g organelles are associated	l for defence in protozoa	ins	
	(a) Nematocysts	(b) Statocysts	(c) Trichocysts	(d) Otocysts	
169.	The chief advantage of	f encystment to an Amoeb	<i>a</i> is		
	(a) The chance to get ri	d of accumulated waste p	roducts		
	(b) The ability to survive during adverse physical conditions				
	(c) The ability to live for some time without ingesting food				
	(d) Protection from par	rasites and predators			
170.	Which is not the locon	notory organ of protozoa			
	(a) Cilia	(b) Flagella	(c) Pseudopodia	(d) Parapodia	
171.	In which of the follow	ing animal dimorphic nuc	leus is found		
	(a) Amoeba proteus				
	(b) <i>Plasmodium vivax</i>				
	(c) Paramecium caudo	itum			
	(d) Trypanosoma gama	biense			
172.	Monocystis belongs to	the order			
	(a) Gregarinida	(b) Coccidia	(c) Microsporidia	(d) Sarcosporidia	
173.	Which protozoan is un	likely to have a contractil	e vacuole		
	(a) Euglena	(b) Paramecium	(c) Amoeba	(d) Plasmodium	
174.	Choose the photosynth	netic protozoan from the fo	ollowing		
	(a) Euglena	(b) Amoeba	(c) Paramecium	(d) Plasmodium	
175.	Entamoeba histolytica	is a human parasite usual	ly found in		
	(a) Liver	(b) Lung	(c) Mouth	(d) Intestine	

176.	During conjugation in <i>Paramecium</i>					
	(a) Out of the four micr	onuclei formed, three nucl	lei degenerate			
	(b) Out of the twelve m	acronuclei formed, four nu	iclei degenerate			
	(c) $\sum$ y gote nucleus undergoes eight successive divisions in each conjugant					
	(d) Out of the sixteen nuclei formed from zygote, 12 become macronuclei and 4 micronuclei					
177.	The protozoan parasite	(h) <i>D</i>				
	(a) Leptomonas	(b) Plasmoalum	(c) Trypanosoma	(d) Leisnmania		
178.	(a) Excretory products	are not found	nic protozoa because			
	(a) Excletory products (b) Hypertonic condition	are not round	medium			
	(c) Isotonic condition of	of internal and external me	dium	(d) Excretion is absent		
170	In humans schizont sta	or and external me	d in	(d) Excitation is absent		
1/5.	(a) Liver cells only		(b) Liver spleen and bl	ood cells		
	(c) RBCs and liver cell	ç	(d) RBCs only			
180	Fuglena belongs to	5	(u) rebes only			
100.	(a) Flagellata	(b) Ciliata	(c) Sporozoa	(d) None of these		
101	Which of the following	(b) Chiata	lusively endoparasite	(d) None of these		
101.	(a) Mastigophora	(b) Sarcodina	(c) Opalinata	(d) Sporozoa		
100	Which of the following	(b) Salcoulla	(c) Opannata	(d) Sporozoa		
102.	(a) Enterobius vermicu	laris	(b) Paramecium cauda	tum		
	(c) Plasmodium vivax	14115	(d) Trypanosoma gamb	iense		
182	Fuglena belongs to whi	ich sub-class	(d) Trypanosonia gano	iense		
103.	(a) Zoomastigophora	(b) Mastigophora	(c) Actinopoda	(d) Phytomastigophora		
184	Which of the following	is not placed correctly in	the respective sub-class	(d) i nytoinastigophora		
104.	(a) Cnidospora-Nosem		(b) Telosporea- <i>Plasmo</i>	dium		
	(c)Actinonodea-Amogh		(d) Holotricha-Paramecium			
185	Protozoans are also cal	led	(u) Holothena-1 urumet			
105.	(a) Unicellular	(b) Multicellular	(c) Acellular	(d) Prokarvotic		
186.	Which is with a shell a	round		(a) Fromany other		
	(a) Amoeba	(b) Arcella	(c) Euglena	(d) Opalina		
187.	Which one is different	from the rest				
	(a) Amoeba	(b) Arcella	(c) Noctiluca	(d) Euglena		
188.	Bioluminescence is exi	bited by		-		
	(a) Ceratium	(b) Toxoplasma	(c) Paramecium	(d) Plasmodium		
189.	Pseudopodia is a chara	cteristic feature of which c	class			
	(a) Mastigophora	(b) Sarcodina	(c) Sporozoa	(d) Ciliata		
190.	Animals of class ciliata	ı				
	(a) Have two nuclei	(b) Are autotrophs	(c) Reproduce sexually	(d) Possess cilia		
1						

191.	Which of the protozoa	n is considered as connec	ting link between anima	ls and plants
	(a) Entamoeba	(b) Paramecium	(c) Euglena	(d) Monocystis
192	Excretion in Amoeba o	ccurs through		
	(a) Nucleus		(b) Parapodia	
	(c) Plasmalemma		(d) Contractile vacuol	e
193	. Amoeba is called imme	ortal and it is scattered all	over the world due to	
	(a) Conjugation	(b) Regeneration	(c) Binary fission	(d) Sexual reproduction
194	. Malaria parasite harm	liver cells		
	(a) In erythrocytic cycl	le	(b) After erythrocytic	cycle
	(c)Before erythrocytic	cycle	(d) None of these	
195	. The reason of pseudop	odium formation is		
	(a) Chemical changes		(b) Difference in the v	viscosity
	(c) Difference in the pr	ressure	(d) Change in the tem	perature
196	. Who discovered malar	ia parasite		
	(a) Sir Ronald Ross	(b) Charles Laveran	(c) Patrick Manson	(d) Grassi
197	. Hyaline cap in <i>Amoebe</i>	<i>a</i> is formed		
	(a) Around food vacuo	ble	(b)Around contractile	vacuole
	(c) Around nucleus		(d) In front of pseudop	podium
198	. Sporogony of malarial	parasite occurs in		
	(a) Liver of man		(b) RBCs of man	
	(c) Stomach wall of me	osquito	(d) Salivary glands of	mosquito
199	. Binary fission in <i>Amoe</i>	eba involves		
	(a) Amitosis	(b) Mitosis	(c) Meiosis	(d) None of these
200.	Nosema belongs to wh	iich phylum		
	(a) Protozoa	(b) Porifera	(c) Chordata	(d) Coelenterata
201.	Which is filter feeder			
	(a) <i>Amoeba</i>	(b) <i>Leech</i>	(c) Spider	(d) Paramecium
202.	Proterospongia is a con	nnecting link between		
	(a) Protozoa and porife	era (b)Porifera and coel	enterata	
	(c) Protozoa and annel	ida (d)Porifera and anne	elida	
203.	Function of contractile	vacuole in protozoa is		
	(a) Osmoregulation		(b) Digestion of food	
	(c) Locomotion		(d) Uptake of oxygen	from water
204.	Class sporozoa of phyl	lum protozoa is characteri	ised by	
	(a) Flagella	(b) Cilia	(c) Parasitism	(d) None of these
205	The members of which	class of protozoa are all	parasitic	
	(a) Mastigophora	(b) Ciliata	(c) Sporozoa	(d) Rhizopoda
206	. In poriterans the skelet	on forming cells are		
	(a) Amoebocytes	(b) Thesocytes	(c) Archaeocytes	(d) Scierocytes

207	.Amoeba was described	in detail by			
	(a) Ronald Ross	(b) Aristotle	(c) Hirshfield	(d) Rosenhoff	
208	. Conjugation in protozo	a is found in			
	(a) Sarcodina	(b) Flagellata	(c) Sporozoa	(d) Ciliata	
209	<b>209.</b> Which one of the following represents class Mastigophora				
	(a) Monocystis	(b) Paramecium	(c) Trypanosoma	(d) Amoeba	
210	. Protista includes				
	(a) Dinoflagellates, An	10eba, Paramecium	(b) Mushroom, Parame	ecium, Euglena	
	(c) Hydra, Amoeba, Pa	aramecium	(d) Yeast, Euglena, din	oflagellates	
211	Which one show biolur	miniscence			
	(a) Noctilucus	(b) Polystomella	(c) Entamoeba	(d) Suctoria	
212	. Protists are				
	1. Unicellular and pro	karyote			
	2. Unicellular and euk	aryote			
	3. Multicellular and en	ukaryote			
	4. Autotrotroph and h	eterotroph			
	(a) $1 + 2 + 3$	(b) $2 + 3 + 4$	(c) $3 + 4$	(d) 2 + 4	
213.	Locomotary organ of s	porozoa is			
	(a) Tentacles	(b) Reticulocytes	(c) Legs	(d) None of the above	
214.	Contractile vacuole is	generally absent in the			
	(a) Parasitic protozoan	S	(b) Marine protozoans		
	(c) Both (a) and (b)		(d) Some fresh water protozoans		

# **PORIFERA**

# Basic Level

215.	A Chamber common to all types of canal system of sponges is called				
	(a) Paragastric cavity	(b) Radial chamber	(c) Excurrent canal	(d) Incurrent canal	
216.	A skeleton of calcareou	us spicules is not found in	which of the following g	groups	
	(a) Calcarea	(b) Polyplacophora	(c) Echinoidea	(d) Hydrozoa	
217.	Which one is not typic	al to all porifers			
	(a) Perforated body		(b) Choanocytes		
	(c) System of pores and	d canal	(d) Presence of spongir	n fibres	
218.	Which of the following	g is a member of phylum p	oorifera		
	(a) Sycon	(b) Leucosolenia	(c) Spongilla	(d) All of them	
219.	Evolution of porifera fi	rom protozoans is evidenc	ed by the animals like		
	(a) Euglena	(b) Chlamydomonas	(c) Volvox	(d) Paramecium	
220.	Amphiblastula and par	enchymula larval stages a	re found in the		
	(a) Coelenterata	(b) Platyhelminthes	(c) Porifera	(d) None of these	
1					

221.	Which cells are useful	for feeding in sponges		
	(a) Thesocytes	(b) Collar cells	(c) Pinacocytes	(d) Sclerocytes
222.	Sponges free swimmin	g larva is called as		
	(a) Veliger	(b) Trochophore	(c) Parenchymula	(d) Bipinnaria
223.	The most distinctive ch	naracter of sponge is		
	(a) Presence of choano	cytes	(b) Unicellular	
	(c) Marine		(d) Asexual reproduction	on
224.	Canal system is a chara	acteristic of		
	(a) Hydra	(b) Sponge	(c) Sea anemone	(d) Sea urchin
225.	Fresh water sponges ar	e also grouped in the		
	(a) Calcarea	(b) Heterocoela	(c) Demospongia	(d) Trachinellida
226.	Canal system is only for	ound in the		
	(a) Coelenterata	(b) Porifera	(c) Platyhelminthes	(d) Nemathelminthes
227.	Choanocytes are presen	nt in		
	(a) Protozoa	(b) Porifera	(c) Coelenterata	(d) Mollusca
228.	"Venus flower basket"	is the name of the dried s	keleton of	
	(a) Euspongia	(b) Euplectella	(c) Spongilla	(d) Leucosolenia
229.	In Leucosolenia, digest	tion takes place in the		
	(a) Paragastric cavity	(b) Stomach	(c) Osculum	(d) Food vacuole
230.	Parenchymula is the lan	rva of		
	(a) <i>Hydra</i>	(b) Ascaris	(c) Pheretima	(d) Leucosolenia
231.	Sponges are			
	(a) Sessile	(b) Planktonic	(c) Free-swimming	(d) Pelagic
232.	Which sponge is given	as a gift in Japan		
	(a) Hyalonema	(b) Euplectella	(c) Tethya	(d) Leucosolenia
233.	Water currents in Leuce	osolenia are produced by		
	(a) Choanocytes	(b) Pinacocytes	(c) Archeocytes	(d) Thesocytes
234.	Members of phylum po	orifera are		
	(a) Exclusively marine	animals		
	(b) Exclusively fresh w	ater animal		
	(c) Mostly fresh water	animals but few are marin	e animals	
	(d) Mostly marine anim	hals but few are fresh wate	er animals	
235.	Which sponge is found	in the river		
	(a) Cliona	(b) Spongilla	(c) Sycon	(d) Hyalonema
236.	What is found in a spor	nge		
	(a) Choanocytes	(b) Nematocysts	(c) Amoebocytes	(d) Interstitial cells
237.	Which of the following	g is boring sponge		
	(a) Cliona	(b) Chalina	(c) Euplectella	(d) Hyalonema
1				

