ANIMAL KINGDOM-1

(INVERTEBRATA OR NON-CHORDATA)

❖ BASIS OF CLASSIFICATION

Basis of classification are – Arrangement of cells, body symmetry, nature of coelom, patterns of digestive, circulatory and reproductive system.

(A) Level of Organization :

1. All members of kingdom Animalia are multicellular, all of them do not exhibit the same pattern of organisation of cells.

2. For example, in sponges, the cells are arranged as loose cell aggregates, i.e., they exhibit **cellular level of organisation.**

3. In coelenterates, the arrangement of cells is more complex. Here the cells performing the same function are arranged into tissues, hence is called **tissue level of organisation.**

4. Organ level of organisation is exhibited by members of Platyhelminthes and other higher phyla where tissues are grouped together to form organs, each specialised for a particular function.

5. Organ System of organisation – Animals like Annelids, Arthropods, Molluscs,Echinoderms and Chordates, organs have associated to form functional systems, each system concerned with a specific physiological function. This pattern is called organ system level of organisation.

6. Organ systems in different groups of animals exhibit various patterns of complexities. For example, the digestive system in Platyhelminthes has only a single opening to the outside of the body that serves as both mouth and anus, and is hence called **incomplete digestive system.**

7. A **complete digestive system** has two openings, mouth and anus.

8. The **circulatory system** may be of two types:

(i) **Open type** in which the blood is pumped out of the heart and the cells and tissues are directly bathed in it.

(ii) **Closed type** in which the blood is circulated through a series of vessels of varying diameters (arteries, veins and capillaries).

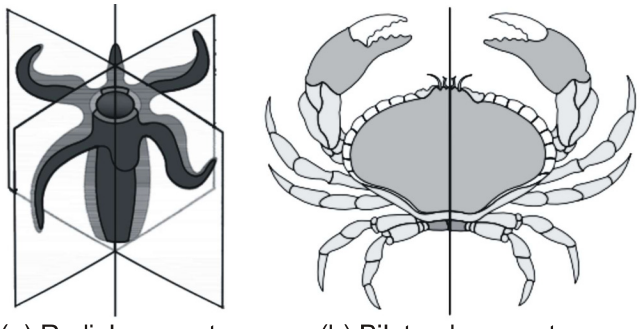
(B) Symmetry in Animals :

1. Asymmetrical – Organisams in which any plane that passes through the centre does not divide them into equal halves. **Eg.** Sponges.

2. Radial Symmetry – Any plane passing through the central axis of the body divides the organism into two identical halves. **Eg.** – Coelenterates, Ctenophores and Echinoderms.

3. Bilateral Symmetry – The body can be divided into identical left and right halves in only one plane.

Eg. – Annelids, Arthropods etc.



(a) Radial symmetry (b) Bilateral symmetry

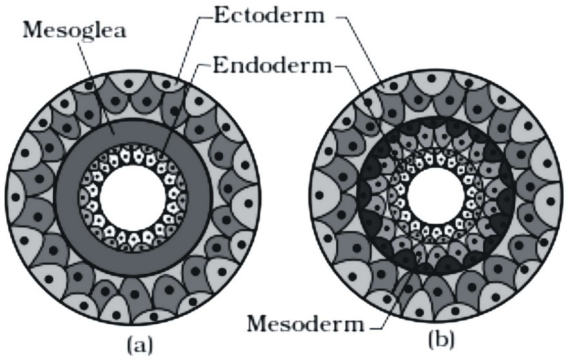
(C) Germ Layers :

1. Diploblastic Animals – Where cells are arranged in two embryonic layers, an external ectoderm and internal endoderm. In between these two layers an undifferentiated layer that is mesoglea is found.

E.g. Porifera, Coelenterata.

2. Triploblastic Animal – Those animals in which the developing embryo has a third germinal layer, mesoderm, in between the ectoderm and endoderm, are called triploblastic animals

Eg. – Platyhelminthes to Chordates.



Showing germinal layers (a) Diploblastic (b) Triploblastic

(D) Coelom(Body cavity) : The body cavity which is lined by mesoderm is called coelom.

1. Eucoelom : Animals possessing coelom are called **coelomates or eucoelomates**.

Eg. – Annelids, Molluscs, Arthropods, Echinoderms, Hemichordates, and Chordates.

2. Pseudocoelom : In some animals mesoderms is presents as scatterd pouches in between the ectoderm and endoderm. Such a body cavity is called pseudocoelom and the animal possessing them are called **Pseudocoelomates.**

3. Acoelom : The animal in which the body cavity is absent are called **acoelomates. E.g.** Platyhelminthes

Diagrammatic sectional view of : Coelomatic (b) Pseudocoelomate (c) Acoelomate

(E) Segmentation

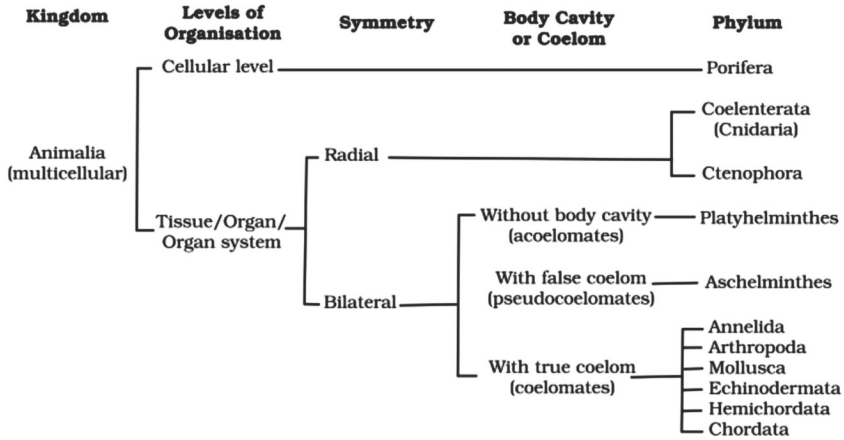
The body is externally and internally divided into segments with a serial repetition of at least some organs. For example, in earthworm, the body shows this pattern called metameric segmentation and the phenomenon is known as **metamerism**.

(F) Notochord

Animals with notochord are called chordates and those animals which do not form this structure are called non-chordates, e.g., Porifera to Echinoderms.

Notochord is a mesodermally derived rod-like structure.

CLASSIFICATION CHART



PHYLUM : PROTOZOA

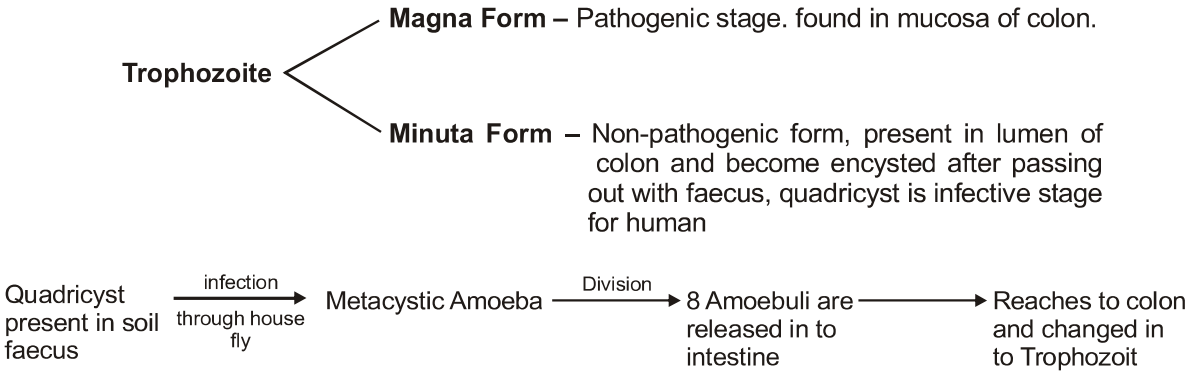
- All protozoans are **Heterotrophs** (Holozoic Nutrition) and live as **Predator** or parasites, Symbionts (*Tryconympha* in intestine of Termite and helps in cellulose digestion) and Endocomensals (*Entamoeba coli*, present in human colon).
- No larva because of no embryo formation
- **Level of body organisation** – Protoplasmic level.
- **Classification:** On the basis of locomotory orgon, 4 classes are formed for all protozoan.

1. Amoeboid Protozoans:

Locomotory organ – Pseudopodia (one or two or many)
Habitat – Fresh water, sea water (Marine) or moist soil
Food capturing – Prey is captured by putting out pseudopoida (false feet)
Eg. *Amoeba, Entamoeba*
Foraminiferan – Some marine forms have silica shells on the surface with minute pores hence called **Eg.** *Radiolaria*
[Fora – Pore; Mini–Small; Fera–Ferre = bearing]

Key Concepts

(a) *E. histolytica* – Endoparasite of human colon, mainly in mucosa layer and **feeds** upon **RBCs**, **Monopodial**, causes amoebic dysentry.



(b) *E. gingabalis* – No Encysted form found because infection occures through kissing mean mouth tomouth, hence no unfavorable conditions are faced so no need of cyst because cyst is only for protection from unfavorable conditions.
(c) *E. coli* – More commensal and less symbiont.

2. Flagellated Protozoan :

Locomotory organ – Flagella
Habit and Habitat – Free living or parasite, some are aquaitic.
Food Capturing – Cytostome for ingestion and cytophyge for egestion and digestion in F.V. in Aquaitic forms (Englena) but not in pathogenic ones.

Eg. *Trypanosoma*	–	**Sleeping Sickness** and **Chagas** Disease
Leishmania	–	Kala azar
Giardia	–	**Dysentry** and **Oriental sore** in Human
Trichomonas	–	Leucorrhoea in human female vagina.
Trichonympha	–	Symbiont in termite intestine for cellulose digestion
Proterospongia	–	Connective link b/w protozoa and porifera.

3. Cilliated Protozoan:

Locomotory organ – Cillia and many in number hence move actively and also steer water with food towards gullet.
Habit and Habitat – Aquaitic, Free living, parasite and commensal.
Food Capturing – Gullet with outer cystostome opening for food ingestion while cytopyge for egestion.

Food digestion in food vacuole in free living forms.

Eg. ***Balentidium*** – Diorrhoea in Human
Paramoecium – Slipper animalculi
Opelina – Endocommensal of frog rectum
Nyctotherus – Endocommensal of frog rectum
Vorticella – Bell animalculi
Didinum – Water bear

4. Sporozoan:

Locomomotory organ – absent

Habit and Habitat – They all are parasite, mostly intracellular parasite.

Spore – Members of this group has spore like infective stage in life cycle hence grouped under class sporozoa.

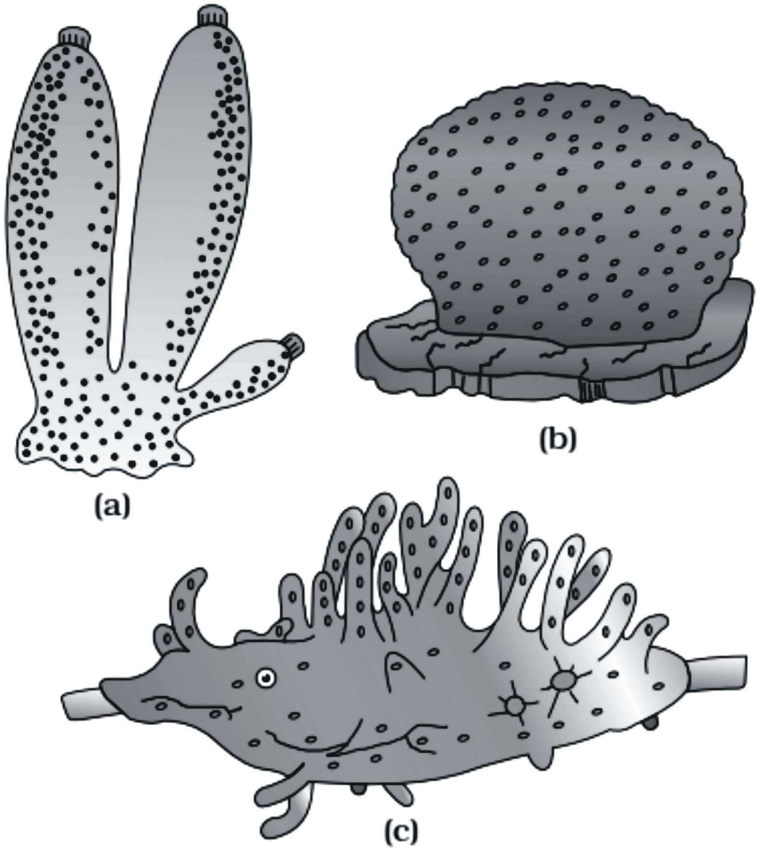
Eg. ***Plasmodium*** – Malaria in Human
Nosema – Pabrien disease in silk moth
Babesia – Red water fever in cattle
Emeria – Coccidiasis in rabbit
Monocystis – Endoparasite of seminal vesicle of earthworm.

PHYLUM - PORIFERA

Pori = pore or Minut holes
Fera = to Ferre = to bear
} Pore bearing animals

Characteristic Features of Porifera

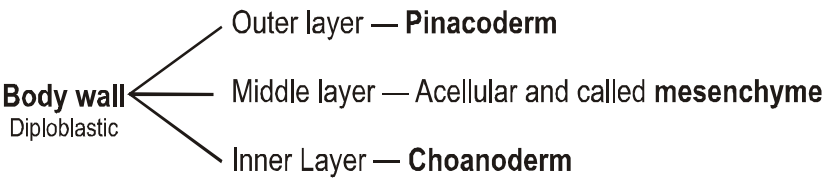
- Porous body, **Many ostia** (mouth) and **single osculum** (Anus) and presence of flagellated choano cytes.
- Presence of **water canal system** (Not waster vascular system because it is found in **Echinoderms**)
- Presence of spicules or spongin fibers as exoskeleton.
- Central body cavity **spongocoel**



Examples for Porifiera : (a) ***Sycon*** , (b) ***Euspongia*** (c) ***Spongilla***

Some other Charecters of Porifera–

(1) Diploblastic, cellular level of body organization, mostly asymmetrical, rarely radialy symmetrical, free living.



(2) All are aquaitic, mostly marine and some are fresh water.
(3) Water canal system is the characteristic feature that is helpfull in –
(i) Food gathering (ii) Gaseous exchange (iii) Removal of wastes
(4) Flagellated **choanocytes** line the **spongocoel** and **flagellated canals** and responsible for –
◆ Maintaing unidirectional water current means ostia towards osculum.
◆ Intracellular digestion
(5) Exoskeleton supports body and made up of **spicules** (calcium carbonate or silicious) or spongin fibres (proteinous and used as bath sponge)
(6) Individuality – Sponges are colonial in nature and it is much more hard to discovere individuality but **olynthus** stage is regarded as **individual sponge**, that contain **many ostia** and **single osculum**.
(7) Digestion – Sponges are carnivorous, feeds upon microfauna (small animals), Intracellular digestion with in food vacuole of choanocytes and amoeboid cells.
(8) Respiration and excretion – General body surface
(9) Sexuality – Hermaphrodite
(10) Reproduction –
◆ **Asexual** – Internal budding (Gemmule)
◆ **Sexual** – oogamous type because sperms are flagellated and motile while ovum are spherical, non-motile.
(11) Fertilization – External and cross fertilization because of protandrous condition i.e. sperm get m a - tured before ovum hence even being hermaphrodite, cross fertilization occurs.
(12) Cleavage – Holoblastic, unequal
(13) Development – Indirect means larval stages are present or comes during development which are morphologicaly different from the adult. **Amphiblastula** and **parenchymula** larva present in life cycle.
(14) Young sponge – ***Olynthus*** is **young sponge** that contain many ostia and single osculum and represent individual sponge.
Representative of the Phylum –
(1) ***Scypha*** – Sycon
(2) ***Spongilla*** **–** Fresh water sopnge
(3) ***Euspongia*** **–** Bath sponge
(4) ***Euplectella*** **–** Venus flower basket, a wedding gift in Japan as the token of together upto death.
(5) ***Hyalonema*** **–** Glass rope sponge.

PHYLUM-COELENTERATA OR CNIDERIA

Coelentron = Coel + interon
↓ ↓
Cavity Intestine → Intestinelike cavity or Gastrovascular covity

Cnideria = Cnidae = Spinging cells (cnidocyte present)

Characteristic Features:

◆ Presence of central gastrovascular cavity coelentron.
◆ Presence of highly specialised cells among all animals are cnidocytes or stinging cells.

Some other characters of Coelentrata:
(1) Habit and Habitat: All aquaitic, Mostly marine and some are fresh water (***Hydra***), sessile (Sedentary and fixed in a place) or free swimming.
(2) Symmetry: Radial
(3) Body organization: Tissue level

(4) Body wall: Diploblastic

Body wall
- Outer layer - Epidermis (Ectodermal)
- Middle acellular layer - Mesogloea
- Inner layer - Gastrodermis (Endodermal)

(5) Cnidocytes: These are highly specialysed stining cells that contain stinging capsule filled with toxic hypnotoxic chemical.
There cells are meant for-
(i) Anchorage
(ii) Defence
(iii) Prey capturing

(6) Coelentron: Central gastrovascular cavity for extracellular digestion, with single opening hypostome (mouth)

(7) Skeleton: Some member of phylum coelentrate and mainly the member of class Anthozoa have exoskeleton ($CaCO_3$) responsible for formation of coral reef and source of coral. **Eg.** ***Coralium*** - Red coral.

(8) Polymorphism: Some members of phylum coelentrata exhibit or persist in at least two form, **polyp** and **medusa** mean exhibit polymorphism.

(i) Polyp form: Cylendrical asexual form **Eg.** ***Hydra, Adamsia***

(ii) Medusa: Umbrella shaped free swimming and sexual form. **Eg.** ***Aurelia (Jelly fish)***

(9) Metagenesis: Metagenesis is the alternation of generation in sexual reproduction,in which polyp asexually produce medusa and medusa sexually produces polyp.

(10) Sexuality: Mostly hermophrodite but some are unisexual like *Hydra Viridisma.*

(11) Gametogenesis: Sex cells (gametes) are formed by Interstitial cells through meiosis.

(12) Fertilization: Cross fertilization due to protondrous condition.

(13) Cleavage: Holoblastic, unequal

(14) Embryonic development: Indirect means larval stages are present. **Larva - Hydrula, Planula, Ephyra**

Representative of the Phylum:

(a) **(b)**

Example of Coelenterata indicating outline of their body form : (a) *Aurelia* (Medusa) (b) *Adamsia* (Polyp)

Coelentrata Organism	–	Common Name
Hydra	–	water devil
Physalia	–	Portuguese man of war
Adamsia	–	Sea anemone
Pennatula	–	Sea pen
Gorgonia	–	Sea fan
Meandrina	–	Brain coral
Coralium	–	Red coral

◆ **Coral Reef:** Formed by deposition of merine coelentrates belong to class anthozoa and reefs are diversity rich.

PHYLUM-CTENOPHORA

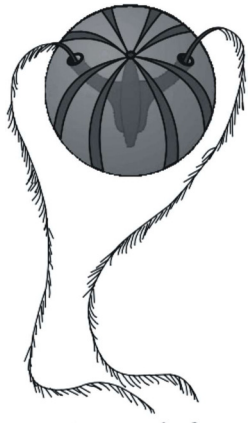
Cteno = comb
Phora = ferre = to bear
Body bear 8 external rows of cilliated comb plates
(1) Habitat and habit : All are exclusively marine, free living and feeds upon zooplankton.
(2) External morphology : Main feature is the presence of cilliated comb plates that helps in locomotion
(3) Symmetry : Radial or biradial symmetry.
(4) Body organization : Tissue level

(5) Body wall : Diploblastic < Outer - Ectoderm; Middle - cellular mesenchyme; Inner - Endoderm

(6) Bioluminiscence : Member of ctenophora emits light and this property called bioluminiscence
(7) Sexuality : Hermaphrodite (Bisexual)
(8) Reproduction : Only sexual reproduction
(9) Fertilization : External
(10) Cleavage and development : Spiral cleavage and indirect development with **cydippid larva.**

Something specific about ctenophores
- ◆ Ctenophore formely included in coelentrata
- ◆ Present from sea surface to depth of 3000 metre.
- ◆ Commonaly called comb jellies, or sea walnuts or sea gooseberry.
- ◆ They reproduce only by sexual method but no alternation of generation.
- ◆ Self fertilization also occurs.

Eg. ***Pleurobranchia, Ctenoplana, Velamen, Beroe.***



Example of Ctenophora *(Pleurobrachia)*

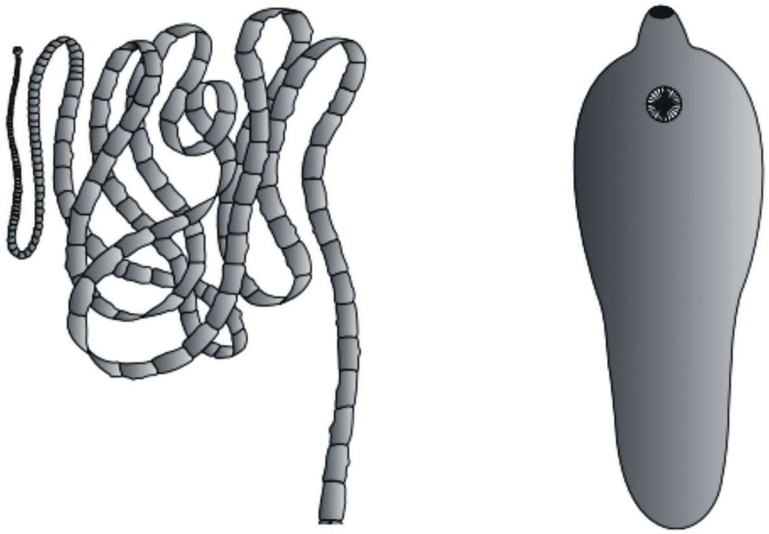
PHYLUM – PLATYHELMINTHES

Platy = Flat
Helminthes+Worm } Flatworm

(1) Habit and Habitat – Mostly parasite (Endoparasite) and few are free living aquitic (*Planaria*).
Note: Hooks and **suckers** are present in **parasitic forms**.
(2) External morphology – Generally body **asegmented** or non-segment (*Planaria and Fasciola*) but **pseudosegmented** (*Taenia*)
(3) Symmetry – Bilateral symmetrical
(4) Locomotory organ – Generally absent but **cillia** as locomotory organ in **Planarian**.
(5) Body wall – Triploblastic
(6) Coelome – Acoelomate. (No space b/w body wall and Alimentary canal)
(7) Level of Body organisation – organ level.

(8) Alimentary Canal and Digestion – Generally alimentary canal absent but incomplete alimentary canal present in Turbellaria and Trematoda). Mouth present and Anus absent. Poor digestion is seen.
(9) Excretion and Osmoregulation – First excretory Organ originated in platyhelminthes as **flame cells or Solenocytes or Protonephridia.**
(10) Respiration – Anaerobic Respiration in parasitic forms but free living form respire through general body surface.
(11) Sexuality – All are bisexual (hermapbrodite)
(12) Reproduction and Fertilisation – Sexual, Cross and self fertilization both, Internal fertilisation.
(13) Development – Indirect Mostly with many larval stage.
Larva : Tape worm (*Taenia*) – Onchosphere, Hexacanth, Cysticercus or bladder worm.
Fasciola (Liver fluke) – Miracidium, sporocyst, radia, cercaria, Metacercaria.

Eg.	***Taenia solium***	–	Pork tapeworm
	Taenia saginata	–	Beef tapeworm
	Echinococcus granulosus	–	Dog tapeworm
	Schistosoma haematobium	–	Blood fluke
	Paragonimus	–	Lung fluke
	Diplozoon	–	Gill fluke of fishes
	Fasciola hepatica	–	Sheep liver fluke.
	Planaria	–	Highest regeneration power.



(a) **(b)**

Example of Platyhelminthes : (a) Tape worm (b) Liver fluke

(a) Tape worm **(b) Liver fluke**

Something specific about platyhelminthes: –

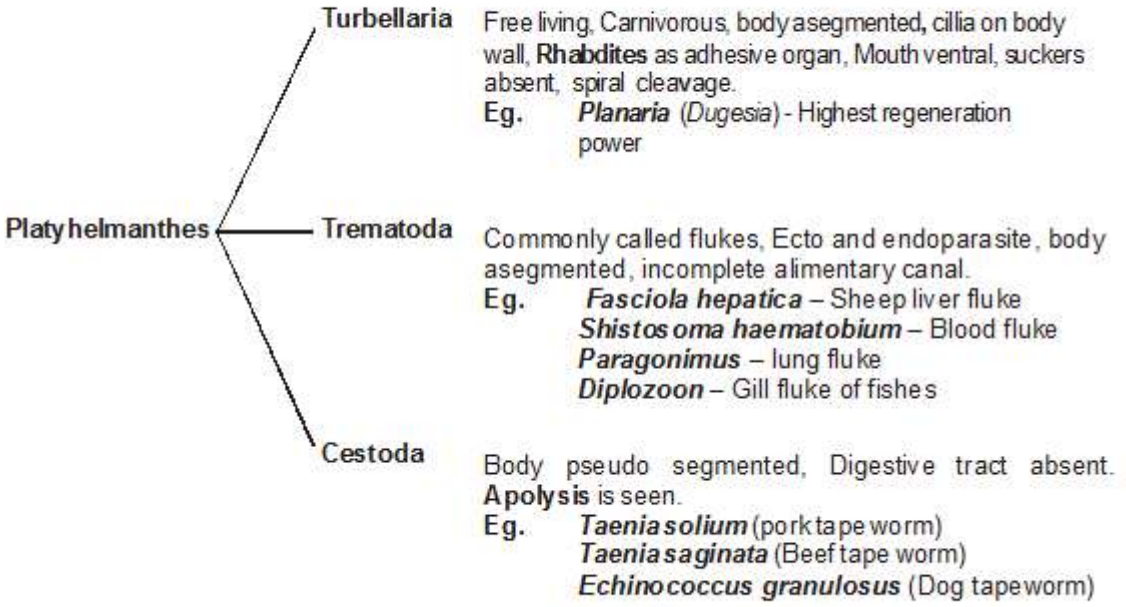
◆ Body segmentation but pseudosegmentation, Bilateral symmetry, Excretory organ (flame cells) first developed in this group
◆ **Digenetic parasite –** Two host , primary and secondary host are needed

Fasciola hepatica { P.Host – Sheep; S.Host – Snail

Taenia solium { P.Host – Man; S.Host – Pig

◆ Parasitic form absorb nutrient through sucker or general body surface.
◆ Cuticle on bodywall is the parasitic adaptation which prevent the organism from digestive enzymes.

Classification:-



PHYLUM – ASCHELMINTHES

(1) Habit and Habitat – Free living (Aquaitic and Terrestrial). Parasite (Endoparasite in animals and plants)

Note: ***Meloidegyne incognitia*** – It is a parasite nematode in plants. Actually it infects the roots of Tobaco plant and causes a great reduction in yield.

(2) External Morphology – Body asegmented, cylendrical, Clear sexual dimorphism (Male and female are recognized by their morphological appearance and generally females are larger than males).

(3) Symmetry – After being cylendrical, they represent bilateral symmetry because dorsal and ventral surface are recognised by **Dorsal** and **Ventral Nerve cord**.

(4) Locomotory organ – Absent

(5) Body wall – Triploblastic
- Outer cuticle layer.
- Middle **syncytial epidermis.**
- Inner muscular layer.

(6) Coelome – Pseudocoelomate (Clear space present between body wall and alimentary canal but not lined with mesoderm hence called pseudocoel or false coelome)

(7) Level of body organisation – Organ-system level.

(8) Alimentary canal and Digestion – Complete alimentary canal with well developed **muscular pharynx**. Mouth and anus are clear. Incomplete digestion of food.

(9) Excretion and osmoregulation – H-shaped excretory system is present that is derived from single **rennet cell** in *Ascaris*. Excretory product-NH_3 that is excreted through separate excretory pore (Separate means not through cloaca)

(10) Respiration and Gaseous Exchange – Parasitic forms are anaerobic *(Ascaris)* but aerobic in free living forms but no respiratory organs are present and gaseous exchange occurs through general body surface.

(11) Sexuality – Bisexual (Dioecious)

◆ **Male animal** – Smaller with curved posterior end, contain copulatory pineal setae.

◆ **Female animal** – Larger with straight body.

(12) Reproduction – Sexual reproduction, Internal fertilisation.

◆ **Male gamete** – Sperm without tail and generally amoeboid

◆ · **Female gamete** – Ova

(13) Embryonic development – Spiral cleavage with Direct or Indirect development.

◆ **Direct development** – The young ones resemble the adult.

◆ **Indirect development** – Larval stage present

◆ **Larva** -- Rhabdity form (*Ascaris*) , Filarae (*Wucheria*)

Eg. ***Ascaris*** –Round worm and parasite of intestine

Wuchereria–Filaria worm and parasite of lymph capillaries of hind limb.

Ancyclostoma–Hook worm

Enterobius –Pin worm and parasite of human caecum, appendix

Loa-loa –Eye worm and causes eyeflu

Dracunculus–Guinea worm, P.Host – Man, S.Host – *Cyclops* and causes Naru disease (Dracunculasis***)***.

