

COURSE CODE: BIO 102
COURSE TITLE: *Introductory Biology II*
NUMBER OF UNITS: 2 Units
COURSE DURATION: 2 Hours per week

COURSE DETAILS:

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Other Lecturer:

COURSE CONTENT:

Basic Principles of Zoological Nomenclature, Outline Classification of Animal Kingdom, Grades of Organization, A brief introduction of the various animal Phyla:

COURSE REQUIREMENTS:

This is a compulsory course for 100 level students of College of Environmental Resources Management, College of Food Science and Human ecology, College of Natural Sciences (Biochemistry, Biological Sciences, Microbiology). Students are expected to participate in all course activities and have a minimum of 75% attendance to be able to write the final examination.

READING LIST:

1. Campbell, N.A. *Biology* 4th ed. New York, Benjamin/Cummings Publishing Co Inc. 1996
2. Hickman, C.P. Sr., Hickman, C.P.Jr., Hickman, F.M. and Roberts, L.S. *Integrated Principles of Zoology*. London, The C.V. Mosby Company. 1979.
3. Segun, A.O. *Tropical Zoology*. Ibadan, University Press plc. 1998.
4. Storer, T.I., Usinger, R.L., Stebbins, R.C. and Nybakken, J.W. *General Zoology*. 6th ed. London, McGraw-Hill Book Company.

LECTURE NOTES

BASIC PRINCIPLES OF ZOOLOGICAL NOMANCLATURE -

TAXONOMY, CLASSIFICATION OR SYSTEMATICS.

Species or organisms that have many attributes in common are placed in the same genus.

Genuses that have similar attributes are placed in the same family.

Families with common characteristics constitute or form an order.

Orders in turn are grouped into classes.

Classes that have similar features form a phylum

The different phyla form the animal kingdom

Sometimes we can have sub kingdom as well as sub phylum.

The full systematic position or classification of the common toad can therefore be given as:

Kingdom: Animalia

Sub Kingdom: Metazoa

Phylum: Chordata

Sub Phylum: Craniata

Class: Amphibia

Order: Anura

Family: Ranidae

Genus: Rana

Species: Temporaria

GRADES OF ORGANISATION OR LEVELS OF ORGANISATION

Three grades of organization are recognized. The great majority of animals, like the mammal, are on the organ level: that is, their body functions are carried out for the most part by organs and organ systems e.g. the alimentary system, kidney, liver, pancreas,

reproductive organ, sense organ, skin etc.

At the other end of the scale are single-celled organisms representing the unicellular level of organization. In these unicells or protists, the functions, which in higher forms are carried out by organs and organ systems, must be performed by organelles within the single cell.

Between these two extremes are primitive multicellular animals at the tissue level of organization e.g. such animals include coelenterates, like Hydra.

Cells Tissues Organs e.g.

skin

A BRIEF INTRODUCTION OF THE VARIOUS ANIMAL PHYLA

Kingdom: Animalia

Sub-Kingdom: Protozoa

Phylum: Protozoa e.g. Amoeba, Euglena, Paramecium, Trypanosome

Sub-Phylum: Metazoa

Phylum: Coelenterata e.g. Hydra, Obelia

Phylum: Platyhelminthes e.g. tapeworm

Phylum: Nematoda(round worm) e.g. Ascaris

Phylum: Annelida(ringworm) e.g. Nereis, earthworm, leeches

Phylum: Mollusca e.g. Snail, Octopus

Phylum: Arthropoda e.g. mosquito, cockroach

Phylum: Echinodermata e.g. starfish, sea cucumber

Phylum: Chordata e.g. fish, frog, man.

ANIMAL DIVERSITY

INVERTEBRATES: THE ANIMAL KINGDOM

They have exoskeleton and the skeleton could be made up of any structure even combination of particles.

They are divided into Phyla.

THE PHYLUM PROTOZOA

FEATURES-- they are unicellular

They are very small and cannot be seen with the naked eyes.

They are microscopic. They have organelles which are not divided into tissues-hence they are called organelles (organs in animals). They have respiratory organelles

REPRODUCTION: - Asexual and sexual method. Asexual is by binary and cyst format.

Sexual method is by the fusion of gametes.

LOCOMOTION: - they move by either pseudopodia, cilia or flagella.