238.	The canal system is a c	haracteristic feature of		
	(a) Helminthes	(b) Coelenterates	(c) Echinoderms	(d) Sponges
239.	The common bath spon	ige belongs to the genus		
	(a) Sycon	(b) Leucosolenia	(c) Euspongia	(d) Spongilla
240.	Classification of Phylu	m Porifera is based on		
	(a) Nutrition	(b) Spicules	(c) Locomotion	(d) Reproduction
241.	Amphiblastula is the lan	rva of		
	(a) <i>Hydra</i>	(b) Sycon	(c) Planaria	(d) Leucosolenia
242.	Classification of sponge	es is primarily based on th	e	
	(a) Body organisation	(b) Body plan	(c) Skeleton	(d) Canal system
243.	What is left, when bath	sponges dries up		
	(a) Spicules	(b) Holdfast	(c) Tentacles	(d) Spongin fibres
244.	Sycon belongs to a grou	p of animals, which are b	est described as	
	(a) Multicellular having	tissue organization, but n	ot body cavity	
	(b) Unicellular or acellu	ılar		
	(c) Multicellular without	tt any tissue organization		
	(d) Multicellular with a	gastrovascular system		
245.	In demospongiae skelet	on is composed of		
	(a) Calcium spicules	(b) Siliceous spicules	(c) Keratin fibres	(d) Spongin fibres
246.	What will happen if a sp	ponge is cut into maximur	n possible pieces	
	(a) These will die		(b) These will different	iate
	(c) Every piece will for	rm a sponge	(d) Some pieces will de	evelop in organs
		<u>COELENT</u>	ERATA	
Basi				
247.	c Level			
	<i>c Level</i> Which of the following	g animals has a tetramorph	ic colony	
	<i>c Level</i> Which of the following (a) Obelia	g animals has a tetramorph (b) Physalia	ic colony (c) Porpita	(d) Velella
248.	<i>c Level</i> Which of the following (a) Obelia Which of the following	g animals has a tetramorph (b) Physalia g animals is without sexual	ic colony (c) Porpita l medusae	(d) Velella
248.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma	g animals has a tetramorph (b) Physalia g animals is without sexua (b) Hydra	ic colony (c) Porpita l medusae (c) Millepora	(d) Velella (d) Velella
248. 249.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r	g animals has a tetramorph (b) Physalia g animals is without sexual (b) Hydra not polymorphic	ic colony (c) Porpita l medusae (c) Millepora	(d) Velella (d) Velella
248. 249.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i>	g animals has a tetramorph (b) Physalia g animals is without sexua (b) Hydra not polymorphic (b) <i>Vellela</i>	ic colony (c) Porpita l medusae (c) Millepora (c) <i>Adamsia</i>	(d) Velella (d) Velella (d) <i>Physalia</i>
248. 249. 250.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are	g animals has a tetramorph (b) Physalia g animals is without sexual (b) Hydra not polymorphic (b) <i>Vellela</i>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i>	(d) Velella (d) Velella (d) <i>Physalia</i>
248. 249. 250.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are (a) Acoelomate	<ul> <li>g animals has a tetramorph</li> <li>(b) Physalia</li> <li>g animals is without sexual</li> <li>(b) Hydra</li> <li>not polymorphic</li> <li>(b) <i>Vellela</i></li> <li>(b) Coelomate</li> </ul>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i> (c) Pseudocoelomate	(d) Velella (d) Velella (d) <i>Physalia</i> (d) None of these
248. 249. 250. 251.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are (a) Acoelomate Which of the following	<ul> <li>g animals has a tetramorph</li> <li>(b) Physalia</li> <li>g animals is without sexual</li> <li>(b) Hydra</li> <li>not polymorphic</li> <li>(b) <i>Vellela</i></li> <li>(b) Coelomate</li> <li>g do not have polyp form</li> </ul>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i> (c) Pseudocoelomate	<ul> <li>(d) Velella</li> <li>(d) Velella</li> <li>(d) <i>Physalia</i></li> <li>(d) None of these</li> </ul>
248. 249. 250. 251.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are (a) Acoelomate Which of the following (a) Hydrozoa	<ul> <li>g animals has a tetramorph</li> <li>(b) Physalia</li> <li>g animals is without sexual</li> <li>(b) Hydra</li> <li>not polymorphic</li> <li>(b) <i>Vellela</i></li> <li>(b) Coelomate</li> <li>g do not have polyp form</li> <li>(b) Scyphozoa</li> </ul>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i> (c) Pseudocoelomate (c) Anthozoa	(d) Velella (d) Velella (d) <i>Physalia</i> (d) None of these (d) All the above
<ol> <li>248.</li> <li>249.</li> <li>250.</li> <li>251.</li> <li>252.</li> </ol>	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are (a) Acoelomate Which of the following (a) Hydrozoa Which group is commo	<ul> <li>g animals has a tetramorph</li> <li>(b) Physalia</li> <li>g animals is without sexual</li> <li>(b) Hydra</li> <li>(b) Hydra</li> <li>(b) Vellela</li> <li>(b) Coelomate</li> <li>(b) Coelomate</li> <li>(c) Scyphozoa</li> <li>(c) Scyphozoa</li> <li>(c) Fuller i</li> </ul>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i> (c) Pseudocoelomate (c) Anthozoa	<ul> <li>(d) Velella</li> <li>(d) Velella</li> <li>(d) <i>Physalia</i></li> <li>(d) None of these</li> <li>(d) All the above</li> </ul>
248. 249. 250. 251. 252.	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are (a) Acoelomate Which of the following (a) Hydrozoa Which group is commo (a) Arthropoda	<ul> <li>g animals has a tetramorph</li> <li>(b) Physalia</li> <li>g animals is without sexual</li> <li>(b) Hydra</li> <li>not polymorphic</li> <li>(b) <i>Vellela</i></li> <li>(b) Coelomate</li> <li>g do not have polyp form</li> <li>(b) Scyphozoa</li> <li>only called as 'sea stick'</li> <li>(b) Echinodermata</li> </ul>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i> (c) Pseudocoelomate (c) Anthozoa (c) Coelenterata	(d) Velella (d) Velella (d) <i>Physalia</i> (d) None of these (d) All the above (d) Porifera
<ol> <li>248.</li> <li>249.</li> <li>250.</li> <li>251.</li> <li>252.</li> <li>253.</li> </ol>	<i>c Level</i> Which of the following (a) Obelia Which of the following (a) Halistemma Which coelenterate is r (a) <i>Porpita</i> Coelenterates are (a) Acoelomate Which of the following (a) Hydrozoa Which group is commo (a) Arthropoda	<ul> <li>g animals has a tetramorph</li> <li>(b) Physalia</li> <li>g animals is without sexual</li> <li>(b) Hydra</li> <li>not polymorphic</li> <li>(b) Vellela</li> <li>(b) Coelomate</li> <li>g do not have polyp form</li> <li>(b) Scyphozoa</li> <li>only called as 'sea stick'</li> <li>(b) Echinodermata</li> </ul>	ic colony (c) Porpita I medusae (c) Millepora (c) <i>Adamsia</i> (c) Pseudocoelomate (c) Anthozoa (c) Coelenterata	<ul> <li>(d) Velella</li> <li>(d) Velella</li> <li>(d) <i>Physalia</i></li> <li>(d) None of these</li> <li>(d) All the above</li> <li>(d) Porifera</li> </ul>

254.	54. Which of the following is a polymorphic coelenterate				
	(a) Physalia	(b) Fungia	(c) Hydra	(d) All of these	
255.	Most appropriate term t	o designate the life cycle of	of <i>Obelia</i> is		
	(a) Neoteny	(b) Metagenesis	(c) Metamorphosis	(d) None of these	
256.	Which of the following	does not belong to phylur	n Coelenterata		
	(a) Sea pen	(b) Sea feather	(c) Sea cucumber	(d) Sea fan	
257.	Sea anemone belongs to	o class			
	(a) Hydrozoa	(b) Anthozoa	(c) Scyphozoa	(d) None of these	
258.	A coelenterate common	nly known as ' <i>fresh water</i> ,	<i>polyp'</i> is		
	(a) Aurelia	(b) Hydra	(c) <i>Obelia</i>	(d) Physalia	
259.	Corals belong to the the	e phylum			
	(a) Protozoa	(b) Porifera	(c) Cnideria	(d) Mollusca	
260.	The phylum of comb je	lly is			
	(a) Mollusca	(b) Echinodermata	(c) Coelenterata	(d) Ctenophora	
261.	Hydra is				
	(a) Herbivorous	(b) More developed	(c) Carnivorous	(d) Omnivorous	
262.	Which is not applicable	e to coelenterata			
	(a) Coelenteron	(b) Choanocytes	(c) Nematoblasts	(d) Radial symmetry	
263.	Coelenterates generally	include animals which ar	e		
	(a) Radially symmetric	al and triploblastic	(b) Radially symmetric	al and diploblastic	
	(c) Bilaterally symmetr	rical and triploblastic	(d) Bilaterally symmetr	ical and diploblastic	
264.	Jelly fish is placed in w	which class of coelenterata			
	(a) Anthozoa	(b) Scyphozoa	(c) Hydrozoa	(d) None of the above	
265.	One of the special char	acters of coelenterata only	is the occurrence of		
	(a) Hermaphroditism	(b) Flame cells	(c) Polymorphism	(d) Nematocysts	
266.	Hydra 1s $()$ $\mathbf{M}$				
	(a) Marine, radially syr	nmetrical and diploblastic	actio		
	(b) Fresh water, biradia	is symmetrical and triplob			
	(c) Fresh water, radially sum	y symmetrical and diplot	astic		
	Organ pipe coral is	interical and urpioblastic			
207.	(a) Astrea	(b) Tubipora	(c) Fungia	(d) Meandrina	
268	'Portuguese man of way	r' is	(c) I uligia	(u) Weandrina	
200.	(a) Soldier of World W	ar-I	(b) Portuguese soldier		
	(c) A sponge	ui 1	(d) A polymorphic col	onial coelenterate	
260	The coral species which	h is extensively used in ier	vellerv		
20y.	(a) Corallium rubram	(b) Anthocodium indicum	n (c) Gorgonia flabellum	(d) Fungia species	
1	(a) Corallum rubram (b) Aninocoalum inalcum (c) Gorgonia flabellum (d) Fungia species				

270	. Phylum coelenterata h	as remained at		
	(a) Cellular level of or	ganisation	(b)Organ level of organisation	
	(c) Tissue level of org	anisation	(d)Organ system level	of organisation
271	. Main cavity in the bod	ly of <i>Hydra</i> is called		
	(a) Gastrovascular cav	vity (b)Schizocoel	(c) Haemocoel	(d) Pseudocoelom
272	. The paralysing toxin ir	n nematocyst is		
	(a) Glutathione	(b) Heparin	(c) Histamine	(d) Hypnotoxin
273	B. Pneumatophore helps i	n		
	(a) Feeding	(b) Reproduction	(c) Protection	(d) Floating
274	In coelenterates, charac	cteristic larva is		
	(a) Planula	(b) Rhabiditiform	(c) Oncosphere	(d) Cysticercus
275	<b>5.</b> A coral island with a c	entral shallow lake is know	vn as	
	(a) Coral reef	(b) Atoll	(c) Corallite	(d) Diatomaceous
	sheath			
276	6. Why does the Ctenoph	ora is a minor phylum		
	(a) It includes small si	zed animals	(b)It includes only few genera	
	(c) It does not include animals of economic importance			
	(d) It was included earlier in cnidaria			
277	The larva of hydra is			
	(a) Planula	(b) Rhabditoid	(c) Trochophore	(d) None of these
278	$\mathbf{B}. Hydra 1\mathbf{S}$	1		1
	(a) Triploblastic, radia	l symmetry & acoelomate	(b) Triploblastic, radia	I symmetry & coelomate
	(c) Diploblastic, radial	symmetry & acoelomate	(d) Diploblastic, radial	symmetry & coelomate
279	•. The true statement reg	arding corals is		
	(a) They form branche	ed colonies	(b) Are solitary or cold	onial polypoid
	(c) They grow as mass	sive bodies	(d) All of these	
280	b. In coelenterates $O_2$ is (	carried to various tissues b	y () Dl	
	(a) Blood pigment		(b) Plasma	
	(c) Diffuses through in	nteguments	(d) Tracheal tubes	
281	. <i>Obelia</i> belongs to whit	ch class of phylum coelent	terata	
	(a) Hydrozoa	(b) Anthozoa	(c) Scyphozoa	(d) None of the above
282	. How many ova are for	med in the ovary of hydra		
	(a) 2	(b) 4	(c) 1	(d) 3
283	. Which one of the follo	owing animals is a coelente	erate	
	(a) Sea cow	(b) Sea horse	(c) Sea cucumber	(d) Sea pen
284	4. Hydra receives impulse	es and stimuli through		
	(a) Nerve net	(b) Sensory cells	(c) Nematocytes	(d) All of these

285	In which class of coele	nterata the polyp and med	usa both are found in or	ne animal
	(a) Hydrozoa	(b) Scyphozoa	(c) Anthozoa	(d) None of them
286.	Which of the following	g belongs to anthozoa		
	(a) Aurelia	(b) Fungia	(c) Stercularia	(d) Dugesia
287.	Mesogloea is present i	n the Phylum		
	(a) Porifera	(b) Coelenterata	(c) Annelida	(d) Arthropoda
288.	Statocysts are sense or	gans of		
	(a) Ascaris	(b) Paramecium	(c) Taenia solium	( <b>d</b> ) Obelia medusa
289.	'Ephyra' is the stage ir	n the life cycle of		
	(a) Frog	(b) Obelia	(c) Aurelia	(d) Sea anemone
		<u>PLATYHELI</u>	MINTHES	
Bas	ic Level			
290.	Solenocytes and nephri	dia are respectively found	l in	
	(a) Platyhelminths and	Annelids	(b)Annelids and Nema	atoda
	(c) Cnidaria and Mollu	c) Cnidaria and Mollusca (d)Mollusca and Echinodermata		
291.	Which of the following	g is a free living flat worm		
	(a) <i>Planaria</i>	(b) Taenia	(c) Fasciola	(d) Pheretima
292.	The free living platyhe	lminthes are		
	(a) Turbellaria	(b) Cestoda		
	(c) Trematoda	(d) Trematoda and cesto	da	
293.	Miracidium larva occu	rs in the life history of		
	(a) Round worm	(b) Liver fluke	(c) Earthworm	(d) Tapeworm
294.	Cestodes are distinguis	hed from other flatworms	by the absence of	
	(a) Nervous System	(b) Digestive system		
	(c) Excretory system	(d) Reproductive system	l	
295.	Which one of the follo	wing is an example of pla	tyhelminthes	
	(a) Trypanosoma	(b) Schistosoma	(c) Plasmodium	(d) Wuchereria
296.	Playhelminthes represe	ents an example of		
	(a) Cellular grade of or	rganisation	(b) Tissue grade of or	ganisation
	(c) Organ-system grad	e of organisation	(d) Tissue-organ grade	e of organisation
297.	The example of digene	etic plathelminthes		
	(a) Fasciola	(b) Aspidogaster	(c) Dugesia	(d) Diplozoon
298.	Cysticercus is the larva	of		
	(a) Liver fluke	(b) Tapeworm	(c) Ascaris	(d) Mollusca
299.	Planaria, liver fluke an	d taenia solium are		
	(a) All segmented	(b) All found in the gut	(c) All have coelom	(d) All are flatworms