Male **Female**

Aschelminthes–Roundworm

Something specific about Nematodes

◆ Parasitic forms are digenetic and monogenetic both

Digenetic–*Wuchereria* < P.Host – Man / S.Host – Culex mosquito

Monogenetic–*Ascaris* – Parasite of human intestine

◆ **Auxentic growth** – The number of body cells is fixed and growth in body size is mainly due to increase in cell size only.

◆ Nematod represent tube with in tube plan because have hollow alimentary canal within hollow body.

◆ Phasmid and Amphids are chemoreceptor.

PHYLUM – ANNELIDA

Annulus – Small ring form

(1) Habit and Habitat – May be aquatic (Marine & Fresh water) and terrestrial both, mostly free living but some are parasite (Leach).

(2) External Morphology- Body rounded and flat both type but metamerically segmented (true segmented).

(3) Symmetry- Bilateral

(4) Locomotory organ- Chitinous setae that are connected with **protractor** and **Retractor** muscles for pulling in and out.

(5) Body wall- Triploblastic, L.M.L. and C.M.L. both present in muscular layer which helps in locomotion also.

(6) Coelome- first time coelome (Eucoelome) appeared in annelids.

(7) Level of body organization- Organ-system

(8) Body plan- Tube with in the tube plane in T.S.

(9) Alimentary canal and Digestion- Complete alimentary canal and extra cellular digestion.

(10) Excretion and Osmoregulation- Excretory organ-Nephridia. Excretory substance-NH_3 and urea.

(11) Respiration- Aerobic and gaseous exchange through general body surface-skin (Cutaneous Respiration)

(12) Body fluids and circulation- Closed blood circulatory system

(13) Neural Control- Neural system consists of paired ganglia connected by lateral nerves to a double ventral nerve cord.

(14) Sexuality-

◆ Mostly hermaphrodite (bisexual) **Eg.** Earthworm, leech.

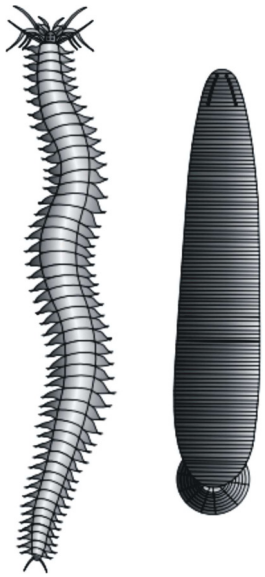
◆ Some are unisexual (Dioecious) **Eg.** Neries (aquatic)

(15) Reproduction and Fertilization- Sexual reproduction and cross-external fertilization in bisexual species.

(16) Development- Mostly direct but rarely indirect

◆ Larva-Trochophore.

Eg. *Neries*- Aquatic and commonalty called sand worm/Clamworm/Ragworm
***Polynoe*-** Bioluminescent and commonly called scale worm.
***Pheretima*-** Earth worm.
***Hirudinaria*-** Blood sucking leech.



Examples of Annelida : (a) *Nereis* (b) *Hirudinaria*

Something specific about Annelida -

- **Parapodia-** Locomotory organ of **Nereis** and parapodia are fleshy with setae.
- **Botrydal tissue-** Solid mesodermal tissue filled in coelome of **Leech**
- **Chloragogen cell-** Analogous to liver of vertebrates
- **Blood-** Red without R.B.Cs b/c Hb dissolved in blood plasma.
- **Schizocoelic Eucoelome-** First time true coelome appeared in Annelids.

Classification- On the basis of setae and sensory organ.

Annelida

- **Class-Polychaeta-** Many setae in each segment and setae are embedded in to parapodia Eg. ***Nereis***.
- **Class-Oligochaeta-** Setae few and no parapodia **Eg.-** ***Pheretima.***
- **Class-Hirudinea-** Setae and parapodia absent. Coelome is reduced in adult because Botroydial tissue filled. in coelome. fixed no. of segments (26 or 33) **Eg.-** Leech

PHYLUM – ARTHROPODA

Arthros = Jointed

Podas = Legs or Appendages

Largest phylum of kingdom Animalia because 80% (two third) animal species belongs to phylum – Arthropoda.

(1) Habit and Habitat: Found in land, water, air and from snowy tops of the high mountain to the depth of the ocean. Free living and parasite (ecto-parasite) both with great economic importance also.

(2) External morphology: Body segmented and divided in to head, thorox, Abdomen or cephalothorax and abdomen with jointed appendages.

(3) Symmetry: Bilateral

(4) Body wall: Triploblastic, outer layer is chitinous cuticle as exoskeleton.

(5) Coelome: Eucoelomate but in adult form of some arthropod it reduced and replaced by haemocoel and restricted around gonads.

(6) Level of Body organization: Organ-system

(7) Alimentary canal and Digestion: Complete alimentary canal with well developed muscular pharynx. Extra-cellular digestion

(8) Excretion and osmoregulation: Malpighian tubules and green or coxal glands while excretory substance

◆ **Uric acid –** Terrestrial arthropods

◆ **Ammonia –** Aquatic Arthropods

(9) Respiration: Aerobic and Respiratory organs are – **Gills, Trachea, Book lungs**

(10) Body fluid and their circulation: Open circulatory System.

(11) Sensory organs:

◆ **Compound and simple eyes** – Photoreceptor

◆ **Antennae** – Olfactory and tangoreceptor

◆ **Statocyst** – For balancing

(12) Sexuality: Unisexual with clear sexual dimorphism.

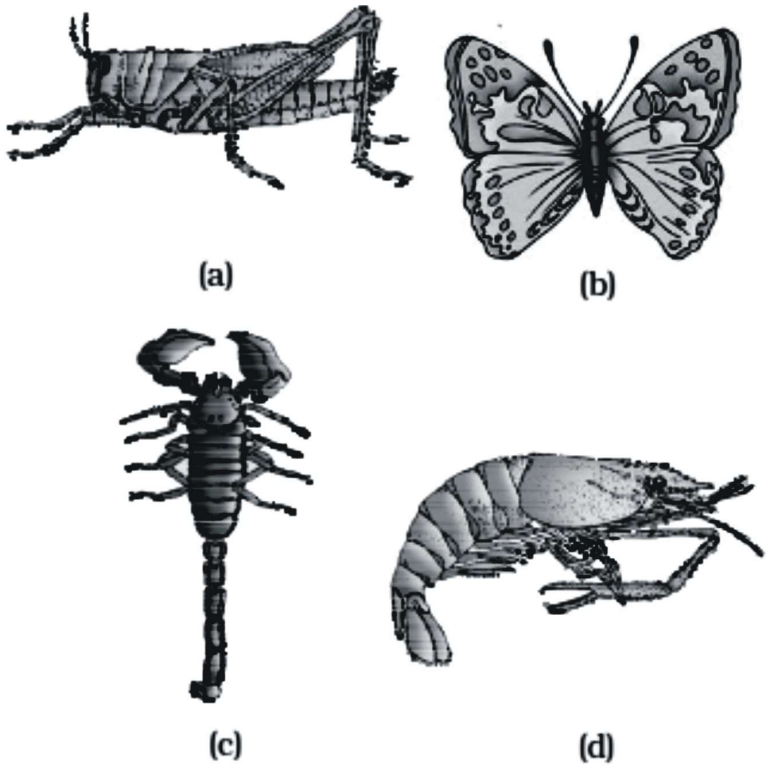
(13) Reproduction and fertilization: Sexual and internal fertilization but embryonic development is outside the body.

◆ **Oviparous –** most of the insects

◆ **Viviparous –** Scorpion

(14) Development: Direct and indirect both

◆ **Larva:** **Nymph** – Cockroach
Maggot – House fly
Caterpillar – Butterfly and Moth



Examples of Arthropoda : (a) Locust (b) Butterfly (c) Scorpion (d) Prawn

Eg. Economically important arthropod

Apis – Honey bee
Bombyx – Silk worm
Laccifer – Lac insect
Palaemon – Prawn

◆ **Vector** –

Musca – Cholera and diorrhea (Bacteria + Protozoa)
Anopheles – Malaria (Plasmodium)
Culex – Filariasis (Nematod)
Ades – Yellow fever (virus)

◆ **Gregarious pest** –
Locusta (locust)

◆ **Poisonous** –
Scorpion, wasps, Bees, *Scolopendra* (centipede)

◆ **Living fossil** – *Limulus* (king crab)

PHYLUM MOLLUSCA

Mollis = Soft

Soft body that is covered by calcarious shell. **Second Largest phylum.**

(1) Habit and Habitat: Mostly aquatic (Marine and fresh water both) but some are terrestrial (***helix***-land snail). Mostly mollusc are predator (Squid and octopus)

(2) External morphology:

◆ Body unsegmented with distinct –

(i) Head **(ii) Muscular foot** **(iii) Visceral hump (covered by soft mantle)**

◆ Body covered by hard calcarious shell

◆ **Mantle** – It is skin fold that coveres visceral hump and secretes calcareous shell.

Note: Body is internally segmented in *Neopelina.*

(3) Symmetry: Bilateral symmetrical but may become asymmetrical due to torson.

(4) Locomotory organ: Muscular foot as locomotary organ which helps in creeping, swimming and burrowing.

(5) Body wall: Triploblastic

(6) Coelome: Eucoelome (true coelome) but reduced at the adult stage and restricted to pericardial cavity, exeretory and reproductive organs.

(7) Level of body organization: Organ-System.

(8) Alimentary canal and digestion: Well developed and Mouth contain file-like rasping organ, called **radulla**.

(9) Respiration: Aerobic respiration. A space between shell and mantle called mantle cavity and this cavity contains feather like gills for respiration (Gills called ctenidia).

(10) Body fluid and their circulation: Open circulatory system and Haemocyanin as blue coloured respiratory pigment.

(11) Excretion and Osmoregulation: Basic excretory organ are metanephridia but gills also perform it.
Excretory product – NH_3

(12) Sensory organs:

(i) Eyes-Photoreceptor and in octopus analogous to vertebrate eyes.
(ii) Tentacle – Tangoreceptor present in anterior body part or head.
(iii) Ospharadium-Chemoreceptor for water taste and determine purity of water also.

(13) Sexuality: Most of the molluscans are unisexual (Dioecious) and oviparous.

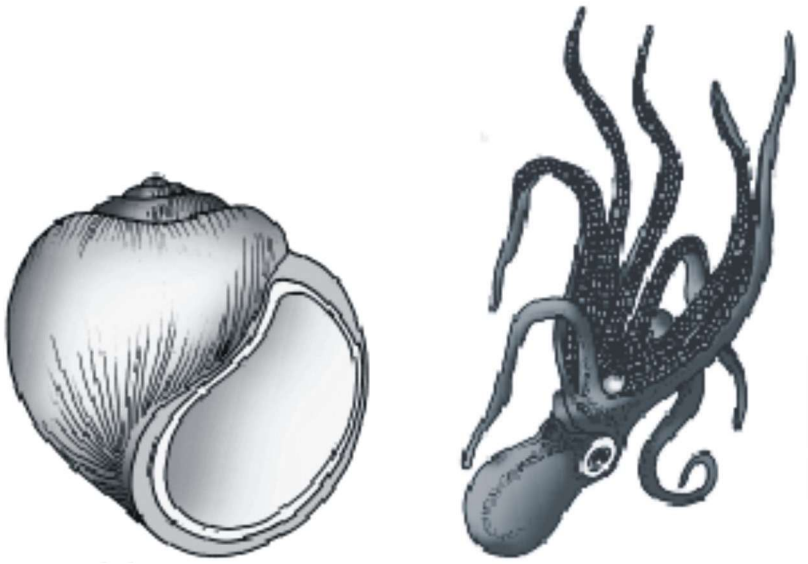
(14) Reproduction and fertilization: sexual, External and internal fertilization, all are oviparous.

(15) Development: Direct but usually indirect

◆ **Larva -**

(i) Trochophore – *Dentalium, Chiton*
(ii) Velliger – *Mussel*
(iii) Glochidium – *Mussel and Pila*

Eg. ***Neopilina***	**–**	Connective link b/w Annelida and Mollusca.
Pila	**–**	Apple snail
Pinctada	**–**	Pearl oyster
Sepia	**–**	Cuttle fish
Loligo	**–**	Squid
Octopus	**–**	Devil fish
Aplysia	**–**	Sea hare
Dentalium	**–**	Elephant tusk shell
Chaetopleura	**–**	Chiton



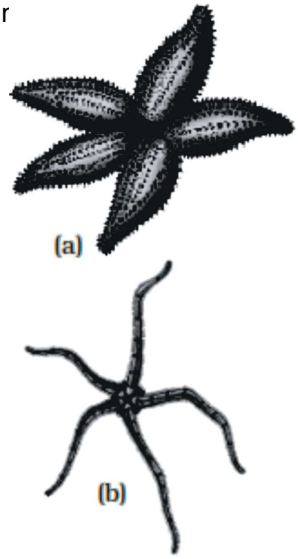
(a) **(a)**

Examples of Mollusca : (a) *Pila* (b) *Octopus*

PHYLUM – ECHINODERMATA

(1) These animals have an endoskeleton of calcareous ossicles and, hence, the name Echinodermata (Spiny bodied).
(2) All are marine with organ-system level of organisation.
(3) The adult echinoderms are radially symmetrical but larvae are bilaterally symr
(4) They are triploblastic and coelomate animals.
(5) Digestive system is complete with mouth on the lower (ventral) side and anus on the upper (dorsal) side.
(6) The most distinctive feature of echinoderms is the presence of water vascular system which helps in locomotion, capture and transport of food and respiration.
(7) An excretory system is absent.
(8) Sexes are separate. Reproduction is sexual. Fertilisation is usually external. Development is indirect with free-swimming larva.

Eg. ***Asterias***	-	Star fish
Echinus	-	Sea urchin
Antedon	**-**	Sea lily
Cucumaria	**-**	Sea cucumber
Ophiura	-	Brittle star



Examples for Echinodermata :
(a) *Asterias*
(b) *Ophiura*

Board Level Exercise

Type (I) : Very Short Answer Type Questions : **[01 Mark Each]**

1. Mention one important phenomenon shown by coelenterates.
2. Name the first phylum including triploblastic animals.
3. In which animal phylum body cavity appears for the first time?
4. What is radula?
5. Name an animal which can reorganise itself into a whole when its broken parts are brought together.
6. Which sponge is used as a marriage gift in Japan?
7. Name the toxin found in the cnidoblasts.
8. What is haemolymph?
9. What is cephalisation?
10. Assign the phylum to which following animals belongs - *Pheretima* & sponge.
11. What are flame cells?
12. Name the second largest animal phylum.
13. Name a free living & parasitic Platyhelminths.
14. Which animal is popularly called ploughman of nature or friend of farmer?
15. What does the name of the phylum Anthropoda signify?

Type (II) : Short Answer Type Questions : **[02 Marks Each]**

16. Outline the role of coelom in animals.
17. Distinguish between diploblastic & triploblastic animals.
18. Why are echinoderms considered closer to chordates than any other phylum?
19. Cite examples of true and false metamerism.
20. What is meant by sexual dimorphism? Give one example?
21. Mention the modification & function of coelom in echinoderms.

Type (III) : Long Answer Type Questions: **[03 Marks Each]**

22. What are basic plans of body design in animals?
23. Which symmetry is most common in animals? Define it.
24. Give a one-word scientific term for the following :
(a) Blood-filled cavity in arthropods
(b) Stinging cells of jellyfishes
(c)Individual animals bearing organs of both sexes
25. Write the affinities of Coelentrata and Ctenophora.
26. What is water canal system? Write the different types with its utility.
27. Write the differences between Aschelmenthes and Platyhelmenthes.

Type (IV) : Very Long Answer Type Questions: **[05 Marks Each]**

28. Enlist the main features of Aschelminthes & give examples.
29. How are non-chordates different from chordates. Write the main features of largest phyla of non-chordate & give examples.
30. Describe the important features of exclusively immovable phylum.
31. Which is the second largest phyla in animal kingdom? Describe the important features of this group with example.
32. Why are Echinodermates considered as the most advanced phyla of non-chordates?

Exercise # 1

OBJECTIVE QUESTIONS

PROTOZOA

1. Study of microscopic animals like *Plasmodium, Amoeba* etc, is called
(1) Virology (2) Parasitology (3) Protozoology (4) Pathology

2. Contractile vacuoles in protozoans primarily serve for
(1) Excretion (2) Water circulation (3) Osmoregulation (4) Water absorption

3. Protists obtain their food as :
(1) Photosynthesisers only (2) Chemosynthesisers only
(3) Holotrophs only (4) Photosynthesisers, holotrophs, symbionts

4. Pseudopodia commonly form in :
(1) *Amoeba* only (2) A variety of protozoans only
(3) A variety of protozoans and leucocytes (4) *Amoeba* and leucocytes

5. Match List I and List II, and select the correct answer using the codes given below the lists

List I (Animals)	**List II (Organs of locomotion)**
A *Paramoecium*	1 Parapodia
B *Mussel*	2 Flagellum
C *Trypanosoma*	3 Foot
D Tube worms	4 Cilia
	5 Tube feet

(1) A = 2, B = 3, C = 1, D = 5 (2) A = 1, B = 5, C = 2, D = 4
(3) A = 4, B = 3, C = 2, D = 1 (4) A = 5, B = 1, C = 4, D = 3

6. Contractile vacuole is present in
(1) *Paramoecium* (2) *Euglena* (3) *Amoeba* (4) All of these

7. Which of the following is the main function of contractile vacuole?
(1) Osmoregulation (2) Excretion (3) Respiration (4) Reproduction

8. Protozoans respire through
(1) Mitochondria (2) Contractile vacuole (3) Pseudopodia (4) General surface

9. Example of a bioluminescent protozoan is :
(1) *Paramoecium* (2) *Opalina* (3) *Entamoeba* (4) *Noctiluca*

10. *Euglena* contains chlorophyll, yet it resembles animals, because it
(1) Reproduces like animals (2) Respires like animals
(3) Possesses a contractile vacuole (4) Feeds like animals in absence of sunlight

11. Which of the following protozoan dipicts the characteristics of both plants and animals?
(1) *Entamoeba* (2) *Paramoecium* (3) *Monocystis* (4) *Volvox*

12. Which class of Protozoa includes all parasitic forms?
(1) Mastigophora (2) Ciliata (3) Sporozoa (4) Sarcodina

13. Locomotory organs are absent in
(1) Sporozoa (2) Ciliates (3) Rhizopoda (4) Zooflagellates

14. Pseudopodia of *Amoeba* are important for :
(1) Feeding only (2) Locomotion only
(3) Feeding and locomotion (4) Offence

15. A common attribute of *Amoeba* and WBCs of vertebrates :
(1) Pseudopodia formation (2) Contractile vacuole
(3) Independent life (4) Holozoic nutrition

16. Egestion of undigested food in *Amoeba* takes place through :
(1) Circumvallation (2) Pinocytosis
(3) A temporary rapture of the surface membrane (4) The hyaline cap formed at its advancing end

17. While doing some experiment with *Amoeba proteus* in a culture medium, it was found that the contractile vacuole of the protozoan disappeared although the other organelles showed normal activity. This must have happened most probably due to :
(1) Change in the temperature of the medium (2) Change in the pH of the medium
(3) Dilution of the medium with tap water (4) Dilution of the medium with sea water

18. During unfavourable conditions *Amoeba* reproduces through
(1) binary fission (2) budding (3) multiple fission (4) conjugation

19. In *Amoeba*, the reproduction in unfavourable condition, three-layered cyst structure formed. This is called
(1) Sporulation (2) Encystment (3) Conjugation (4) Regeneration

20. *Entamoeba histolytica* is found in man in
(1) Colon (2) Small intestine (3) Oral cavity (4) Stomach

21. *Entamoeba histolytica* does not have or differs from *Amoeba* in the absence of
(1) Nucleus (2) Contractile vacuole (3) Food vacuole (4) Pseudopodia

22. How many nuclei are found in the mature cyst of *Entamoeba coli*?
(1) two (2) four (3) eight (4) none of these

23. Contractile vacuoles are characteristic osmoregulatory organelles of protozoans. Which protozoan does not have such a vacuole?
(1) *Amoeba* (2) *Euglena*
(3) *Entamoeba histolytica* has (4) *Paramoecium*

24. How many young *Amoeba*e hatch out from a cyst of *Entamoeba histolytica*?
(1) One (2) Two (3) Four (4) Six

25. Which of the following does not spread disease?
(1) *Entamoeba coli* (2) *Entamoeba histolytica*
(3) *Entamoeba gingivalis* (4) *Plasmodium ovale*

26. Which one resides in the mouth of human beings?
(1) *Entamoeba histolytica* (2) *Amoeba proteus*
(3) *Entamoeba coli* (4) *Entamoeba gingivalis*

27. Malaria is caused by
(1) *Plasmodium* (2) *Mosquitoes* (3) *Trypanosoma* (4) *Trichomonas*

28. The secondary host of *Plasmodium* is
(1) Male Culex (2) Male Anopheles (3) Female Anopheles (4) Female Culex

29. Stage of *Plasmodium* infective to man and injected into human blood by mosquito is
(1) Trophozoite (2) Merozoite (3) Sporozoite (4) Cyst

30. The substance that causes malarial fever and is accumulated in developing trophozoites of *Plasmodium* by degradation of haemoglobin in RBCs of human host :
(1) Haem (2) Globin (3) Haematin (4) Haemozoin

31. Malarial fever coincides with liberation of
(1) Trophozoites (2) Merozoites
(3) Cryptomerozoites (4) Metacryptomerozoites

32. The stage of Plasmodium when mosquito is infective
(1) Sexual stage or gametogamy (2) Pre-erythrocytic cycla
(3) Exoerythrocytic stage (4) None of these

33. African sleeping sickness is caused by
(1) *Trypanosoma gambiense* and transmitted by *Glossina palpalis*
(2) *Entamoeba gingivalis* and transmitted by housefly
(3) *Plasmodium vivax* and transmitted by tsetse fly
(4) *Trypanosoma lewsi* and transmitted by bedbug

34. Secondary host of *Trypanosoma* is :
(1) Housefly (2) Tsetse fly (3) Culex (4) Sandfly

35. Trichocysts are found for the
(1) Nutrition (2) Defence (3) Reproduction (4) None of these

36. Protozoa reproduce by several methods. Which protozoan reproduces both by binary fission and conjugation?
(1) *Amoeba* (2) *Euglena* (3) *Monocystis* (4) *Paramoecium*

37. In *Paramoecium*, both conjugation and autogamy are sexual processes because of :
(1) Involvement of two individuals (2) Fusion of two haploid nuclei
(3) Gene recombination (4) Rejuvenation

38. In *Amoeba,* NH_3 is excreted by
(1) Contractile vacuole (2) Food vacuole (3) Plasmalemma (4) All of these

39. *Leishmania tropica* causes
(1) Sleeping sickness (2) Kala-azar (3) Oriental sore (4) None of these

40. Macro- and micronuclei are the characteristic feature of
(1) *Paramoecium* and *Vorticella* (2) *Opalina* and *Nyctotherus*
(3) *Hydra* and *Balantidium* (4) *Vorticella* and *Plasmodium*

41. A person suffering from malaria feels fever when
(1) RBC generally ruptured and haemozoin granules are released
(2) Exo-erythrocytic cycle is completed
(3) Signet ring stage is formed
(4) All of the above

PORIFERA

1. Most important character of all sponges
(1) Coelenteron (2) Herbivorous nutrition (3) Choanocytes (4) Only sexual reproduction

2. In sponges there is
(1) Radial symmetry (2) A true coelom
(3) A single exit and a number of mouthlets (4) A single mouthlet and a number of exists

3. Which of the following are ``multicellular grade'' organisms?
(1) Sponges (2) Coelenterates (3) Prokaryotes (4) Vertebrates

4. Organization in sponges is
(1) Protoplasmic grade (2) Cellular grade (3) Organ grade (4) Tissue grade

5. Cells which create water current and ingest food in *Leucosolenia* and other sponges
(1) Trophocytes (2) Pinacocytes (3) Porocytes (4) Choanocytes

6. Cells found only in sponges and not in other metazoans
(1) Choanocytes (2) Chondrocytes (3) Nematocytes (4) Nematoblasts

7. Choanocytes or collar cells occur only in
(1) Cnidarians (2) Trematodes (3) Sponges (4) Earthworms

8. Endoskeleton of sponges is made up of
(1) Cartilage
(2) Bone
(3) Calcareous spicules
(4) Calcareous or siliceous spicules, or siliceous spicules and spongin fibres or only spongin fibres

9. Classification of phylum Porifera is primarily based on
(1) Canal system (2) Spicules (3) Symmetry (4) Branching

10. The precious marriage gift in Japan is
(1) *Spongilla* (2) *Hyalonema* (3) *Leucosolenia* (4) *Euplectella*

11. 'Venus' Flower Basket is the name of
(1) *Leucosolenia* (2) *Euplectella* (3) *Sycon* (4) *Euspongia*

12. `Venus' Flower Basket belongs to the phylum
(1) Porifera (2) Coelenterata (3) Mollusca (4) Echinodermata

13. Bath sponges are found in
(1) Red Sea (2) Gulf of Mexico (3) Mediterranean Sea (4) All of these

14. Body mof *Euspongia* is mainly composed of
(1) Spicules (2) Spongin fibres (3) Nematoblasts (4) Mesogloea

15. A sponge harmful to oyster industry is
(1) *Cliona* (2) *Euspongia* (3) *Hyalonema* (4) *Spongilla*

16. Which of the following is detrimental to pearl industry?
(1) *Euspongia* (2) *Oyster* (3) *Cliona* (4) *Chalina*

17. *Leucosolenia* is
(1) Feee-living, solitary and marine (2) Sessile, solitary and marine
(3) Sessile, colonial and marine (4) Sessile, colonial and freshwater

18. Locomotion is not known to occur in
(1) *Amoeba* (2) Maggot of housefly (3) Earthworm (4) *Leucosolenia*

19. Body of *Leucosolenia* is
(1) Cylindrical and radially symmetrical (2) Spherical and symmetrical
(3) Cylindrical and asymmetrical (4) Elliptical and asymmetrical

20. Symmetry in *Leucosolenia* is
(1) Spherical (2) Radial (3) Bilateral (4) Asymmetrical

21. Cavity common to all types of canal systems in sponges is
(1) Incurrent canal (2) Excurrent canal (3) Spongocoel (4) Radial Chamber

22. Porocytes are special cells for the passage of
(1) Excretory products within body of flatworms
(2) Sweat upon surface of mammalian epidermis
(3) Incoming water current in the body of sponges
(4) Outgoing water current on top of sponges

23. Which of the following cells in sponges catch food?
(1) Pinacocytes (2) Choanocytes (3) Thesocytes (4) Archaeocytes

24. Which of the following pairs is not correctly matched?
(1) Amoebocytes - Transport food to nonfeeding cells
(2) Collar cells - Movement of water and filtering food
(3) Osculum - Control of water entry
(4) Spicules - Skeletal supporting element

25. Exit for water current in *Leucosolenia* and other sponges is
(1) Aboral pore (2) Ostium (3) Osculum (4) Cloaca

26. Sponges need a continuous current of water flowing through their bodies for
(1) Respiration
(2) Respiration and excretion
(3) Respiration, excretion and reproduction
(4) Respiration, excretion, nutrition and reproduction

27. Animal which passes water current through its body for food is
(1) Sponge (2) *Hydra* (3) Starfish (4) Earthworm

28. Main process of asexual reproduction in *Leucosolenia* is
(1) Budding (2) Branching and regeneration
(3) Formation of reduction bodies (4) None of these

29. Reproductive cells in sponges probably form from
(1) Archaeocytes (2) Pinacocytes (3) Myocytes (4) Scleroblasts

COELENTERATA

1. Macro- and micronuclei are the characteristic feature of
(1) *Paramoecium* and *Vorticella* (2) *Opalina* and *Nyctotherus*
(3) *Hydra* and *Balantidium* (4) *Vorticella* and *Plasmodium*

2. Blind sac body plan is shown by
(1) annelids (2) arthropods (3) roundworms (4) coelenterates

3. Ctenophores have similarities with members of
(1) Porifera (2) Annelida (3) Coelenterata (4) Arthropoda

4. Polyp phase is absent in
(1) *Aurelia* (2) *Hydra* (3) *Physalia* (4) *Obelia*

5. Which one of the following has a biradial symmetry ?
(1) *Paramoecium* (2) *Jelly fish* (3) *Cockroach* (4) *Sea anemone*

6. Scyphozoan medusa is more commonly known as
(1) Sea pen (2) *Obelia* (3) Sea urchin (4) *Jelly fish*

7. The *Jelly fish* is classified under the phylum
(1) Porifera (2) Cnidaria (3) Mollusca (4) Echinodermata

8. In *Hydra*, nematocysts are found only in
(1) epidermis (2) mesodermis (3) endodermis (4) gastrodermis

9. The following are the features associated with Cnidaria
I. Radial symmetry
II. Presence of gastrovascular cavity
III. Animals are in either of the two forms-polyp and medusa or both
IV. Alternation of generations in their history
Which of the above are true of *Metridium*?
(1) all (2) only I and II (3) only II and III (4) only I, II and IV