They have one or more nuclei.

Nucleus is for the general well being of the animal not for a particular sect.

NUTRITION: - Holophytic, holozoic, parasitic or saprophytic.

The phylum has four classes.

1 Sarcodina or Rhizopoda

pseudopodia

2 Mastigophora flagella

3 Ciliophora cilia. Depending on the type

or method of locomotion

4 Sporozoa parasitic no

external organelles

CLASS: Sarcodina e.g. Amoeba.

Characteristics: Principal phase Amoeboid

No shell, exoskeleton Lobose (blunt) pseudopodia

Method of reproduction – binary fusion

HOW AMOEBA ILLUSTRATES THE CHARACTERISTICS OF LIVING THINGS

FEEDING: Amoeba is found in ponds and feeds on smaller organisms e.g. diatoms. It engulfs its food with the pseudopodia and absorbs it into the endoplasm. The unwanted material is ejected into the water through the ectoplasm because there is no special organelle for this purpose but the food vacuole.

MOVEMENT: It makes use of its pseudopodia by producing it in any direction.

RESPIRATION: By taking oxygen from the water and diffusing Carbon dioxide from the water through the ectoplasm.

EXCRETION: This is by osmoregulation. It excretes by discharging the waste products through the contractile vacuole.

IRRITABILITY: The whole body is sensitive and feels the environment in which it is.

REPRODUCTION: Asexual and sexual method.

Asexual Binary and cyst formation

Sexual Fusion of gametes.

CLASS: MASTIGOPHORES e.g. Euglena

SUB CLASS: Phytomastigina e.g. Euglena

SUB CLASS: Zoomastigina e.g. Trypanosoma

This class has both properties of plants and animals.

LIFE HISTORY OF TRYPANOSOMA

It has two hosts. They are vertebrate man and tsetse fly.

CONTROL METHODS

To control trypanosome, you have to control the vectors i.e. tsetse fly, hence, you have to know the life histories of the two vectors, tsetse fly and man in order to know when to attack the vectors.

LIFE HISTORY OF TSETSE FLY

They are Oviparous.

Egg larvae pupa adult

stage

CLASS: CILIOPHORA e.g. Paramecium

They possess cilia

They possess mega and micro nucleus

They reproduce by binary fission and by conjugation

ORDER: Holotricha – uniform cilia whereas in others the cilia are restricted to certain parts of the body.

PARAMECIUM

PHYLUM: Protozoa

CLASS: Ciliophora ORDER: Holotricha

SPECIES: Paramecium

CLASS: Ciliophora P. Caudatum

Differentiation

Cilia – locomotion and nutrition (around the oral groove)

Trichocyst – anchoring and attacking

Meganeucleus – somatic activities

Contractile vacuole – excretion and osmoregulation

Food vacuole – digestion

Pellicle – covering – a permanent shape

Myonemes – contractile – squeeze through narrow passages

Cytostome – point of ingestion

Undulating membrane, oral groove, gullet – feeding purposes

Anal spot – point of defaecation

FEEDING OF PARAMECIUM

Digestion and absorption of food particles takes place all over the body and finally the waste materials are egested through the anal spot.

RESPIRATION: osmoregulation

CONJUGATION: Fusion of gametes, involving two paramecia of different strains. Each of the two strains is known as conjugant. The meganeucleus does not take part in conjugation, the meganeucleus disappears.

SIMILARITIES BETWEEN CONJUGATION AND SEXUAL REPRODUCTION IN

THE HIGHER METAZOA

CONJUGATION SEXUAL

REPRODUCTION

1. Individuals of different strains Male and Female
2. Meiotic formation of haploid gametic nucleus Haploid gametes formed by meiosis
3. Fusion of two gametic nuclei which differ in Fusion of two dissimilar gametes to size and behaviour to form a zygotic nucleus form zygote

CLASS: Sporozoa e.g. Plasmodium vivax

Characteristics

1. Parasitic
2. No external organelle of locomotion
3. No meganucleus

It causes malaria fever. It has two hosts, mosquito, vector, man. The female mosquito sucks blood and takes in malaria from where it sucks blood and

transfers it to another person by biting that one. This is how malaria is spread.