300.	Turbellarian epidermis differs from that of a trematode due to				
	(a) Presence of rhabdite	es	(b) Presence of syncytic	um in trematodes	
	(c) Presence of cilia		(d) (a) and (c) both		
301.	Platyhelminthes are cal	led as			
	(a) Round worms	(b) Flat worms	(c) Blind worms	(d) Tubicolous worms	
302.	The scientific name of	pin worm or seat worm is			
	(a) Trichinella		(b) Ancylostoma		
	(c) Enterobius vermicu	laris	(d) Wuchereria		
303.	Dropping of gravid pro	oglottids by cestodes is ca	lled		
	(a) Apolysis	(b) Autotomy	(c) Paedogenesis	(d) Autophagy	
304.	Excretory organs of pla	atyhelminthes are	-		
	(a) Nephridia	(b) Protonephridia	(c) Solenocytes	(d) Archaeocytes	
305.	Laurer's cannal is found	d in			
	(a) Amoeba	(b) Paramecium	(c) Fasciola	(d) Hydra	
306.	Turbellarians are free l	iving			
	(a) Nematodes	(b) Annelids	(c) Trematodes	(d) Flatworm	
307.	Tapeworms obtain thei	r food from			
	(a) Mouth	(b) Suckers	(c) Outer surface	(d) All the above	
308.	Locomotory organs in	Taenia are called			
	(a) Setae	(b) Parapodia	(c) Flagella	(d) None of these	
309.	To which of the follow	ing Phylum class Tremato	da belongs		
	(a) Platyhelminthes	(b) Arthropoda	(c) Mollusca	(d) Annelida	
310.	Gut is found in all but of	one of the following taxon	omic group of platyhelm	ninthes	
	(a) Digenoidea	(b) Cestoda	(c) Turbellaria	(d) Aspidogastrea	
311.	The excretory organs o	f flatworms are			
	(a) Flame cells	(b) Nephridia	(c) Malpighian tubules	(d) Rennate glands	
312.	Flatworms are				
	(a) Acoelomates	(b) Pseudocoelomates	(c) Haemocoelomates	(d) Coelomates	
313.	Members of class Trem	natoda are commonly calle	ed as		
	(a) Blood flukes	(b) Flatworms	(c) Flukes	(d) Tapeworms	
314.	Flame cells is the chara	acteristic of			
	(a) Nematoda	(b) Coelenterata	(c) Platyhelminthes	(d) Some arthropoda	
315.	Tapeworm is placed in	the class			
	(a) Cestoda	(b) Trematoda	(c) Sporozoa	(d) Suctoria	

# **NEMETHELMINTHES**

#### **Basic Level**

316.	Pin worm is called as				
	(a) Schistosoma haema	tobium	(b) Wuchereria bancrofti		
	(c) Ancylostoma duode	enale	(d) Anterobius vermicularis		
317.	Female Ascaris lumbric	coides is identified on the	basis of		
	(a) Straight posterior en	nd	(b) A common cloacal	aperture	
	(c) Presence of two spie	cules at posterior end	(d) Presence of pre and	post anal papillae	
318.	3. Pineal setae in male Ascaris are found in				
	(a) Cloaca	(b) Rectum	(c) Anus	(d) Mouth	
319.	<b>9.</b> One of the following characteristics is not correct for nematoda				
	(a) Elongated cylindric	al body	(b) Fixed number of ce	lls in the body	
	(c) Hermaphroditism		(d) Pseudocoelomate		
320.	Female Ascaris differs	from the male in			
	(a) Having pineal setae	(b) Curvature of tail	(c) Body length	(d) None of these	
321.	Which of the following	groups have one or more	e animals which are not p	seudocoelomate	
	(a) Ascaris, taenia		(b) Enterobius, wuchereria		
	(c)Ancylostoma, dracu	nculus	(d) Ascaris, ancyloston	na	
322.	Ascaris completes its li	fe cycle in			
	(a) Only in man	(b) Man and sheep	(c) Man and mosquito	(d) Man and cow	
323.	In Ascaris 3 <sup>rd</sup> moulting	takes place in			
	(a) Intestine	(b) Lung	(c) Liver	(d) Egg	
324.	Syncytial epidermal cel	lls are present in			
	(a) Platyhelminthes	(b) Nematodes	(c) Some annelids	(d) $(a)$ and $(b)$ both	
325.	A rhabditiform larva is	(b) Tan automa	(a) Hydra	(d) Lauragalania	
226	(a) Ascuris Wuchararia bancrofti i	(0) Tupeworm	(C) Hyara	(d) Leucosolenia	
320.	(a) Tse_tse fly	(b) Male Anonheles	(c) Culer mosquito	(d) Female Anonholos	
327	Body cavity of <i>Ascaris</i>	is	(c) Culex mosquito	(d) I emaie <i>intophetes</i>	
527.	(a) Pseudocoel	(b) Enterocoel	(c) Coelom	(d) Acoelom	
328.	The larva of <i>Ascaris</i> un	dergoes the migration in	which of the following c	ourse	
5	(a) Alimentary canal, li	ver, intestine	6		
	(b) Alimentary canal, h	eart, lungs, trachea, intest	tine		
	(c) Alimentary canal, h	eart, liver, lungs, trachea,	mouth, intestine		
	(d) Alimentary canal, li	ver, heart, lungs, trachea,	pharynx, intestine		
320	which is not a typical character of phylum nematoda				
------	---	-----------------------------	-------------------------	---------------------------	
329.	(a) Syncytial enidermis	(b) Non-living cuticle	ouu		
	(c) Pseudocoel	(d) All are parasite in ani	mals		
220	Which of the following	sense organs present in	Ascaris are chemored	entors and are located in	
330.	ventrolateral lips	S sense organs present in		eptons and are foculed in	
	(a) Amphids	(b) Pineal setae	(c) Pineal spicules	(d) Copulatory bursa	
331.	Roundworms differ from	n flatworms in having a			
	(a) Circulatory system	(b) Pseudocoel			
	(c) Dorsal nerve cord	(d) Circular muscle layer			
332.	The infective stage of A	<i>scaris</i> is			
	(a) Embryonated egg	(b) Sporozoite	(c) Cysticercus larva	(d) Rhabditoid larva	
333.	Ascaris performs				
	(a) Aerobic respiration	(b) Anaerobic respiration	(c) Both (a) and (b)	(d) None of these	
334.	Coenocytic epidermis is	s present in			
	(a) Ascaris	(b) Cockroach	(c) Earthworm	(d) Housefly	
335.	What type of ectoderm	is found in Ascaris			
	(a) Pseudoplasmic	(b) Segmented	(c) Syncytial	(d) Tubular	
336.	The adult Wuchereria b	ancrofti lives in			
	(a) Human subdermal s	paces	(b) Muscles of culex		
	(c) Salivary glands of c	ulex	(d) Human lymph glan	ds	
337.	One of the following is	not a nematode parasite			
	(a) Trichinella	(b) Ascaris	(c) Dracunculus	(d) Schistosoma	
338.	Which is the monogene	tic in following			
	(a) <i>Tapeworm</i>	(b) Ascaris	(c) Fasciola	(d) Hookworm	
339.	All worms are				
	(a) Triploblastic	(b) Segmented	(c) Endo-parasites	(d) Free-living	
		ANNEL	IDA		
Basi	ic Level				
340.	Metamerically segment	ed body is present in			
	(a) Earthworm	(b) Leech	(c) Nereis	(d) All of the above	
341.	Earhworm is placed in t	the group			
	(a) Oligochaeta	(b) Polychaeta	(c) Hirudinea	(d) Crustacea	
342.	Chloragogen cells of ea	rthworm are similar to the	e organ of vertebrate's		
	(a) Liver	(b) Lung	(c) Kidney	(d) Spleen	
343.	Male genital aperture of	f earthworms is located in	the segment		
	(a) 13	(b) 14	(c) 19	(d) 18	
344.	Annelids are				
	(a) Radially symmetrica	al (b)Externally segmen	ted (c)Triploblastic	(d) Pseudocoelomate	

345.	5. The parasite found in the seminal vesicle of earthworm			
	(a) Monocystis	(b) Nosema	(c) Sarcocystis	(d) Nyctotherus
346.	Body is segmented in			
	(a) Coelenterate	(b) Annelida	(c) Porifera	(d) Mollusca
347.	Besides Annelida and A	Arthropoda, the metameri	sm is exhibited by	
	(a) Acanthocephala	(b) Chordata	(c) Mollusca	(d) Cestoda
348.	Pheritima posthuma an	d Periplanata are similar	in which aspect	
	(a) Both have nephredia	a as excretory organs	(b) Both have ventral n	nerve cord
	(c) Both belong to same	e taxonomical group	(d) All the above	
349.	Which of the following	belongs to the phylum a	nnelida	
	(a) Octopus	(b) Ant	(c) Nereis	(d) Crab
350.	A definite number of be	ody segments is found in		
	(a) Leech	(b) Earthworm	(c) Tapeworm	(d) Slug
351.	Peripatus is a connectin	ng link between		
	(a) Reptiles and birds		(b) Annelida and arthropoda	
	(c)Mollusca and annelie	da	(d) Mollusca and arthropoda	
352.	Closed blood vascular s	system, liver cells in the b	blood and chitinous setae	or parapodia are the
	characteristics of			
	(a) Arthropoda	(b) Nematoda	(c) Annelida	(d) None of these
353.	Metamerism or metame	eric segmentation is chara	acteristic feature of	
	(a) Porifera	(b) Mollusca	(c) Annelida	(d) Platyhelminthes
354.	In which of the following	ng, clitellum is absent		
	(a) Polychaeta	(b) Oligochaeta	(c) <i>Hirudinea</i>	(d) All the above
355.	The typhlosole in earth	worm is related with		
	(a) Excretion	(b) Absorption	(c) Respiration	(d) Reproduction
356.	Botryoidal tissue is fou	nd in		
	(a) Rabbit	(b) Ascaris	(c) Hirudinaria	(d) Earthworm
357.	Which is not a feature of	of Annelid		
	(a) Metameric segment	ation	(b) Nephridia	
	(c) Pseudocoelom		(d) Clitellum	
358.	In Pheretima, there are	red coloured round bodie	es in 4 <sup>th</sup> , 5 <sup>th</sup> and 6 <sup>th</sup> segm	ents above the alimentary
	canal. They are believe	d to be involved in		
	(a) Excretion	(b) Digestion		
	(c) Reproduction	(d) Leucocyte productio	n	
359.	The connecting link bet	tween annelida and mollu	isca is	
	(a) Neopilina	(b) Nautilus	(c) Glochidium larva	(d) Valiger larva
360.	Which one of the follow	wing exhibits concentric '	"tube within tube" plan	
	(a) Arthropoda	(b) Oligochaeta	(c) Mollusca	(d) Echinodermata
1				

361.	. Phylum annelida resembles mollusca in embryonic features because both have				
	(a) Spiral cleavage and	l mesoderm formation			
	(b) Identical conspicuous segmentation in body, muscles and nervous system				
	(c) Meroblastic cleava	ge and ectoderm formation	n		
	(d) Special type of more	uth parts			
362.	How are annelida adva	nced over nematoda			
	(a) Closed circulation		(b) True coelom		
	(c) Metameric segmen	tation	(d) All of these		
363.	The colour of the body	in earthworm is brown du	ue to the presence of		
	(a) Porphyrin	(b) Haemoglobin	(c) Blood	(d) Haemocyanin	
364.	The famous Indian Zoo	ologist who wrote a memo	oir upon Pheretima posth	uma is	
	(a) J.C. Bose	(b) M.L.Bhatia	(c) K.N.Bahl	(d) Beni Prasad	
365.	Most important use of	Pheretima posthuma is			
	(a) To catch fish		(b) To make dish		
	(c) To make soil saline	;	(d) To make soil porou	s and fertile	
366.	In which of the follow	ing class of Annelida, one	pair ovaries and several	pair testes are found	
	(a) Archiannelida	(b) Hirudinea	(c) Oligochaeta	(d) Polychaeta	
367.	Fertilization in earthwo	orm is			
	(a) Cross fertilization	(b) Mutual fertilization	(c) Self fertilization	(d) None of these	
368.	Of which the body is n	nade up of 33 somites			
	(a) Leech	(b) Earthworm	(c) Tapeworm	(d) Slug	
369.	Aphrodite, commonly	known as sea mouse is a			
	(a) Annelid	(b) Mollusca	(c) Insect	(d) Mammal	
		<u>ARTHRO</u>	PODA		
Basi	ic Level				
370.	Book lung is the chara	cter of			
	(a) Mollusca	(b) Insect	(c) Arachnida	(d) Crustacea	
371.	Cephalothorax is found	d in the			
	(a) Arthropoda	(b) Annelida	(c) Nematoda	(d) Echinodermata	
372.	Presence of hepatopan	creas is character of			
	(a) Annelida	(b) Echinodermata only	(c) Arthropods only	(d) (b) and (c)both	
373.	The process of converse	sion of a small cockroach	into an adult cockroach i	s called as	
	(a) Moulting	(b) Metamorphosis	(c) Ecdysis	(d) Transformation	
374.	'Hexapoda' is another n	name of			
	(a) Crustacea	(b) Arachnida	(c) Insecta	(d) Archiannelida	
375.	Snakes receive sound	vibrations by			
	(a) Tympanum	(b) Body	(c) Internal ear	(d) Earth	