10. Which of the following classes exhibit polymorphism ?
(1) Calcarea (2) Hydrozoa (3) Polychaete (4) Scyphozoa

11. Which one is mismatched ?
(1) *Obelia* - Sea water
(2) *Physalia* - Sea water
(3) *Hydra vulgaris* - Sea water
(4) *Hydra gangetica* - Freshwater

12. Cnidoblasts of *Hydra* are
(1) sensory (2) complicated
(3) with nematocyst apparatus (4) all of the above

13. Absence of circulatory system in *Hydra* is compensated by
(1) pseudocoelomic fluid (2) gastrovascular cavity (3) presence of tentacles (4) none of the above

CTENOPHORA

1. Biradial symmetry and lack of cnidoblasts are the characteristics of
(1) *Hydra* and starfish (2) Ctenoplana and Beroe
(3) *Aurelia* and *Paramoecium* (4) Starfish and sea anemone

2. Ctenophores have similarities with members of
(1) Porifera (2) Annelida (3) Coelenterata (4) Arthropoda

3. Polyp phase is absent in
(1) *Aurelia* (2) *Hydra* (3) *Physalia* (4) *Obelia*

4. Lagoon refers to
(1) a full moon
(2) horse shoe shaped coral reef
(3) the sea breaking into the land and then separated by sand dunes
(4) a spot in a desert made fertile by presence of water

5. Which is incorrect ?
(1) Trichocyst – Rhizopoda (2) Nematocyst – Cnidaria
(3) Colloblast – Ctenophora (4) Choanocyte – Porifera

6. Nematoblasts are formed by
(1) nerve cells (2) glands cells (3) interstitial cells (4) mesoepithelial cells

7. Which one of the following has a biradial symmetry ?
(1) *Paramoecium* (2) *Jelly fish* (3) Cockroach (4) Sea anemone

8. Scyphozoan medusa is more commonly known as
(1) Sea pen (2) Obelia (3) Sea urchin (4) *Jelly fish*

9. The *jelly fish* is classified under the phylum
(1) Porifera (2) Cnidaria (3) Mollusca (4) Echinodermata

10. In Hydra, nematocysts are found only in
(1) epidermis (2) mesodermis (3) endodermis (4) gastrodermis

11. Which of the following possesses a hard exoskeleton formed by calcium carbonate
(1) *Aurelia* (2) *Physalia* (3) *Coralium* (4) *Halistemma*

PLATYHELMINTHES & ASCHELMINTHES

1. The study of worms causing parasitic infestation in humans is
(1) Malacology (2) Helminthology (3) Ichthyology (4) Herpetology

2. All worms are
(1) acoelomates (2) pseudocoelomates (3) coelomates (4) none

3. Flame cells are excretory organs of
(1) Coelenterates (2) Platyhelminthes (3) Annelida (4) Echinodermata

4. The excretory structures of flatworms are
(1) Malpighian tubules (2) Green glands (3) Metanephridia (4) Flame cells

5. Anus is absent in
(1) *Fasciola* (2) *Metaphire* (3) *Unio* (4) *Periplaneta*

6. Miracidium larva occurs in the life cycle of
(1) Liver fluke (2) Tapeworm (3) *Ascaris* (4) Malarial parasite

7. Cercaria stage is found in the life cycle of
(1) *Plasmodium* (2) *Ascaris* (3) *Taenia* (4) *Fasciola*

8. Which will show both alternation of generation and alternation of host?
(1) *Fasciola* (2) *Taenia* (3) *Ascaris* (4) *Cyclops*

9. Stage of the life history of liver fluke when it infects the intermediate host is
(1) Metacercaria (2) Cysticercus (3) Rhabditiform (4) Miracidium

10. Shedding of proglottids in tapeworm is called
(1) histolysis (2) topolysis (3) apolysis (4) detachment

11. Excretion in *Taenia* is done by
(1) nephridia (2) flame cells (3) green glands (4) malpighian bodies

12. The secondary host of *Taenia* is
(1) Dog (2) Man (3) Pig (4) Snail

13. Cysticercus is the larval stage of
(1) Liver fluke (2) Pinworm (3) Tapeworm (4) Roundworm

14. Cysticerci in pig muscles can remain viable for
(1) one month (2) six months (3) one year (4) several years

15. Schistosoma is a parasite found in
(1) Blood (2) Liver (3) Intestine (4) Lungs

16. Flame cells are the excretory organ of
(1) Prawn (2) *Planaria* (3) Silverfish (4) *Hydra*

17. In tapeworm vitelline gland produces
(1) Shell (2) Ova (3) Mucous cells (4) Yolk cells

18. Pseudocoelom is not found in
(1) *Ascaris* (2) *Ancylostoma* (3) *Fasciola* (4) *None of these*

19. In contrast to Annelids the Platyhelminthes show
(1) Radial symmetry (2) Bilateral symmetry
(3) Absence of body cavity (4) Presence of pseudocoel

20. Syncytial (=coenocytic) epidermis is present in
(1) Housefly (2) *Ascaris* (3) *Metaphire* (4) *Periplaneta*

21. Body cavity of *Ascaris* is called
(1) Haemocoel (2) Schizocoel (3) Enterocoel (4) Pseudocoel

22. A coelom (body cavity)derived from blastocoel is known as
(1) Pseudocoelom (2) Haemocoel (3) Schizocoel (4) Enterocoel

23. Amphids present on ventrolateral lips of *Ascaris* are
(1) Tangoreceptors (2) Chemoreceptors (3) Thermoreceptors (4) Photoreceptors

24. Sexual dimorphism is found in
(1) *Hydra* (2) *Ascaris* (3) *Fasciola* (4) Earthworm

25. Sexual dimorphism is distinct in *Ascaris* because of
(1) Body colour (2) Buccal margins (3) Penial setae (4) None

26. The third and fourth stage larvae of *Ascaris* develop in one of the following organs of human body
(1) Liver (2) Heart (3) Lungs (4) Spleen

27. Which parasite has no intermediate host
(1) *Fasciola* (2) *Taenia* (3) *Plasmodium* (4) *Ascaris*

28. Human beings become infected with *Ascaris* through
(1) Inhalation of dust (2) Bite of Aedes mosquito
(3) Contaminated food, soil and drinking water (4) Contact with an infected person

29. A rhabditiform larva forms in the life cycle of
(1) *Hydra* (2) Tapeworm (3) Liver fluke (4) *Ascaris*

30. *Wuchereria bancrofti* is transmitted by
(1) Culex (2) Anopheles (3) Tsetse fly (4) Sandfly

31. Filariasis is caused by
(1) *Ascaris lumbricoides* (2) *Taenia solium* (3) *Fasciola hepatica* (4) *Wuchereria bancrofti*

32. Scientific name of pinworm is
(1) *Trichinella* (2) *Ancylostoma* (3) *Enterobius* (4) *Wuchereria*

33. Who has suggested the name `Platyhelminthes'?
(1) Robert Grant (2) Leuckart (3) Gegenbaur (4) Von Seiblod

34. What is common amongst tapeworm, liver fluke and planarian?
(1) They are all found in gut (2) They are all segmented
(3) They all have flattened body (4) They all have a coelom

35. Regeneration power can best be studied in
(1) *Dugesia/Planaria* (2) *Amphioxus* (3) *Earthworm* (4) *Ascaris*

36. An example of free-living platyhelminth with a ciliated body
(1) *Dugesia* (2) *Fasciola* (3) *Enterobius* (4) *Schistosoma*

37. Body is unsegmented in
(1) Cockroach (2) Earthworm (3) *Fasciola* (4) *Taenia*

38. Digestive system is not found in
(1) *Ascaris* (2) *Taenia* (3) *Cockroach* (4) *Earthworm*

39. Tapeworm has no alimentary canal, because
(1) it does not require nutrients (2) it feeds only when young
(3) it absorbs nutrients through body surface (4) none of these

40. *Taenia solium* is characterized by
(1) externally divided body (2) absence of digestive tract
(3) presence of hooks for adhesion (4) all of the above

41. Tapeworm feeds by
(1) scolex (2) rostellum (3) suckers (4) body wall

42. Larva of *Schistosoma* is
(1) Cercaria (2) Planula (3) Cysticercus (4) Muller's larva

43. In *Schistosoma,* gynaecophoric canal lodges
(1) Male (2) Female (3) Both of these (4) None of these

44. Bladderworm is
(1) Larva of silkmoth (2) Larva of *Taenia*
(3) Common name of *Ascaris* (4) Urine containing sac

45. Spiral cleavage is observed in
(1) Frog (2) Fish (3) *Turbellaria* (4) Hydra

46. Which of the following infests the snail in the life cycle of *Fasciola*?
(1) Cercaria (2) Redia (3) Miracidium (4) Metacercaria

47. Unlike other trematodes, *Schistosoma haematobium* is dioecious and
(1) Male lives in the pelvic veins
(2) Female lives in pelvic veins
(3) Female is larger than male and encloses male in its gynaecophoric canal
(4) The larger male retains the smaller female in its gynaecophoric canal

48. Gynaecophoric canal is present in some animals of
(1) Nematoda (2) Cestoda (3) Trematoda (4) Tubellaria

49. Solenocytes are the main excretory structures in
(1) Platyhelminthes (2) Annelida (3) Mollusca (4) Echinodermata

50. Laurer's canal is present in
(1) *Ascaris* (2) *Taenia* (3) *Periplaneta* (4) *Fasciola*

51. Which one of the following has no alimentary canal?
(1) *Taenia* and Liver fluke (2) *Taenia* and *Echinococcus*
iPlanaria and Dipylidium (4) *Fasciola* and *Diplostomum*

52. Roundworms differ from flatworms in having a
(1) Pseudocoel (2) Circular muscle layer
(3) Dorsal nerve cord (4) Circulatory system

53. Body is unsegmented in
(1) Scorpion (2) *Ascaris* (3) Earthworm (4) Mosquito

54. Female *Ascaris* is identified on the basis of
(1) A common cloacal aperture (2) Straight posterior end
(3) Presence of preanal and postanal papillae (4) Presence of two spicules at posterior end

55. The posterior end of male *Ascaris* is
(1) Curved (2) Flattened (3) Straight (4) Coiled

56. Female *Ascaris* differs from the male in having
(1) Pineal setae (2) Longer body (3) Curved tail (4) None of these

57. *Ascaris* protects itself from effects of digestive enzymes of the host by means of
(1) Cuticle (2) Antienzymes (3) Both (1) and (2) (4) Mucus

58. Excretory pores present in *Ascaris* are
(1) One (2) One pair (3) Two pairs (4) Many

59. Excretory system of *Ascaris* is shaped like
(1) H (2) I (3) M (4) N

60. Amphids upon lips of *Ascaris*
(1) Secrete saliva (2) Are adhesive organs
(3) Secrete proteolytic enzymes (4) Are organs of smell and chemoreception

61. Sensory structures in *Ascaris* are
(1) Phasmids (2) Papillae (3) Amphids (4) All of these

62. Sexual dimorphism is distinct in *Ascaris* because of
(1) Body colour (2) Buccal margins (3) Penial setae (4) None

63. Sperms of *Ascaris* are characterized by
(1) Long form (2) Absence of flagellum
(3) Motility (4) Ability to induce meiosis in the eggs

64. Second moulting of *Ascaris* larva occurs in
(1) Lung of the host (2) Blood vessel of host (3) Intestine of host (4) Sand only

65. Second instar larva of *Ascaris* is formed in
(1) Embryonated eggs (2) Human lungs (3) Human stomach (4) Human liver

66. The first two stages of larva in *Ascaris* occur in
(1) Host intestine (2) Eggs themselves (3) Body cavity (4) Uterus

67. The first stage larva of *Ascaris* is
(1) Miracidium (2) Filiform (3) Rhabditiform (4) Microfilaria

ANNELIDA

1. Metamerism is characteristic of phylum
(1) Porifera (2) Platyhelminthes (3) Annelida (4) Mollusca

2. A postanal tail is absent in
(1) Snake (2) Earthworm (3) Rabbit (4) Lizard

3. Which of the following belongs to phylum Annelida?
(1) *Nereis* (2) Octopus (3) Crab (4) Ant

4. A suctorial mouth is found in
(1) *Ascaris* (2) *Taenia* (3) Earthworm (4) Leech

5. What is common between leech, centipede and earthworm?
(1) Hermaphroditism (2) Ventral nerve cord (3) Absence of legs (4) Malpighian tubules

6. Famous Indian zoologist who wrote a memoir upon *Metaphire posthuma*
(1) J.C. Bose (2) Bhatia M.L. (3) Bahl K.N. (4) Beni Prasad

7. In earthworm, genital papillae occur in segments
(1) 16 and 17 (2) 16 and 18 (3) 17 and 18 (4) 17 and 19

8. In earthworm, the function of chloragogen cells is
(1) Reproduction (2) Digestion (3) Excretion (4) Regeneration

9. Role of typhlosole in earthworms is to
(1) Emulsify food (2) Kill bacteria
(3) Increase absorptive area (4) Produce digestive enzymes

10. Haemoglobin is found dissolved in blood plasma of
(1) Earthworm (2) Cockroach (3) Rabbit (4) Frog

11. The blood pigment of earthworm is
(1) Haemocyanin (2) Haemoglobin (3) Haemin (4) Cyanin

12. Blood is red but there are no red blood cells in
(1) Earthworm (2) Cockroach (3) Bedbug (4) Rabbit

13. In *Metaphire* the three kinds of nephridia are distributed as follows
(1) All segments except 1st to 4th and 10th to 14th segments
(2) All segments except first three segments
(3) Meganephridia in pre-clitellar segments and micronephridia in post-clitellar segments
(4) Micronephridia in all segments, meganephridia in dlitellar and post-clitellar regions

14. In earthworm the
(1) testes are larger than the ovaries (2) ovaries are larger than the testes
(3) both are equal (4) right testis larger than the ovary

15. An annelid in which internal fertilization occurs in
(1) *Neanthes* (2) *Eunice* (3) *Hirudinaria* (4) *Polygordius*

16. Locomotion occurs in earthworm through
(1) setae (2) parapodia
(3) setae and circular muscles (4) setae, circular and longitudinal muscles

17. Blood glands of *Metaphire* are located in which segments?
(1) 1, 2, and 3 (2) 3, 4 and 5 (3) 4, 5 and 6 (4) 10, 11 and 12

18. Which is not a feature of annelids?
(1) Metameric segmentation (2) Nephridia
(3) Pseudocoelom (4) Clitellum

19. Chloragogen cells resemble the following in function
(1) collared cells (2) flame cells (3) plasma cells (4) mesophyll cells

20. Spermathecae in earthworm is
(1) for producing sperm
(2) for storages of sperm obtained from male earthworm during copulation and used in future
(3) both (1) and (2)
(4) none of these

21. Leech secretes which of the following anticoagulant?
(1) Hirudin (2) Heparin (3) Serotonin (4) Histamine

ARTHROPODA

1. Which is not a member of class insecta?
(1) Louse (2) Cockroach (3) Spider (4) Musca

2. The first animals to fly were
(1) Birds (2) Insects (3) Mammals (4) Lizards

3. Which is a connecting link?
(1) *Pila* (2) *Limulus* (3) *Periplaneta* (4) *Peripatus*

4. Which one of the following is nonpoisonous?
(1) Crab (2) Centipede (3) Spider (4) Scorpion

5. Which one is a tracheate group?
(1) Spider – *Peripatus* – Mosquito (2) Crab – *Centipede* – Cockroach
(3) Silkworm – Bedbug – Sandfly (4) Housefly – Kingcrab – Scorpion

6. Puncturing elements in mouthparts of female Anopheles are
(1) Labrum and labium (2) Mandibles and labium
(3) Maxillae and mandibles (4) Hypopharynx and labium

7. Male mosquito cannot pierce our skin because it has no
(1) Maxillae (2) Antennae (3) Proboscis (4) Mandibles

8. Which mouthpart occurs in female Anopheles, but not in males?
(1) Proboscis (2) Mandibles (3) Maxillae (4) Antennae

9. Male mosquitoes feed on
(1) Flower nectar (2) Blood (3) Water (4) All of these

10. Eggs of Anopheles are found
(1) singly with air floats (2) singly without air floats
(3) in rafts with air floats (4) in rafts without air floats

11. Which one is the best silk?
(1) Erisilk (2) Mulberry silk (3) Tusser silk (4) None of the above

12. Chemical nature of silk is
(1) Protein (2) Lipid (3) Carbohydrate (4) Chitin

13. *Bombyx mori* feeds on the leaves of
(1) Neem (2) Betel (3) Cotton (4) Mulberry

14. Lac is -
(1) epidermal secretion of entire body of insects (2) excretory product
(3) plant product (4) a dead insect

15. Lac is produced as -
(1) secretions from body (2) excretion from body
(3) excess of food oozing out of body (4) faeces of lac insect

16. Which of the following are the true secretions of silkworm and honeybee?
(1) Lac only (2) Silk only (3) Honey and silk (4) Silk and wax

17. Drones are produced by honeybee by
(1) Fertilization of egg with sperm of male (2) Parthenogenesis
(3) Fragmentation and binary fission (4) None of these

18. Beetle larvae are called
(1) naids (2) grubs (3) nymphs (4) maggots

19. Mouthparts of a butterfly are of the type -
(1) Sponging (2) Siphoning (3) Piercing and sucking (4) Chewing and sucking

20. What is common among silverfish, scorpion, crab and honeybee?
(1) Compound eyes (2) Poison glands (3) Metamorphosis (4) Jointed legs

21. Which one of the following occur in wild conditions?
(1) Silkworm (2) Lac insect (3) *Periplaneta* (4) Blatta

22. Which of the following pairs is correct?
(1) Sandfly – Amoebic dysentery
(2) Culex – Filariasis
(3) Housefly – Yellow fever
(4) Bedbug – Kala-azar

MOLLUSCA

1. Name the branch of science dealing with mollusca
(1) Conchology (2) Malacology (3) Entomology (4) Parasitology

2. Study of molluscan shells is
(1) Mastology (2) Malacology (3) Conchology (4) Entomology

3. The shell found in most of the molluscs is secreted by
(1) Foot (2) Head (3) Mantle (4) All of the above

4. Special mode of feeding by radula is found in
(1) Sea mouse (2) Earthworm (3) Molluscs (4) Sea snake

5. The metallic ion contained in the blood of mollusca is
(1) Iron (2) Copper (3) Magnesium (4) Zinc

6. Haemocyanin, the blue colouring pigment of molluscan blood contains
(1) Iron (2) Magnesium (3) Copper (4) Manganese

7. Closed circulatory system does not occur in
(1) Cockroach (2) Cuttlefish (3) Snail (4) All of the above

8. Molluscan blood contains
(1) Haemoglobin (2) Haemocyanin (3) Haemozoin (4) All of the above

9. Trochophore larva occurs in
(1) Annelida and Porifera (2) Annelida and Mollusca
(3) Mollusca and Coelenterata (4) Coelenterata and Annelida

10. Pearl is obtained from
(1) *Oyster* (2) *Sepia* (3) Devil fish (4) Star fish

11. An unsegmented animal is
(1) Glow-worm (2) Tapeworm (3) Earthworm (4) Shipworm

12. A wood boring mollusc is
(1) *Teredo* (2) *Chiton* (3) Limax (4) Patella

13. Foot is displaced to the neighbourhood of the mouth and divided into arms in
(1) *Sepia* (2) *Chiton* (3) *Pila* (4) *Neopilina*

14. Squid, cuttlefish and Octopus belong to the class
(1) Decapoda (2) Scaphopoda (3) Cephalopoda (4) Apoda

15. Most molluscs are -
(1) Marine (2) Freshwater (3) Terrestrial (4) None

16. Which one belongs to the class of sea hare?
(1) Sea cow (2) Sea squirt (3) Snail (4) *Sepia*

17. In snail, the mantle cavity is pushed forward and outward due to
(1) Torsion (2) Fast swimming (3) Symmetry (4) None

18. Match list I with list II and select the correct answer from answer code given below

List I	**List II**
A *Aurelia*	1 Parenchymula
B Sponge	2 Ephyra
C Mollusca	3 Trochophore
D Polychaeta	4 Veliger

(1) A = 1, B = 2, C = 3, D = 4 (2) A = 2, B = 3, C = 4, D = 1
(3) A = 3, B = 4, C = 1, D = 2 (4) A = 2, B = 1, C = 4, D = 3

19. A cephalopod without shell is
(1) *Pila* (2) Octopus (3) *Sepia* (4) Unio

ECHINODERMATA

1. Which one of the following groups of the animals lives only inmarine habitat?
(1) Porifera (2) Cnidaria (3) Echinodermata (4)Mollusca

2. Which of the following have a radially symmertical body?
(1) Star fish (2) Frog (3) Pigeon (4) Apple snails

3. Water vascular system is found in
(1) Sponges (2) Cnidarians (3) Echinoderms (4) Arthropods

4. Which ofthe following are radially symmetrical animals?
(1) Coelenterata (2) Echinodermata (3) Both (4)Mollusca

5. Which of the following animal groups has radially symmetrical adult but bilaterally symmetrical larva?
(1) Echinodermata (2)Mollusca (3) Cnidaria (4)Annelida

6. A diagnostic characteristic of Echinodermata
(1) Symmetry bilateral in larva and radial in adult (2) Respiration by tracheae
(3) Jointed legs (4) Exoskeleton of chitinous cuticle

7. Echinoderms show following characteristics
(1) Spiny skin, radial symmetry (2) Smooth skin, radial symmetry
(3) Spiny skin, bilateral symmetry (4) Spiny skin, asymmetry

8. Radial symmetry is usually exhibited in animals which
(1) have one opening of alimentary canal (2) live in water
(3) have ciliary mode of feeding (4) are attached to the substratum

9. An animal having unsegmented coelom, superficial radial symmetry in adult but bilateral symmetry in larva is member of
(1) Echinodermata (2)Mollusca (3)Annelida (4) Arthropoda

10. Echinodermata is a group of animals which are
(1) Coelomate, spiny and marine (2) Acoelomate, spiny and marine
(3) Coelomate, horny and marine (4) Jointed legged, coelomate and marine

11. One feature exclusive to Echinodermata is
(1) water vascular system (2) eye spots (3) neurosensory cells (4) radial symmetry

12. Echinoderms are -
(1) Freshwater forms (2) Exclusively marine
(3) Both freshwater and marine (4) None of the above

13. In echinodermata, tube feet are related with
(1)Ambulacral system (2) Excretory system (3) Reproductive system (4) Respiratory system

14. The main function of ambulacral system in echinodermis
(1) Defence (2) Circulation (3) Food collection (4) Locomotion'

15. Echinodermata includes exclusively
(1)Marine animals (2) Terrestrial animals (3) Aerial animals (4)Arboreal animals

16. Organs of locomotion in Echinodermata are
(1) Pseudopodia (2) Parapodia (3) Foot (4) Tube feet

17. Tube feet are locomotory organs found in
(1) Annelida (2) Mollusca (3) Arthropoda (4) Echinodermata

18. Tube feet are characteristic structures of
(1) Star fish (2) Cuttle fish (3) Cray fish (4) Jelly fish

19. Which is not amember of Echinodermata?
(1) Ophiothrix (2) Sea lily (3)Ascaris (4) Starfish

20. "Aristotle's lantern" occurs in
(1) Sea urchin (2) *Asterias* (3) Sea anemone (4) *Ophiothrix*

21. Aristotle's lantern is used for
(1) Chewing (2) Locomotion (3) Excretion (4) Chemoreception

22. Water vascular system is characteristic of
(1) Pisces (2) Porifera (3)Amphibia (4) Starfish

23. Which one is the common ancestral larval form of echinoderms, hemichordates and chordates?
(1) Dipleurula (2) Bipinnaria (3) Tomaria (4) Trochophore

24. Which is unrelated?
(1) Sea star (2) Sea cucumber (3) Sea squid (4) Sea urchin

25. Radial symmetry is found in
(1)Anopheles (2) Snail (3) Cockroach (4) *Asterias*

26. Echinoderms are heartless, brainless, headless, yet from evolutionary point of view, they have been placed on the top of the invertebrate phyla because of
(1) power of reproduction (2) power of regeneration
(3) presence of enterocoel (4) exclusively marine habitat

27. Pentamerous symmetry is found in
(1) sea pen (2) sea horse (3) sea urchin (4) sea mouse

28. Box like calcareous test is found in
(1) sea lily (2) sea star (3) sand dollar (4) sea cucumber

29. The nature of exoskeleton in Echinodermata is
(1) silicious (2) tunicin (3) calcareous (4) chitinous

30. An animal having unsegmented coelomated and radially symmetrical body with distinct oral and aboral surfaces is a member of
(1) Porifera (2)Mollusca (3) Echinodermata (4) Arthropoda

31. In which of the following water vascular system is present?
(1) Porifera only (2) Echinodermata only
(3) Both Porifera and Echinodermata (4) None of them

32. Which of the following animal phyla belongs to Deuterostomia?
(1)Annelida (2) Parazoa (3) Mollusca (4) Echinodermata

33. In which class of echinoderm, bipinnaria larva is found?
(1) Crinoidea (2) Pentameria (3) Asteroidea (4) Holothuroidea

34. Which phylum has none of freshwater form?
(1) Chordata (2) Porifera (3) Echinodermata (4) Mollusca

35. Echinoderms are considered to be the most evolved invertebrates because they
(1) are schizocoelic
(2) are enterocoelic
(3) have a great power of regeneration
(4) show resemblance with chordates in their embryonic development

36. Star fish belongs to the phylum
(1) Porifera (2) Arthropoda (3) Coelenterata (4) Echinodermata

37. Select the correct statements
(1) All annelids have setae (2) All molluscs have external or internal shell
(3) All echinoderms have water vascular system (4) All arthropods have at least one pair of antenna

Exercise # 2

OBJECTIVE QUESTIONS

1. Which of the following is not in the phylum Mollusca (molluscs) ?
(1) Clam (2) *Oyster* (3) Shrimp (4) Snail

2. Which group of organisms has the largest number of described species ?
(1) Arthropond (2) Vertebrates (3) Bacteria (4) Fungi

3. Animals of the same phylum are grouped. Mark the incorrect group
(1) Spider, insects, shrimp (2) Fish, mammal, reptile
(3) Snail, squid, slug (4) Earthworm, millipede, leech

4. Larva of Anopheles is a
(1) Surface feeder with long, conical respiratory siphon
(2) Surface feeder with undeveloped respiratory siphon
(3) Bottom feeder with undeveloped respiratory siphon
(4) Bottom feeder with long, conical respiratory siphon

5. Which of the followign is not an insect ?
(1) Ant (2) Mosquito (3) Spider (4) Locusts

6. Adult tapeworms feed by
(1) Wafting food particles into their mouths along ciliated tracts
(2) Secreting enzymes and absorbing the food they digest
(3) Absorbing food from their surroundings
(4) Taking in food through muscular proboscis

Exercise # 3

AIIMS CORNER

1. Which one of the following animals is correctly matched with its one characteristic and the taxon?

(AIIMS 2008)

	Animals	Characteristic	Taxon
(1)	Millipede	Ventral nerve cord	Arachnida
(2)	Duck billed Platypus	Oviparous	Mammalia
(3)	Silver fish	Pectoral and pelvic fins	Chordate
(4)	Sea Anemone	Triploblastic	Cnidaria

ASSERTION / REASONING

In each of the following questions a statement of Assertion (1) is given followed by a corresponding statement of Reason (R) just below it. Of the statements, mark the correct answer as
(1) If both assertion and resaon are true and reason is the correct explanation of assertion
(2) If both assertion and reason are true but reason is not the correct explanation of assertion
(3) If assertion is true but reason is false
(4) If both assertion and reason are false.