Polymorphs of plasmodium

1. Trophozoites in the liver of man
2. Shizonts in the blood cell
3. Sporozoites in the saliva of mosquito
4. Sporozoites in the blood of man.

Control of Malaria parasite

1. Treatment of infection in the patient _____ drugs.
2. Prevention of infection. _____ eradication of the vector.
3. Control of the vector _____ life history.

Treatment of infection

The effect is known when the symptoms appear on the patient. And treatment is by taking tablets chloroquin, primaquin etc.

Prevention of infection

This is done by eradicating the vector by clearing the bush etc. and taking care of ourselves from being bitten by mosquitoes, cover up yourself at midnight.

Control of infection

With the knowledge of the life history of the sporozoites, we know that effect of mosquito bite is not immediately known, but after 8-10 days when the trophozoites might have been developed in the liver, then we take drugs to kill the trophozoites, thus preventing them from growing further.

2. Knowledge of the life history of mosquito can also help in control. Egg – larva – pupa – adult. We can control the larva stage by pouring oil on the eggs on water, thus preventing them from proceeding to pupa stage.

3. Introduction of fishes that will eat the larvae and introduction of D.D.T (insecticides to kill adult mosquitoes.)

Phylum: Coelenterata ----- metazoan.

Characteristics:

1. They are multi cellular animals.
2. They have two body layers i.e. diploblastic ectoderm and endoderm with mesogloea in between i.e. the two body layers are separated by a structureless, jelly-like layer called mesogloea.
3. They possess a body cavity called enteron, hence, coelenterons.
4. There is only one opening ---- the mouth, there is no anus.
5. The mouth is surrounded by tentacles.
6. They possess nematocysts ---this is for defense and for food captures because

the nematocysts contain poison and they are ejected out of the body.

7. They reproduce asexually by budding and sexually by fusion of gametes. 8. No excretory or respiratory tissue.

9. Some are solitary, while some are colonial.

10. Some exhibit polymorphism.

11. They are mostly marine.

They are subdivided into two sub – phyla.

Sub – phylum I Cnidaria – possess nematocysts, locomotion by muscular activity.

E.g. hydra, obelia, physalia (Portuguese man of war), vellela, jelly fishes.

Sub – phylum II Ctenophora – no nematocysts, locomotion with the help of

cilia. E.g. beroe, pleurobrachia.

Sub – phylum Cnidaria – has 3 classes

Class: Hydrozoa e.g. obelia, hydra.

1. They are solitary or colonial forms with both polyp and medusa forms in the life history.

Order: Hydrida e.g. hydra

Solitary, polyps

No medusoid stage.

Possess hollow tentacles

No coenosarc or perisarc (differentiation of body into layers.)

Order: Calyptoblastea e.g. obelia, colonial, possess both polyps and meduloid stage.

Possession of coenosarcs and perisarc

They exhibit polymorphism – polyp or feeding zooid hydranth.

Asexual reproduce zooid called gonozoid which bud the medusa.

Sexual ___ sexes are separate but not externally distinguishable. They are 4 gonads in a medusa.

The blastostyle or gonozoid is the reproductive polyp, which has lost the tentacles, mouth and the capacity to feed, and become specialized for asexual reproduction. Each one arises as a hollow extension of the coenosarcs, which is enclosed in a flask-shaped extension of the perisarc called the gonotheca, with a distal aperture. A blastostyle grows at the base of a branch of the stem carrying a hydranth. Along the sides of the blastostyle medusae-buds are formed, which on maturity separate off and leave the gonotheca through its aperture to swim away from the colony (thus disseminating the species).

Phylum Platyhelminthes e.g. flatworms

Characteristics:-

1. Triploblastic
2. Dorsoventrally flattened body
3. Bilaterally symmetrical
4. Acoelomate
5. Ciliated ectoderm in free living forms
6. They have suckers and hooks
7. They have thick cuticle
8. Digestive system incomplete, no germs
9. Well developed circular and longitudinal muscles
10. There are spaces between organs filled with parenchyma ----- a form of connective tissue
11. Platyhelminthes have simple sense organs like eye-spots

12. Excretory system consisting of two longitudinal canals which branch and terminate in flame cells. (Flame cells are ciliary or flagellory structures on the upper part of the cell lumen.)
13. No respiratory, circulatory or skeletal system.
14. They are mostly hermaphrodite with direct development in some but indirect in some parasitic forms.
15. Possession of proglottides in some form.
16. Ability to regenerate.