376.	Glow worm is			
	(a) Annelid	(b) Helminthes	(c) Insect	(d) Mollusca
377.	Which thing is commo	n in leech, mosquito bed b	bug and rat	
	(a) All have anticoagul	atin	(b) All have nucleus	
	(c) All have no cellular	r membrane	(d) All have sexual pha	ase
378.	Cockroach belongs to	class		
	(a) Hexapoda	(b) Apoda	(c) Myriapoda	(d) Cephalopoda
379.	The image formed in the	ne eyes of cockroach is		
	(a) Apposition	(b) Superposition	(c) Both (a) and (b)	(d) None of these
380.	What is common amor	ng silver fish, scorpion, cra	ab and honey bee	
	(a) Compound eyes	(b) Poison glands	(c) Jointed legs	(d) Metamorphosis
381.	A myriapoda has			
	(a) Chitinous exoskele	ton, dorsal nerve cord, three	ee body segments and o	ne pair of antennae
	(b) Chitinous exoskele	ton, ventral nerve cord, the	ree body segments and t	wo pair of antennae
	(c) Soft body, ventral r	nerve cord, numerous body	y segments and two pair	of antennae
	(d) Chitinous exoskele	ton, ventral nerve cord, nu	merous body segments a	and one pair of antennae
382.	Cockroach belongs to t	the class		
	(a) Arthropoda	(b) Insecta	(c) Crustacea	(d) Arachnida
383.	Characteristic common	in spider, cockroach and	centipede	
	(a) Compound eyes	(b) Book lungs	(c) Green gland	(d) Jointed legs
384.	A moth is closely relat	ed to		
	(a) Butterfly	(b) Cricket	(c) Beetle	(d) Wasp
385.	Nauplius larva belongs	to		
	(a) Insects	(b) Shrimps	(c) Echinoderms	(d) Molluscs
386.	A suctorial mouth is pr	esent in	( .) II	
- 0-	(a) Leech The biggest phylum in	(D) COCKFORCE	(c) Houselly	(d) Butterny
387.	(a) Arthropoda	(b) Platybalminthas	(c) Chordata	(d) Protozoa
200	(a) Anthropoda The arthropods do not		(c) Chordata	(u) 1101020a
300.	(a) True coelom	(b) Exoskeleton	(c) Haemocoel	(d) Malnighian body
280	(a) The cocioni	ch		(u) Maipiginan bouy
309.	(a) Resembles human l	plood in colour	(b) Circulates through	arteries and vains
	(a) Circulates through	an open system	(d) Has harmoglobin in	atteries and venis
200	Hind wings of mosquit	coos are termed as	(u) Has hadhiogiothi h	
390.	(a) Coxa	(b) Flytra	(c) Halteres	(d) Tentorium
201	Which of the following	(0) Livua	of housefly	
391.	(a) I abrum	(b) Eninharvny	(c) Mandibles	(d) Maxillary nalne
			(c) manufolds	(a) maximary parps

392.	. Haemocoel is found in			
	(a) <i>Hydra</i> and <i>Aurelia</i>		(b) Taenia and Ascaris	
	(c) Balanoglossus and	Herdmania	(d) Cockroach and <i>Pila</i>	
393.	Universal character of	insect is		
	(a) Two pair of wings	(b) Compound eyes	(c) Three pair of legs	(d) $(b)$ and $(c)$ both
394.	Biramous appendages a	are typically found in		
	(a) Insecta	(b) Crustacea	(c) Annelida	(d) Arachnida
395.	Which one of the follow	wing belongs to phylum a	rthropoda	
	(a) Octopus	(b) Termite	(c) Nereis	(d) Leech
396.	In cockroach, the excre	etory organs are		
	(a) Malpighian tubules		(b) Nephridia	
	(c) Malpighian corpusc	cles	(d) Solenocytes (flame	cells)
<b>39</b> 7•	Eggs of human louse a	re called		
	(a) Maggots	(b) Nits	(c) Tumblers	(d) Cocoon
398.	Larvae of beetles are k	nown as		
	(a) Caterpillars	(b) Grubs	(c) Maggots	(d) Naids
399.	Pupa of butterfly is cal	led as		(1) NT 1
	(a) Caterpillar	(b) Chrysalis	(c) Imago	(d) Nymph
400.	(a) Cills of branchias	(h) Trachasa	(a) <b>D</b> agninatomy transato	(d) All of these
	(a) Ghis of Dialiciliae	(0) Hacheae	(c) Respiratory truthets	(u) All of these
401.				(1) A (1
	(a) Arachnida	(b) Echarida	(c) Actinozoa	(d) Anthozoa
402.	Book-lungs are respira	tory organs which are four	nd in	
	(a) Insects	(b) Crustaceans	(c) Arachnids	(d) Onychophores
403.	Structures which help i	in distinguishing male coc	oaches from females are	
	(a) Anal cerci	(b) Anal styles	(c) Longer antennae	(d) Functional wings
404.	The haemocoel of an in	nsect is actually a		
	(a) Modified blood ves	sel (b)True coelom	(c) Pseudocoelom	(d) Schizocoelom
405.	Moths and butterflies c	come under		
	(a) Isoptera	(b) Hemiptera	(c) Lepidoptera	(d) Diptera
406.	Which of them is in tra	cheate group		
	(a) Crab-Centipede-Co	ckroach	(b) King crab-Scorpion	-Housefly
	(c) Spider-Peripatus-M	osquito	(d) Bedbug-Sandfly-Si	lkworm
407.	Which of the following	y is not an insect	(4) 1118 118	
40/1	(a) Cockroach	(b) Red bug	(c) Mosquito	(d) Snider
409	Which of the following	tis not an insact	(c) mosquito	(a) opider
408.	(a) Coolmoor	(b) Tiele	(a) Paatla	(d) Wase
	(a) Cockroach	(0) TICK	(c) Deelle	(u) wasp

I						
	409.	9. What is the similarity between cockroach, anopheles and housefly				
		(a) Cuticle covering the	e body	(b) Two pair wings		
		(c) Three pair legs		(d) Presence of cephalothorax		
	410.	To which order the Per	<i>iplaneta americana</i> belon	gs		
		(a) Diptera	(b) Orthoptera	(c) Hemiptera	(d) None of the above	
	411.	Crayfish is a				
		(a) Crustacean animal	(b) Edible fish	(c) Poisonous fish	(d) None of the above	
	412.	An important character	of Arthropoda is			
		(a) Jointed legs	(b) Unsegmented body	(c) Shell over the body	(d) Three pair of legs	
	413.	In which of the following	ng sets all are vectors			
		(a) Physalia, Musca doi	mestica, Anopheles	(b) Amoeba, Physalia, A	Musca	
		(c) Anopheles, Musca,	Culex	(d) All of the above		
	414.	Phlebotomus argentipu	s is a vector for			
		<ul><li>(a) Trypanosome evansi</li><li>(c) Leishmania donovani</li></ul>		(b) Trypanosoma gamb	iense	
				(d) Trypanosoma cruzi		
<b>415.</b> Two pairs of antennae are found in class						
		(a) Myriapoda	(b) Crustacea	(c) Insecta	(d) Arachnida	
	416.	Class crustacea have wh	hich of the following featu	ire		
		(a) Cephalothorax, birar	nous appendages and gills	5		
		(b) Cephalothorax, book	c lungs and chitinous exos	keleton		
		(c) Head and thorax, bo	ok lungs and chitinous exo	oskeleton		
		(d) Head and thorax, bir	amous appendages and be	ook lungs		
	417.	The modification of sec	cond pair of wings into ha	Iteres or balancers is the	characteristic of	
	_	(a) Lepidoptera	(b) Orthoptera	(c) Diptera	(d) Hemiptera	
	418.	10 which of the followi	(h) Arechnide	(a) <b>Cr</b> rustagga	(d) Manastamata	
	410	(a) Chilopoua Which of the following	(0) Alacinnua belongs to Phylum Arthr	(C) Clustacea	(u) merostolliata	
	419.	(a) Star fish	(b) Gold fish	(c) Silver fish	(d) Cuttle fish	
	120	Wriggler is the larva of			(d) Cuttle Hish	
	420.	(a) Cockroach	(b) Mosquito	(c) Butterfly	(d) Housefly	
	421.	Study of ants is	(0) 110544110	(c) Duttering	(a) 11005011y	
	•	(a) Malacology	(b) Myremecology	(c) Mycology	(d) Myology	
	422.	Mouth part of mosquito	o is			
		(a) Sucking and piercin	g type	(b) Sponging type	(c) Biting and chewing	
		type	(d) None of these			
	423.	Which of the following	respires by gills			
		(a) Prawn	(b) Frog	(c) Crocodile	(d) Whale	

424.	Chitin is found in			
	(a) Mollusca	(b) Arthropoda	(c) Echinodermata	(d) Coelenterata
425.	What distinguishes an	insect from crustacean		
	(a) Number of eyes		(b) Arrangement of ner	ve cords
	(c) Number of appenda	Iges	(d) Presence of wings	
426.	Common feature in ear	thworm and cockroach is	C C	
	(a) Cuticle (Exoskeleto	n)	(b) Solid and ventral ne	erve cord
	(c) Nephridia		(d) Malpighian tubules	
427.	Alary muscle is associa	ated with		
	(a) Heart & circulation		(b) Malpighian tubules	& excretion
	(c) Trachea & respirati	on	(d) None of these	
428.	Complete metamorphos	sis present in		
	(a) House fly and most	luito	(b) House fly and cockroach	
	(c) Mosquito and cock	roach	(d) None of the above	
429.	Organ of mastication in	cockroach is		
	(a) Labrum	(b) Labium	(c) Mandibles	(d) Maxilla
430.	Which of the following	is an insect		
	(a) Moth	(b) Mites	(c) Prawn	(d) Scorpion
431.	Scorpion belongs to a c	lass to which one of the fo	ollowing also belong	
	(a) Ticks	(b) Crab	(c) Branacles	(d) Cockroach
432.	Acarology deals with the	ne study of		
	(a) Fossils	(b) Ticks and mites	(c) Molluscs	(d) Coral reef
433.	In crustaceans, respirati	on takes place by		
	(a) Gills	(b) Book lungs	(c) Ctenidia	(d) Trachea
434.	Ommatidia serve the pu	rpose of photoreception in		
	(a) Sunflower	(b) Cockroach	(c) Frog	(d) Humans
435.	Caterpillar and maggot	are		
	(a) Larvae	(b) Nymphs	(c) Adults	(d) Pupa
436.	Vision in cockroach is			
	(a) Monocular	(D) Binocular	(c) Ultrasonic	(d) Mosaic
437.	sneu, a body covering	(b) Protozoc	(a) Divoluio	(d) Cructo coore
	(a) Cephalopoda	(U) F101020a	(C) Divalvia	(u) Crustaceans

# MOLLUSCA

Basi	c Level			
438.	Octopus belongs to class	S		
	(a) Mollusca	(b) Pelecypoda	(c) Arthropoda	(d) Cephalopoda
439.	Mytilus belongs to class	5		
	(a) Amphineura	(b) Arthropoda	(c) Echinodermata	(d) Pelecypoda
440.	Unio have			
	(a) One chambered hea	rt (b)Two chambered he	eart	
	(c)Three chambered he	art (d)No heart		
441.	Foot is displaced to the	neighbourhood of mouth	and divided into arms in	
	(a) Ostrea	(b) Pila	(c) <i>Sepia</i>	(d) Chiton
442.	Most mollusc are			
	(a) Terrestrial	(b) Fresh water	(c) Marine	(d) None of these
443.	Natural pearl is a			
	(a) A molluscan secreti	on	(b) Annelida secretion	
	(c) An arthopoda secret	tion	(d) An echinodermata s	secretion
444.	The elephant tusk shell	is		
	(a) Dentalium	(b) Nautilus	(c) <i>Limax</i>	(d) Octopus
445.	Which one of the follow	wing is not a mollusc		
	(a) Sea mica	(b) Sea lemon	(c) Sea hare	(d) Sea feather
446.	Indian Pearl oyster is t	he common name of		
	(a) Unio	(b) Mytilus	(c) Pecten	(d) Pinctada
447.	Which among the follo	wing is not a class of phyl	um mollusca	
	(a) Gastropoda	(b) Scaphopoda	(c) Decapoda	(d) Cephalopoda
448.	Which of the following	mollusc is formed by a la	rva which have torsion	
	(a) Lamelledens	(b) Pila	(c) Sepia	(d) Octopus
449.	Which one of the follow	wing classes has the maxir	num economic importar	nce
	(a) Gastropoda	(b) Myriapoda	(c) Pelecypoda	(d) Cephalopoda
450.	Which one of the follow	wing is a distinctive charac	cter of class Bivalvia of	the phylum Mollusca
	(a) Absence of a head			
	(b) Presence of arms or	tentacles around the mou	th	
	(c) Absence of gills		(d) Presence of a coiled	l shell
451.	Which one belongs to t	he class of sea here		
	(a) Sea cow	(b) Sea squirt	(c) Snail	(d) Sepia
452.	Mantle, foot and shell a	are the character of		
	(a) Nautilus	(b) Echinus	(c) Limulus	(d) Euplectella
453·	Scaphopoda are commo	only called		
	(a) Whelks	(b) Periwinkles	(c) Oysters	(d) Tusk shells

454.	4. "Shell of mollusc is produced by its			
	(a) Radula	(b) Thorax	(c) Mantle	(d) Abdomen
455.	Visceral mass undergo	torsion in		
	(a) Gastropoda	(b) Cephalopoda	(c) Palacopoda	(d) None of these
456.	In mollusca, eye is pres	sent over a stalk called		
	(a) Ostracum	(b) Operculum	(c) Osphradium	(d) Ommatophores
457.	Pila is the example of v	vhich class		
	(a) Gastropoda	(b) Pelecypoda	(c) Cephalopoda	(d) Scaphopoda
<b>458.</b> Pearl oyster belongs to the class				
	(a) Cephalopoda	(b) Pelecypoda	(c) Scaphopoda	(d) Gastropoda
459.	Pearl is produced in the	e bivalve belonging to the	genus	
	(a) Ostraea	(b) Pinctada	(c) Pecten	(d) Lamellidens
<b>460.</b> Which of the following animals belongs to mollusca				
	(a) Gold fish	(b) Silver fish	(c) Cuttle fish	(d) Star fish
461.	Mental, foot and restric	eted coelom in pericardiun	n, gonads and kidneys ar	e the characters of
	(a) Arthropoda	(b) Annelida	(c) Mollusca	(d) Echinodermata
462.	The mollusc which is a	considered to be a living	fossil and also shows cl	haracters of annelids like
	nephridia and internal s	segmentation is		
	(a) Pinctada vulgaris	(b) Nautilus	(c) Neopilina galatheca	(d) None of these
463.	Which of the following	classes do not belong to j	phylum mollusca	
	(a) Monoplacophora	(b) Gastropoda	(c) Trematoda	(d) Pelecypoda
464.	In molluscs, the respira	tory pigment is		
	(a) Haemoglobin		(b) Hamocyanin in the	blood cells
	(c) Myoglobin	1.6 . 11 1	(d) Haemocyanin in the	e blood plasma
465.	In gastropods, the larva	ll form is called		
	(a) Ephyra	(b) Glochidium		
	(c) Scyphistoma	(d) Veliger and trochoph	ore	
466.	Cephalopoda is a class	of animals in which		
	(a) Notochord extends	upto head	(b) Foot is located on h	
	(c) Head is located on I	001	(a) Head is fused with	INOFAX
467.	Sea nare 1s	(h) Dila	(a) Tarada	(d) Conto
	(a) Apiysia	(U) Flia	(c) Teledo	(u) septa