2. **Assertion** : Sponges have tissue level of organization
Reason : Sponges are multicellular
(1) (2) (3) (4)

3. **Assertion** : *Plasmodium vivax* is responsible for malaria.
Reason : Malaria is caused by polluted water
(1) (2) (3) (4)

4. **Assertion** : Blood is colourless in the insects.
Reason : Insect blood has no role in O_2 transport.
(1) (2) (3) (4)

5. **Assertion** : Metamerism is the characteristic of annelida.
Reason : Metamerism is one type of body segmentation.
(1) (2) (3) (4)

6. **Assertion** : Spermathecae are the main part of reproductive system of annelida.
Reason : Spemathecae help in sperm transfer.
(1) (2) (3) (4)

7. **Assertion :** There is no chance of transmission of malaria to man on the bite of a female Anopheles mosquito
Reason : It carries a non-virulent strain of *Plasmodium*.
(1) (2) (3) (4)

8. **Assertion :** Tapeworm, roundworm and pinworm are endoparasites of human intestine.
Reason : Improperly cooked food is the source of intestinal infections.
(1) (2) (3) (4)

Exercise # 4

Level -1 QUESTIONS OF PREVIOUS YEAR OF AIPMT

1. Metameric segmentation is the characteristic of **(AIPMT 2006)**
(1) mollusca and chordata (2) platyhelminthes and arthropoda
(3) echinodermata and annelida (4) annelida and arthropoda

2. Which one of the following is not a living fossil ? **(AIPMT 2006)**
(1) *Peripatus* (2) King crab (3) *Sphenodon* (4) *Archaeopteryx*

3. In which one of the following sets of animals to all the four give birth to young ones ?
(1) kangaroo, hedgehog, dolphin, Loris (2) lion, bat, whale, ostrich
(3) Platypus, penguin, bat, hippopotamus (4) shrew, bat, cat, kiwi **(AIPMT 2006)**

4. Two common characters found in centipede, cockroach, and crab are **(AIPMT 2006)**
(1) book lungs and antennae (2) compound eyes and anal cerci
(3) jointed legs and chitinous exoskeleton (4) green glands and tracheae

5. Biradial symmetry and lack of cnidoblasts are the characteristics of **(AIPMT 2006)**
(1) *Hydra* and starfish (2) Starfish and sea anemone
(3) Ctenoplana and Beroe (4) *Aurelia* and *Paramoecium*

6. Which of the following animal can successfully reproduce without utilizing the process of mitosis?
(1) *Amoeba* (2) *Hydra* (3) Tapeworm (4) *Sycon*

7. What is true about *Nereis*, scorpion, cockroach and silver fish ? **(AIPMT 2007)**
(1) they all possess dorsal heart (2) none of them is aquatic
(3) they all belong to the same phylum (4) they all have jointed paired appendages

8. Earthworms have no skeleton but during burrowing, the anterior end becomes turgid and acts as a *hydra*u-lic skeleton. It is due to **(AIPMT 2008)**
(1) gut peristalsis (2) setae (3) coelomic fluid (4) blood

9. Which one of the following is true description about an animal concerned ?
(AIPMT 2008)
(1) rat -left kidney is slightly higher in position than the right one.
(2) Cockroach - 10 pairs of spiracles (2 pairs onthroax and 8 pairs on abdomen)
(3) earthworm - the alimentary canal consists of a sequence of pharynx, oesophagus, stomach, gizzard and intestine.
(4) frog - body divisible into three regions - head, neck and trunk.

10. Which one of the following is not a characteristic of phylum Annelida
(1) Pseudocoelom (2) Ventral nerve cord
(3) Closed circulatory system (4) Segmentation

11. Which one of the following phyla is correctly matched with its two general characteristics ? **(AIPMT 2008)**
(1) echinodermata - pentamerous radial symmetry and mostly internal fertilization
(2) mollusca - normally oviparous and develop-ment through a trochophore or velliger larva.
(3) arthropoda - body divided into head, thorax and abdomen and respiration by tracheae.
(4) chordata - notochord at some stage and separate anal and urinary openings to the outside.

12. Which one of the following pairs of items correctly belong to the category of organs mentioned against it ? **(AIPMT 2008)**

(1) nephridia of earthworm and malpighian tubules of cockroach - excretory organs.
(2) wings of honey bee and wings of crow - homologous organs
(3) thorns of *Bougainvilea* and tendrils of *Cucurbita* - analogous organs
(4) nictitating membrane and blind spot in human eye - vestigial organs.

13. Which one of the following groups of three animals each is correctly matched with their one characteristic morphological feature ? **(AIPMT 2008)**

(1) scorpion, spider, cockroach, ventral solid CNS
(2) cockroach, locust, *Taenia*, metameric segmentation
(3) liver fluke, sea anemone, sea cucumber, bilateral symmetry
(4) *Centipede*, prawn, sea urchin, jointed appendages

14. *Ascaris* is characterized by **(AIPMT 2008)**

(1) presence of true coelom but absence of metamerism.
(2) presence of true coelom and metamerism (metamerisation)
(3) absence of true coelom but presence of metamerism
(4) presence of neither true coelom nor metamerism

15. Which one of the following groups of animals is bilaterally symmetrical and triploblastic? **(AIPMT 2009)**

(1) sponges (2) coelenterates (cnidarians)
(3) aschelminthes (round worms) (4) ctenophores

16. One example of animals having a single opening to the outside that serves both as mouth as well as anus is **(AIPMT 2009)**

(1) *Asterias* (2) *Ascidia* (3) *Fasciola* (4) *Octopus*

17. Which one of the following kinds of animals are triploblastic? **(AIPMT 2009)**

(1) Sponges (2) Ctenophores (3) Corals (4) Flat worms

18. Which one of the following statements about certain given animals is correct? **(AIPMT 2009)**

(1) Molluscs are acoelomates
(2) Insects are pseudocoelomoates
(3) Flat worms (Platyhelminthes) are coelomates
(4) Round worms (Aschelminthes) are pseudocoelomates.

19. Which one of the following statements about the four of *Spongilla*, Leech. Dolphin and penguine is correct? **(AIPMT 2009)**

(1) Leech is a fresh water form while all other are marine
(2) *Spongilla* has special collar cells called choanocytes, not found in the remaining three.
(3) All are bilaterally symmetrical
(4) Penguin is homoiothermic while the remaining three are poikilothermic.

20. Signet ring stage is found in **(AIPMT-Mains 2010)**

(1) *Plasmodium* (2) *Pelomyxa* (3) *Paramoecium* (4) *Euglena*

21. Choanocyte is found in **(AIPMT-Mains 2010)**

(1) Protozoa (2) Porifera (3) Coelenterates (4) Ctenophora

22. Which of the following is not present in the body wall of *Hydra*? **(AIPMT-Mains 2010)**

(1) Sensory cell (2) Glial cell (3) Cnidoblasts (4) Nerve cell

23. Which of the following statements is incorrect? **(AIPMT-Mains 2010)**

(1) Cnidocil is for defence in *Hydra* (2) Nerves are absent in *Hydra*
(3) *Hydra* is coelenterate (4) *Hydra* shows budding

24. Excretory pore of *Ascaris* is present **(AIPMT-Mains 2010)**

(1) Behind the mouth (2) On the posterior end (3) On the dorsal side (4) In the middle of body

25. Which of the following match is correct? **(AIPMT-Mains 2010)**

(1) Cockroach – Crustacea (2) *Pila* – pelecypoda
(3) Spider – arachnida (4) *Unio* – gastropoda

26. The head of Cockroach lacks. **(AIPMT (Mains) 2010)**
(1) Cardo (2) Gena (3) Frons (4) Trochanter

27. Which of the following is incorrect for *Pheretima*? **(AIPMT (Mains) 2010)**
(1) Genital papillae are present on 17th and 19th segment
(2) Male genital pores are present on 18th segment
(3) Clitellum is present on segments 24, 25, 26
(4) Segments of earthworm are called somiters

28. Which of the following statements is correct regarding Cockroach? **(AIPMT (Mains) 2010)**
(1) Compound eye is also called as ocellus
(2) Spiracle helps in excretion
(3) Phallomere is present in female Cockroach
(4) Ventral nerve cord

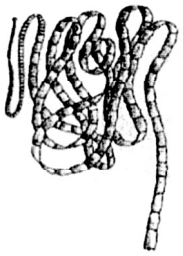
29. In which one of the following organisms its excretory organs are correctly stated? **(AIPMT 2010)**
(1) Cockroach – Malpighian tubules and enteric caeca
(2) Earthworm – Pharyngeal integumentary and septal nephridia
(3) Frog – Kidneys, skin and buccal epithelium
(4) Humans – Kindneys, sebaceous glands and tear glands.

30. Which one of the following option gives the correct matching of a disease with its causative organism and mode mode of infection. **(AIPMT 2011)**

	Disease	Gausative Organisms	Mode of Infection
1	Typhoid	*Salmonella typhi*	With inspired air
2	Pneumonia	*Sreptococcus pneumoniae*	Droplet infection
3	Elephantiasis	*Wuchereria bancrofti*	infected water and food
4	Malaria	*Plasmodium vivax*	Bite of male anopheles mosquito

(1) 1 (2) 2 (3) 3 (4) 4

31. The figure shows four animals (1), (2), (3) and (4). Select the correct answer with respect to a common characteristics of two of these animals. **(AIPMT 2011)**

(A)  (B)  (C)  (D) 

(1) (A) and (D) respire mainly through body wall (2) (B) and (C) show radial symmetry
(3) (A) and (B) have cnidoblasts for self-defense (4) (C) and (D) have a true coelom

32. One very special feature in the earthworm *(Pheretima)* is that **(AIPMT 2011)**
(1) Fertilisation for eggs occurs inside the body
(2) The typhlosole greatly increases the effective absorption area of the digested food in the intestine
(3) The S- shaped setae embedded in the integument are the defensive weapons used against the enemies
(4) It has a long dorsal tubular heart

33. Where will you look for the sporozoites of the malarial parasite? **(AIPMT 2011)**
(1) Saliva of infected female *Anopheles* mosquito
(2) red blood corpuscles of humans suffering from malaria
(3) Spleen of infectd humans
(4) Salivary glands of freshly moulted female *Anopheles* mosquito

34. Which one of the following organisms is not an example of eukaryotic cells? **(AIPMT 2011)**
(1) *Paramoecium caudatum* (2) *Escherichia coli*
(3) *Euglena* viridis (4) *Amoeba proteus*

35. Which of the following is correctly stated as it happens in the common cockroach ? **(AIPMT 2011)**
(1) Malpighian tubules are excretory organs projecting out from the colon.
(2) Oxygen is transported by haemoglobin in blood
(3) Nitrogenous excretory product is urea.
(4) The food is ground by mandibles and gizzard

36. Which group of animals belong to the same phylum? **(NEET 2013)**
(1) Earthworm, Pinworm, Tapeworm (2) Prawn, Scorpion, Locusta
(3) Sponge, Sea anemone, Starfish (4) Malarial parasite, *Amoeba*, Mosquito

37. Which of the following are correctly matched with respect to their taxonomic classification? **(NEET 2013)**
(1) Centipede, millipede, spider, scorpion-Insecta
(2) House fly, butterfly, tsetsefly, silverfish-Insecta
(3) Spiny anteater, sea urchin, sea cucuber- Echinodermata
(4) Flying fish, cuttlefish, silverfish - Pisces

Level -2 QUESTIONS OF PREVIOUS YEAR OF COMPETITIVE EXAMS

38. The contractile vacuole in protozoans are **(Jharkhand CECE 2003)**
(1) analogues to liver of man (2) homologues to liver of man
(3) homologues to kidney of man (4) analogues to kidney of man

39. The chief advantage of encystment of an *Amoeba* is : **(CBSE 2003)**
(1) protection from parasites and predators
(2) the chance to get rid of accumulated waste products
(3) the ability to survive during adverse physical conditions
(4) the ability to live for some time without ingesting food

40. *Amoeba* is **(CPMT 2003)**
(1) unicellular plant (2) unicellular animal (3) multicellular plant (4) multicellular animal

41. Which one of the following is not involved in the nutrition of *Amoeba*? **(Orissa JEE 2003)**
(1) exocytosis (2) phagocytosis (3) saprotrophy (4) intracellular digestion

42. Which of the following statement is not true for *Entamoeba*? **(Orissa JEE 2003)**
(1) Presence of contractile vacuole (2) Presence of pseudopodium
(3) Presence of food vacuole (4) Presence of nucleus

43. The cyst wall of *Euglena* is made up of : **(EAMCET 2002)**
(1) lipids (2) histones (3) carbohydrates (4) lipoproteins

44. *Triatoma* infest and is the intermediate host in the life-cycle of **(EAMCET 2003)**
(1) *Trypanosoma* cruzi (2) *Leishmania tropica*
(3) *Leishmania donovani* (4) *Schistosoma haematobium*

45. Which of the following transmits Visceral Leishmaniasis? **(Jharkhand CECE 2003)**
(1) Culex (2) Cimex (3) *Glossina* (4) Phlebotomus

46. Man in the life cycle of *Plasmodium* is **(AFMC 2005)**
(1) primary host (2) secondary host (3) intermediate host (4) none of these

47. Female Anopheles is **(AMU 2002)**
(1) endogenous host for *Plasmodium* (2) exogenous host for *Plasmodium*
(3) initial host (4) none of these

48. *Plasmodium falciparum* causes which type of malaria? **(EAMCET 2002)**
(1) Tertian (2) Quartan (3) Pernicious (4) Benign tenian

49. Shuffner's dots produced by *Plasmodium* are **(EAMCET 2002)**
(1) Antigens (2) Antibodies (3) Hormones (4) Reserve food

50. According to locomotory organ which is wrong? **(Orissa JEE 2002)**
(1) *Hydra* — tentacles (2) *Paramoecium* — cilia
(3) *Nereis* — parapodia (4) *Plasmodium* — flagella

51. During malarial infection the first cells infected are **(CPMT 2003)**
(1) erythrocytes (2) hepatocytes (3) leucocytes (4) thrombocytes

52. Ronald Ross who worked on malaria in - **(CPMT 2003)**
(1) Chennai (2) London (3) Lucknow (4) Hyderabad

53. Malarial parasites with 48 hours cycle are : **(Orissa JEE 2003)**
(1) *Plasmodium* malariae, *P. ovale* and *P. vivax*
(2) *Plasmodium* falciparum, *P. ovale* and *P. vivax*
(3) *Plasmodium* malariae, *P. falciparum* and *P. ovale*
(4) *Plasmodium* malariae, *P. falciparum* and *P. vivax*

54. When a freshwater protozoan possessing a contractile vacuole, is placed in a glass containing marine water, the vacuole will **(CBSE 2004)**
(1) increase in size (2) disappear (3) decrease in size (4) increase in number

55. Contractile vacuole is absent in : **(AFMC 2004)**
(1) Sporozoa (2) Sarcodina (3) Zooflagellate (4) Slime molds

56. *Plasmodium* is **(Manipal 2004)**
(1) intercellular (2) internuclear (3) endoparasite (4) ectoparasite

57. All protozoans have **(Orissa JEE 2004)**
(1) pseudopodia (2) contractile vacuole (3) holozoic nutrition (4) eukaryotic organization

58. ---------- is not true for *Euglena* **(Orissa JEE 2004)**
(1) Presence of cellulosic cell wall (2) Presence of proteinaceous pellicle
(3) Presence of protoplasmic capsule (4) Both (1) and (2)

59. Common feature of *Euglena*, *Amoeba*, *Trypanosoma* and *Entamoeba* is : **(Orissa JEE 2004)**
(1) binary fission (2) multiple fission (3) holozoic nutrition (4) contractile vacuole

60. Which is false for nutrition in *Amoeba*? **(Orissa JEE 2004)**
(1) Omnivorous (2) Holozoic nutrition (3) Photoautotroph (4) Pseudopodia feeder

61. Which is not related with the sexual reproduction in protozoans? **(Orissa JEE 2004)**
(1) Cytogamy (2) Autogamy (3) Conjugation (4) Schizogony

62. Which of the following is not the locomotory organ of protozoa? **(AFMC 2005)**
(1) cilia (2) flagella (3) parapodia (4) pseudopodia

63. Which one of the following statements is correct? **(PCS 2005)**
(1) Tsetse fly spreads Kala-azar
(2) Sand fly spreads sleeping sickness
(3) *Trichonympha* a symbiotic protozoan is found in the gut of termite
(4) *Pediculus humanus* corporis is an endoparasite

64. Sporogony of malarial parasite occur in **(DPMT 2004)**
(1) Liver of man (2) Stomach wall of mosquito
(3) RBCs of man (4) Salivary gland of mosquito

65. In *Plasmodium* ookinete is formed by **(RPMT 2004)**
(1) trophozoite (2) zygote (3) sporozoite (4) merozoite

66. In which of the following places, is the ookinite stage of malarial parasite found? **(PCS 2004)**
(1) Liver of man (2) Erythrocytes of man
(3) Salivary glands of mosquito (4) Stomach of mosquito

67. Slipper animalcule is **(Manipal 2005)**
(1) *Paramoecium* (2) *Trypanosoma* (3) *Entamoeba* (4) Protozoa

68. Which of the following unicellular organism has a macronucleus for trophic function and one or more micronuclei for reproduction? **(CBSE 2005)**
(1) *Euglena* (2) *Amoeba* (3) *Paramoecium* (4) *Trypanosoma*

69. During conjugation in *Paramoecium* **(Pb. PMT 2004)**
(1) out of the four micronuclei formed three degenerate
(2) out of six macronuclei formed four degenerate
(3) zygote nucleus undergoes eigh12t successive division in each conjugant
(4) out of 16 nuclei only 4 degenerate

70. Osmoregulation in *Paramoecium* is a function of : **(Karnataka CET 2005)**
(1) cytopyge (2) cytostome (3) trichocyst (4) contractile vacuole

71. The type of canal system found in *Leucosolenia* is **(BHU PMT 2007)**
(1) ascon type (2) sycon type (3) leucon type (4) aphodal type

72. Which one of the following species of silkworm are found in India? **(BHU PMT 2007)**
(1) *Bombyx mori* (2) Antheraea paphia (3) *Antheraea roylei* (4) *Attacus atlasensis*

73. Caterpillars and maggot are **(BHU PMT 2007)**
(1) larvae (2) nymphs (3) adults (4) pupa

74. In which segment in earthworm is the clitellum present? **(BHU PMT 2007)**
(1) 16th segment (2) 17th to 19th segment (3) 14th to 16th segment (4) 5th to 6th segment

75. Osphradium of *Pila globosa* is **(BHU PMT 2007)**
(1) photoreceptor (2) thermoreceptor (3) chemoreceptor (4) tangoreceptor

76. Syncytial epidermis is found in **(BHU PMT 2007)**
(1) *Hydra* (2) *Ascaris* (3) earthworm (4) star fish

77. The colour of the body in earthworm is brown due to presence of **(BHU PMT 2007)**
(1) porphyrin (2) haemoglobin (3) blood (4) haemocyanin

78. *Hydra* punctures the victim by injecting the chemical **(BHU PMT 2007)**
(1) sarafotoxin (2) toxoplasmin (3) hypnotoxin (4) kaliotoxin

79. Cestodes are distinguished from other flatworm by the absence of **(BHU PMT 2007)**
(1) nervous system (2) digestive system (3) excretory system (4) reproductive system

80. In *Hydra*, nematocysts are found only in **(BHU PMT 2007)**
(1) epidermis (2) gastrodermis (3) mesodermis (4) endodermis

81. In which of the following organisms, self-fertilization is seen ? **(KCET 2007)**
(1) fish (2) roundworm (3) earthworm (4) liverfluke

82. Find the odd example **(KCET 2007)**
(1) sea fly (2) sea fan (3) sea cucumber (4) sea urchin

83. In mollusca eye is present over a stalk called **(UPCPMT 2007)**
(1) osphradium (2) ostracum (3) ommatophore (4) operculum

84. Which of the following is not a character of *Taenia solium* ? **(UPCPMT 2007)**
(1) apolysis (2) proglottid (3) metamerism (4) strobila

85. *Daphnia* is commonly known as - **(UPCPMT 2007)**
(1) clam shrimp (2) fairy shrimp (3) water fleas (4) tadpole shrimp

86. Which of the following characters are present in class crustacea ? **(UPCPMT 2007)**
(1) cephalothorax, gills and appendages (2) head and thorax, gills and appendages
(3) cephalothorax, book gills and appendages (4) head and thorax, book gills and appendages

87. Which of the following are correct for axolotl larva? **(UPCPMT 2007)**
(i) it shows neoteny and paedogenesis
(ii) absence of thyroxine affect metamorphosis
(iii) it is the larva of hemichordata
(1) (I), (ii) and (iii) (2) (i) and (ii) (3) (ii) and (iii) (4) (iii)

88. Absence of circulatory system in *Hydra* is compensated by **(UPCPMT 2007)**
(1) pseudocoelomic fluid (2) gastrovascular cavity
(3) presence of tentacles (4) none of these

89. Body of earthworm is divided into how many similar segments which are called metameres or somites ?
(1) 60 to 120 (2) 100 to 120 (3) 80 to 120 (4) 120 or more **(UPCPMT 2007)**

90. *Wuchereri*a is found in **(UPCPMT 2007)**
(1) lymph nodes (2) lungs (3) eye (4) gonads

91. *Ascaris* is characterised by **(CBSE 2008)**
(1) Presence of true coelom but absence of metamerism
(2) Presence of neither true coelom nor metamerism
(3) Presence of true coelom and metamerism
(4) Absence of true coelom but presence of metamerism.

92. Earthworms have no skeleton but during burrowing, the anterior end becomes turgid and acts as a hydraulic skeleton. It is due to **(CBSE 2008)**
(1) Gut peristalsis (2) Setae (3) Coelomic fluid (4) Blood

93. Which one of following is not characteristic of phylum annelida? **(CBSE 2008)**
(1) Pseudocoelom (2) Ventral nerve cord
(3) Closed circulatory system (4) Segmentation

94. Which one of the following group of three animals each is correctly matched with their characteristic morphological feature? **(CBSE 2008)**

	Animals	Morphological features
(1)	Scorpion, Spider, Cockroach	Ventral solid central nervous system
(2)	Cockroach, locust, *Taenia*	Metameric segmentation
(3)	Liver fluke, Sea Anaemone, Sea Cucumber	Bilateral symmetry
(4)	Centipede, Prawn, Sea Urchin	Jointed appendages

95. Which one of following phyla is correctly matched with two general characteristics? **(CBSE 2008)**
(1) Echinodermata – Pentamerous radial symmetry and mostly internal fertilisation
(2) Mollusca – Normally oviparous and development through trochophore or veliger larva
(3) Arthropoda – Body divided into head, thorax and abdomen and respiration by tracheae
(4) Chordata – Notochord at some stage and separate anal and urinary opening to the outside.

96. Thigmotaxis is not shown by **(CPMT 2008)**
(1) *Paramoecium* (2) *Hydra* (3) *Amoeba* (4) *Ascaris*

97. Polyp phase is absent in **(CPMT 2008)**
(1) *Hydra* (2) *Aurelia* (3) Obelia (4) Physalia

98. The characteristic larva of phyllum ..... coelenterata is **(CPMT 2008)**
(1) Planula (2) Rhabdiform (3) Wriggler (4) Cysticercus

99. "Turbellarians" are free living **(CPMT 2008)**
(1) Nematodes (2) Cestodes (3) Trematodes (4) Flat worms

100. The intermediate host of Schistosoma is **(CPMT 2008)**
(1) Mosquito (2) Snail (3) Housefly (4) Sheep

101. In *Ascaris* the coelom is **(CPMT 2008)**
(1) Pseudocoelom (2) Schizocoelom (3) True coelom (4) Haemocoelom

102. Among the following colonial insects are **(CPMT 2008)**
(1) Locusts (2) White ants (3) Bed bug (4) Mosquitoes

103. In mollusca, eye is present over a stalk, called **(CPMT 2008)**
(1) Operculum (2) Osphradium (3) Ostracum (4) Ommatophore

104. In *Pheretima* septa are absent between which segments? **(CPMT 2008)**
(1) 3/4 and 9/10 (2) 5/6 and 7/8 (3) 4/5 and 8/9 (4) 7/8 and 6/7

105. In which of the following animals, respiration occurs without any respiratory organ? **(CPMT 2008)**
(1) Earthworm (2) Fish (3) Cockroach (4) Frog

106. In Cockroach, larval and nymphal characters are maintained by **(CPMT 2008)**
(1) Parotid gland (2) Salivary gland (3) Ecdysone (4) Juvenile hormone

107. The female genital pore of *Pheretima posthuma* is located upon the segment **(CPMT 2008)**
(1) 14th (2) 16th (3) 18th (4) 15th

108. Passive food ingestion in *Amoeba* is known as **(BHU 2008)**
(1) Import (2) Invagination (3) Circumvallation (4) Circumfluence

109. Medusa is the reproductive stage of the organism - **(BHU 2008)**
(1) *Hydra* (2) *Aurelia* (3) Sea Anemone (4) Obelia

110. Cavity of coelenterate is called **(BHU 2008)**
(1) Coelom (2) Coelenteron (3) Cavity (4) None of these

111. In the life cycle of mosquito, comma shaped stage is **(BHU 2008)**
(1) Larval stage (2) Imago stage (3) Pupal stage (4) None of these

112. *Entamoeba histolytica* differs form *Amoeba* in absence of **(BHU Mains 2008)**
(1) Nucleus (2) Pseudopodia (3) Contractile vacuole (4) Ectoplasm

113. Polyp phase is absent in **(BHU Mains 2008)**
(1) *Hydra* (2) *Aurelia* (3) Obelia (4) Physalia

114. In which of these following phyla, while the adult shows radial symmetry, the larva shows bilateral symmetry? **(Kerala PMT 2008)**
(1) annelids (2) arthropods (3) molluscs (4) echinoderms
(5) porifera

115. Match List - I with List - II and select the correct option. **(Kerala PMT 2008)**

List - I	**List - II**
A. Protozoa	1. Pennatula
B. Aschelminthes	2. Beroe
C. Porifera	3. *Monocystis*
D. Ctenophora	4. Wuchereria
E. Cnidaria	5. *Cliona*

(1) A - 3, B - 5, C - 4, D - I, E - 2 (2) A - 4, B-3, C - 5, D - 2, E - 1
(3) A - 3, B - 4, C - 5, D - 3, E - 1 (4) A - 3, B - 4, C - 5, D - I, E - 2

116. The number of abdominal segments in male and female cockroach is **(Kerala PMT 2008)**
(1) 10, 10 (2) 9, 10 (3) 10, 11 (4) 8, 10

117. In earthworm, the characteristic internal median fold of dorsal wall of the intestine called typhlosole is present in: **(Kerala PMT 2008)**
(1) 5 to 9 segments (2) 9 to 14 segments (3) 26 to 35 segments (4) 15 to last segment
(5) 35 to last segment

118. The parasite which completes its life cycle in a single host is **(WB Jee 2008)**
(1) *Fasciola hepatica* (3) *Taenia solium* (2) *Plasmodium vivax* (4) *Ascaris* lumbricoides

119. Water vascular system is present in which of the following phyla ? **(WB Jee 2008)**
(1) porifera (2) cnidaria (3) ctenophora (4) echinodermata

120. In which triploblatic animal coelom is absent? **(WB Jee 2008)**
(1) platyhelminthes (2) aschelminthes (3) annelida (4) arthropoda

121. A waxy substance produced by honey bee to repair combs is called **(WB Jee 2008)**
(1) propolis (2) honey dew (3) nectar (4) sporopollenin

122. In which of the following phyla compound eyes are present ? **(WB Jee 2008)**
(1) annelida (2) arthropoda (3) mollusca (4) echinodermata

123. Which one of the following is not a major carp? **(WB Jee 2008)**
(1) Cirrhinus mrigala (2) Puntius tieto
(3) Ctenopharyngodon idella (4) Labeo rohita

124. Which one of the following is the infective stage of *Ascaris* lumbricoides ? **(WB Jee 2008)**
(1) unsegmented egg (2) egg with first stage larva
(3) egg with second stage larva (4) free third stage larva

125. If a live Earthworm is pricked with a needle on its outer surface without damaging its gut, the fluid that comes out is **(CBSE 2009)**
(1) Coelomic fluid (2) Excretory fluid (3) Slimy mucus (4) Haemolymph

126. Which one of the following correctly describes the location of some body parts in the Earthworm *Pheretima*?
(1) Two pairs of accessory glands in 16-18 segments **(CBSE 2009)**
(2) Two pairs of testes in 10th and 11th segments
(3) Four pairs of spermathecae in 4-7 segments
(4) One pair of ovaries attached at intersegmetal septum of 14th and 15 th segments.