There are three classes of platyhelminthes

Class Turbellaria e.g. Planaria

They are free – living forms

They have ciliated ectoderm

No proglottides, no hooks and suckers

They are capable of regenerating

Sense organs are frequently well developed

Class Trematoda (parasites) e.g. flukes

They are flat and leaf – like shaped with suckers for attachment.

They possess thick cuticle for clinging.

No ciliated ectoderm

There are some backwardly directed spines e.g. fasciola.

Order Monogenea (heterocotylea)

They have no alteration of hosts

Their anterior sucker is poorly developed or absent

Posterior sucker is well developed.

No larva stage e.g. polystomium.

Order Digenea (Malacotylea) e.g. Fasciola hepatica (liver fluke.)

There is alteration of two hosts

Well developed anterior sucker.

Indirect development e.g. snail and sheep.

Class III Cestoda e.g. Tapeworm

They are extreme endoparasites

They have gut, suckers and hooks

They have two hosts ___ pig and man Very thick cuticle

Form proglottides.

Structural, physiological and reproductive modifications of Fasciola to the parasitic mode of life

1. Flat shape for early adaptation in the host intestine, presence of suckers, for attachment.
2. Hermaphrodite, no need for searching for opposite sexes.
3. Thick cuticle, for protection against enzyme actions from the host.
4. Anti – enzymes produced, for protection against enzyme actions from the host.
5. Backwardly directed spines, for early adaptation in the host intestine.
6. Production of large numbers of eggs, to make sure of getting offsprings.
7. Possession of two hosts, for long survival of thee Fasciola (parasite).

- a. Cilia in miracidia larvae
- b. Penetrating gland for easy entrance into its hosts.

Each larva stage with morphological adaptations to enable them survive the ordeal during their brief sojourn in the outside world.

- c. Tailed cercaria produced
- d. Ability of cercaria to encyst, to ensure survival.
- e. Possession of eyespot to know the right host to infest.
- f. There is polyembryony, ability to produce.

Many larval stages develop asexually to balance the mortality rate when exposed to hazards.

EFFECT ON THE HOST

It affects the liver of the sheep and when they are many they can kill the sheep. But they do not affect man.

PARASITIC ADAPTATIONS OF TAENIA SOLIUM

1. Possession of hooks and suckers, for attachment.
2. Flat shape, for easy existence in the host.
3. Thick cuticle, for prevention of enzymes produced by the host.
4. No digestive system, because it is in the environment of digested food which it depends on.
5. Nervous, locomotory system and excretory system reduced, because no need for all these as its well situated.
6. Hermaphrodite, no need for search for opposite sexes.
7. Production of large numbers of fertilized eggs, for assurance of getting

offsprings.

8. Regeneration, for survival of the parasite.
9. Two hosts, for survival of the parasite.
10. Encystment of oncosphore and cysticerus, for survival of the parasite.
11. Anaerobic respiration, because it exists in an environment of low oxygen, it respire anaerobically.
12. Anti-enzymes, prevention against enzymes actions of the host.

Effect on the host – man

It causes taeniasis.

The symptoms i.e. effects are

1. Sharp abdominal pains.
2. Constipation
3. Vomiting
4. Indigestion
5. Loss of appetite and nervous disorder
6. Hunger, loss of weight

Phylum NEMATODA (roundworms)

They are thread-like, cylindrical, round worms. They are triploblastic acoelomate animals. They are bilaterally symmetrical and unsegmented. There is a peculiar perivisceral cavity. The body is covered by a smooth non-chitinous cuticle. There is a single layer of longitudinal muscle underlying the epidermis. They are divided into four quadrants. The excretory system consists of two intracellular tubes with a single excretory pore. The alimentary canal is simple straight and opens by a mouth and an

anus. Sexes are usually separate and gonads are tubular. No vascular or respiratory system. The cilia are absent even in the developmental stage.

Classification

Class Ascarididae e.g. Ascaris.

They have between three to six lips around the mouth. Males have curve posterior ends while female ends are straight. They have two spicules, they have no copulatory bursai.