# **ECHINODERMATA**

### Basic Level

	468.	<b>8.</b> In echinodermata, tube feet are related with				
		(a) Excretory system	(b) Ambulacral system	(c) Reproductive system	(d) Respiratory system	
	469.	Aristotle's lantern is fou	und in			
		(a) Jelly fish	(b) Sea anemone	(c) Sea lily	(d) Sea urchin	
	<b>470.</b>	The term not applicable	e to echinodermata			
		(a) Madreporite	(b) Podia	(c) Marine	(d) Bilateral symmetry	
	471.	Water vascular system	(ambulacral system) is typ	ically found in		
		(a) Hydra	(b) Sponge	(c) Earthworm	(d) Star fish	
	472.	Main function of pedice	ellariae in Asterias is			
		(a) Digestion		(b) Excretion		
		(c) Respiration		(d) Capture of prey and	removal of debris	
	47 <b>3</b> .	Sea lilies are the memb	ers of class			
		(a) Ophiuroidea	(b) Asteroidea	(c) Crinoidea	(d) Echinoidea	
	474.	Starfish belongs to clas	S			
		(a) Pisces	(b) Cephalopoda	(c) Asteroidea	(d) Ophiuroidea	
	47 <b>5</b> .	Ambulacral grooves are	e absent in the living form	s of the class		
		(a) Crinoidea	(b) Ophiuroidea	(c) Asteroidea	(d) Echinodermata	
	476.	Aristotle's lantern is a c	haracteristic of the follow	ing class of echinoderma	ata	
		(a) Echinoidea	(b) Ophiuroidea	(c) Holothuroidea	(d) Asteroidea	
	<b>4</b> 77•	Bipinnaria is the larva of	of			
		(a) Pila	(b) Lemellidens			
		(c) Sepia	(d) Star fish (Asteroidea)			
	478.	Water vascular system	is the unique character			
		(a) Echinodermata	(b) Arthropoda	(c) Protochordata	(d) Mollusca	
	47 <b>9</b> .	Echinoderms are exclus	sively			
		(a) Pond living	(b) Riverine	(c) Marine	(d) Lacustrine	
	480.	Systematic position of e	echinoderms is between			
		(a) Arthropods and Mo	lluscs	(b) Molluses and Chore	lates	
		(c) Invertebrates and Cl	hordates	(d) None of these		
	481.	A special feature of Evi	isecretion (Autoformy) is	found in		
		(a) Chordata	(b) Echinodermata	(c) Annelida	(d) Coelentrata	
	482.	In which class of echine	odermata stalk is found for	r attachment with substra	atum	
		(a) Asteroidea	(b) Echinoidea	(c) Ophiuroidea	(d) Crinoidea	
	483.	Tube feet are the charac	cteristic structures of			
		(a) Jellyfish	(b) Cuttlefish	(c) Starfish	(d) Crayfish	
1						

484. Basket star belongs to class (b) Echinoidea (a) Ophiuroidea (c) Asteroidea (d) Crinoidea **485.** Which character is common in phylum Echinodermata and Chordata (a) Mouth arises some distance away from blastopore (Deuterostomial) (b) Mouth arises from blastopore or anterior margin of blastopore (Protostomial) (d) Presence of notochord (c) Presence of pharyngeal gill slits **486.** Antedon belongs to the class (a) Crinoidea (b) Asteroidea (c) Ophiuroidea (d) Echinoidea **487.** Respiration by dermal gills (branchiae) and respiratory tree is performed by the animals of (b) Echinodermata (a) Mollusca (c) Protochordata (d) Arthropoda **488.** Presence of a skeleton of calcareous structure is found in all the members of which phylum (a) Porifera (b) Echinodermata (c) Mollusca (d) Protozoa **489.** In which phylum is water vascular system found (a) Protozoa (b) Arthropoda (c) Porifera (d) Echinodermata

## **CHORDATA**

#### **Basic Level**

490.	. The correct classification of <i>Balanoglossus</i> is				
	(a) Chordata $\rightarrow$ Verteb	rata $\rightarrow$ Enteropneusta	(b) Chordata $\rightarrow$ Vertebrata $\rightarrow$ Pterobranchia		
	(c) Chordata $\rightarrow$ Hemichordata $\rightarrow$ Pterobranchia		(d) Chordata $\rightarrow$ Hemic	hordata →Enteropneusta	
491. Balanoglossus belongs to					
	(a) Hemichordata	(b) Cephalochordata	(c) Urochordatra	(d) Cyclostomata	
492.	192. Members of Hemichordata are				
	(a) Burrowing animals	(b) Exclusively marine	(c) Fresh water worms	(d) Terrestrial	
493.	193. Animals which show viviparity include				
	(a) Whales	(b) Bony fishes	(c) Turtles	(d) Running birds	
494.	194. Which of the following animals is not a vertebrate				
	(a) Oryctolagus	(b) Eurotyphlis	(c) Sparrow	(d) Amphioxus	
495.	In which of the following	ng the notochord is presen	nt in embryonic stage		
	(a) Vertebrates	(b) Some chordates	(c) All chordates	(d) Non-chordates	
496.	Which of the following	are Anamniotes			
	(a) Chondrichthyes, Os	teichthyes, Amphibia	(b) Reptilia, Aves, Amphibia		
	(c) Amphibia, Aves, M	ammals	(d) Reptilia, Mammals,	Aves	
497.	In Urochordata notocho	ord is found in			
	(a) Head of adult	(b) Tail of adult	(c) Tail of larva	(d) Test of adult	

498.	a. In which of the following jaws are found				
	(a) Herdmania	(b) Fish	(c) Petromyzon	(d) Amphioxus	
499.	Temperature changes in	n the environment affect n	nost of the animals whic	h are	
	(a) Aquatic	(b) Desert living	(c) Poikilothermic	(d) Homoiothermic	
500.	Weberian ossicles are f	found in			
	(a) Frogs	(b) Snakes	(c) Fishes	(d) Birds	
501.	The animal who posses	sses notochord throughout	life is		
	(a) Fish	(b) Amphioxus	(c) Bird	(d) Snake	
502.	In which of the followi	ng groups the members ar	e exclusively marine		
	(a) Aquatic vertebrates	(b) Tetrapoda	(c) Pisces	(d) Protochordata	
503.	Branchiostoma belong	s to			
	(a) Urochordata	(b) Hemichordata	(c) Cephalochordata	(d) Protochordata	
504.	Which of the following	g group of characters is p	present in all chordates	in some or other stage in	
	their life				
	(a) Mammary glands, h	nair and gill slits			
	(b) Notochord, gill slits	s and dorsal tubular nervou	us system		
	(c) Notochord, scales a	nd dorsal tubular nervous	system		
	(d) Gill slits, vertebral	column and notochord			
505.	Agnatha includes				
	(a) Hag fishes	(b) Fishes	(c) Jelly fishes	(d) Flying fishes	
506.	Notochord is restricted	to tail region only in			
	(a) Hemichordata	(b) Cephalochordata	(c) Tunicata	(d) None of these	
507.	Cyclostomes are				
	(a) Monoecious		(b) Dioecious		
	(c) Monoecious-and die	oecious both	(d) Hermaphrodite		
508.	Whose skin colour doe	s not change			
	(a) <i>Chameleon</i>	(b) Horse	(c) Garden lizard	(d) Two of the above	
509.	One character is given	wrongly for phylum chord	lata mark it		
	(a) Presence of notocho	ord	(b) Presence of vertebr	al column	
	(c) Paired gill slits com	nected with the exterior			
	(d) A central nervous s	ystem dorsal to digestive of	canal		
510.	Which of the following	g is a chordate feature, not	shared by the non-chord	lates	
	(a) Metamerism	(b) Axiate organization	(c) Bilateral symmetry	(d) Pharyngeal gill slits	
511.	Which of the following	g are first Gnathostomes			
	(a) Fish	(b) Amphibians	(c) Aves	(d) Mammalians	
512.	Characteristic features	of cyclostomata are			
	(a) Elongated cylindric	al body	(b)Round mouth		
	(c) Round mouth with	out jaws and paired append	lages		
	(d) Round mouth with	jaw and unpaired appenda	ges		

513.	Retrogressive metamor	phosis is found in			
	(a) Balanoglossus	(b) Branchiostoma	(c) Herdmania	(d) All of these	
514.	Correct Statement is				
	(a) Archaeopteryx is co	onnecting link between av	es and mammals		
	(b) Duck-billed platypu	is is connecting link betw	een mammals and reptile	es	
	(c) Sea horse is connec	ting link between horse a	nd fish		
	(d) Hydra is connecting	g link between protozoa a	nd metazoa		
515.	Mark the odd member	from the following			
	(a) Turtle	(b) Lizard	(c) Dolphin	(d) Crocodile	
516.	Gnathostomata is divid	ed into 2 super classes, the	nese are		
	(a) Acrania and craniat	a	(b) Pisces and tetrapod	a	
	(c) Amniota and bipeda	al	(d) Tetrapoda and gnat	hostomata	
517.	The lamprey (Petromyz	zon) is included in the same	ne taxonomic class as the	e	
	(a) Chamaeleon (Anoli	s)	(b)Hag fish ( <i>Myxine</i> )		
	(c) Salamander (Ambys	stoma)	(d) Lung fish ( <i>Neoceratodus</i> )		
518.	The portal system seen	in all vertebrates is			
	(a) Hepatic	(b) Renal	(c) Both (a) and (b)	(d) Pulmonary	
519.	Cold blooded animals a	are those having			
	(a) Cold blood				
	(b) Variable body temperature according to the temperature of atmosphere				
		berature according to the t	emperature of atmospher	re	
	(c) Always constant ter	nperature	emperature of atmospher	re	
	(c) Always constant ter (d) Blood, which can fl	mperature according to the t mperature low even below $4^{\circ}C$	emperature of atmospher	re	
520.	(c) Always constant ter (d) Blood, which can fl Chordates are distingui	mperature according to the t mperature low even below $4^{\circ}C$ shed from non-chordates	emperature of atmospher by the presence of	re	
520.	<ul> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> </ul>	mperature according to the t mperature low even below $4^{\circ}C$ shed from non-chordates (b) Dorsal nerve cord	by the presence of	re	
520.	<ul> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> </ul>	mperature according to the t mperature low even below $4^{\circ}C$ shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve	by the presence of cord	re Gashisharaa	
520. 521.	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hamishordata</li> </ul>	mperature according to the t mperature low even below $4^{\circ}C$ shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata	by the presence of cord dy proboscis in animals of	of which group	
520. 521.	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> </ul>	mperature according to the t mperature low even below $4^{\circ}C$ shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata	re of which group (d) Chordata	
520. 521. 522.	<ul> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia Huma</li> </ul>	nperature according to the t nperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata g is rightly matched n beings	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata	re of which group (d) Chordata	
520. 521. 522.	<ul> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> </ul>	mperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata g is rightly matched n beings	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi	re of which group (d) Chordata ede dna	
520. 521. 522.	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which group</li> </ul>	mperature according to the t mperature low even below $4^{\circ}C$ shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata g is rightly matched n beings	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi	of which group (d) Chordata ede dna oternal ear	
520. 521. 522. 523.	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which grow</li> <li>(a) Amphibia</li> </ul>	mperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of bod (b) Urochordata g is rightly matched n beings up of the followings, have (b) Reptilia	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi e three ossicles in their ir	re of which group (d) Chordata ede dna nternal ear (d) Mammalia	
<ul> <li>520.</li> <li>521.</li> <li>522.</li> <li>523.</li> <li>524.</li> </ul>	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which grow</li> <li>(a) Amphibia</li> <li>The group that does no</li> </ul>	mperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of bod (b) Urochordata g is rightly matched n beings up of the followings, have (b) Reptilia t fit into this category	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi e three ossicles in their ir (c) Aves	re of which group (d) Chordata ede dna nternal ear (d) Mammalia	
520. 521. 522. 523. 524.	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which grow</li> <li>(a) Amphibia</li> <li>The group that does no</li> <li>(a) Amphibia</li> </ul>	mperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of bod (b) Urochordata g is rightly matched n beings up of the followings, have (b) Reptilia t fit into this category (b) Reptiles	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi e three ossicles in their ir (c) Aves (c) Aves	re of which group (d) Chordata ede dna nternal ear (d) Mammalia (d) Mammals	
<ul> <li>520.</li> <li>521.</li> <li>522.</li> <li>523.</li> <li>524.</li> <li>525.</li> </ul>	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which grow</li> <li>(a) Amphibia</li> <li>The group that does no</li> <li>(a) Amphibia</li> <li>Heterodont, thecodont</li> </ul>	nperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata g is rightly matched n beings up of the followings, have (b) Reptilia t fit into this category (b) Reptiles and diphydont are the cha	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi e three ossicles in their ir (c) Aves (c) Aves	re of which group (d) Chordata ede dna nternal ear (d) Mammalia (d) Mammals	
<ul> <li>520.</li> <li>521.</li> <li>522.</li> <li>523.</li> <li>524.</li> <li>525.</li> </ul>	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ter</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which grov</li> <li>(a) Amphibia</li> <li>The group that does no</li> <li>(a) Amphibia</li> <li>Heterodont, thecodont</li> <li>(a) Egg laying mamma</li> </ul>	nperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata g is rightly matched n beings up of the followings, have (b) Reptilia t fit into this category (b) Reptiles and diphydont are the cha ls (b)Viviparous mamm	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi e three ossicles in their ir (c) Aves (c) Aves aracteristics of nals	re of which group (d) Chordata ede dna nternal ear (d) Mammalia (d) Mammals	
<ul> <li>520.</li> <li>521.</li> <li>522.</li> <li>523.</li> <li>524.</li> <li>525.</li> </ul>	<ul> <li>(b) Variable body temp</li> <li>(c) Always constant ten</li> <li>(d) Blood, which can fl</li> <li>Chordates are distingui</li> <li>(a) Ventral nerve cord</li> <li>(c) Brain</li> <li>Notochord is restricted</li> <li>(a) Hemichordata</li> <li>Which of the following</li> <li>(a) Mammalia – Huma</li> <li>(c) Pisces – Silver fish</li> <li>Members of which grov</li> <li>(a) Amphibia</li> <li>The group that does no</li> <li>(a) Amphibia</li> <li>Heterodont, thecodont</li> <li>(a) Egg laying mamma</li> <li>(c) Carnivorous mamma</li> </ul>	nperature according to the t mperature low even below 4° <i>C</i> shed from non-chordates (b) Dorsal nerve cord (d) Dorsal tubular nerve to the anterior part of boo (b) Urochordata g is rightly matched n beings up of the followings, have (b) Reptilia t fit into this category (b) Reptiles and diphydont are the cha ls (b)Viviparous mammals (d)All of the above	emperature of atmospher by the presence of cord dy proboscis in animals o (c) Cephalochordata (b) Mollusca – Centipe (d) Echinoderm – Echi e three ossicles in their ir (c) Aves (c) Aves aracteristics of nals	of which group (d) Chordata ede dna nternal ear (d) Mammalia (d) Mammals	