127. Book lungs are respiratory organs of **(AFMC 2009)**
(1) Mollusca (2) Arachnida (3) Mammals (4) Earthworm

128. Which of the following has closed circulatory system? **(AFMC 2009)**
(1) Arthropods (2) Platyhelminthes (3) Annelids (4) Molluscs

129. Aedes mosquito is a vector of **(AFMC 2009)**
(1) Malaria (2) Cholera (3) Dengue (4) Filariasis

130. The life span of honey bee drone is **(WB JEE 2009)**
(1) 3-4 months (2) 1-2 months (3) 6-7 months (4) 10-12 months

131. The most widespread group of organisms on earth belongs to kingdom **(AMU 2009)**
(1) monera (2) protista (3) fungi (4) plantae

132. Deuterostome condition and indeterminate radial cleavage are characteristic of **(AMU 2009)**
(1) chordates and arthropods (2) chordates and echinoderms
(3) arthropods and echinoderms (4) chordates, arthropods and annelids

133. Which one of these is referred to as "venus flower basket" ? **(Kerala PMT 2009)**
(1) *Spongilla* (2) Sycon (3) *Euplectella* (4) *Cliona*

134. The presence of tube feet is a characteristic feature of the phylum **(Kerala PMT 2009)**
(1) arthropoda (2) annelida (3) nemathelminthes (4) echinodermata

135. Match List I with List II and choose the correct option **(Kerala PMT 2009)**

List I	**List II**
1. Cockroach	A. Nephridia
2. *Clarias*	B. Malpighian tubules
3. Earthworm	C. Kidneys
4. *Balanoglossus*	D. Flame cells
5. Flatworm	E. Proboscis gland

(1) 1 - A, 2 - C, 3 - B, 4 - D, 5 - E (2) 1- C, 2 - A, 3 - B, 4 - E, 5 - D
(3) 1- B, 2 - A, 3 - C, 4 - E, 5 - D (4) 1 - B, 2 - C, 3 - A, 4 - E, 5 - D

136. Which of the following is properly matched? **(KCET 2009)**
(1) Arthropoda - Insecta - Spider (2) Mollusca - Cephalopoda - *Unio*
(3) Platyhelminthes - Trematoda - *Planaria* (4) Echinodermata - Asteroidea - Starfish

137. All flat worms differ from all round worms in having **(DU PMT 2009)**
(1) triploblastic body (2) solid mesoderm
(3) bilateral symmetry (4) metamorphosis in the life history

138. Primitive nervous system is formed in **(UP CPMT 2009)**
(1) sponge (2) cnidaria (coelenterata)
(3) echinodermata (4) annelida

139. Tissues are absent in the body of **(UP CPMT 2009)**
(1) sponge (2) annelida (3) platyhelminthes (4) arthropoda

140. E. *histolytica* does not show **(UP CPMT 2010)**
(1) Binary fission (2) Encystation (3) Budding (4) Excystation

141. Life span of *Ascaris* is **(AFMC 2010)**
(1) 3-4 months (2) 5-6 months (3) 7-8 months (4) 9-12 months

142. Culex and Anopheles show similarity in that **(UP CPMT 2010)**
(1) Females of both transmit diseases
(2) Larvae float in water
(3) Larvae lie horizontally, floating parallel to surface of water
(4) All of the above

143. Metanephridia of Earthworm are **(UP CPMT 2010)**
(1) Homologous to flame cells (2) Analogous to flame cells
(3) Connected with respiration (4) Helpful in copulation

144. In Earthworm, clitellum occurs over segments **(UP CPMT 2010)**
(1) 5-8 (2) 10-11 (3) 14-16 (4) 23-26

145. Connecting linked between Annelida and Mollusca is **(UP CPMT 2010)**
(1) Neoplina (2) *Chiton* (3) *Peripatus* (4) King Crab

146. Starfish belongs to the class **(RPMT 2011)**
(1) Pisces (2) cephalopoda (3) Asteroidea (4) Ophuroidea

147. Which of the following is not an insect? **(RPMT 2011)**
(1) Ant (2) Mosquito (3) Spider (4) Locusts

148. The canal system is characteristic feature of **(RPMT 2011)**
(1) sponges (2) helminthes (3) echinoderms (4) coelenterates

149. In protozoa, like *Amoeba* and *Paramoecium*, the organ found for osmoregulation is **(RPMT 2011)**
(1) nucleus (2) food vacuole (3) mitochondria (4) contractile vacuole

150. Which of the following organisms is pseudocoelomate? **(RPMT 2011)**
(1) Hookworm (2) Liver fluke (3) *Jelly fish* (4) Leech

151. Natural parthenogenesis is found in **(RPMT 2011)**
(1) Housefly (2) Honey bee (3) Drosophila (4) All of these

152. Which of the following is belongs to Phylum Arthropoda? **(RPMT 2011)**
(1) Star fish (2) Gold fish (3) Silver fish (4) Cuttle fish

153. In five kingdom classification, *Euglena* is placed in **(RPMT 2011)**
(1) Monera (2) Protista (3) Fungi (4) Animalia

154. In which one of the following the genus name, its two charcters and its phylum are not correctly matched, whereas the remaining three are correct

	Genus name		Two characters	Phylum
(1)	*Pila*	(a)	Body Segmented	Mollusca
		(b)	Mouth with Radual	
(2)	*Asterias*	(a)	Spiny Skinned	Echinodermata
		(b)	Water vascular system	
(3)	*Sycon*	(a)	Pore bearing	Porifera
		(b)	Canal system	
(4)	*Periplaneta*	(a)	Jointed appendages	Arthropoda
		(b)	Chitinous exoskeleton	

Answers

BOARD LEVEL EXERCISE : HINT & SOLUTIONS

1. Polymorphism
2. Platyhelminthes.
3. INematoda.
4. Rasping organ of molluscans.
5. Sponge.
6. *Euplectella*-the Venus's flower basket.
7. Hypnotoxin.
8. Colourless fluid (blood) filling the haemocoel.
9. Differentiation of a distinct head at the anterior end of an animal.
10. Annelida & Porifera respectively.
11. Excretory organ of flat worms.
12. Mollusca
13. Planaria & Tape worm respectively.
14. Earthworm.
15. It shows the jointed nature of arthropod appendages (G. arthros=joint, podos=foot).
16. The body cavity which is lined by mesoderm is called coelom which provides space for the development of different body organ.
17. Animals with two germinal layers are diploblastic while with three germinal layer are triploblastic.
18. Both are deutrostomata
19. Annelids and tapeworms respectively.
20. Presence of external visible differences between male and female sexes.
21. A part of the echinoderm coelom is modified into a water-vascular system for help in locomotion.
22. See Page no. 1 - 2
23. Bilateral, a body divisible into two similar halves by median longitudinal vertical plane only is said to have bilateral symmetry.
24. (a) Haemocoel
(b) Cnidoblasts
(c) Hermaphrodite
25. See Page no. 6 - 7
26. See Page no. 6
27. See Page no. 8-9
28. See Page no. 9 - 10
29. See Page no. 12
30. See Page no. 4
31. See Page no. 13
32. See Page no. 14

EXERCISE - 1

PROTOZOA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	3	**2**	3	**3**	4	**4**	3	**5**	3	**6**	4	**7**	1	**8**	4	**9**	4	**10**	4
11	4	**12**	3	**13**	1	**14**	3	**15**	1	**16**	3	**17**	4	**18**	3	**19**	2	**20**	1
21	2	**22**	3	**23**	3	**24**	1	**25**	1	**26**	4	**27**	1	**28**	3	**29**	3	**30**	4
31	2	**32**	1	**33**	1	**34**	2	**35**	2	**36**	4	**37**	4	**38**	3	**39**	3	**40**	1
41	1																		

PORIFERA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	3	**2**	3	**3**	1	**4**	2	**5**	4	**6**	1	**7**	3	**8**	4	**9**	2	**10**	4
11	2	**12**	1	**13**	4	**14**	2	**15**	1	**16**	3	**17**	3	**18**	4	**19**	1	**20**	2
21	3	**22**	3	**23**	2	**24**	3	**25**	3	**26**	4	**27**	1	**28**	1	**29**	1		

COELENTERATA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	1	2	4	3	3	4	1	5	4	6	4	7	2	8	1	9	2	10	2
11	3	12	3	13	2														

CTENOFORA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	2	2	3	3	1	4	3	5	1	6	3	7	4	8	4	9	2	10	1
11	3																		

PLATYHELMINTHES & ASCHELMINTHES

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	2	2	3	3	2	4	4	5	1	6	1	7	4	8	1	9	4	10	3
11	2	12	3	13	3	14	4	15	1	16	2	17	4	18	3	19	3	20	2
21	4	22	1	23	2	24	2	25	3	26	3	27	4	28	3	29	4	30	1
31	4	32	3	33	3	34	3	35	1	36	1	37	3	38	2	39	3	40	4
41	4	42	1	43	2	44	2	45	3	46	3	47	4	48	3	49	1	50	4
51	2	52	1	53	2	54	2	55	1	56	2	57	3	58	1	59	1	60	4
61	4	62	3	63	2	64	1	65	1	66	2	67	3						

ANNELIDA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	3	2	2	3	1	4	4	5	2	6	3	7	4	8	3	9	3	10	1
11	2	12	1	13	2	14	2	15	3	16	4	17	3	18	3	19	2	20	2
21	1																		

ARTHOPODA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	3	2	2	3	4	4	1	5	3	6	3	7	4	8	2	9	1	10	1
11	2	12	1	13	4	14	1	15	1	16	4	17	2	18	4	19	2	20	4
21	2	22	2																

MOLLUSCA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	2	2	3	3	3	4	3	5	2	6	3	7	4	8	2	9	2	10	1
11	4	12	1	13	1	14	3	15	1	16	3	17	1	18	4	19	2		

ECHINODERMATA

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	3	2	1	3	3	4	3	5	1	6	1	7	1	8	2	9	1	10	1
11	1	12	2	13	1	14	2	15	1	16	4	17	4	18	1	19	3	20	1
21	1	22	4	23	1	24	3	25	4	26	3	27	3	28	3	29	3	30	3
31	2	32	4	33	3	34	3	35	2	36	4	37	3						

EXERCISE - 2

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	3	2	1	3	4	4	2	5	3	6	3								

EXERCISE - 3

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	2	2	4	3	3	4	1	5	1	6	1	7	3	8	2				

EXERCISE - 4

Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.	Q.	Ans.
1	4	2	4	3	1	4	3	5	3	6	4	7	1	8	3	9	2	10	1
11	3	12	1	13	1	14	4	15	3	16	3	17	4	18	4	19	2	20	1
21	2	22	2	23	2	24	1	25	3	26	4	27	3	28	4	29	2	30	2
31	4	32	2	33	1	34	2	35	4	36	2	37	2	38	4	39	3	40	2
41	3	42	1	43	3	44	1	45	4	46	1	47	2	48	3	49	1	50	4
51	2	52	4	53	2	54	2	55	1	56	3	57	4	58	1	59	1	60	3
61	4	62	3	63	3	64	2	65	2	66	4	67	1	68	3	69	1	70	4
71	1	72	2	73	1	74	3	75	3	76	2	77	1	78	3	79	2	80	1
81	4	82	2	83	3	84	3	85	3	86	1	87	2	88	2	89	2	90	1
91	2	92	3	93	1	94	1	95	2	96	4	97	2	98	1	99	4	100	2
101	1	102	2	103	4	104	1	105	1	106	4	107	1	108	1	109	4	110	2
111	3	112	3	113	2	114	4	115	3	116	1	117	3	118	4	119	4	120	1
121	1	122	2	123	2	124	31	125	1	126	2	127	2	128	3	129	3	130.	2
131	4	132	2	133	3	134	4	135	4	136	4	137	2	138	2	139	1	140	3
141	4	142	4	143	2	144	3	145	1	146	3	147	3	148	1	149	4	150	1
151	2	152	3	153	2	154	1												

Animal Kingdom-2
(Vertebrata or Chordates)

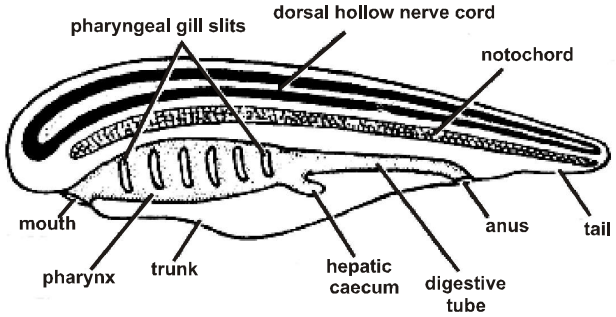
- **INTRODUCTION :**

Chordata is the most advanced animal phylum and includes about 45,000 living species. All the chordates have certain diagnostic features. These are present at least in some stages of development and may be retained even in the adult as notochord; central nervous system; gill slits; tail etc. This subkingdom of vertebrates from the stand-point of efficiency in the higher chordates includes the largest and best known groups of animals. All the vertebrates are chordates, but then all the chordates are not vertebrates.

PHYLUM - CHORDATA

All the chordates possess three unique characteristics at some stage in their life history. These diagnostic features are :

- The dorsal hollow or tubular nerve cord
- A longitudnal supporting notochord
- A series of pharyngeal gill slits present at a stage of life cycle.
- These are bilaterally symmetrical, triploblastic, coelomate with organ-system level of organisation. Largest of the deuterostome phyla.



Diagrammatic side view of a chordate showing the three

- Phylum chordata is divided into two groups :

A. **Acrania** (Protochordata)
B. **Craniata** (Euchordata)

A. **Acrania (Protochordata) :** All marine small, primitive chordates, lack a head, skull or cranium, verte bral column, jaws and brain. It is divided into three subphyla- **Hemichordata. Urochordata** and **Cephalochordata,** chiefly on the basis of notochord present (Recent opinion removes Hemichordata as a separate phylum of invertebrates).

B. **Craniata (Euchordata) :** It includes single subphyla **Vertebrata** which is divided into two subdivisions

a. **Agnatha (Jawless vertebrates) :** It has two classes - **Ostracodermi** and **Cyclostomata.**

b. **Gnathostomata :** It is further divided into two superclasses :

(i) **Pisces :** It is divided into three classes - **Placodermi, Chondrichthyes** and **Osteichthyes.**

(ii) **Tetrapoda :** It is divided into four classes - **Amphibia, Reptilia, Aves** and **Mammalia.**

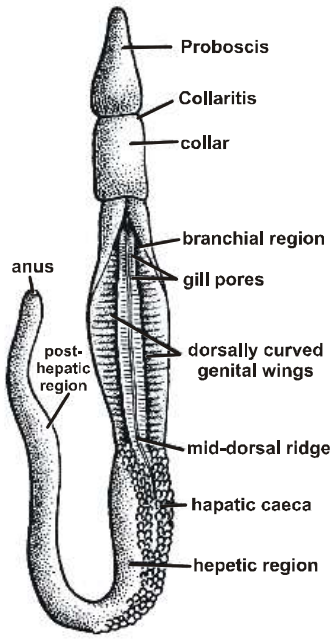
SUB PHYLUM : HEMICHORDATA

(Connective links between Non-Chordates and Chordates)

- Body is soft and unsegmented divided into proboscis, collar and trunk.
- Bilaterally symmetrical; triploblastic; coelomate.
- Digestive tract complete; respiration occurs through gills.
- Blood colourless without corpuscles. A circulatory system is open type.
- Sexes separate, development direct or indirect, larva **tornaria**, external fertilization

- Restriction of `notochord' to the anterior part of the body draws the name Hemichordata.
- Notochord as such is not present, while buccal diverticulum with glomerulus is called stomochord.
- Resemble the chordates in having all the three primary chordate structures, namely gill slits, notochord and dorsal hollow nerve cord.
- Respiration takes place through gills.
- Excretory organ is proboscis gland.
- **Differ from the chordates in**

(i) Lacking cephalization, metamerism, paired appendages, tail, exoskeleton, cloaca, living endoskeleton, haemoglobin and RBC.
(ii) Containing dorsal heart
(iii) Having open neurocoel
(iv) Bearing numerous gonads
(v) Gill slits are dorsal in position instead of lateral as in chordates
(vi) Resemble the echinoderms in nervous system, coelom and larval form. They also have common habits, ecological niche and possess remarkable power of regeneration.

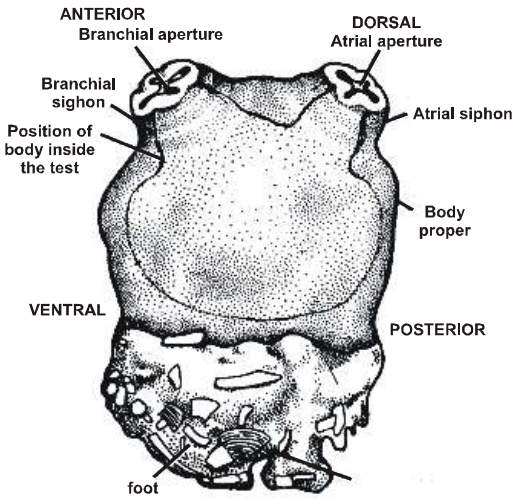


Balanoglossus: External features in dorsal view

- Important from evolutionary point of view as they link the chordates with non chordates. E.g. *Balanoglossus* (tongue worm or acorn worm), *Saccoglossus*.

SUBPHYLUM : UROCHORDATA

- Body is unsegmented and usually lacks tail, covered by a test or tunic composed largely of **tunicin,** allied to cellulose. Appendages absent.
- The **notochord** is only **present in the tail of larva** and **disappears in the adult**.
- Coelom absent; digestive tract complete
- Respiratory system has two to numerous gill slits in the pharyngeal wall
- Circulatory system open type; simple tubular ventral heart.
- Nervous system is represented in the adult by a single dorsal ganglion.
- Urochordata often referred to as protochordatas.
- Larva has a hollow nerve cord.
- Excretion is carried out by nephrocytes, pyloric gland or neural gland.

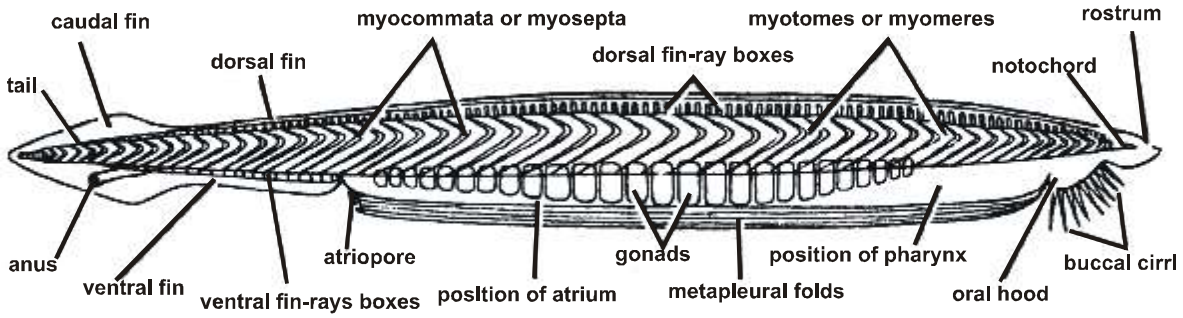


Herdmania: External features in left view

- Sexes united, always cross and external fertilization; asexual reproduction by budding; some forms exhibit alternation of generations.
- Larva undergoes retrogressive metamorphosis.
- The larva is known as Ascidian tadpole. **Eg.** *Herdmania* (Sea squirt), *Salpa, Doliolum, Ascidia.*

SUBPHYLUM : CEPHALOCHORDATA

- Body fish-like adapted for burrowing and swimming. It lacks head, but possesses a tail.
- Paired appendages absent, median fins (dorsal, ventral and caudal) are present.
- Notochord extends the entire length from head to tail of the body and passes ahead of the nerve cord in front. **Notochord persistent throughout life.**
- A true enterocoelous coelom is present. It is however reduced in the pharyngeal region of atrium.
- Digestive tract complete; circulatory system closed; Heart and respiratory pigments are present.
- Pharyngeal gill slits are numerous and better developed.
- Brain is indistinct; no paired sense organs - eyes, ears, nares.
- Excretory system includes paired protonephridia with solenocytes.
- Sexes separate; fertilization external; Holoblastic segmentation.
- Larva undergoes progressive metamorphosis. e.g. *Branchiostoma* (*Amphioxus* or Lancelet).



Branchiostoma: Entire animal in right side view

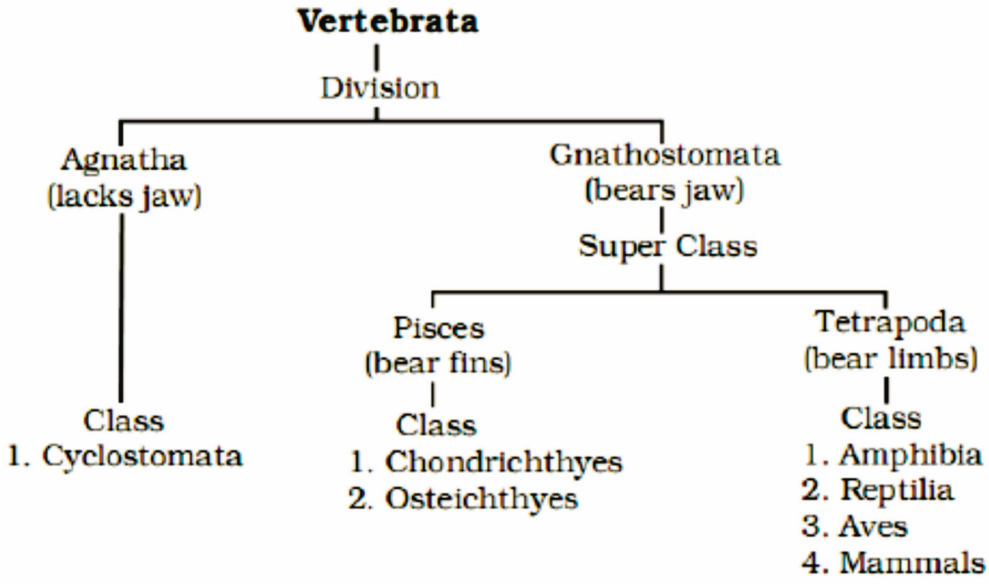
Key Concepts

(**1**) *Herdmania* Larva (tadpole) is free swimming while adult is fixed.
(2) Tunicates reverses the direction of its heart beat periodically.
(3) Blood of tunicates is unique as it has respiratory pigment. It is rich in both sulphuric acid and vanadium. Vanadium is green coloured pigment.
(4) *Pyrosoma*, an example of tunicates is brightly luminous at night.
(**5**) Notochord is hydrostatic i.e., supported by internal fluid pressure.
(6) **Stomochord** is an out growth from the anterior part of gut of *Balanoglossus* which was earlier consid ered as **half notochord.**
(7) **Myotomes** are the segments of muscles.
(8) Tadpole larva of *Herdmania* is more complex than adult.

EUCHORDATA/ CRANIATA
SUBPHYLUM - VERTEBRATA

- Body divided into head, neck, trunk and tail. Some notable exceptions are there : Fishes lack the neck, amphibians lack both the neck and tail (exceptions are there), apes and man have vestigial tail.
- Have two pairs of appendages, which are in the form of fins in the fish and limbs in other vertebrates. Certain forms have secondarily lost one pair or both the pairs of appendages.
- Have integument basically of two parts : an outer epidermis of stratified epithelium derived from the ectoderm and an inner dermis of connective tissue developed from the mesoderm.
- Endoskeleton is formed of cartilage or of cartilage and bone.
- Have a large coelom that contains viscera suspended by mesentries. It is divided into a pericardial sac and a general body cavity. Mammals possess a separate thoracic cavity also.
- The complete digestive tract of vertebrates is ventral to the nerve cord, and gives rise to digestive glands pancreas and liver.
- In lower vertebrates respiratory organs are paired gills, whereas in land forms lungs are present.

- Besides the basic chordate characters, vertebrates have a ventral muscular heart, Closed circulatory system; heart 2, 3 or 4 chambered; lymphatic system present; erythrocytes and haemoglobin are present.
- Notochord is only present in the embryonic stage, it is replaced by vertebral column in adult forms.
- Kidneys for excretion and osmoregulation and paired appendages which may be fins or limbs.
- A pair of kidneys are present for excretion, and osmoregulation.
- Endocrine glands are well developed.
- Unisexual and have single pair of gonads.
- Thus all vertebrates are chordates but all chordates are not vertebrates.



(A) DIVISION - AGNATHA (JAWLESS VERTEBRATES)

- Jawless primitive fish like vertebrates without true Jaws and paired limbs.

Class : Cyclostomata

- All living members of this class are ectoparasites on some fishes.
- Skin soft and scale less.
- Mouth without jaws and remains permanently open.
- Mouth circular and suctorial
- Median fins with cartilaginous rays, but no paired appendages. Tail diphycercal
- Cartilaginous endoskeleton. Cranium and vertebral column are carlilaginous.
- Digestive system lacks stomach. Intestine with a fold, typhlosole
- They are marine animals for spawning they migrate to fresh water after spawning within a few days they die. After metamorphosis their larvae return to the ocean.
- Gill slits 5 to 16 pairs
- Heart 2 chambered; poikilothermous.
- Two mesonephric kidneys
- Dorsal nerve cord; 8 to 10 pairs of cranial nerves
- Single median olfactory sac and nostril.
- Auditory organ with 1 or 2 semicircular canals.
- Sexes separate or united; fertilization external; development direct or with prolonged larval stage (larva is ammocoete e.g. lamprey). e.g., Lamprey (*Petromyzon)*, Hag fish (*Myxine*).

Fig : A jawless vertebrate - *Petromyzon*

Key Concepts

(1) ***Petromyzon*** though marine yet goes to fresh water for spawning i.e., **anandromous.**
(2) **Ammocoete larva** hatches out in about 14-21 days
(3) **Ammocoete** is connecting link between *Amphioxus* and the cyclostomes.
(4) **Lingual Cartilage** is also part of skeleton, lies in the tongue region and supports it (Lingual = related to tongue).

(B) DIVISION - GNATHOSTOMATA

- Jawed vertebrates having true jaws and paired limbs.
- All the fish and fish-like aquatic gnathostomes are placed in the **superclass Pisces,** whereas all the four footed terrestrial gnathostomes in the **superclass Tetrapoda**

Table : Difference between Pisces and Tetrapoda

Pisces	Tetrapoda
1. Exclusively aquatic	1. Aquatic or terrestrial. Some arboreal and aerial.
2. Paired limbs, if present, as fins.	2. Paired pentadactyl limbs present.
3. Median fins present.	3. Median fins absent.
4. Skin usually moist and scaly.	4. Skin usually dry and cornified.
5. Respiration aquatic, by gills.	5. Respiration aerial, by lungs.
6. Sense organs functional in water	6. Sense organs functional in air.

SUPER CLASS-I : PISCES

It is divided into three classes :

CLASS I : Placodermi

- Extinct fishes with primitive jaw
- The name placodermi means "armoured fish" or "Plate skinned" (cosmoid scale).
- Earliest jawed vertebrates.
- Appeared in silurian, flourished in devonian and carboniferous and became extinct in permian.
- Both paired and unpaired fins were present. Caudal fin heterocercal.
- Autostylic jaw suspension; gill slits are covered by operculum.

Examples : *Climatius* - Spiny Shark; *Coccosteus; Dunklosteus.*

CLASS II : Chondrichthyes (Cartilaginous fishes)

- Body may be laterally compressed or dorsoventrally flattened. It consists of head, trunk and tail.
- Fins are supported by horny fin-rays.
- The pelvic fins bear **claspers in the male** which are posterior in location.
- There are generally two dorsal fins. The caudal fin is asymmetrical (heterocercal).
- Skin has unicellularal epidermal mucous glands and dermal scale (placoid scales)
- Endoskeleton is entirely cartilaginous. Notochord is persistent throughout life.

- Mouth is ventral. Jaws well developed. The alimentary canal opens into the cloaca. Intestine has a **scroll valve.**

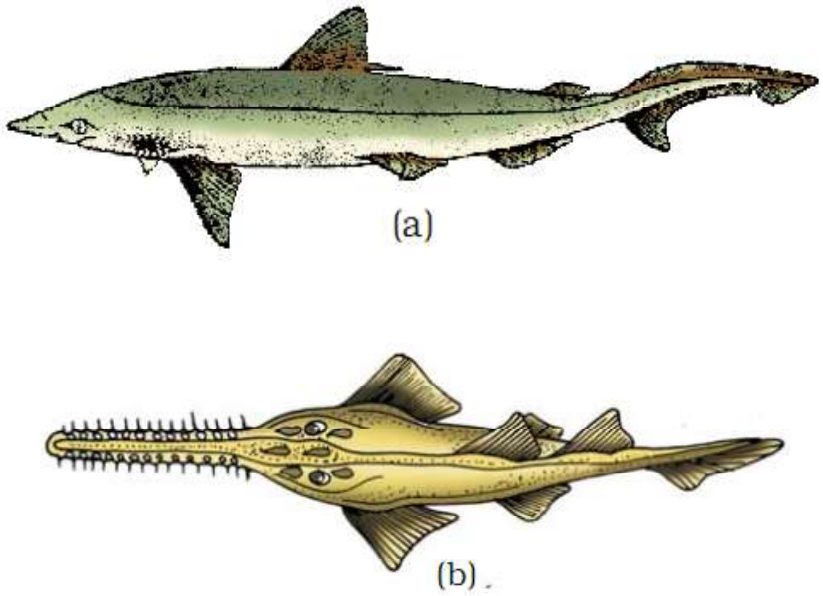


Fig : Example of Cartilaginous fishes : (a) *Scoliodon* (b) *Pristis*

- Teeth are modified placoid scales which are backwoardly directed.
- Respiratory system includes 5-7 pairs of lamelliform (plate-like) gills. Gill slits are without gill covers **(opercula)** except *Chimaera* (connecting link between chondrichthyes & osteichthyes)
- Swim bladder, which regulates buoyancy, is absent due to the absence of air bladder, they have to swim contantly to avoid sinking.
- Heart is two-chambered, having one auricle and one ventricle. Sinus venosus and conus arteriosus are present. Renal portal system is well developed. Red blood corpuscles are oval. biconves and nucleated. They are **poikilothermal** animals. They lack the cpacity to regulate their body temperature.
- There are 10 pairs of cranial nerves.
- Olfactory sacs do not open into the mouth cavity by internal nares. Ear consists only of membranous labyrinth, bearing three semicircular ducts. Lateral-line sense organs are well developed, which detect waves and currents in water.
- Nitrogenous waste matter is urea.
- Sexes are separate. The reproductive ducts discharge into the cloaca. Male usually has claspers which are used for copulation. Fertilization is internal. Most forms are ovoviviparous or oviparous. Some are viviparous. Life history is simple.
- Most chondrichthyes are marine. All are predaceous.
- Some of fishes have electric orgons (*Torpedo*).