Class Strongylidae e.g. Ancylostoma

These are nematodes with simple mouth without papillae. The males have two copulatory spicules and three bursai for ejaculation.

This phylum is one of the largest phyla in the animal kingdom as regards number of individuals and species. Its members live either freely in the sea, soil or decaying organic matter, or parasitically on other animals as well as plants i.e. they are parasitry both plants and animals. In spite of their very wide dispersal, their anatomy is remarkably simple and uniform.

Phylum ANNELIDA

Characteristics

1. Metamerically segmented worms.
2. Body wall with well developed outer circular and inner longitudinal layers of muscle with glandular epidermis.
3. Transparent thin, moist cuticle
4. Possession of chitinous chaetae which are borne on parapodia in some.
5. Possession of COMPLETE DIGESTIVE SYSTEM.
6. Respiration by skin or gills
7. Excretory system consists of segmentally arranged nephridia.
8. Well developed nervous system
9. May be hermaphrodite or of separate sexes

10. Presence of a trocophore larva in some, others have direct development.
11. Closed blood vascular system with haemoglobin.

There are three main classes

1. Class Polychaeta e.g Nereis
2. Class Oligochaeta e.g. Earthworm
3. Class Hirudinea e.g. Parasites, leeches

Class Polychaeta

Characteristics

1. Possession of parapodia on which are borne numerous chaetae
2. Possession of distinct head with eyes, palps and tentacles, cephalisation
3. No clitellum
4. Separate sexes
5. They are mostly marine.
6. They have trocophore larva.

Class Oligochaeta

Characteristics

1. No parapodia

2. Few setae
3. Possess clitellum

4. They are hermaphrodite
5. They have direct development
6. Their head is not clearly distinct.

Class Hirudinea

Characteristics

1. They are ectoparasites
2. Possession of anterior and posterior suckers
3. Body with fixed number of segments which is subdivided into annuli
4. No parapodia or chaeta
5. They are hermaphrodite, direct development.
6. They develop clitellum when sexually mature.
7. They have direct development.

Phylum ARTHROPODA

Characteristics

1. Triploblastic, coelomate, metametrically segmented.
2. Jointed appendages modified for various purposes.
3. Exoskeleton of chitin
4. Body usually divided into 3 regions, head, thorax and abdomen.
5. Possession of striated and non-striated muscles
6. Complete digestive system with mouth-parts for different methods of feeding
7. Open blood system, haemocyanin which are blue in colour
8. No nephridia

9. No cilia except in peripatus
10. Respiration is through body surface, spiracles, trachea, gills or lung books
11. Excretory system by green or antennary gland in aquatic ones and malpighian tubules in terrestrial ones.
12. Well developed nervous system
13. Sensory organs well developed consisting of eyes, antennae and antennules, balancing organs and in some auditory organs
14. Pronounced cephalisation with definite anterior end where sensory organs are concentrated.
15. Sexes nearly always separate 16. Some show metamorphosis

There are many classes of arthropods

Class Onychophora e.g. peripatus

Characteristics

1. Thin cuticle, soft muscular body wall
2. Longitudinal and circular muscles
3. Spiracles scattered, irregularly over the body
4. Cilia present in genital organs
5. Body wormlike and externally unsegmented with imperfectly jointed legs each with 2 claws
6. Possession of nephridia
7. Separate sexes, direct development.

Class Crustacea: Aquatic lobsters, crayfish, shrimps, crabs, water fleas and others.

Characteristics

1. Possession of gills.
2. Queen or antennary gland for excretion
3. Possess antennae and antennules
4. Well developed mouthparts
5. Appendages modified for swimming, walking and food capture
6. Body divided into two 2 regions, cephalothorax and abdomen
7. They possess exoskeleton

Class Myriapoda

Characteristics

1. possess tracheate, land living
2. Arthropods with elongated body
3. Possess a distinct head with a pair of antennae
4. Excretion by malpighian tubules.