526.	Only left aortic arches	are present in		
	(a) Reptiles of order cr	ocodilus	(b)Birds	
	(c)Mammals		(d)Both (a) and (c)	
527.	Which of the following	g is known as living fossil		
	(a) Lepidosiren	(b) Lepidosteus	(c) Latimeria	(d) Neoceratodus
528.	Which is living fossil			
	(a) Coelacanth	(b) Limulus	(c) Sphenodon	(d) All of these
529.	The petromyzon belong	gs to		
	(a) Chondrichthyes	(b) Osteichthyes	(c) Cyclostomata	(d) Amphibia
530.	Which one of the follow	wing invertebrates is a deu	iterostome and enterocoe	elous coelomate
	(a) Pila	(b) Ascaris	(c) Aphrodite	(d) Asterias
531.	Monocondylic skull, di	ry skin and procoelus verte	ebrae are present in	
	(a) Amphibia	(b) Reptilia	(c) Birds	(d) Mammals
532.	Monocondylic skull, w	arm blooded animals with	air sacs are present in	
	(a) Reptilia	(b) Birds	(c) Amphibia	(d) Mammalia
533.	Carpo-metacarpus and	tarso-metatarsus are prese	ent in	
	(a) Reptilia	(b) Mammalia	(c) Birds	(d) Both (a) and (b)
53 <b>4</b> .	The group 'amniota' in	cludes		
	(a) Birds and reptiles		(b) Birds and mammals	5
	(c) Reptiles and mammals (d) Reptiles, birds and mammals			mammals
535.	The animal group, whe	ere the adults are degenera	ted but larvae are well de	eveloped, is
	(a) Agnatha	(b) Tunicates	(c) Amphibians	(d) Cephalo chordates
536.	Animals having a built	-in thermostat to maintain	constant body temperatu	ure are known as
	(a) Biothermic	(b) Poikilothermic	(c) Oligothermic	(d) Homoiothermic
537.	Which one of the follow	wing sets of animals belor	igs to the same class of a	ı phylum
	(a) Hydra, jelly fish, cr	ay fish	(b) Bat, pigeon, whale	
	(c) Spider, scorpion, ce	entipede	(d) Whale, otter, kanga	roo
538.	Which of the following	g is a matching set in taxor	nomy	
	(a) Man, chimpanzee, I	monkey	(b) Cuttle fish, jelly fish	h, silver fish
	(c) Bat, pigeon, crow		(d) Oyster, octopus, sta	r fish
539·	Constant body tempera	ture is found in		
	(a) Earthworm	(b) Snake	(c) Frog	(d) Cow
540.	Temperature regulation	n is founds in		
	(a) Rat	(b) Fish	(c) Frog	(d) Lizard
541.	Which one of the follow	wing is a true terrestrial ar	nimal	
	(a) Frog	(b) Tortoise	(c) Salamander	(d) Toad
542.	The most important dis	tinctive character of chore	lata is the presence of	
	(a) Vertebral column	(b) Hairy skin	(c) Notochord	(d) All the above
1				

543.	Which one is different	from others		
	(a) Whale	(b) Porpoise	(c) Bat	(d) Fish
544.	Heart pumps impure bl	ood in case of		
	(a) Shark	(b) Whale	(c) Frog	(d) Lizard
545.	Which of the following	groups has no member h	aving gliding or flying a	ppendages
	(a) Arthropoda	(b) Cyclostomata	(c) Mammals	(d) Fishes
546.	Which one is a poikilot	hermic (cold blooded) an	imal	
	(a) Penguin	(b) Whale	(c) Otter	(d) Tortoise
547.	One of the primary cha	racter of chordates is		
	(a) Solid ventral nerve	cord	(b)Dorsal tubular nerve	e cord
	(c) Paired nerve cord		(d) Ganglionated nerve	cord
548.	An animal having penta	adactyl limbs without clay	ws belongs to the class	
	(a) Amphibia	(b) Reptilia	(c) Aves	(d) Mammalia
		<u>PISCI</u>	<u>ES</u>	
Basi	ic Level			
549.	Lateral line system is p	resent in		
	(a) Fish	(b) Frog	(c) Reptiles	(d) Man
550.	Dolphins are	(h) A	$(\cdot)$ <b>D</b> = $-t^{1}$	(1) Managarata
	(a) Fisnes Which one of the follow	(b) Ampnibians	(c) Reptiles	(d) Mammals
551.	(a) Silver fich	(h) Dog figh	(a) Cray fich	(d) Stor fich
	(a) Silver fish	(0) Dog IIsli fish due to one of its follo	(C) Clay IISII	(u) Star fish
552.	(a) Mouth	(b) Gait	(c) Carnivorous	(d) Power of smell
552	Sea horse is an example	e of	(c) carmvorous	(u) I ower of shien
555.	(a) Mammalia	(b) Pisces	(c) Aves	(d) Reptilia
554.	Which of the following	thas a cartilagenous endo	skeleton	(), <b>F</b>
	(a) Elasmobranch	(b) Dipnoi	(c) Mollusca	(d) Bony fishes
555.	Heterocercal tail is four	nd in		· · · ·
	(a) Cartilaginous fishes	(b) Bony fishes	(c) Whale	(d) Amphibians
556.	Stenohaline fishes are n	represented by		
	(a) Fresh water fishes of	only		
	(b) Marine fishes only			
	(c) Those which can tol	erate a narrow range of sa	linity in water only	
	(d) Those which can tol	erate a wide range of salin	nity in water	
557·	Fishes having swim bla	adder, which do not have	direct communication w	ith the exterior and where
	resorbent and secretory	part is not sharply separa	ited from one another are $()$	e called as
	(a) Physostomes	(b) Physoclists	(c) Euphysoclists	(d) Paraphysoclists

558.	8. Torpedo is commonly known as				
	(a) Sea horse	(b) Electric ray	(c) Globe fish	(d) Sucker fish	
559.	Electric organs are four	nd in			
	(a) Sharks	(b) Porpoises	(c) Goldfish	(d) Rays (Torpedo)	
560.	A fish is characterised	by the presence of			
	(a) Dermal scales	(b) Paired fins	(c) Pharyngeal gills	(d) All the above	
561.	Which one of the follow	wing is an example of a lu	ing-fish		
	(a) Scoliodon	(b) Coelacanth	(c) Labeo	(d) Protopterus	
562.	562. Which one of the following is exotic Indian fish				
	(a) Clarias	(b) <i>Labeo</i>	(c) Cypris	(d) Dephnia	
563.	Which is a true fish				
	(a) Cat fish	(b) Jelly fish	(c) Cuttle fish	(d) Silver fish	
564.	What would you call the	ne study of fishes			
	(a) Ichthyology	(b) Herpetology	(c) Saurology	(d) Ornithology	
565.	Which of the following	g is a migratory fish			
	(a) Shark	(b) Salmon	(c) Carp	(d) Ribbon fish	
566.	Which fins are paired i	n fishes			
	(a) Dorsal fin and anal	fin	(b) Pelvic fin and ventral fin		
	(c) Pectoral fin and pel	vic fin	(d) Caudal fin and dors	al fin	
567.	Petromyzon is a connec	cting link between			
	(a) <i>Balanoglossus</i> and <i>L</i>	Amphioxus	(b) Amphioxus and cyc	lostoma	
	(c) Cyclostoma and pis	ces	(d) Pisces and amphibi	ans	
568.	Elasmobranchs are exc	lusively			
	(a) Fresh water forms	(b) Marine water forms	(c) Brackish water form	ns (d)None of these	
569.	Jaws are absent in				
	(a) Protochordata		(b) Protochordata and c	cyclostomata	
	(c) Amphioxus and bal	anoglossus	(d) Herdmania and my	xine	
570.	Which of the following	g sets of animals belong to	class cyclostomata		
	(a) Herdmania and petr	comyzon	(b) Petromyzone and m	iyxine	
	(c) Amphioxus and bal	anoglossus	(d) Herdmania and my	xine	
571.	Swim bladder or air bla	adder is present only in			
	(a) Fish	(b) Amphibia	(c) Aquatic reptilia	(d) Aquatic mammals	
572.	Lateral line system is n	ot present in			
	(a) Sea horse	(b) Clarias	(c) Shark	(d) Aquatic amphibians	
573.	Pristis belongs to the c	lass			
	(a) Dipnoi	(b) Telostomi	(c) Elasmobranchii	(d) Holocephali	
574.	Which of the following	g is not a fish			
	(a) Lung fish	(b) Silver fish	(c) Cat fish	(d) Dog fish	

575.	5. The term 'protista' was given by			
	(a) Carolus Linnaeus		(b) John Ray	
	(c) George Leapold Cu	vier	(d) Ernst Haeckel	
576.	Scales in chondrichthy	es are		
	(a) Placoid	(b) Ganoid	(c) Cycloid	(d) Sesamoid
577.	Bony plates and scutes	are found in addition to se	cales in	
	(a) Hag fish	(b) Eel	(c) Flying fish	(d) Sea horse
578.	Pharyngeal gill slits are	e found in		
	(a) Shark	(b) Cray fish	(c) Cuttle fish	(d) Star fish
57 <b>9</b> .	The fish Wallago is con	mmonly called as 'fresh w	ater shark', because it is	
	(a) Cartilaginous		(b) Dangerously predat	ory
	(c) Lives in sea		(d) Resembles shark in	body form
580.	Which fish gives birth	to young ones		
	(a) Scoliodon	(b) Anabas	(c) Heteropneustes	(d) Catla
581.	True fishes possess gill	s and fins. Which of the f	ollowing is not a true fish	h
	(a) Silver fish (Lepisma	a)	(b) Gold fish (Carassiu	s)
	(c) Silver carp (Hythala	amictyes)	(d) Sea horse (Hippoca	mpus)
582.	Which of following is a	a true fish		
	(a) Dog fish	(b) Silver fish	(c) Star fish	(d) Whale
583.	In Icthyology, we study	/		
	(a) Aves	(b) Reptiles	(c) Insects	(d) Fishes
584.	Cartilaginous fishes are	e characterised by the pres	sence of	
	(a) Terminal mouth	(b) Ventral mouth	(c) A homocercal tail	(d) A heterocercal tail
585.	Heart of fishes is			
	(a) One chambered	(b) Two chambered	(c) Three chambered	(d) Four chambered
586.	Placoid scales are found	d in		
	(a) Bony fishes	(b) Cartilaginous fishes		
	(c) Lung fishes	(d) Palaeontogical fishes		
587.	Which one of the follo	wing combination is gene	rally recommended for a	composite fish farming in
I	ndia			
	(a) Catla, Cyprinus, Cla	arias	(b) Catla, Labeo, Cirrh	inus
	(c) Cirrhinus, Cyprinus	, Channa	(d) Clarias, Chanos, Cy	prinus
588.	Fishes are			
	(a) Homoiothermic	(b) Poikilothermic	(c) Both (a) and (b)	(d) None of these
589.	Which of the following	is characteristic feature of	of fishes	
	(a) Tail and venous hea	urt	(b) Venous heart and g	ills
	(c) Epidermal scales an	id tail	(d) Epidermal scales an	nd gills
590.	Sea horse is			
	(a) Fish	(b) Reptile	(c) Mammal	(d) Bird

## **AMPHIBIA**

Basi	c Level				
591.	Animals of which order	r have tail in their larval fo	orm	S	
	(a) Apoda	(b) Urodela	(c)	Anura	(d) None of them
592.	Frogs and toads belong	s to order			
	(a) Apoda	(b) Anura	(c)	Stegocephalia	(d) Urodela
<b>593</b> .	Tailless amphibians are	e the members of the group	2		
	(a) Salientia (Anura)	(b) Gymnophiona (Apoda	a)	(c)Urodela (Caudata	a) (d)Cyclostomata
<b>594</b> .	In amphibians the heart	tis			
	(a) Venous		(b)	With double circula	tion
	(c) With open circulation	on	(d)	With arterial and ve	nous circulation
<b>595</b> .	Which one of the follow	wing is not a true amphibia	an a	nimal	
	(a) Frog	(b) Tortoise	(c)	Salamander	(d) Toad
596.	The common name of r	necturus is			
	(a) Cave salamander	(b) Congo eel	(c)	Hell bender	(d) Mud puppy
<b>59</b> 7•	Which one of the animation	al of amphibia has no tong	gue		
	(a) Amphiuma	(b) Ichthyophis	(c)	Necturus	(d) Salamander
598.	Salamander belongs to	the class			
	(a) Reptilia	(b) Amphibia	(c)	Aves	(d) Mammalia
599·	The main difference be	tween Gymnophiona (Apo	oda)	and Urodela is that	Urodela
	(a) Have two auricles a	nd one ventricle	(b)	Have smooth moist	skin
	(c) Have a cloaca		(d) Respire by lungs in the adult stage		
600.	Midwife toad is anothe	r name for			
	(a) Alytes	(b) Hyla	(c)	Rhacophorus	(d) Pipa
601.	Which animal is surina	m toad		<b>D</b>	
	(a) Pipa	(b) Bufo	(c)	Bombinator	(d) Alytes
602.	Capacity of amphibians	s to change colour is called	1	G 1	
	(a) Metachrosis	(b) Metachronous	(c)	Synchronous	(d) None of these
603.	Limbless amphibians b	elong to the order		<b>C</b> 1.	
	(a) Anura	(b) Urodela	(c)	Gymnophiana	(d) Squamata
604.	Amphibians breed			0	
	(a) In crevices	(b) In water	(c)	On trees	(d) In soil
605.	The name of flying frog	g 18			
	(a) <i>Khacophorus</i>	(b) $Bufo$	(c)	Phyllobates	(d) Necturus
606.	which type of coelom	is found in frog			
	(a) Enterocoel	(D) SCHIZOCOEI	(C)	rseudocoel	(u) Haemocoel
607.	which of the following	(h) Johthmonthian	(-)	Amahian	(d) Dolong - 1
	(a) Salamander	(b) Ichthyophis	(C)	Ampinoxus	(u) Balanoglossus