Examples :

Scoliodon	-	Dog fish
Sphyrna	-	Hammer headed shark
Pristis	-	Jaw fish
Torpedo	-	Electric ray
Trygon	-	Sting ray
Chimaera	-	Rat or Rabbit Fish or king of herrings.
Pristis	-	Saw fish
Carcharodon	-	Great white shark

CLASS III : Osteichthyes (Bony fishes)

- Including both marine and fresh water fishes with bony endoskeleton.
- Body is often spindle-shaped and stream lined. It facilitates movement through water.
- Fins are supported by cartilaginous or bony fin-rays. Pectoral and pelvic fins act as balancers and brakes

during swimming. The fins lack claspers in both the sexes. There is generally a single dorsal fin. Caudal fin is homocercal. The tail helps to propel the fisn by its lateral movements.

- Skin has unicellular mucous glands and dermal scales and skin is covered with cycloid/clenoid scales.
- Endoskeleton is partly or wholly bony, replaced by distinct vertebrae.
- Mouth is terminal or subterminal. Alimentary canal opens out by anus. Intestine generally lacks a scroll valve.
- Respiratory system includes 4 pairs of gills. Gill slits covered by gill covers (opercula).
- Air bladder is present which regulates buoyancy.
- Gas-filled swin bladder is often present which acts as a buoyancy regulator. In some bony fishs, the swim bladder is used as a lung for breathing air.
- Heart is 2-chambered, having one auricle and one ventricle. Sinus venosus and Conus arteriosus are present.They are poikilothermal animals, they are **cold-blooded** animals.
- There are 10 pairs of cranial nerves.
- Olfactory sacs are dorsal. They communicate with the mouth cavity in lung fish only. Ear consists only of membranous labyrinth having three semicircular ducts. Lateral-line sense organs are well developed.
- Nitrogenous waste matter is mostly ammonia.
- Sexes are generally indistinguishable externally. Fertilization is generally external. Most forms are ovip**a**rous. Some are ovoviviparous or even viviparous. Some fishes show parental care of eggs.
- The bony fishes occur in fresh, brackish, salt, warm and cold water. Many deep sea fishes are lumines cent. Some fishes can change colours, and some can leave water and crawl on land. Most fish used as food are bony fishes. The common food fishes of India are :

(a) Freshwater Species	**(b) Marine Species**
(i) *Labeo rohita* (Rohu)	(i) *Harpodon* (Bombay Duck)
(ii) *Labeo calbasu* (Calbasu)	(ii) *Anguilla* (Eel)
(iii) *Catla catla* (Catla)	(iii) *Sardinella* (Salmon)
(iv) *Cyprinus carpio* (Carp)	(iv) *Hilsa* (Hilsa)

Examples : *Anguilla* - Eel fish, *Labeo* - Rohu, *Hippocampus* - sea horse, *Anabas* - climbing perch, *Gambusia* - mosquito fish. *Neoceratodus* - Australian lung fish, *Protopterus* - African lung fish, *Lepidosiren* - American lung fish, *Solea* - flat fish, *Exocoetus* (Flying fish), *Catla* (Katla), *Clarias* (Magur), Aquarium - *Betta* (fighting fish), *Pterophyllum* (Angel Fish)

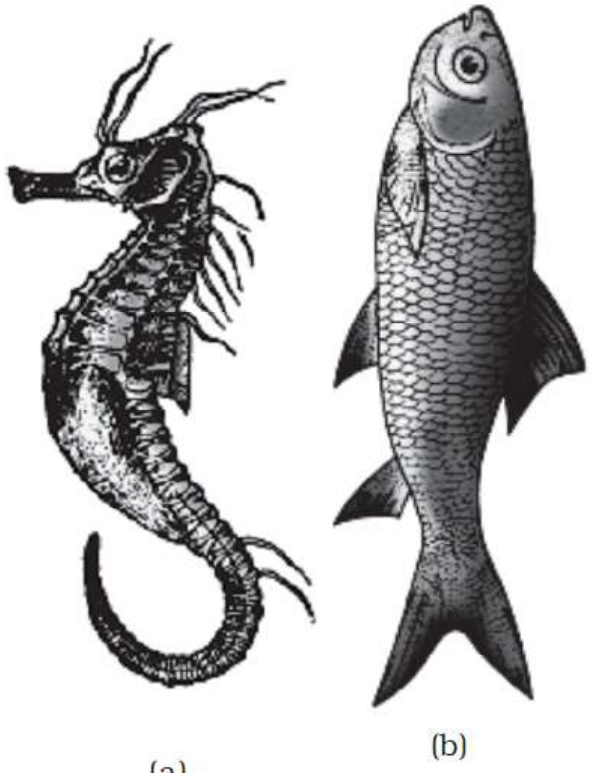


Fig : Examples of Bony fishes : (a) Hippocampus (b) Catla

(1) The largest shark *Rhinodon* measures about 21 metres.
(2) Some air-breathing fishes, use their paired fins to move about on land, gave rise to the first land verte brates.
(3) A living fossil of this group is Latimeria, a lobe-finned fish.

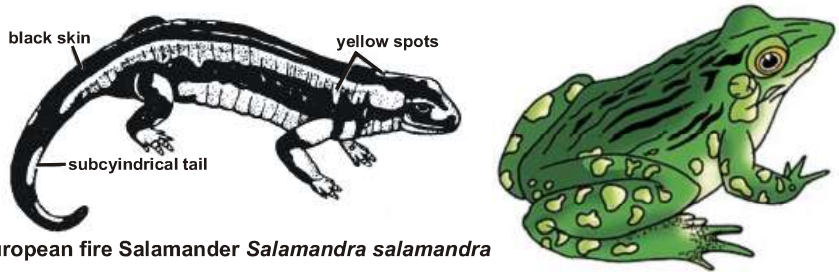
SUPER CLASS-II : TETRAPODA

CLASS : AMPHIBIA

The name indicates (**Gr.**, **Amphi :** dual, **bios :** life), amphibians can live in aquatic as well as terrestrial habitats, **without scales on the skin**.

- First cold blooded vertebrates from evolution point of view which came to the land. They can live on land as well as in water.
- Body varies in form. It may be divisible into head, neck, trunk and tail or only into head and trunk.
- There are two pairs of pentadactyl limbs, each with 4-5 or fewer digits. The digits are without claws, nails or hoofs, and often have webs.
- Skin is smooth moist, rich in mucous and poison glands. It is vascular and respiratory in most species. Scales are generally absent.
- Endoskeleton is mostly bony. Skull is **dicondylic,** means has two occipital condyles. Most vertebrae are procoelous.
- Mouth is large and armed with teeth in the upper or lower or both the jaws. The teeth are **acrodont. Vomerine teeth** may also occur. Amphibians are the **first vertebrates to have a true tongue.** (A true tongue has muscles and is protrusible). Alimentary canal with urinary and reproductive tract leads into the **cloaca**.
- **Respiration** takes place by **gills, lungs**, lining of **buccopharygeal** cavity and **skin**, either separately or in combination. Some forms have vocal cords and vocal sacs.
- The heart is 3-chambered (Two auricles and one ventricle): **Hepatic Portal system** and **Renal portal system** is **well developed**. RBC are **oval, biconvex and nucleated**.
- There are 10 pairs of cranial nerves.
- The olfactory sacs are paired and dorsal. They communicate with anterior part of the bucco pahryngeal cavity by internal nares. Eyes often have **movable eye lids**. Middle ear with a single auditory oscicle **(Collumela)**. There is no external ear represents by **tympanum**. Lateral-line sense organs present in the larvae.
- Waste material is removed mostly as urea. Urinary bladder is present. Kidney is **mesonephric** but the larva has pronephric kidney.
- Alimentary canal, urinary and reproductive tracts open into a common chamber called cloaca which opens to the exterior.
- Sexes are separate.
- Male usually lacks copulatory organ. Fertilization is external. Most forms are oviparous and development is indirect
- Some frogs live on trees, e.g. *Hyla*. Many amphibians show parental care. Male midwife toad (*Alytes*) carries eggs round the thighs, female Surinam toad (*Pipa*) carries eggs in special pits on its back till tad-poles become small frogs.

Eg. *Bufo* (Toad), *Rana* (frog), *Hyla* (Tree frog), *Salamandra* (Salamander), *Ichthyophis* (Limbless amphibia).



European fire Salamander *Salamandra salamandra*

Fig :Examples of Amphibia : *Rana*

CLASS- REPTILIA
(Repere or Reptum = Creep or Crawl)

Herpatology - Study of Lizard
Ophiology/Saurology - Study of Snakes

- Reptiles represent the first class of vertebrates fully adapted for the life in dry places on land.
- Predominantly terrestrial, **creeping** or **burrowing, mostly carnivorous, air-breathing, cold-blooded, oviparous** and **tetrapodal vertebrates.**
- Limbs 2 pairs, **pentadactyl**. Digits provided with horny claws. Limbs absent in all snakes.
- Exoskeleton of horny epidermal **scales, shields, plates** and **scutes**.
- **Skin dry, cornified** and **devoid** of **glands**.
- Mouth terminal. Jaws bear simple conical teeth. In turtles teeth are replaced by horny beaks.
- Alimentary canal terminates into a cloacal aperture.
- Endoskeleton bony. **Skull** with **one occipetal condyle (Monocondylic)**.
- Respiration occurs by lungs. Only ribs help to expand and contract the trunk, making lung respiration more efficient than in amphibians.
- The heart usually 3 chambered and is **incompletely four-chambered**. **Sinus venosus** is **present**, but **truncus arteriosus** is **absent**. **Crocodiles** have a **completely four-chambered heart** like the birds and mammals. **Renal portal system** is **reduced**. RBC are **oval, biconvex** and **nucleated**.
- There are 12 pairs of cranial nerves.
- Waste material is removed chiefly as uric acid in land forms and as urea in aquatic forms. Urinary bladder may be present.
- They do not have external ear, **tympanum** represents ear
- Lateral line system absent. **Jacobson's organs** present in the roof of mouth.
- Sexes separate. Male usually with a muscular copulatory organ.
- Fertilization internal. Mostly oviparous.
- Large yolky eggs covered with leathery shell's embryonic membranes (amnion, chorion, yolk sac and allantois) appear during development.
- Snakes and lizard shed their scales as skin cast.
- Direct development.
- Parental care usually absent.

Eg. : *Chelone* (Turtle), *Testudo* (Tortoise), *Chameleon* (Tree lizard), *Calotes* (Garden lizard), *Crocodilus* (Crocodile), *Alligator* (Alligator), *Hemidactylus* (Wall lizard).
Poisonous snakes - *Naja* (Cobra), *Bungarus* (Krait), *Vipera*(Viper)

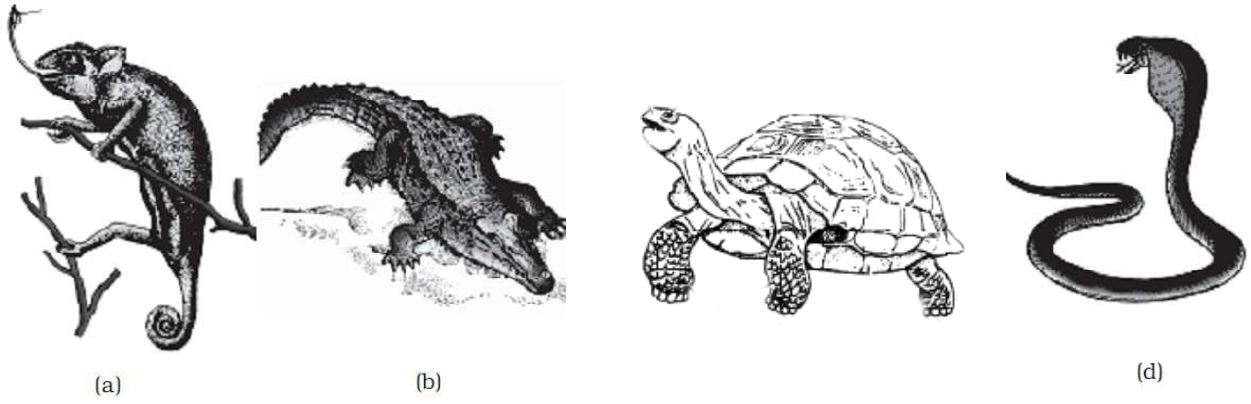


Fig : Reptiles : (a) *Chameleon* (b) *Crocodilus* (c) *Chelone* (d) *Naja*

CLASS - AVES

Ornithology - Study of Birds
Nidology - Study of bird's Nest

- Feather-clad, air-breathing, warm-blooded (homoiothermous), oviparous, bipedal flying vertebrates.
- Body divisible into four distince regions : head, neck, trunk and tail. Jawed bones prolonged into a toothless **beak** or bill. Neck is long and flexible. Tail is short and stumpy.
- Limbs are two pairs. Forelimbs are modified as wings for flying. Hindlimbs or legs are large, and variously adapted for walking, running, scratching, perching, food capturing, swimming or clasping the tree branches.
- Exoskeleton is epidermal; feathers form a non-conducting body covering for warmth, scales on the legs, similar to those of reptiles; claws on the toes, and sheaths on the beaks.
- Endoskeleton fully ossified. **Long bones** are **hollow** with air cavities so that called as **pneumatic**.
- **Skin is dry and devoid of glands except the oil or preen gland at the root of tail.**
- **Pectoral muscles** of **flight** are well developed.
- **Vertebral column short. Centrum of vertebrae heterocoelous (saddle-shaped).**
- A **synsacrum** results by fusion of **posterior thoracic**, **lumbar**, **sacral** and **anterior caudal vertebrae**. Tail vertebrae few, compressed laterally and the last 3 or 4 fused into a plough shape bone, **pygostyle** act as rudder
- **Sternum large**, usually with a vertical, mid-ventral keel for attachment of large **flight muscles**.
- Both **clavicles** and single **interclavicle fused** to form a **V-shaped bone**, called furcula or wishbone.
- Pelvic girdle large, strong and fused with synsaccrum throughout its length.
- **Skull** is **monocondylic**.
- **Oesophagus frequently** dilated into a **crop** for quick feeding and storage.
- **Heart completely 4-chambered**. There is neither sinus venosus nor truncus arteriosus. Only right aortic (systemic) arch persists in adult. **Renal portal system vestigeal**.
- **Birds are the first vertebrates to have warm blood.**
- **Respiration by compact, spongy, non-distensible lungs continuous with thin-walled air sacs.**
- Larynx without vocal cords. A sound box or syrinx, produces voice.
- Kidneys metanephric. **Urinary bladder absent**. Birds are uricotelic i.e.excrete uric acid.
- Cerebrum, cerebellum and optic lobes greatly developed. Cranial nerves 12 pairs.
- Olfactory organs poor. Middle ear contains a single ossicle. Eyes large and possess nictitating membranes, and a vascular pecten.
- Male has a pair of abdominal testes. **A copulatory organ absent except in ratitae, ducks, geese**, etc. Female has a single functional left ovary and oviduct.
- Fertilization internal. Females oviparous. Eggs large with much yolk and hard calcareous shell.
- Extra-embryonic membranes present.
- Parental care is well marked.
- The digestive tract of birds has additional chambers the crop and gizzard.

Eg. *Couous* (Crow), Columba (Pigeon), *Psittacula* (Parrot), *Struthio* (Ostrich), *Pavo*(Peacock), *Aptenodytes* (Penguin), *Neophron* (Vulture.)

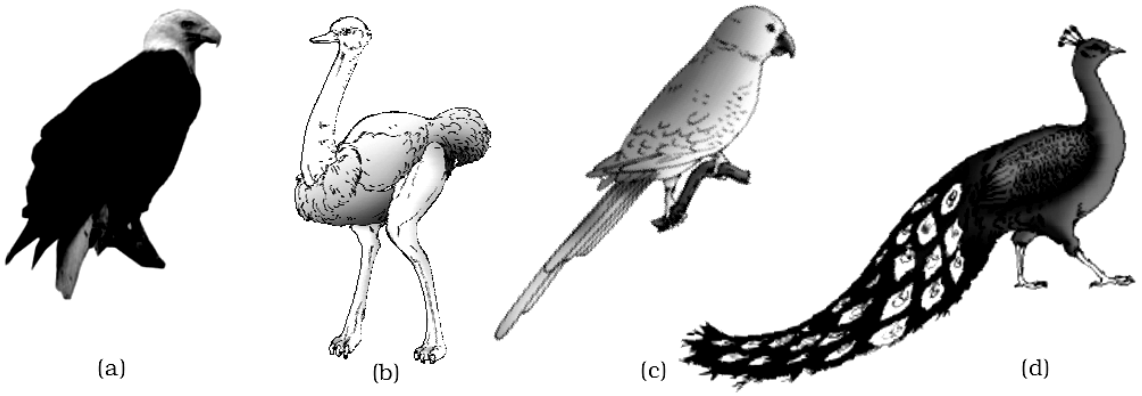


Fig : Some birds : (a) *Neophron* (b) *Struthio* (c) *Psittacula* (d) *Pavo*

CLASS-MAMMALIA

(Mammae = Mammary gland)

- They are found in a variety of habitats polar ice caps, deserts, mountains, forests, grasslands and dark caves. Body distinctly divisible into head, neck, trunk and tail.
- Limbs 2 pairs, pentadactyle, and variously adapted for walking, running, climbing, burrowing, swimming or flying. Hindlimbs absent in cetaceans and sirenians.
- Hair-clad, mostly terrestrial, air-breathing, warm-blooded, viviparous, tetrapod vertebrates. Exoskeleton includes horny, epidermal hair, spines, scales, claws, nails, hoofs, horns, bony dermal plates, etc. S k i n richly glandular containing sweat, sebaceous (oil) and sometimes scent glands in both the sexes. Females have mammary glands with teats skin of mammals is unique in possessing hair.
- A muscular partition, called diaphragm, separates the thoracic cavity from the abdominal cavity.
- Endoskeleton of bone. Skull dicondylic. A single zygomatic arch present. Each half of lower jaw made of a single bone,the dentary. Alimentary canal terminates by anus, there being no cloaca except monotremes. Teeth are of several types (heterodont), borne in sockets (thecodont) and represented by two sets (diphyo dont).
- The most unique mammalian characteristics is the presence of milk producing gland (mammary g lands) by which the young one are nourished. Respiration always by lungs (pulmonary). Glottis pro tected by a epiglottis. Larynx contains vocal cords.
- Heart 4-chambered with double circulation. Only the left aortic arch present. Renal portal system absent, R.B.C. small, circular and non-nucleated.
- Homiothermous animals.
- Kidneys metanephric. Excretion is ureotelic.
- Brain highly evolved. Both cerebrum and cerebellum large and convoluted. Corpora quadrigemina and Corpus callosum present. Cranial nerves 12 pairs.
- Sense organs 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.
- Sexual dimorphism generally well marked. Male has an erectile, copulatory organ or penis. Testes com monly placed in a bag or scrotum outside abdomen. They are viviparous with few exceptions and development is direct.
- Fertilization internal. Except egg-laying monotremes, mammals are viviparous, giving birth to living young ones. Parental care well developed. Mammals show greatest intelligence among animals.

Eg. Oviparous - *Ornithorhynchus* (Platypus) ; *Viviparous-Macropus* (Kangaroo), *Pteropus* (Flying fox), *Camelus* (Camel), *Macaca* (Monkey), *Rattus* (Rat), *Canis* (Dog), *Felis* (Cat), *Elephas* (Elephant), *Equus* (Horse), *Delphinus* (Common dolphin), *Balaenoptera* (Blue whale), *Panthera tigris* (Tiger), *Panthera leo* (Lion).

Board Level Exercise

Type (I) : Very Short Answer Type Questions : **[01 Mark Each]**

1. Name a vertebrate in which jaws are absent.

2. Name an example of egg-laying mammals.

3. What is the sound-producing organ of birds?

4. Give one example of Cephalochordata.

5. What is the function of lateral-lines sense organs?

6. Cite one characteristics of Urochordata

7. Which vertebrate group first developed limbs?

8. Which lizard is well known for changing colours?

9. Of what tissue are the electric organs of *Torpedo* made?

10. What is a common feature between amphibians and insects?

11. Name any extinct bird.

Type (II) : Short Answer Type Questions : **[02 Marks Each]**

12. List four adaptations that help the birds (Aves) in flying.

13. What is protochordates? How is it classified ?

14. What is a common feature between amphibians and insects?

15. Give two examples of the phylum Hemichordata.

16. Name 2 poisonous and 2 nonpoisonous snakes.

17. Name 2 flightless birds.

18. What is a monocondylic skull? Cite one example.

19. What is the fate of notochord in higher chordates?

20. What is marsupium?

21. What are pneumatic bones? Where do you find them?

Type (III) : Long Answer Type Questions: **[03 Marks Each]**

22. List three basic chordate characters.

23. "All vertebrates are chordates but all chordates are not vertebrates" justify the statement.

24. "Mammals are the most successful & dominant animals today." Give evidence.

25. Name 2 types of vertebrate metamorphosis. Cite one example of each.

26. What is the role of swim bladder in fishes.

27. What are amniotes?

Type (IV) : Very Long Answer Type Questions: **[05 Marks Each]**

28. Write a short note on hemichordate.

29. What do you mean by Agnatha? Give five important features of its class with example.

30. Write the differences between Chondrichthyes and Osteichthyes

31. Write 4 unique features of class mammalia and give its classification.

32. "Birds are glorrified reptiles." Justify this statement.

Exercise # 1

OBJECTIVE QUESTIONS

CHORDATA

1. Structure present in all adult vertebrates
(1) Notochord (2) Dorsal tubular nerve cord
(3) Pharyngeal gill slits (4) Renal portal system

2. Characters of which group are present in all chordates in some stage or the other of their life cycle?
(1) Gill clefts, vertebral column and notochord
(2) Mammary glands, hairs and gill clefts
(3) Notochord, scales and dorsal tubular nervous system
(4) Notochord, gill clefts and dorsal tubular central nervous system

3. In vertebrates which one of the following structures is believed to have been transformed into thyroid gland?
(1) Pygostyle (2) Urostyle (3) Anal style (4) Endostyle

4. Which one of the following does not have a specialised heart?
(1) Amphioxus (2) Dog fish (3) Chameleon (4) Scaly-ant-eater

5. Balanoglossus belongs to the group
(1) Platyhelminthes (2) Annelida (3) Cephalochordata (4) Hemichordata

6. Which of the following sets is mismatched?
(1) Spider, Centipede, Cockroach (2) Bat, Goat, Horse
(3) Crayfish, Cuttlefish, Hagfish (4) Starfish, Sea cucumber, Sea urchin

7. One of the primary characters of chordates is
(1) paired nerve cord (2) solid ventral nerve cord
(3) ganglionated nerve cord (4) dorsal tubular nerve cord

8. Structure present in all adult vertebrates
(1) Notochord (2) Dorsal tubular nerve cord
(3) Pharyngeal gill slits (4) Renal portal system

9. Which one of the following is not a characteristic feature of all the chordates?
(1) Dorsal nerve cord
(2) Presence of coelom
(3) A diaphragm separating thorax from abdomen
(4) Pharyngeal gill clefts in the early embryonic stages

10. Common characteristic of all vertebrates without exception is
(1) exoskeleton
(2) presence of well developed skull
(3) two pairs of functional appendages
(4) division of body into head, neck, trunk and tail

11. Vertebrates have
(1) Body cavity with alimentary canal (2) Dorsal tubular nerve cord
(3) Ventrally situated heart (4) All of the above

12. Vertebral column is derived from
(1) Notochord (2) Dorsal nerve cord
(3) Ventral nerve cord (4) Outgrowth of cranium

13. A chordate character is
(1) Gills (2) Post-anal tail (3) Spiracles (4) Chitinous exoskeleton

14. Group amniota includes
(1) Reptiles, birds and mammals (2) Birds and reptiles
(3) Birds and mammals (4) Reptiles and mammals

15. Cold blooded animal is the one which has
(1) Cold blood (2) Cold habitat
(3) Low body temperature (4) No regulatory system of body temperature

16. Cold blooded animal is
(1) Man (2) Snake (3) Pigeon (4) Cattle

17. Homoiothermal animals are
(1) Pigeon, Bat and Rabbit (2) Fish, Frog and Lion
(3) Tortoise, Lizard and Pigeon (4) Rat, Snake and Crocodile

18. Homoiothermal animal is
(1) Frog (2) Fish (3) Rabbit (4) Lizard.

19. Which of the following is a poikilothermal animal ?
(1) Whale (2) Penguin (3) Otter (4) Tortoise

20. Which of these is not a vertebrate ?
(1) *Oryctolagus* (2) *Amphioxus* (3) Fish (4) Sparrow

21. Larva of Balanoglossus is
(1) Tornaria (2) Muller's larva (3) Kentrogen larva (4) Tadpole

22. In which group, the notochord is limited to only anterior part of proboscis ?
(1) Mammalia (2) Cephalochordata (3) Hemichordata (4) Urochordata

23. The wheel organ is found in
(1) ascidian (2) lancet (3) starfish (4) acorn worm

24. Representative of Hemichordate is
(1) *Scoliodon* (2) *Myxine* (3) *Balanoglossus* (4) *Petromyzon*

25. Amphioxus belongs to
(1) Cephalochordata (2) Urochordata (3) Vertebrata (4) Hemichordata

26. Besides Annelida and Arthropoda, the metamerism is exhibited by
(1) Acanthocephala (2) Chordata (3) Mollusca (4) Cestoda

27. Amnion and allantois are found in
(1) Fish, Frog and Fowl (2) Fish and Fox
(3) Fowl and Fox (4) Frog, Fowl and Fox

28. The jawless vertebrate is
(1) *Hyla* (2) Loris (3) Crocodile (4) *Petromyzon*

29. The group devoid of gliding/flying animals is
(1) Fishes (2) Cyclostomes (3) Reptiles (4) Mammals

30. The lamprey (Petromyzon) is included in the same taxonomic class as the
(1) Chameleon *(Anolis)* (2) Hagfish *(Myxine)*
(3) Salamander *(Ambystoma)* (4) Lungfish *(Neoceratodus)*

31. The larva of Petromyzon is known as
(1) Ammocoete (2) Tornaria (3) Axolotal (4) Bipinnaria

32. Petromyzon is
(1) Anadromous (2) Catadromous (3) Both (4) None

33. Ancestors of cyclostomes are
(1) Myxinoides (2) Arthropods (3) Ostracoderms (4) Urochordates

34. Which one of the following is not a part of the chordate body?
(1) Endostyle (2) Pygostyle (3) Urostyle (4) Anal style

35. *Oikopleura* belongs to
(1) Tunicata (2) Cephalochordata (3) Hemichordata (4) Cyclostomata

36. The exclusively sedentary protochordate animals are found in the class
(1) Pterobranchia (2) Larvacea (3) Ascidiacea (4) Thaliacea

37. Which of the following is not found in vertebrates?
(1) Bilateral symmetry (2) Gill openings (3) Body scales (4) Cnidoblasts

38. Velum is found in -
(1) *Herdmania* (2) *Amphioxus* (3) *Branchiostoma* (4) Both (2) and (3)

39. In which of the following animals heart is provided with two pacemakers?
(1) *Herdmania* (2) Camel (3) *Sphenodon* (4) Giraffe

40. The echinoderms, hemichordates and chordates had the following larva as common ancestral form
(1) Dipleurula (2) Tornaria (3) Bipinnaria (4) Trochophore

41. Which of the following is a chordate feature, not shared by the non-chordates?
(1) Triploblastic body (2) True coelom (3) Bilateral symmetry (4) Pharyngeal gill-slits

42. In which of the following notochord is present in embryonic stage?
(1) All chordates (2) Vertebrates (3) Some chordates (4) Nonchordates

43. A member of Hemichordata is -
(1) *Salpa* (2) *Petromyzon* (3) *Myxine* (4) *Balanoglossus*

44. The correct classification of Balanoglossus is
(1) Chordata - Vertebrata - Enteropneusta
(2) Chordata - Vertebrata - Pterobranchia
(3) Chordata - Hemichorda - Pterobranchia
(4) Chordata - Hemichorda - Enteropneusta

45. In urochordata notochord is found in
(1) tail of adult (2) test of adult (3) head of adult (4) tail of larva

46. Which one of the following is not an acraniate ?
(1) *Salpa* (2) *Herdmania* (3) *Amphioxus* (4) Cyclostome

47. Mode of feeding in tunicates is
(1) parasitic (2) macrophagus (3) ciliary filter (4) myxotrophic

48. During retrogressive metamorphosis of the ascidian tadpole. which one of the following does not regress?
(1) nerve cord (2) gill slits (3) caudal myotomes (4) notochord

49. **Statement 1-** Cephalochordata bears notochord all along the body throughout life.
Statement 2 - Urochordate bears vertebral column only in tail region throughout the life. Then which is correct
(1) both are correct (2) 1st correct, 2nd wrong
(3) 1st wrong, 2nd correct (4) both 1st and 2nd are wrong

50. Match List I (Larval forms) with List II (Corresponding adults) and select the correct answer using the codes given below the lists