608. Frog which lives on the trees

	(a) Alytes	(b) Bufo	(c) Hyla	(d) Rana
		<u>REPTII</u>		
Basi	ic Level			
609.	Wall lizard can run effi	ciently on vertical surface	s because of	
	(a) Tetrapod condition		(b) Pentadactyle condit	ion
	(c) Lamellae present ur	nder digits	(d) Tip of digits are rou	nded
610.	Only poisonous lizard of	of the world is		
	(a) Draco	(b) Heloderma	(c) Sphenodon	(d) Varanus
611.	Typhlop is a			
	(a) True snake	(b) False snake	(c) True worm	(d) Shark
612.	Classification of reptili	a is based on		
	(a) Scales	(b) Type of brain	(c) Vaccuties	(d) None of these
613.	Which of the following	snake is not poisonous		
	(a) <i>Naja naja</i>	(b) Python	(c) Bungarus	(d) Hydrophis
614.	Limbless lizard is			
	(a) Draco	(b) Ophisaurus	(c) Amblyrhynchus	(d) Moloch
615.	Reptiles share which of	f the following character w	with birds and mammals	
	(a) Amnion	(b) Diaphragm	(c) Homeothermy	(d) All of these
616.	In which of the followi	ng subclasses of reptiles, t	he skull has a solid roof	
	(a) Anapsida	(b) Diapsida	(c) Synapsida	(d) Parapsida
617.	The type of dentition in	n Crocodile is		
	(a) Acrodont	(b) Bunodont	(c) Pleurodont	(d) Thecodont
618.	Which of the following	s is a poisonous snake		
	(a) Eryx	(b) Natrix	(c) Tree snake	(d) Russel's viper
619.	The most highly advand	ced character in crocodile	(reptilia) is the presence	of
	(a) Powerful jaws	(b) Shelled eggs		
	(c) Thecodont dentition	n (d) Four chambered hear	t	
620.	Study of reptiles is kno	wn as		
	(a) Ichthyology	(b) Ornithology	(c) Herpetology	(d) Mammology
621.	Which one of the follow	wing is a limbless lizard		
	(a) Hemidactylus	(b) Chamelion	(c) Anguis	(d) Phrynosoma
622.	Tortoise are			
	(a) Viviparous	(b) Oviparous	(c) Bisexual	(d) Parthenogenic
623.	A snake can be distingu	hished from a lizard by the	absence of	
	(a) Limbs and tympanu	m	(b) Limbs and girdles	
	(c) Limbs, girdles and t	tympanum	(d) Limbs, girdles, tym	panum and sternum

624.	Members of class Rept	ilia are		
	(a) Homoiothermic and	l amniotic	(b) Homoiothermic and	l anamniotic
	(c) Poikilothermic and	amniotic	(d) Poikilothermic and	anamniotic
625.	Exclusively aquatic rep	otiles are included under th	ne group	
	(a) Rhynchocephalia	(b) Ophidia	(c) Lacertilia	(d) Crocodilia
626.	Out of the following, re-	eptiles and birds differ in o	only one, which is it	
	(a) The skin possesses	scales	(b) They lay eggs	
	(c) Capacity of laying h	nard shelled eggs	(d) There is regulation	of the body temperature
627.	Scientific name of king	cobra is		
	(a) <i>Naja naja</i>	(b) Bungarus coerulus	(c) Naja hunnah	(d) Vipera russelli
628.	Crocodile heart is			
	(a) Single chambered	(b) 2-chambered	(c) 3-chambered	(d) 4-chambered
629.	Diapsid skull is found i	in the following		
	(a) Crocodile, Turtle ar	nd Seymouria	(b) Sphenodon, Crocod	lile and Viper
	(c) Natrix, Draco and T	lurtle	(d) Calotes, Cobra and	Varanosaurus
630.	Foramen of Panizzae is	found in the heart of		
	(a) Rabbit	(b) Crocodile	(c) Pigeon	(d) Frog
631.	Most favourable land a	daptation for reptile is		
	(a) Moist skin	(b) Scales on body	(c) Pulmonary respirati	ion (d)None of these
632.	Carapace is present in			
	(a) Toad	(b) Bird	(c) Frog	(d) Tortoise
633.	Which is a poisonous s	nake		
	(a) Enhydrina	(b) Typhlops	(c) Python	(d) Eryx
634.	In suborder ophidia, the	e vertebrae are		
	(a) Amphicoelus	(b) Acoelus	(c) Heterocoelus	(d) Procoelus
635.	Which of the following	snake has hind legs		
	(a) Python	(b) Bungarus	(c) Typhlops	(d) King cobra
636.	Which is non-poisonou	S		
	(a) Spider	(b) Scorpion	(c) Centipede	(d) Crab
	-	-	-	
		AVE	<u>s</u>	
Basi	c Level			
637.	Urinary bladder in bird	s is absent because		
	(a) Disturbs equilibrium	n of birds	(b) Urine is absent	(c) Solid excretory
	product	(d) All of them		
638.	Which is not aerial ada	ptation of Birds	( ) <b></b>	
	(a) Single ovary	(b) Pneumatic bone	(c) Gizzard	(d) Keeled sternum

639.	9. Flightless birds belong to				
	(a) Ratites	(b) Neornithes	(c) Archaeornithes	(d) None of these	
640.	Quill feathers at the bas	se of quill wings are called	l		
	(a) Remiges	(b) Barbules	(c) Coverts	(d) Down feathers	
641.	Pneumatic bones are for	ound in			
	(a) Domestic lizard	(b) Tadpole of frog	(c) Flying lizard	(d) Pigeon	
642.	The pelvic girdle of bin	rds is attached to a comple	ex structure formed by the	he fusion of last thoracic,	
	all lumbar and first five	e caudal vertebra. This stru	cture is called		
	(a) Synsacrum	(b) Symphysis	(c) Synkaryon	(d) Sympelvis	
643.	Which of the following	bird is viviparous			
	(a) Penguin	(b) Humming bird	(c) Albatross	(d) None of these	
644.	Archaeopteryx called a	connecting link, carried th	ne characters of		
	(a) Reptile and bird (b) Reptile and mammal				
	(c) Fish and amphibian (d) Amphibian and reptile				
645.	Connecting link betwee	en reptiles and birds is			
	(a) Dimetrodon	(b) <i>Dodo</i>	(c) Archaeopteryx	(d) Sphenodon	
646.	Birds are				
	(a) Cold blooded	(b) Homoiothermal	(c) Poikilothermal	(d) Homeopoiesis	
647.	Flightless bird, cassowa	ary is found in			
	(a) Australia	(b) Newzealand	(c) Indonesia	(d) Mauritious	
648.	Which animals have a b	beak with jaws but no teetl	h		
	(a) Aves	(b) Snakes	(c) Mammals	(d) All the above	
649.	Characteristic feature o	f aves is			
	(a) Presence of beak an	d features	(b) Ability to lay eggs		
	(c) Air spaces in lungs		(d) All the above		
650.	Syrinx is present in				
	(a) Aves	(b) Reptilia	(c) Mammals	(d) Aquatic amphibians	
651.	Only right aortic arches	s are present in			
	(a) Reptilia	(b) Mammals	(c) Birds	(d) None of these	
652.	Only one ovary is prese	ent in the			
	(a) Aquatic reptiles	(b) Terrestrial reptiles			
	(c) Birds	(d) Egg laying mammals			
653.	Which one of the follow	wing is a flightless bird			
	(a) Passer	(b) Corvus	(c) Aptenodytes	(d) Pavo cristatus	
654.	The study of migration	of birds is known as			
	(a) Ecology	(b) Nidology	(c) Phenology	(d) Phrenology	
655.	A pigeon in the absence	e of down feathers will not	t be able to		
	(a) Fly for long distance	e	(b) Protect against ector	parasites	
	(c) Exhibit secondary s	exual dimorphism	(d) Keep the body warr	n	
1					

1				
656.	Pneumatic bones of bin	ds		
	(a) Increase the respira	tory rate	(b) Increase the heart b	beat rate
	(c) Increase the $CO_2$ or	ıtput	(d) Increase the buoyar	ncy
657.	Which of the following	g sets is of flightless birds		
	(a) Penguin, Pecock, F	owl, Rhea, Kiwi, Moa, Os	strich	
	(b) Emu, Penguin, Rhe	a, Kiwi, Moa, Cassowary		
	(c) Albatros, Humming	g bird, Falcon, Hawk, Emu	ı (d) Ostrich, Emu, Kiwi	i, Falcon, Albatros
658.	Which one is character	istic for birds		
	(a) They are flying anim	mals	(b) They are warm bloc	oded
	(c) They are Bipedal an	nd have feathres	(d) They are quadruped	d and have scales
659.	The beak in birds is too	othed in		
	(a) Ostrich	(b) Kiwi	(c) Archaeopteryx	(d) Pelican
660.	The most important cha	aracteristic of class aves is	8	
	(a) Homoiothermous as	nimals	(b) Tetrapod vertebrates	
	(c) Bipedal vertebrates		(d) Exoskeleton of feathers	
661.	The vertebrae of birds	are characteristically		
	(a) Heterocoelous	(b) Acoelous	(c) Opisthocoelous	(d) Amphicoelous
662.	The members of class A	Aves are characterised by	the presence of	
	(a) Hollow jaws and for	our chambered heart		
	(b) Bipedal locomotion	and body covered with fe	eathers	
	(c) Two chambered heat	art with ossified skeleton	(d) Homoiothermic con	ndition and viviparity
663.	Which of the following	g is not found in birds		
	(a) Hind limb	(b) Fore limb	(c) Pelvic girdle	(d) Pectoral girdle
664.	Which of the following	g birds cannot fly		
	(a) Peacock	(b) Duck	(c) Emu	(d) Stork
		MAM	MALIA	
Basi	ic Level			
665.	In which order human	is placed ?		
	(a) Carnivora	(b) Rodentia	(c) Primate	(d) None of the above
666.	The order insectivora c	comes under		
	(a) Class mammalia	(b) Class insecta	(c) Phylum echinodern	nata (d)Phylum arthropod
667.	Egg-laying mammals a	re grouped as		
	(a) Eutheria	(b) Prototheria	(c) Rodentia	(d) Metatheria
668.	'Bat' is classified as a	mammal because		
	(a) It has hairs	(b) It can flv	(c) It has pinna	(d) It has testes
	(, 10 mus muits	(),	(•) It has plinta	(, 10 1145 00000

669.	Ornithorynchus is a			
	(a) Fossil bird		(b) Flightless bird	
	(c) Connecting link bet	ween reptiles and birds	(d) Mammal	
670.	Which of the following	g animals is an example of	f class mammalia ?	
	(a) <i>Manis</i>	(b) Planorbis	(c) Hydrophis	(d) Psittacula
671.	External ears are chara	cteristics of		
	(a) Birds	(b) Mammals		
	(c) Birds and mammals	s (d) Mammals and reptile	es	
672.	Eutherian mammals are	9		
	(a) Oviparous		(b) Viviparous	
	(c) Ovoviviparous		(d) Both oviparous and	lovoviviparous
673.	Marsupials are			
	(a) Oviparous	(b) Viviparous	(c) Ovoviviparous	(d) Omniparous
674.	Which one of the follow	wing is not a mammal?		
	(a) Ant eater	(b) Echidna	(c) Heloderma	(d) Dolphin
675.	Animals belonging to t	he order 'rodentia' have		
	(a) Long incisors	(b) long canines	(c) short incisors	(d) long molars
676.	Viviparous animal is			
	(a) Shark	(b) Mud puppy	(c) Bony shark	(d) Fish
677.	Corpora bigemina is no	ot present in		
	(a) Frog	(b) Snake	(c) Birds	(d) Rabbit
678.	Which is the common of	character between all the	mammals	
	(a) They are oviparous		(b) They are herbivoro	us
	(c) They are carnivorou	18	(d) They have seven cervical vertebrae	
679.	Why do mammals lack	mucus glands in their ski		
	(a) The skin is not slipp	pery	(b) The skin is tough	
<b>60</b> -	(c) The epidermis has f	nany layers of cells	(d) The skin is not resp	biratory
680.	(a) Amphibia	(b) Pontilia	(c) Birds	(d) Mammalia
691	(a) Ampirora	(b) Reptilla	(c) blids	(u) Mainmana
001.	(a) Birds only	(b) Mammals only	(c) Reptilia only	(d) (a) and (b) both
682	The development of on	tic lobes is maximum in	(c) Repullie only	(d) (d) and (b) both
	(a) Birds	(b) Reptilia	(c) Mammals	(d) Amphibia
683.	Cerebellum of one of the	he following animals is pr	ovided with lateral lobes	and arborvitae
	(a) Reptilia	(b) Mammals	(c) Birds	(d) Amphibia

684.	4. 12 pairs of cranial nerves are present in				
	(a) Reptilia	(b) Birds only	(c) Mammals only	(d) All the above	
685.	In mammals, the name	"Innominate" has been a	pplied to		
	(a) A nerve and an arte	ery	(b) A part of skeleton a	and an artery	
	(c) A bone and a nerve		(d) A vein and a kidney	y tubule	
686.	Rabbit belongs to the c	order			
	(a) Rodentia	(b) Lagomorpha	(c) Artiodactyla	(d) Perissodactyla	
687.	To which of the taxono	omic group does whale bel	ong		
	(a) Fishes	(b) Reptilia	(c) Mammalia	(d) Arthropoda	
688.	Which one of the follo	wing is a metatherian			
	(a) Didelphis	(b) Ornithorhynchus	(c) Tarsier	(d) Hysterics	
689.	The mammal which po	ossesses both the character	S		
	(a) Marsupials	(b) Monotremes	(c) Equus	(d) Oryctolagus	
690.	Which character is not	same in aves and mamma	ls		
	(a) Single systemic arch (b)Metanephric kidney				
	(c)Seven cervical verte	brae (d)Homoiotherms			
691.	Kangaroo is a member	of which order			
	(a) Monotremata	(b) Marsupialia	(c) Prototheria	(d) Insectivora	
692.	First flying animals are				
	(a) Mammals	(b) Reptiles	(c) Insects	(d) Aves	
693.	Monotremata is a grou	p of animals which includ	es		
	(a) Fishes with a single	e gill aperature			
	(b)Insects with a single	e pair of functional spiracle	es		
	(c) Mammals with a sin	ngle common cloacal oper	ning (d)Protozoans with	single flagellum	
694.	Egg laying mammals a	re found in			
	(a) India	(b) South Africa	(c) Africa	(d) Australia	
695.	Apart from mammals,	other group of animals ma	intaining a high and con	stant body temperature is	
	(a) Insects	(b) Fishes	(c) Worms	(d) Birds	
696.	Kangaroo is a native of	f			
	(a) Africa	(b) Australia	(c) Austria	(d) Mexico	
697.	Chief distinguishing fe	atures of the mammals are			
	(a) Hairy skin and ovir	bary	(b) Hairy skin and man	nmary glands	
	(c) Mammary glands a	nd teeth	(d) Pinna and teeth		
698.	(a) All vortebrates	111 (b) A11 mommolo	(a) All placental married	nola (d) All protothariana	
	(a) All verteorates	(U) An mammals	(c) An placental mamn	nais (u) All prototnerians	

699.	. A rabbit shows resemblance with frog in											
	(a) Nucleated RBC cord	(b) Oval RBC	(c) Renal portal system	(d) Dorsal tubular nerve								
700.	Birds and bats are good	l fliers. The bat differs from	m bird in having									
	(a) Diaphragm	(b) Four chambered hear	t (c) Wings	(d) Small brain								
701.	Largest animals belong	to class										
	(a) Arthropoda	(b) Pisces	(c) Mammalia	(d) Reptilia								
702.	The biological name of	'domestic cat' is										
	(a) Panthera domestica	(b) Felis domestica	(c) Felis leo	(d) Panthera indica								
703.	Metanephros are preser	nt in										
	(a) Birds	(b) Reptilia	(c) Mammals	(d) All of the above								
7 <b>0</b> 4.	Which of following gro	oup of mammals, the place	enta is absent									
	(a) Prototheria	(b) Metatheria	(c) Eutheria	(d) Theria								
705.	Which one of the follow	wing is a metatherian mam	nmal									
	(a) <i>Echidna</i>	(b) Kangaroo	(c) Shrew	(d) Pangolin								
706.	Most important charact	eristic of a mammal is										
	(a) Presence of the code	ont dentition	(b) A four chambered heart									
	(c) Presence of corpus	callosum in brain	(d) Presence of diaphragm									
7 <b>0</b> 7.	Which pair of the anim	al groups, has oxygenated	d and de-oxygenated blood in the heart separately									
	(a) Amphibians and rep	otiles	(b) Birds and Mammals									
	(c) Reptiles and Birds		(d) Reptiles and Mammals									
708.	Bats are included in the	e same taxonomial group a	IS									
	(a) Birds	(b) Butterflies	(c) Flying lizards	(d) Whales								
709.	Select the correct set of	animals of class-mammal	lia									
	(a) Lion, hippopotamus	, penguin, bat	(b) Lion, bat, whale, ostrich									
	(c) Hippopotamus, pen	guin, whale, kangaroo	(d) Whale, bat, kangaroo, hippopotamus									
710.	The class of phylum ch	ordata to which bat belong	gs									
	(a) Mammalia	(b) Reptilia	(c) Aves	(d) Amphibia								
711.	External ears are charac	cteristics of										
	(a) Mammals	(b) Reptiles	(c) Amphibia	(d) Pisces								
712.	Which one of the follow	wing is an exclusive chara	cter of class mammalia									
	(a) Presence of a compl	letely 4-chambered heart	(b) Homoiothermy									
	(c) Presence of musular	r diaphragm	(d) Internal fertilization									
713.	Which mammal lacks c	corpus callosum										
	(a) Ornithorhynchus	(b) Balenoptera	(c) Macropus	(d) Macaca								
1												

714.	The following mamma	l lays eggs									
	(a) Porcupine	(b) Platypus	(c)	) Kangaroo	(d) Koala						
715.	Double Vagina are four	nd in									
	(a) Monotremata	(b) Eutheria	(c)	) Marsupials	(d) All of the above						
716.	Echidna is found in										
	(a) India	(b) Africa	(c)	) Malaysia	(d) Australia						
717.	Bat can travel with										
	(a) Eyes open		(b) Eyes plugged and ears open								
	(c) Ears plugged and e	yes open	(d)	) Ears closed and eye	es plugged						
718.	Which one of the follow	wing is egg-laying mamm	al								
	(a) Pangolin	(b) Tachyglossus	(c)	) Porcupine	(d) Bat						
719.	The example of Marsu	pialia is									
	(a) Macropus	(b) Elephant	(c)	) Horse	(d) Rabbit						
720.	Order primata contains										
	(a) Shrew and hedge he	og (b)Bats and vampire	(c)	) Monkeys and man	(d) Horses and zebra						
721.	Duck-billed platypus (a	ornithorhynchus) is									
	(a) A primitive egg lay	ing reptile	(b) An advance egg laying reptile								
	(c) A primitive aquatic	egg laying mammal	(d) An aquatic bird								
722.	Members of which gro	up of the following are eg	g laying								
	(a) Prototheria	(b) Eutheria	(c)	) Metatheria	(d) Theria						
723.	The order Cetacea inclu	udes									
	(a) Monkey, gorilla and	d man	(b)	) Cat, dog, wolf and 1	lion						
	(c) Whale, dolfin and p	oorpoise	(d)	) Hippopotamus, pig	and giraffe						
724.	Whale is included amo	ng mammals because it ha	is a								
	(a) Pair of lungs		(b) Pair of nostrils								
	(c) Four chambered here	art	(d) Diaphragm between thorax and abdomen								
725.	Which of the following	g mammals have cloaca									
	(a) Prototheria	(b) Metatheria	(c)	) Eutheria	(d) Theria						
726.	Lingulates or odd-toed	mammals (Horse, Ass and	d Ze	Zebra) belong to the order							
	(a) Artiodactyla	(b) Perissodactyla	(c)	) Lagomporpha	(d) Edentata						
727.	Which of the following	g mammals, has scrotal tes	tes								
	(a) Prototherians	(b) All placental mamma	ls	(c)Elephant	(d) Man						
728.	All the carnivores have										
	(a) Short incisors	(b) Long incisors	(c)	) Short canines	(d) Long canines						
729.	The rodents are charact	terised by									
	(a) Long canines	(b) Long incisors	(c)	) Hooves on feet	(d) Claws on toes						

730.	. A group of animals having marsupium												
	(a) Monotremata	(b) Eutheria	(c) Metatheria	(d) Prototheria									
731.	Sea cows are aquatic m	ammals included under											
	(a) Lagomorpha	(b) Pinnipedia	(c) Cetacea	(d) Sirenia									
732.	Echolocation is found i	n											
	(a) Insects	(b) Birds	(c) Bats	(d) Monkeys									
733.	Jaw suspension charact	eristic of mammals is											
	(a) Amphistylic	(b) Craniostylic	(c) Autodiastylic	(d) Hyostylic									
734.	Which of the following	is prototherian											
	(a) Platypus	(b) Macropus	(c) Opposum	(d) Bradypus									
735.	Without teats, mamman	ry glands are found in											
	(a) Prototheria	(b) Metatheria	(c) Eutheria	(d) Theria									
736.	Most animals domestic	ated by man belong to the	order										
	(a) Carnivora	(b) Rodentia	(c) Angulata	(d) Lagomorpha									
737.	Bats belong to which o	rder											
	(a) Carnivora	(b) Chiroptera	(c) Dermaptera	(d) Cetacea									

# ANSWER

### ASSIGNMENT (BASIC & ADVANCE LEVEL)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
b	d	с	b	a	b	a	d	d	с	с	a	d	b	b	d	d	a	с	d
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
b	a	a	a	a	c	d	a	c	b	c	b	c	c	a	a	c	a	b	d
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
a	c	c	c	c	a	c	a	a	c	d	b	d	c	a	d	c	b	c	b
60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
b	c	b	b	b	a	c	d	a	b	c	a	b	d	b	a	d	d	d	b
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
c	a	a	d	c	b	b	c	c	a	b	d	c	c	d	d	b	a	a	b
100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
b	a	b	a	a	a	b	a	b	c	c	b	d	d	d	a	c	c	b	a
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139
c	b	b	d	b	b	a	C	a	C	d	a	b	b	d	a	c	b	a	c
140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
с	c	b	c	b	b	c	c	b	d	d	c	a	c	c	c	d	b	c	b
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179
d	b	С	b	b	d	d	C	b	d	С	a	d	a	d	a	b	С	С	a
180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199
d	a	d	c	a	b	d	a	b	a	c	c	c	c	b	b	d	C	b	a
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219
a	a	a	c	c	a	c	a	C	a	a	a	a	c	a	a	a	a	C	c
220 h	221	222	223 h	224	225 h	226 h	227 h	228	229	230	231 h	232	233	234 b	235	236	237	238	239 h
D	C	a	D	c	D	D	D	a	a	a	D	a	a	D	a	a	a	C	D
240 b	241	242 d	243	244 d	245	246 b	247 b	248	249	250 b	251	252	253	254 b	255	256 b	257 b	258	259 d
D	C	u	C	u	C a(=	D	0	C	a	U	C	C	a	D	C	D	U a==	C	u
260 C	261 h	262 h	263 h	264 C	265 C	266 h	267 d	208 9	269 C	270 9	271 d	272 d	273	<sup>274</sup>	<sup>275</sup>	276 d	277 C	278 d	279 C
280	281	282	282	284	285	286	287	a 288	280	a 200	201	202	a 202	204	205	206	207	208	200
200	201 C	<u></u>	<u>203</u> d	204	- <u>205</u> h	<u>200</u>	 d	200 C	209 a	290 a	291	<u>192</u>	- <u>- 93</u>	- <u>- 94</u> h	-295 d	290 a	<u>9</u> /	<u>- 290</u>	<u>99</u> d
300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
b	C C	<u> </u>	c	C C	C C	d	d	a	b	<u>э</u> ге а	a	C C	C	a	d	a	a	c	C C
320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339
a	a	b	b	a	c	a	d	d	a	b	a	c	a	c	d	d	b	a	d
340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359
a	a	d	c	a	b	b	b	c	a	b	c	c	a	b	c	c	d	a	b
360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379
a	d	a	c	d	b	a	a	a	c	a	c	b	c	d	c	d	a	a	a

380	381	382	383	384	385	386	<b>38</b> 7	388	389	390	391	392	393	394	395	396	<b>39</b> 7	398	399
d	b	d	a	b	a	a	d	c	c	c	d	c	b	b	a	b	b	b	d
400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419
a	c	b	b	c	d	d	b	c	b	a	a	c	c	b	a	c	d	c	b
420	421	422	423	424	425	426	<b>42</b> 7	428	429	430	431	432	433	434	435	436	<b>43</b> 7	438	439
b	a	a	b	c	b	a	a	c	a	a	b	a	b	a	d	d	d	d	c
440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459
c	c	a	a	d	d	c	b	c	a	c	a	d	c	a	d	a	b	d	c
460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479
c	c	c	d	d	b	a	b	d	d	d	d	c	c	b	a	d	a	c	c
480	481	482	483	484	485	486	<b>48</b> 7	488	489	490	491	492	493	494	495	496	<b>49</b> 7	498	499
b	d	c	a	a	a	b	b	d	d	a	b	a	d	c	a	c	b	c	c
500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519
b	d	c	b	a	c	d	b	b	d	a	c	c	b	c	b	b	a	b	d
520	521	522	523	524	525	526	<b>52</b> 7	528	529	530	531	532	533	534	535	536	<b>53</b> 7	538	539
a	a	d	a	b	c	c	d	c	d	b	b	c	d	b	d	d	a	d	a
540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559
b	c	d	a	b	d	b	a	a	d	b	d	b	a	a	c	b	b	d	d
560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	<b>5</b> 77	578	579
d	a	a	a	b	c	b	b	b	b	a	d	c	b	d	a	d	a	d	a
580	581	582	583	584	585	586	<b>58</b> 7	588	589	590	591	592	593	594	595	596	<b>59</b> 7	598	599
a	a	d	b	b	b	b	b	b	a	с	b	a	d	b	d	c	b	b	a
600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619
a	a	c	b	a	a	b	c	c	b	a	c	b	b	a	a	d	d	d	c
620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639
c	b	d	c	d	d	c	d	b	b	b	d	a	d	a	a	a	c	a	c
640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659
d	a	d	a	c	b	a	a	d	a	с	c	c	b	a	d	b	c	c	d
660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679
a	b	b	c	c	a	b	a	d	a	b	с	c	c	a	a	d	d	d	d
680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699
d	a	b	d	b	b	с	a	b	с	b	с	c	d	d	b	b	b	d	a
700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719
c	b	d	a	b	d	b	d	d	a	a	c	a	b	c	d	b	b	a	c
720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736			
c	a	c	d	a	b	d	d	b	c	d	c	b	a	a	c	b	1		