List I (Larval forms)	**List II (Adults)**
A Tornaria	1 Star fish
B Brachiolaria	2 Jelly fish
C Tadpole	3 *Herdmania*
D Trochophore	4 Nereis
	5 *Balanoglossus*

Answer codes :
(1) A = 5, B = 1, C = 3, D = 1
(2) A = 3, B = 2, C = 2, D = 4
(3) A = 5, B = 2, C = 3, D = 4
(4) A = 3, B = 1, C = 2, D = 1

51. Match List I (Product) with List II (Source) and select the correct answer using the codes given below the lists

List I (Products)	**List II** (Source)
A Shagreen	1 Fish manure
B Isinglass	2 Sturgeon
C Caviar	3 Skin of elasmobranchs
D Fish guano	4 Air bladder of fish

Answer codes :

(1) A = 2, B = 4, C = 3, D = 1 (2) A = 3, B = 1, C = 2, D = 4
(3) A = 2, B = 1, C = 3, D = 4 (4) A = 3, B = 4, C = 2, D = 1

52. Which of the following statements is true?
(1) All chordates are vertebrates (2) All vertebrates are chordates
(3) Nonchordates have a vertebral column (4) Invertebrates possess a tubular nerve cord

53. All chordates at one or the other stage have
(1) a movable jaw (2) vertebral column
(3) pharyngeal gill-slits (4) two pairs of pentadactyl limb

54. Which of the following chordate characters is not shared by non-chordates?
(1) bilateral symmetry (2) pharyngeal gill slits (3) axial organization (4) metamerism

55. Which of the following animal has a notochord throughout its life?
(1) Fish (2) Bird (3) Snake (4) *Amphioxus*

56. Herdmania belongs to which subphyla which is also called tunicata?
(1) Cephalochordata (2) Hemichordata (3) Urochordata (4) Protochordata

57. Which of the following passageways is part of cloaca of vertebrates?
(1) Rectum (2) Reproductive tract (3) Urinary tract (4) All of these

58. Pancreas is absent in which group of vertebrates?
(1) Apoda (2) Teleost (3) Cyclostomates (4) Elasmobranch

PISCES

1. Bony plates/scutes occur in addition to scales in
(1) Sea horse (2) Flying fish (3) Eel (4) Climbing perch

2. Association between suckerfish *(Remora)* and shark is
(1) Symbiosis (2) Commensalism (3) Parasitism (4) Predation

3. Living fossil is
(1) Dog fish (2) Flying fish
(3) *Coelacanth (Latimeria)* (4) *Dodo*

4. Which one is a true fish?
(1) Whale (2) Cuttle fish (3) Silver fish (4) Flying fish

5. Most fishes, amphibians and reptiles are
(1) Oviparous (2) Viviparous (3) Scaly (4) Homoiothermal

6. Anadromous fishes move
(1) from sea to freshwater (2) from sea to estuary (3) from river to sea (4) from estuary to sea

7. Cartilaginous fishes do not have
(1) Operculum (2) Scales (3) Gill slits (4) Pelvic fins

8. Which is viviparous?
(1) Bony fish (2) Lung fish (3) Frog (4) Shark

9. Which one is a fish?
(1) Sea cow (2) Sea cucumber (3) Sea horse (4) Sea urchin

10. Branch of biology dealing with study of fishes is
(1) Toxicology (2) Ornithology (3) Piscology (4) Ichthyology

11. A vertebrate having entire cartilaginous skeleton is
(1) *Dolphin* (2) *Rana* (3) *Labeo* (4) *Scoliodon*

12. Placoid scales occur in
(1) Lizard (2) Toad (3) Cartilaginous fishes (4) Bony fishes

13. In fishes the kidney is
(1) Pronephros (2) Mesonephros (3) Metanephros (4) Holonephros

14. Which is a cold blooded animal?
(1) Pigeon (2) Shark (3) Kangaroo (4) Rabbit

15. Common name of fish *Anguilla* is
(1) Eel (2) Rohu (3) Hilsa (4) Bombay duck

16. Ammocoete larva occurs in the life-history of
(1) *Lamprey* (2) *Sea urchin* (3) *Balanoglossus* (4) Ascidian

17. The carnivorous fish, *Gambusia*, is introduced in the lakes, ponds to control a deadly disease in India, feeds on the larvae of -
(1) Nephantis (2) Dragon fly (3) Anopheles (4) All of these

18. Carp fish common in India is
(1) *Hilsa* (2) *Labeo* (3) *Wallago* (4) Barbus

19. *Salmon* belongs to the group of
(1) Bony fishes (2) Cartilaginous fishes (3) Cod fishes (4) Trout fishes

20. The group of Anamniota includes
(1) Birds and Mammals (2) Reptiles and Birds
(3) Fishes and Amphibia (4) Reptiles and Mammals

21. The aquatic organism with prehensile tail is
(1) Macaca (2) Chameleon (3) Exocoetus (4) Hippocampus

22. Presence of claspers is an important character in
(1) *Sphyrna* (2) *Echeneis* (3) *Hippocampus* (4) *Exocoetus*

23. Identify the catfish from the below given fishes
(1) *Catla catla* (2) *Labeo rohita* (3) *Wallago attu* (4) *Cirrhinus mrigala*

24. Weberian ossicles are found in
(1) frogs (2) birds (3) fishes (4) snakes

25. Which one of the following fishes is a living fossil?
(1) *Narcine* (2) *Polypterus* (3) *Leipdosiren* (4) *Protopterus*

26. Match List I with List II and select your correct answer from the answer codes

List I	**List II**
A *Arius*	(i) Four eyed fish
B *Hippocampus*	(ii) Mouth breeder
C *Gambusia*	(iii) Sucker fish
D *Echeneis*	(iv) Larvivorous fish
E *Anableps*	(v) Male broods eggs

Answer codes :
(1) A = (ii), B = (v), C = (iv), D = (iii), E = (i)
(2) A = (i), B = (ii), C = (iii), D = (iv), E = (v)
(3) A = (ii), B = (v), C = (iii), D = (iv), E = (i)
(4) A = (v), B = (iv), C = (iii), D = (ii), E = (i)

27. Endoskeleton is cartilaginous in
(1) Mollusca (2) Osteichthyes (3) Dipnoi (4) Elasmobranches

28. Electric organs occur in
(1) Sharks (2) Goldfish (3) Rays (4) *Porpoises*

29. *Gambusia* is -
(1) Parasitic fish (2) Pest of fishes
(3) Fish predator of mosquito larvae (4) A mosquito spreading yellow fever

30. Heart pumps impure blood in
(1) Frog (Amphibia) (2) Shark (Pisces) (3) Lizard (Reptilia) (4) Whale (Mammalia)

31. Lateral line system is present in
(1) Fish (2) Frog (3) Reptile (4) Man

32. Which of the following is a true fish?
(1) Silver fish (2) Jelly fish (3) Star fish (4) Dog fish

33. Which of the following fish is famous for migration?
(1) *Salmon* (2) Shark (3) Carp (4) Ribbon fish

34. Isinglass is obtained from
(1) Air bladder (2) Scales (3) Liver (4) All of the above

35. Which of the following fishes is introduced in India by foreigners?
(1) *Clarius batrachus* (2) *Pomphret* (3) *Labeo rohita* (4) *Mystus singhala*

36. In India, the best aquarium is located at
(1) ZSI, Kolkata (2) Tarapur, Mumbai (3) Chennai (4) Vishakhapatnam

37. Electric organs of fishes are highly modified masses of
(1) Nerve cells (2) Muscle cells (3) Elastic fibres (4) White fibres

38. Lung fishes are
(1) Marine inhabitants (2) Marine and freshwater inhabitants
(3) Freshwater and terrestrial inhabitants (4) Freshwater inhabitants

39. At present, the Dipnoans are distributed over
(1) Europe and North America (2) Latin America and Australia
(3) Europe and Latin America (4) North America and Australia

40. Placoid scales are found in
(1) *Scoliodon* (2) *Hippocampus* (3) Carps (4) Cuttlefish

41. Which of the following is an anadromous fish?
(1) *Anguilla* (2) *Hilsa* (3) *Salmon* (4) Yellow eel

42. *Scoliodon* is commonly called dogfish due to one of its following characteristics?
(1) Gait (2) Mouth (3) Carnivorous (4) Power of smell

43. In one of the following fishes, the dorsal fin is modified into suckers
(1) *Torpedo* (2) *Echeneis* (3) *Hippocampus* (4) *Neoceratodus*

44. The fish Lepidosiren belongs to the country
(1) South Africa (2) New Zealand (3) South America (4) England

45. *Torpedo* is commonly known as
(1) Sucker fish (2) Globe fish (3) Electric ray (4) Sea horse

46. Australian lungfish is called
(1) *Lepidosiren* (2) *Lepidosteus* (3) *Protopterus* (4) *Neoceratodus*

47. Isinglass, a type of by product of fish industry, is principally used for
(1) production of insulin (2) feeding cattle, pig and poultry
(3) preparation of paints and varnishes (4) clarification of vinegar, wines and beer

48. Which of the following are anamniotes?
(1) Reptilia, Mammalia and Aves (2) Reptilia, Aves and Amphibia
(3) Amphibia, Aves and Mammalia (4) Chondrichthyes, Osteichthyes and Amphibia

49. Which of the following is not a fish?
(1) Cuttle fish (2) Sucker fish (3) Flat fish (4) Pipe fish

50. Which of the following types of fishes have heterocercal tail?
(1) Dipnoi fish (2) Bony fish (3) Cartilaginous fish (4) All of these

51. Which fins are paired in fishes?
(1) dorsal and anal fin (2) caudal fin and dorsal fin
(3) pelvic fin and ventral fin (4) pectoral fin and pelvic fin

52. Which type of scales are found on the skin of cartilaginous fishes?
(1) Ganoid (2) Placoid (3) Ctenoid (4) Cycloid

53. Freshwater bony fishes maintain water balance by
(1) excreting hypotonic urine (2) excreting salt across their gills
(3) drinking small amount of water (4) excreting water in the form of uric acid

54. Ganoid scales are present in
(1) *Labeo* (2) *Anguilla* (3) *Amia* (4) *Lepidosteus*

55. Sense organ found only in fishes
(1) optic (2) olfactory (3) lateral line (4) all of these

56. Which one of the following is a true fish?
(1) Star fish (2) Dog fish (3) Jelly fish (4) Cuttle fish

57. Air bladder is present in
(1) *Anabas* (2) *Torpedo* (3) *Scoliodon* (4) Elasmobranch

58. Which of the following is a fish?
(1) Sea horse (2) *Salmon* (3) Bombay duck (4) All of the above

59. *Hemicyclaspsis* belongs to the class
(1) pisces (2) ostracodermi (3) cyclostomata (4) gnathostomata

60. Which of the following scales are similar to mammalian teeth?
(1) Cycloid (2) Placoid (3) Ganoid (4) Ctenoid

AMPHIBIA

1. Fire-bellied toad is -
(1) *Amphiuma* (2) *Necturus* (3) *Salamandra* (4) Bombinator

2. An amphibian lacking tongue is
(1) *Necturus* (2) *Amphiuma* (3) *Salamandra* (4) *Ichthyophis*

3. Necturus is -
(1) Hell bender (2) Congo eel (3) Mud puppy (4) Blind worm

4. In Amphibia scales are present in the skin of
(1) Toad (2) Siren (3) Ichthyophis (4) Proteus

5. Neoteny is observed in
(1) Ambystoma (2) Alytes (3) Sycon (4) Sacculina

6. First amphibian appeared during the period
(1) Permian (2) Carboniferous (3) Devonian (4) Silurian

7. A frog has
(1) Hands but no fingers (2) Ears but no pinnae (3) Eyes but no lids (4) Jaws but no teeth

8. Frog has
(1) Five fingers and four toes (2) Four fingers and five toes
(3) Five fingers and five toes (4) Four fingers and four toes

9. Which of the following is modified into poison gland?
(1) Sebaceous gland (2) Pituitary gland (3) Parotoid gland (4) None of these

10. Axolotal is the name given to the larva of
(1) Silkworm (2) *Ambystoma* (3) *Amphioxus* (4) Roundworm

11. Axolotal larva belongs to the order
(1) Urodeta (2) Anura (3) Apoda (4) Stegocephalia

12. The venous system of frog differ from that of rabbit in the presence of
(1) Hepatic portal system (2) Renal portal system
(3) Three vena cavae (4) Hepatic vein

13. Absence of thumb is characteristic of
(1) Rabbit (2) Man (3) Frog (4) Monkey

14. *Salamander* is
(1) an amphibian (2) a bird (3) a mollusc (4) an echinoderm

15. Which of the following is a limbless amphibian?
(1) *Salamander* (2) *Ichthyophis* (3) *Anguilla* (4) *Pheretima*

16. Which is not a true amphibian animal?
(1) Toad (2) Frog (3) Tortoise (4) Salamander

17. Common Indian bull frog is
(1) *Rana tigrina* (2) *Rana esculenta* (3) *Rana silvatica* (4) *Rana cyanophlyctis*

18. Retention of larval characters even after sexual maturity is called
(1) Ontogenesis (2) Parthenogenesis (3) Neoteny (4) Phyllogenesis

19. The glands present in the skin of frog are
(1) Mucous and poisonous (2) Sweat and mammary
(3) Sweat and sebaceous (4) Mucous and sweat

20. Frog is
(1) Aminotelic (2) Ammonotelic (3) Ureotelic (4) Uricotelic

21. Neoteny is found in
(1) Tadpole (2) *Salamander* (3) *Hyla* (4) *Axolotal*

22. Frog belongs to order
(1) Urodela (2) Apoda (3) Caudata (4) Anura

23. The functional kidney of frog tadpole is
(1) Pronephros (2) Mesonephros (3) Metanephros (4) Archinephros

24. Flying frog is
(1) *Hyla* (2) *Rhacophorus* (3) *Ambystoma* (4) *Astylosternus*

25. Ancestral amphibians were tetrapods that evolved during
(1) Ordovician (2) Silurian (3) Devonian (4) Carboniferous

26. Neck is absent in frog. This helps frog in
(1) Catching prey (2) Respiration (3) Swimming in water (4) Jumping on ground

27. A frog lives in water or near water because
(1) it can get its food easily in water
(2) its hindlimbs are webbed and help in swimming
(3) it can see through its transparent eyelids while swimming
(4) it respires through the skin

28. The extinct amphibian is
(1) *Diplocaulus* (2) *Necturus* (3) *Diplodocus* (4) *Seymouria*

29. Common trait amongst fishes, amphibians and reptiles is
(1) Laying of eggs (2) Shelled eggs (3) Gills (4) Scales

REPTILIA

1. A true terrestrial animal is
(1) Tortoise (2) Toad (3) Frog (4) Necturus

2. Which one of the following pair is correctly matched?
(1) Sphenodon - New Zealand (2) Ostrich - New Zealand
(3) Kiwi - Australia (4) Platypus - South America

3. Voluntary breaking of tail occurs in
(1) Snake (2) Lizard (3) Leech (4) Cockroach

4. Odd-numbered digits are not found in
(1) Rhinoceros (2) Horse (3) Camel (4) Zebra

5. Which of the following teeth are lophodont?
(1) Canine and Premolar (2) Premolar and Incisor
(3) Incisor and Canine (4) Premolar and Molar

6. Existence of marsupials in Australia and New Zealand proves
(1) Continental drift (2) Geological period (3) Both (1) and (2) (4) None of these

7. Which one of the following is a poisonous snake?
(1) *Python* (2) *Typhlops* (3) *Eryx* (4) *Enhydrina*

8. *Typhlops* is
(1) Sea snake (2) Grass snake
(3) Glass snake (4) Blind snake

9. Name a nonpoisonous snake
(1) Cobra (2) Krait (3) Viper (4) Rat snake

10. The heart is 3 or 4 chambered in the vertebrate group
(1) Fishes (2) Amphibia (3) Reptilia (4) Aves

11. A nonpoisonous snake is
(1) *Bungarus* (2) *Viper* (3) *Python* (4) Sea snake

12. Vestigial hindlimbs occur in the snake
(1) *Python* (2) Cobra (3) Krait (4) Russel's viper

13. Besides mammals, diaphragm also occurs in
(1) Birds (2) Crocodiles (3) Fishes (4) Toads

14. A poisonous lizard is
(1) *Varanus* (2) *Chameleon* (3) *Ancistrodon* (4) *Heloderma*

15. Which is correct for Indian snakes?
(1) Only sea snakes are non-poisonous (2) Only sea snakes are poisonous
(3) All water shakes are poisonous (4) All sea snakes are poisonous

16. The most poisonous snake is
(1) Krait (2) Tree snake (3) Python (4) Rat snake

17. Snakes do not have
(1) Movable eyelids (2) Girdles (3) Limbs (4) All of the above

18. Snake moulting consists of
(1) Epidermis (2) Dermis (3) Cornified cells (4) Stratum germinativum

19. Poison fangs is snakes are present on the bone
(1) Vomers (2) Maxilla (3) Palatines (4) Premaxilla

20. Gavial or gharial is found in
(1) Freshwater (2) Sea water (3) Brackish water (4) Terrestrial habitats

21. Some reptiles show autotomy which means
(1) Voluntary breaking tail to confuse enemy
(2) Signal for charging
(3) Signal for courtship
(4) State of starvation prior to death

22. Which one of the following is a characteristic feature of sea snake?
(1) Round tail (2) Flat tail (3) Tail with rattle (4) Tail with mouth

23. Golden age of reptiles is
(1) Palaeozoic (2) Mesozoic (3) Coenozoic (4) Proterozoic

24. Teeth conducting poison in a snake are called
(1) Incisors (2) Canines (3) Heterodont (4) Fangs

25. The reptile which glides in the air is
(1) *Draco* (2) *Phrynosoma* (3) *Anguis* (4) *Calotes*

26. Jacobson's organ is related to
(1) Taste (2) Sight (3) Touch (4) Smell

27. Mesozoic era was dominated by
(1) Mammals (2) Fishes (3) Gymnosperms (4) Dinosaurs

28. When the tail is cylindrical and ventral scales do not extend the entire width of the belly, the snake is
(1) Non-poisonous (2) Either poisonous or non-poisonous
(3) Definitely poisonous (4) Deadly poisonous

29. Cleidoic eggs are found in
(1) Fishes (2) Amphibia (3) Reptiles (4) None of these

30. In snakes eyelids are
(1) Immovable (2) Movable (3) Absent (4) All of these

31. In snakes the poison glands are modifications of
(1) Lingual glands (2) Parotid glands (3) Sublingual glands (4) Molar glands

32. Even ventricles of reptiles are partitioned but there is mixing of blood
(1) due to common ejection and entrance of blood in lungs
(2) auricles are non-partitioned
(3) heart is partially four-chambered
(4) none of these

33. Consider the following statements
The classification of
1. amphibians is based on their habitat
2. reptiles is based on teh nature of their skulls
3. birds is based on their bones
4. mammals is based on their mode of reproduction
Of these statements
(1) 1 alone is correct (2) 1 and 3 are correct (3) 2 alone is correct (4) 2 and 4 are correct

34. Foramen of Panizzae is found in the heart of
(1) Frog (2) Pigeon (3) Crocodile (4) Rabbit

35. Metanephric kidneys are found in
(1) Reptiles only (2) Birds only
(3) Mammals only (4) Reptiles, birds and mammals

36. Cobra can be distinguished from other snakes by its
(1) Black colour (2) Agile habit (3) Hood (4) Round tail

37. Jacobson's organ is concerned with
(1) Smell (2) Burrowing (3) Touch (4) Vision

38. Large size scales fully extended from side to side on the belly are characteristic of
(1) Krait and sea snake (2) Cobra and Python
(3) Rat snake and Cobra (4) Python and Krait

39. Most favourable land adaptation for reptile is
(1) Pulmonary respiration (2) Moist skin
(3) Scales on body (4) None

40. Pear-shaped head, sharply separated from rest of the body and covered with small scales is a feature of
(1) Pythons (2) Vipers (3) Kraits (4) Cobras

41. Which of the following is a marine snake?
(1) *Enhydrina* (2) *Typhlops* (3) *Bungarus* (4) *Naja*

42. The injection of serum of horse which has been repeatedly injected by cobra venom into a person bitten by cobra results in
(1) No immunity (2) Natural immunity (3) Active immunity (4) Passive immunity

43. Study of snakes is called
(1) Ichthyology (2) Enterology (3) Serpentology (4) Entomology

44. Scientific name of king cobra is
(1) *Naja naja* (2) *Vipera russelli* (3) *Bungarus coerulus* (4) *Naja hannah*

45. Post anal tail is present in
(1) cobra (2) earthworm (3) scorpion (4) lower invertebrate

46. A stumpy laterally compressed tail is characteristic of
(1) Tree snake (2) Sea snake (3) Rat snake (4) Rattle snake

47. Eggs of reptiles and birds can be designated as
(1) Alecithal (2) Isolecithal (3) Homolecithal (4) Telolecithal

48. Most dinosaurs became extinct during
(1) Late Triassic (2) Late Jurassic (3) Cretaceous (4) Early Tertiary

49. Limbless lizard is
(1) *Draco* (2) *Varanus* (3) *Ophisaurus* (4) *Mabouia*

50. Ophisaurus belongs to
(1) Pisces (2) Reptilia (3) Amphibia (4) Mammalia

51. 'Glass snake' is
(1) poisonous snake (2) poisonous lizard (3) non-poisonous lizard (4) non-poisonous snake

52. Urinary bladder is absent in
(1) lizards (2) snakes (3) crocodiles (4) both (2) and (3)

53. Which of the following has only one lung?
(1) Aves (2) Lacertelia (3) Ophidia (4) Aquatic mammals

54. Which of the following is called `living fossil' ?
(1) Dodo (2) King crab
(3) King crab and Tuatara (4) Tuatara, Dodo and King crab

55. Diapsid skull is found in the following
(1) Natrix, *Draco* and Turtle (2) Crocodile, Turtle and *Seymouria*
(3) *Sphenodon*, Crocodile and Viper (4) Calotes, Cobra and Varanosaurus

56. Which of the following reptile is a `living fossil'?
(1) *Peripatus* (2) *Latimeria* (3) *Archaeopteryx* (4) *Sphenodon*

57. Antivenome injections used for snake bite are prepared at
(1) IVRI, Bareilly (2) NDRI, Karnal
(3) Hoffkin's Research Institute, Mumbai (4) IARI, New Delhi

58. Which one of the following snakes has sensitive patches called pits that help the snake in tracking down warm blooded animals even in pitch darkness ?
(1) Cobra (2) Banded (3) Rattle snake (4) Green python

59. Study of reptiles is called
(1) Ichthyology (2) Ornithology (3) Herpetology (4) Ophiology

60. Which one of the following snakes is a poisonous one
(1) *Zamenis* (2) *Typhlops* (3) *Hydrophis* (4) *Tropidonotus*

61. Heart of crocodile is
(1) three chambered (2) two chambered
(3) single chambered (4) four chambered

62. Which one of the following bones of a poisonous snake bears fangs?
(1) Maxilla (2) Pterygoid (3) Quadrate (4) Squamosal

63. Chevron bone is found in the vertebrae of
(1) *Varanus* (2) *Crotalus* (3) *Ophisaurus* (4) All of the above

64. The snake having head shields and elongated hexagonal vertebrals is
(1) *Naja* (2) *Eryx* (3) *Bungarus* (4) *Ptyas*

AVES

1. On which side of the female birds ovary develops?
(1) Left side (2) Right side
(3) Both the sides (4) Both sides but lacks oviducts

2. The branch of science dealing with the study of birds is
(1) Herpetology (2) Ornithology (3) Oncology (4) Anthropology

3. Both male and female pigeons secrete milk through
(1) Mammary glands (2) Crop glands (3) Salivary glands (4) Gizzard glands

4. Beak is toothed in
(1) Ostrich (2) Kiwi (3) *Archaeopteryx* (4) *Pelican*

5. Birds have bipedal locomotion as it
(1) reduces body weight (2) increases rate of locomotion
(3) provides more support to the body (4) spares forelimbs for flight

6. Bone marrow does not occur in
(1) Fishes (2) Amphibians (3) Birds (4) Reptiles

7. Preen gland occurs in
(1) Pisces (2) Aves (3) Reptilia (4) Mammalia

8. If a bird is transfered from 30°C to 10°C. The body temperature will change to
(1) 10°C (2) 30°C (3) 15°C (4) Remain unchanged

9. Tinamus was an endemic genus of flightless birds found in ``Bird Continent'' located in
(1) Palaearctic region (2) Oriental region (3) Neotropical region (4) Nearctic region

10. Among birds, the longest annual migration is undertaken by
(1) Arctic tern (2) Flamingo (3) Painted stork (4) Pelican

11. The largest and the most powerful adductor muscle in flying bird is the
(1) Coracobrachialis longus (2) Pectoralis major
(3) Pectoralis minor (4) Tensor longus

12. A flying bird lands by
(1) folding the wings back and dropping on the ground or other substratum
(2) folding the wings above and back of the body and coming down
(3) lowering and fanning out the retrices
(4) pronation and forward movements of wings

13. Birds and bats are good fliers, but the bat differs from birds in having a
(1) Diaphragm (2) 4-chambered heart (3) Wings (4) Small brain

14. Birds fly with the help of
(1) Patagium (2) Wing (3) Feather (4) Limbs

15. An endangered bird is
(1) condor (2) hillock (3) sun bird (4) great Indian bustard

16. “Pigeon milk" is secreted in the
(1) uropygial gland (2) crop glands of female
(3) crop glands of male and female (4) mammary glands of the pigeon

17. ‘Birds are glorified reptiles'. This statement was made by
(1) Salim Ali (2) Charles Darwin (3) Huxley (4) Haldane

18. Which of these defines the bird best?
(1) Flying (2) Warm-blooded
(3) Feathered quadrupeds (4) Feathered bipeds

19. Which one is an oviparous animal?
(1) Pigeon (2) Whale (3) Bat (4) Amoeba

20. Air sacs of birds
(1) Keep body warm (2) Facilitate blood circulation
(3) Maintain body temperature (4) Reduce body weight

21. Kiwi is found in
(1) India (2) South America (3) New Zealand (4) East Indies

22. Penguin is found in
(1) Africa (2) Australia (3) America (4) Antarctica

23. What is true about birds?
(1) they possess a diaphragm separating thorax from abdomen
(2) they usually maintain a body temperature which is relatively lower than that of mammals
(3) they excrete mostly urea
(4) they have a beak but on teeth

24. What is common among ostrich, penguin and kiwi?
(1) These are flightless birds (2) These are running birds
(3) These are migratory birds (4) These have 4 toes in their feet

25. Ostrich is a native of
(1) America (2) Austria (3) Africa (4) Australia

26. Flight muscles of bird are attached to
(1) Clavicle (2) Coracoid (3) Keel of sternum (4) Scapula

27. Bird vertebrae are
(1) Heterocoelous (2) Procoelous (3) Acoelous (4) Opisthocoelous

28. Birds differ from bats in the absence of
(1) 4-chambered heart (2) Homoiothermy (3) Diaphragm (4) Tracheae

29. The largest egg belongs to
(1) Elephant (2) Whale (3) Dinosaur (4) Ostrich

30. A bird has a very thin pointed beak, what can you think about this bird?
(1) Honey sucking (2) Pollen eating (3) Carnivore (4) Seed eater

31. The wishbone of the birds is derived from
(1) Skull (2) Pectoral girdle (3) Pelvic girdle (4) Hindlimb

32. Eggs of birds are
(1) Alecithal (2) Telolecithal (3) Homolecithal (4) Isolecithal

33. Without exception, all birds are
(1) omnivorous (2) have feathers and fly
(3) form nests and care them (4) have calcareous shelled egg

34. Which of the following is merry thought bone?
(1) Coracoid (2) Clavicle (3) Scapula (4) Suprascapula

35. Pneumatic bones are found in
(1) Pigeon (2) Whale (3) *Rana* (4) Shark

36. Penguins belong to the class
(1) Mammalia (2) Pisces (3) Aves (4) Primates

37. A well known bird sanctuary of our country is situated at
(1) Kaziranga (2) Bandipur (3) Palamu (4) Bharatpur

38. Fossil remains of *Archaeopteryx* were recovered from the rock beds of the
(1) Cretaceous (2) Jurassic (3) Triassic (4) Permian

39. Tinamus was an endemic genus of flightless birds found in ``Bird Continent'' located in
(1) Palaearctic region (2) Oriental region (3) Neotropical region (4) Nearctic region

40. In singing birds, the sound is produced by the
(1) Lungs (2) Air sacs (3) Syrinx (4) Larynx

41. The nucleus of Pander is a component of
(1) Frog's egg (2) Mammalian egg (3) Hen's egg (4) Reptilian egg

42. The mesoderm in chick embryo gives rise to all of the following organs except the
(1) Heart (2) Kidney (3) Brain (4) Skeleton

43. During migration, birds determine compass direction using
(1) Land marking and water bodies (2) Water bodies and mountains
(3) Mountains and land markings (4) Celestial bodies

44. Air sacs are present in
(1) Aves (2) Reptiles (3) Mammals (4) Amphibians

45. Kingfisher is a bird in which the feet are
(1) Scratching type (2) Raptorial type (3) Perching type (4) Wading type

46. One of the following is a flightless bird
(1) *Aptenodytes* (2) *Pavo* (3) *Flamingo* (4) *Pelican*

47. In flying birds, which of the following are useful in flight besides pneumatic bones?
(1) Furcula (2) Syrinx (3) Quill feathers (4) Pygostyle

MAMMALIA

1. In which group, all the animals do not belong to same phylum?
(1) Man, Amphioxus and Panthera (2) Earthworm, Hirudo and Blatta
(3) Both (1) and (2) (4) None of these

2. Which of the following is the largest mammal?
(1) Elephant (2) Dolphin (3) Loxodonta (4) Whale

3. The mammals usually do not lay eggs, but one of these lays
(1) Spiny anteater (2) Scaly anteater (3) Hedge hog (4) Porcupine

4. The mammals evolved from the reptile in the
(1) Cretaceous (2) Triassic (3) Devonian (4) Carboniferous

5. Which one of the following is an exclusive character of class Mammalia?
(1) Presence of completely 4-chambered heart (2) Homoiothermy
(3) Internal fertilization (4) Presence of a muscular diaphragm

6. Which set of animals belongs to the same class?
(1) Hydra, Jellyfish and Crayfish (2) Bat, Pigeon and Whale
(3) Spider, Scorpion and Centipede (4) Kangaroo, Whale and Otter

7. Largest living animals belong to
(1) Mammalia (2) Pisces (3) Echinodermata (4) Reptilia

8. "Sea lion" belongs to
(1) Class Reptilia (2) Subclass Prototheria (3) Superclass Pisces (4) Order Carnivora

9. Just as mammalia is to chordata, so is
(1) Cetacea to vertebrata (2) Ophidia to snakes
(3) Periplaneta to Insecta (4) Trematoda to Platyhelminthes

10. Common feature of whale, bat and rat
(1) presence of external ears
(2) absence of neck
(3) extra abdominal testes to avoid higher temperature of body
(4) presence of muscular diaphragm between thorax and abdomen

11. Gorilla, Chimpanzee, man and monkey belong to same
(1) Order (2) Family (3) Genus (4) Species

12. Hairs occur in all mammals except those of
(1) Chiroptera (2) Rodentia (3) Cetacea (4) Primates

13. Lions in India are now found in
(1) Kaziranga National Park (2) Sunderbans
(3) Corbett National Park (4) Gir National Park

14. Which of the following is an egg-laying mammal?
(1) *Pteropus* (2) *Porcupine* (3) *Pangolin* (4) *Tachyglossus*

15. Which of the following lays eggs, yet the female secretes milk?
(1) Bat (2) Ostrich (3) Kangaroo (4) Platypus

16. A group of animals having marsupium
(1) Eutheria (2) Prototheria (3) Metatheria (4) Monotremata

17. Which one of the following statements is true as regard to a certain mammal and its feature?
(1) Bats have feathers (2) Platypus is oviparous
(3) Elephant is ovoviviparous (4) Camel has biconcave RBCs

18. Sonar system is found only in
(1) Bats (2) Birds (3) Otter (4) All of these

19. Kangaroo is a native animal of
(1) Mexico (2) Australia (3) New Zealand (4) Austria

20. Viviparity is found in
(1) Rabbit (2) Lizard (3) Snake (4) Frog

21. Two chief features of mammals which distinguish them from other vertebrates are
(1) Hairy skin and oviparity (2) Hairy skin and mammary glands
(3) Mammary glands and teeth (4) Pinna and teeth

22. Milk glands are characteristic of
(1) All vertebrates (2) All mammals
(3) Only placental mammals (4) Only primates and ruminants

23. Which animal eats its own faeces?
(1) Pig (2) Goat (3) Rabbit (4) Elephant

24. The sweat glands in mammals are primarily concerned with
(1) Regulation of water content (2) Regulation of body heat
(3) Killing of skin bacteria (4) Removal of excess of salt

25. The first mammal arose
(1) After the extinction of dinosaurs (2) Before the origin of dinosaurs
(3) Along with the dinosaurs (4) From dinosaurs

26. Viviparous animals are
(1) Running birds, silverfish, prawns (2) Turtles, snakes, leeches
(3) Bony fishes, frog, lizards (4) Scorpions, whales, rabbits

27. A mammal which lays eggs instead of giving birth to offspring is
(1) Rabbit (2) Macropus (3) Duck-billed platypus (4) Whale

28. All mammals
(1) possess canine teeth (2) possess ear pinna
(3) give birth to young ones (4) typically possess seven cervical vertebrae

29. Which will not affect echolocation in bats?
(1) covering eyes only (2) covering the whole head
(3) covering the ears (4) covering the eyes and ears

30. Rodents have
(1) Long spines (2) Long incisors (3) Long canines (4) Hooves

31. *Echidna* is
(1) a reptile of Australia (2) a mammal of Australia
(3) a reptile of Africa (4) a mammal of Africa

32. *Equus* rests on
(1) One digit (2) Three digits (3) Four digits (4) Five digits

33. The smallest eggs belong to
(1) Fishes (2) Amphibians (3) Reptiles (4) Mammals

34. To which taxonomic group does a whale belong to
(1) Fishes (2) Reptiles (3) Arthropods (4) Mammals

35. Locomotion in Kangaroo is
(1) Saltatorial (2) Volant (3) Cursorial (4) Creeping

36. Kidney of adult rabbit is
(1) Pronephros (2) Mesonephros (3) Opisthonephros (4) Metanephros

37. Eutherian mammals are characterized by
(1) Ovoviviparity (2) Hairy skin (3) True placentation (4) Glandular skin

38. The cervical vertebra in humans is
(1) same as in whale (2) more than that of rabbit
(3) double than that of horse (4) less than that in Giraffe

39. Ear pinna is found in
(1) Reptiles (2) Mammals (3) Aves (4) All vertebrates

40. A mammal in which milk is squired diwn to throat of the baby by muscular contraction of mother is
(1) Whale (2) Rhinoceros (3) Bear (4) Camel

41. Which one of the following is an exclusive character of class Mammalia?
(1) Homiothermy (2) 4-chambered heart (3) Muscular diaphragm (4) Nucleated RBCs

42. Kangaroo belongs to
(1) Monotremata (2) Prototheria (3) Marsupialia (4) Insectivora

43. Which one has a poison gland?
(1) Wall lizard (2) Scoliodon (3) Rat snake (4) Male platypus

44. In most mammals, testes are located in scrotal sacs for
(1) Sperm development (2) Sex differentiation
(3) Independent functioning of kidney (4) More space to visceral organs

45. Heart of mammal is
(1) 1-chambered (2) 3-chambered (3) 2-chambered (4) 4-chambered

46. A monkey with prehensile tail is
(1) Rhesus monkey (2) Spider monkey (3) Bonnet monkey (4) All of these

47. Pouched mammals are
(1) Metatherians (2) Prototherians (3) Eutherians (4) None

48. In mammals, few vertebrae join to form
(1) Humerus (2) Femur (3) Synsacrum (4) Atlas

49. Identify the correctly matched pair
(1) Gir Forest-Rhino (2) Kaziranga-Elephant (3) Corbett Park-Aves (4) Rann of Kutch-Wild Ass

50. What is the common among mammals?
(1) Carnivorous feeding habit (2) Ventral nerve cord
(3) Moulting (4) 7 cervical vertebrae

51. In mammals placenta is formed by
(1) Amnion (2) Chorion (3) Yolk sac (4) Chorioallantois

52. Eutherian mammals are
(1) Oviparous (2) Viviparous
(3) Ovoviviparous (4) Both oviparous and ovoviviparous

53. Egg of eutherian mammals is
(1) Centrolecithal (2) Telolecithal (3) Macrolecithal (4) Microlecithal

54. Platypus is
(1) Prototheria (2) Metatheria (3) Eutheria (4) Primates

55. Pinna is absent in
(1) Sirenia (2) Primates (3) Rodentia (4) All of these

56. Hairs are made up of
(1) α -Keratin (2) β -Keratin (3) Lipid (4) Protein

57. The sweat glands are scanty in
(1) Elephant (2) Man (3) Rabbit (4) Polar bear

58. Which of the following exist in maximum number of terms of genera and species?
(1) Aquatic mammals (2) Carnivore mammals (3) Herbivore mammals (4) Terrestrial mammals

59. The example of Marsupialia is
(1) *Macropus* (2) Horse (3) Rabbit (4) Elephant

60. The zoological name of `Lion-tailed macaque' is
(1) *Macaca rhesus* (2) *Macaca silenus* (3) *Macaca mulatta* (4) None of these

61. All mammals
(1) give birth to live young (2) have a thick coat of hair
(3) nourish their young with milk (4) have a uterus

62. The feathers at the bases of wing-quills are called
(1) Down feathers (2) Coverts (3) Barbules (4) Filoplumes

63. Thecodont dentition is found in
(1) Crocodila (2) Anapsida (3) Lacertilia (4) Ophidia

64. Mammary glands are without teats (nipples) in
(1) Metatheria (2) Prototheria (3) Theria (4) Eutheria

65. If groups of minute scales, arranged in transverse rows, are found beneath the grooves of the skin, the animal can be identified as
(1) Anuran (2) Caudata (3) Urodela (4) Apodan

Exercise # 2

OBJECTIVE QUESTIONS

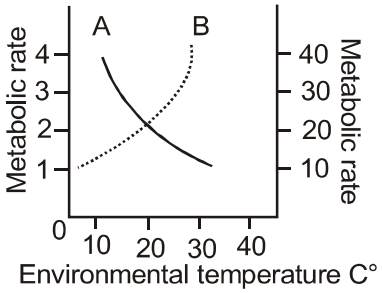
1. Which of the following is present in the respiratory system of insects, fish and mammals ?
(1) Blood containing oxyhaemoglobin (2) Alveoli
(3) Spiracles (4) A thin moist surface

2. Only one of the following features of the phylum Chordata also is present in adult Tunicata (= Urochordata). Which feature ?
(1) Possession of a chorda (2) Possession of visceral slits (= pharyngeal slits)
(3) Possession of a tail (4) Possession of a dorsal tubular nervous system

3. The increase in complexity of the vertebrate circulatory system is represented by which of the following combinations ?
(1) Toad-rabbit-alligator-shark (2) Shark-frog-alligator-rabbit
(3) Shark-crocodile-rabbit-frog (4) Alligator-dog-shark-toad

4. Which of the following animals is not a mammal ?
(1) Bird (2) Kangaroo (3) Dog (4) Human

5. Curves A and B in the following graph represent



(1) A : cat B : lizard
(2) A : elephant B : mouse
(3) A : Bird B : mouse
(4) A : fish B : frog

Exercise # 3

AIIMS CORNER

1. Which one of the following animals is correctly-matched with its one characteristic and the taxon? **(AIIMS 2006)**

Animal	Characteristic	Taxon
(1) millipede	ventral nerve cord	arachnida
(2) duck bill platypus	oviparous	mammalia
(3) silverfish	pectoral and pelvic fins	chordata
(4) sea anemone	triploblastic	cnidaria

2. All mammals without any exception are characterized by **(AIIMS 2006)**
(1) viviparity and biconcave red blood cells
(2) extra-abdominal testes and a four-chambered heart
(3) heterodont teeth and 12 pairs of cranial nerves
(4) a muscular diaphragm and milk producing gland

ASSERTION / REASONING

In each of the following questions a statement of Assertion (A) is given followed by a corresponding statement of Reason (R) just below it. Of the statements, mark the correct answer as
(1) If both assertion and resaon are true and reason is the correct explanation of assertion
(2) If both assertion and reason are true but reason is not the correct explanation of assertion
(3) If assertion is true but reason is false
(4) If both assertion and reason are false.

3. **Assertion** : Cutaneous gland help in regulation of body temperature.
Reason : Cutaneous glands produced from stratum germinativm.
(1) (2) (3) (4)

4. **Assertion** : Syrinx is the characteristic of birds.
Reason : Syrinx helps in swallowing food.
(1) (2) (3) (4)

5. **Assertion** : In fishes, heart is venous.
Reason : Only veins are present in the heart of fishes.
(1) (2) (3) (4)

6. **Assertion** : Water vascular system is the characteristic of echinoderms
Reason : Main function of water vascular system is locomotion.
(1) (2) (3) (4)

7. **Assertion** : Metamorphosis in hemichordates is an important event.
Reason : In metamorphosis, the larva gradually changes into the adult.
(1) (2) (3) (4)

Exercise # 4

LEVEL - I

Questions of Previous Year of AIPMT

1. Which one of the following in birds, indicates their reptilian ancestry ? **(AIPMT 2008)**
(1) two special chambers crops and gizzard in their digestive tract.
(2) eggs with a calcareous shell
(3) scales on their hind limbs
(4) four-chambered heart

2. Which one of the following pairs of animals comprise 'jawless fishes'? **(AIPMT 2009)**
(1) Guppies and hag fishes (2) Lampreys and eels
(3) Mackerels and Rohu (4) Lampreys and hag fishes

3. Which one of the following structures in Pheretima is correctly matched with its function **(AIPMT 2011)**
(1) Clitellum - secretes cocoon (2) Gizzard - absorbs digested food
(3) Setae- defence against predators (4) Typhlosole - storage of extra nutrients

4. Ureters act as urogenital ducts in : **(AIPMT 2011)**
(1) human males (2) human females
(3) frog's both males and females (4) frog's males

5. Which one of the following groups of animals is correctly matched with its one characteristic feature without even a single exception ? **(AIPMT 2011)**
(1) Reptilia : possess 3 - chambered heart with one incompletely divided ventricle
(2) Chordata : possess a mouth provided with an upper and lower jaw
(3) Chondrichthyes : possess cartilanginous endoskeleton
(4) Mammalia : give birth to young one.

6. Uricoteli mode of passing out nitrogenous wastes is found in : **(AIPMT 2011)**
(1) Reptiles and Bird (2) Birds and Annelids
(3) Amphibians and Reptiles (4) Insects and Amphibians

7. Which one of the following animals is correctly matched with its particular named taxonomic category?
(1) Tiger - tigris, the species (2) Cuttlefish - Mollusca, a class **(AIPMT 2011)**
(3) Humans - Primata, the family (4) Housefly - Musca an order

8. In which one of the folllowing the genus name, its two characters and its, class/phylum are correctly matched? **(AIPMT 2011)**

	Genus name		Two characters	Class/phylum
(1)	Ascaris	(a)	Body segmented	Annelida
		(b)	Males and females distinct	
(2)	Salamandra	(a)	A tympanum represents ear	Amphibia
		(b)	Fertilization is external	
(3)	Pteropus	(a)	Skin possesses hair	Mammalia
		(b)	Oviparous	
(4)	Aurelia	(a)	Cnidoblasts	Coelenterata
		(b)	Organ level of organization	

9. Which one of the following pairs of animals are similar to each other pertaining to the feature stated against them ? **(AIPMT Mains - 2012)**
(1) Pteropus and *Ornithorhyncus* - Viviparity
(2) Garden lizard and Crocodile - Three chambered heart
(3) Ascaris and *Ancylostoma* - Metameric segmentation
(4) Sea horse and Flying fish - Cold blooded (poikilothermal)

10. Which one of the following categories of animals, is correctly described with no single exception in it ? **(AIPMT Mains - 2012)**

(1) All reptiles possess scales, have a three chambered heart and are cold blooded (poikilothermal)
(2) All bony fishes have four pairs of gills and an operculum on each side.
(3) All sponges are marine and have collared cells.
(4) All mammals are viviparous and possess diaphragm for breathing

11. Which one of the following organisms is scientifically correctly named, correctly printed. according to the International Rules of Nomenclature and correctly described ? **(AIPMT Mains - 2012)**

(1) *Musca domestica* - The common house lizard, a reptile
(2) *Plasmodium falciparum* - A protozoan pathogen causing the most serious type of malaria
(3) *Felis tigris* - The Indian tiger, well protected in Gir forests.
(4) *E.coli* - Full name *Entamoeba coli*, a commonly occurring bacterium in human intestine

12. Match the name of the animal (column I), with one characteristics (column II), and the phylum/class (column III) to which it belongs : **(NEET-2013)**

	Column I	Column II	Column III
(1)	*Ichthyophis*	terrestrial	Reptilia
(2)	*Limulus*	body covered by chitinous exoskeleton	Pisces
(3)	*Adamsia*	radially symmetrical	Porifera
(4)	*Petromyzon*	ectoparasite	Cyclostomata

LEVEL - II

Questions of Previous Year of Competitive Exams

13. Which of the following character is exclusive to mammals? **(Karnataka CET 2006)**

(1) presence of a four chambered heart (2) homeothermic condition
(3) respiration by lungs (4) presence of a diaphragm

14. What is the common between parrot, platypus and kangaroo? **(AIPMT 2007)**

(1) toothless jaws (2) functional post-anal tail
(3) ovoparity (4) homoiothermy

15. Order primata contains **(BHU PMT 2007)**

(1) shrew and hedgehog (2) bats and flying fox (3) monkeys and man (4) horses and zebra

16. Limbless amphibians belong to the order **(BHU PMT 2007)**

(1) anura (2) urodela (3) gymnophiona (4) lissamphibia

17. Which of the following snakes is non-poisonous? **(BHU PMT 2007)**

(1) cobra (2) krait (3) viper (4) python

18. The post-anal tail is present in **(KCET 2007)**

(1) chordates (2) vertebrates (3) invertebrates (4) in all of them

19. **Statement A :** All metatherians are placental mammals. **(KCET 2007)**
Statement B : All placental mammals have menstrual cycle.

(1) Statement A is true and statement B is false. (2) Statement B is true and statement A is false.
(3) Both the statements A and B are true. (4) Both the statements, A and B are false.

20. Which of the following has exoskeleton of scales and paired copulatory organ or penis? **(UPCPMT 2007)**

(1) sharks (2) lizards (3) urodela (4) urochordata

21. The number of gills present in Osteichthyes is **(Kerala PMT 2008)**

(1) 2 pairs (2) 6-15 pairs (3) 5 pairs (4) 4 pairs

22. Select the correct order of classification of *Rana tigerina* upto genus **(Kerala PMT 2008)**

(1) chordata, craniata, amphibia, gnathostomata, *Rana*
(2) chordata, craniata, gnathostomata, amphibia, *Rana*
(3) chordata, amphibia, gnathostomata, craniata, *tigerina*
(4) chordata, craniata, amphibia, gnathostomata, *tigerina*

23. The cloaca of frog is a common chamber for the urinary tract, reproductive tract and **(Keraia PMT 2008)**
(1) alimentary canal (2) portal system (3) hepaticportal vessels (4) notochord

24. Mesoglia is seen in between **(WB Jee 2008)**
(1) ectoderm and endoderm (2) ectoderm and mesoderm
(3) mesoderm and endoderm (4) just below mesoderm

25. Green gland is the excretory organ of **(WB Jee 2008)**
(1) prawn (2) butterfly (3) snail (4) earthworm

26. Royal jelly is secreted from **(WB Jee 2008)**
(1) hypopharyngeal gland (2) salivary gland
(3) milk gland (4) integumentary gland

27. Choose the minor carp from the following : **(WB JEE 2009)**
(1) *Cyprinus carpio* (2) *Labeo calbasu* (3) *Labeo bata* (4) *Ctenopharyngodon idella*

28. Ornithorhynchus is an example of **(WB JEE 2009)**
(1) dinosaur (2) monotreme mammal (3) marsupial mammal (4) eutherian mammal

29. *Scirpophaga incertulus* is an example of **(WB JEE 2009)**
(1) monophagus pest (2) diphagus pest (3) oligophagus pest (4) polyphagus pest

30. Two-chambered heart is a feature of **(Kerala PMT 2008)**
(1) amphibians (2) fishes (3) reptiles (4) birds

31. Which of the following mammals is not an odd toed ungulate? **(DU PMT 2009)**
(1) rhinoceros (2) camel (3) zebra (4) horse

32. Which of the following is most poisonous? **(AFMC 2009)**
(1) Chamaeleon (2) glass snake (3) Heloderma (4) horn toad

33. Venom of cobra attacks **(AFMC 2009)**
(1) digestive system (2) immune system (3) nervous system (4) circulatory system

34. Tube feet are locomotary organs of **(UP CPMT 2009)**
(1) Spider (2) Reptile (3) Star fish (4) Cat fish

35. Which one of the following pairs of animals comprises "jawless fishes" ? **(CPMT 2009)**
(1) Guppies and hag fishes (2) Mackerals and Rohu
(3) Lampreys and eels (4) Lampreys and hag fishes

36. Which of the following is a connecting link between mammals and reptiles ? **(AFMC 2009)**
(1) *Balanoglossus* (2) *Ornithorhyncus* (3) *Peripatus* (4) *Archaeopteryx*

37. Which of the folloiwng is not a character of chordates ? **(UPCPMT 2010)**
(1) Ventral nerve cord (2) Pharyngeal gills slits
(3) Bilateral symmetry (4) Rod-like notochord

38. Which one of the following option shows correct matching pair ? **(UPCPMT 2010)**
(1) Man – Ureotelic (2) Bird – Ammonotelie
(3) Fish – Uricotelic (4) Frog – Uricotelic

39. In Frog cloacal apperture is used for elimination of **(AFMC 2010)**
(1) Urine (2) Gametes (3) Faecal matter (4) All the above

40. Fifth cranial nerve in Frog is - **(AFMC 2010)**
(1) Vagus (2) Trigeminal (3) Olfactory (4) None of these

41. Mammal's Heart is **(RPMT 2011)**
(1) Myogenic (2) neurogenic (3) Voluntary (4) sympathetic

42. A group of animals having marsupium is **(RPMT 2011)**
(1) monotremata (2) eutheria (3) metatheria (4) pantotheria

43. Which sound producing organ is found in bird ? **(RPMT 2011)**
(1) pharynx (2) Larynx (3) Syrinx (4) Trachea

Answers

BOARD LEVEL EXERCISE : HINT & SOLUTIONS

1. *Petromyzon.*

2. Platypus

3. Syrinx.

4. *Branchiostoma (Amphioxus)*

5. Detection of currents and waves in water.

6. Notochord confined to tail only.

7. Amphibia.

8. Chamaeleon.

9. Modified muscle.

10. Larval forms and metamorphosis.

11. Dodo

12. Page No. 10

13. Pg. no. 1

14. Larval forms and metamorphosis.

15. *Balanoglossus*-the Acorn (tongue) worm and *Cephalodiscus*.

16. Poisonous snake - Cobra, viper
Non-Poisonous snake - python, rat snake.

17. Ostrich , Kiwi.

18. A skull with a single occipital condyle, e.g., reptiles and birds.

19. Notochord is replaced by vertebral column partly or fully in higher chordates.

20. Marsupium is pouch on the female's belly for rearing the young one in the metatherian mammals.

21. Bones having air spaces in them. Birds have such bones to make body light for flying.

22. **(i)** The dorsal hollow or tubular nerve cord

(ii) A longitudinal supporting notochord

(iii) A seriies of pharyngeal gill slits present at a stage of life cycle.

25. Progressive metamorphosis undergone by frog's tadpole and retrogressive metamorphosis shown by Herdmania's larva.

26. By altering gas pressure in it, the swim bladder acts as a buoyancy regulator and enables the fish to stay at a particular level without expending energy in swimming. It acts as a lung for breathing air is some fishes.

27. Reptiles, birds and mammals that form special extra-embryonic membranes amnion, chorion, allantois, yolk sac during embryonic development.

28. Follow Page No. 2

29. Follow Page No. 4

30. Follow Page No. 5-6

31. Follow Page No. 11-12

32. Follow Page No.9

EXERCISE - 1

CHORDATA																			
Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	2	**2**	4	**3**	4	**4**	1	**5**	4	**6**	3	**7**	4	**8**	2	**9**	3	**10**	2
11	4	**12**	1	**13**	2	**14**	1	**15**	4	**16**	2	**17**	1	**18**	3	**19**	4	**20**	2
21	1	**22**	3	**23**	2	**24**	3	**25**	1	**26**	2	**27**	3	**28**	4	**29**	2	**30**	2
31	1	**32**	1	**33**	3	**34**	4	**35**	1	**36**	3	**37**	4	**38**	4	**39**	1	**40**	1
41	4	**42**	1	**43**	4	**44**	4	**45**	4	**46**	4	**47**	3	**48**	2	**49**	2	**50**	1
51	4	**52**	2	**53**	3	**54**	2	**55**	4	**56**	3	**57**	4	**58**	3				

PISCES																			
Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	1	**2**	2	**3**	3	**4**	4	**5**	1	**6**	1	**7**	1	**8**	4	**9**	3	**10**	4
11	4	**12**	3	**13**	2	**14**	2	**15**	1	**16**	1	**17**	3	**18**	2	**19**	4	**20**	3
21	4	**22**	1	**23**	3	**24**	3	**25**	2	**26**	1	**27**	4	**28**	3	**29**	3	**30**	2
31	1	**32**	4	**33**	1	**34**	1	**35**	2	**36**	2	**37**	2	**38**	4	**39**	2	**40**	1
41	3	**42**	4	**43**	2	**44**	3	**45**	3	**46**	4	**47**	4	**48**	4	**49**	1	**50**	3
51	4	**52**	2	**53**	1	**54**	4	**55**	3	**56**	2	**57**	1	**58**	4	**59**	2	**60**	2

AMPHIBIA																			
Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	4	**2**	4	**3**	3	**4**	3	**5**	1	**6**	3	**7**	2	**8**	2	**9**	3	**10**	2
11	1	**12**	2	**13**	3	**14**	1	**15**	2	**16**	3	**17**	1	**18**	3	**19**	1	**20**	3
21	4	**22**	4	**23**	1	**24**	2	**25**	3	**26**	4	**27**	4	**28**	1	**29**	1		

REPTILIA																			
Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	1	**2**	1	**3**	2	**4**	3	**5**	4	**6**	3	**7**	4	**8**	4	**9**	4	**10**	3
11	3	**12**	1	**13**	2	**14**	4	**15**	4	**16**	1	**17**	4	**18**	3	**19**	2	**20**	1
21	1	**22**	2	**23**	2	**24**	4	**25**	1	**26**	4	**27**	4	**28**	1	**29**	3	**30**	1
31	2	**32**	3	**33**	3	**34**	3	**35**	4	**36**	3	**37**	1	**38**	3	**39**	3	**40**	2
41	1	**42**	4	**43**	3	**44**	4	**45**	1	**46**	2	**47**	4	**48**	3	**49**	3	**50**	2
51	3	**52**	4	**53**	3	**54**	3	**55**	3	**56**	4	**57**	3	**58**	3	**59**	3	**60**	3
61	4	**62**	1	**63**	1	**64**	3												

AVES																			
Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	1	**2**	2	**3**	2	**4**	3	**5**	4	**6**	3	**7**	2	**8**	4	**9**	3	**10**	1
11	2	**12**	2	**13**	1	**14**	2	**15**	4	**16**	3	**17**	3	**18**	4	**19**	1	**20**	4
21	3	**22**	4	**23**	4	**24**	1	**25**	3	**26**	3	**27**	1	**28**	3	**29**	4	**30**	1
31	2	**32**	3	**33**	4	**34**	2	**35**	1	**36**	3	**37**	4	**38**	2	**39**	3	**40**	3
41	3	**42**	3	**43**	4	**44**	1	**45**	4	**46**	1	**47**	3						

HAMMALIA																			
Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	2	**2**	4	**3**	1	**4**	2	**5**	4	**6**	4	**7**	1	**8**	4	**9**	4	**10**	4
11	1	**12**	3	**13**	4	**14**	4	**15**	4	**16**	3	**17**	2	**18**	1	**19**	2	**20**	1
21	2	**22**	2	**23**	3	**24**	2	**25**	3	**26**	4	**27**	3	**28**	4	**29**	1	**30**	2
31	2	**32**	1	**33**	4	**34**	4	**35**	1	**36**	4	**37**	3	**38**	1	**39**	2	**40**	1
41	3	**42**	3	**43**	4	**44**	1	**45**	4	**46**	2	**47**	1	**48**	3	**49**	4	**50**	4
51	4	**52**	2	**53**	4	**54**	1	**55**	1	**56**	1	**57**	4	**58**	4	**59**	1	**60**	2
61	3	**62**	2	**63**	1	**64**	2	**65**	4										

EXERCISE - 2

Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	4	**2**	2	**3**	2	**4**	1	**5**	4										

EXERCISE - 3

Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	2	**2**	4	**3**	2	**4**	3	**5**	3	**6**	2	**7**	1						

EXERCISE - 4

Q.	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.	**Q.**	Ans.
1	3	**2**	4	**3**	1	**4**	4	**5**	3	**6**	1	**7**	1	**8**	3	**9**	4	**10**	2
11	2	**12**	4	**13**	4	**14**	4	**15**	3	**16**	3	**17**	4	**18**	1	**19**	2	**20**	2
21	4	**22**	2	**23**	1	**24**	1	**25**	1	**26**	1	**27**	3	**28**	2	**29**	1	**30**	2
31	2	**32**	3	**33**	3	**34**	3	**35**	4	**36**	1	**37**	1	**38**	1	**39**	4	**40**	2
41	1	**42**	3	**43**	3														