Subclass Chilopoda ___ Centipedes

Subclass Diplopoda ___ Millipedes

Class Arachnides (scorpion, spiders, ticks, mites)

Characteristics

1. Arthropods with fully chitinised exoskeleton
2. They have two regions, proxoma and opisthosoma
3. Well developed appendages modified for various purposes, maybe sensory, prehensile or for walking but typically four pairs of walking appendages
4. Respiration by gill or lung books or by trachea

5. Excretion by coxal glands or malpighian tubules
6. Poison glands in some
7. Sexes separate with direct development
8. Possession of a pair of chelicerae (instead of antennae)

Class Insecta

Characteristics

1. The body is segmented
2. The body is covered by chitinous exoskeleton
3. Body divided into three regions, head, thorax and abdomen
4. On the head are found the following: - a pair of antennae, a pair of mandibles and 2 pairs of maxillae, adapted for sucking, biting, piercing, and chewing.
5. Two pairs of wing, some a pair, some none, when two pairs on pro and Meta thorax.
6. Three pairs of walking legs
7. Respiration is by trachea, branched spiracles
8. They have a complete digestive system, fore, mid and hind gut.
9. Salivary gland
10. An open circulatory system
11. Malpighian tubules open into the hind gut.
12. Nervous system
13. Possess a pair of large compound eye
14. Separate sexes. Internal fertilization
15. Complete or incomplete metamorphosis. When complete egg – larva – pupa – adult. When incomplete egg – nymph – adult.

16. Pathonogenous , some of them reproduce by parthenogenesis in form of sexual reproduction

Insect have about 29 orders.

Success of insects

1. Small size
2. Produce large number of eggs
3. Exoskeleton for conservation of water
4. Possession of different types of mouthparts for chewing, piercing, sucker

create less competition among the insects

5. Excretory product of uric acid, so they lose little or no water
6. Leg appendages modified for jumping, leaping and swimming. Locomotion.
7. A pair of large compound eyes for easy sight
8. Protective colouration or a mode of protection against enemies
9. Ability to live anywhere, air, land, water.
10. Possession of trachea for respiration
11. Possession of antennae for feeling
12. Possession of wings for flight, escape and colonization of the species and finding of food
13. Ability to metamorphosise the metamorphosis stages can exist on their own because of their possession of adaptations for their own survival e.g. gills and spiracles
14. Colonies, special insect, ability to live together and work as a committee with division of labour.

Economic importance of insects

Usefulness

1. Agents of pollination
2. Source of protein, source of food
3. Production of honey
4. Production of silk
5. Some enrich the soil
6. Some used as a means of biological control.

Harmful effects

1. Vectors of parasites, causing diseases, tsetse fly, mosquitoes
2. Pests of fresh, stored products
3. Some secrete poisons

Phylum MOLLUSCA

Characteristics

1. Soft body animals which are not segmented
2. Body enclosed in a mantle which secretes the shell
3. Some with ventral muscular foot
4. They have head with tentacles
5. Complete digestive system, radula, gills, lungs, body surface
6. Some are aquatic, marine and freshwater, terrestrial, some are parasitic
7. Possession of nephridia for excretion

Class Amphineura e.g. chiton

Characteristics

1. No tentacles, no eyes

2. Elongated body

Class Gastropoda e.g. Helix

Characteristics

1. Possess head with tentacles
2. Show spiral coiling and torsion
3. Possession of large flattened foot

Class Scaphopoda e.g. Dentalium

Characteristics

1. Live in a tubular shell opening at both ends
2. They have reduced foot
3. No tentacle

Class Lamellibranchiata e.g. Anodonta, mytilus

Characteristics

1. They have bivalve shell
2. Laterally compressed rudimental head.
3. No tentacles

Class Cephalopoda e.g. logilo, sepia, octopus

Characteristics

1. Well developed head with a crown of tentacles

2. Possess siphon
3. Chambered shell
4. Possess well developed eyes

Phylum Echinodermata This phylum includes very peculiar forms which are quite different from the preceding

ones. They are unsegmented coelomate animals which are radially symmetrical in the adult (usually five rayed), but bilaterally symmetrical in the larval stage.

They possess a DERMAL SKELETON which consists of calcareous ossicles (bones) that may develop short or long spines.

The nervous system is diffuse and remains attached to the epidermis.

No nephridia or any other special excretory organs.

The sexes are separate and gonads discharge by special ducts directly to the exterior.

The echinoderms are very common as fossil forms (since the Cambrian period) and are entirely marine.

None of them are parasitic.

The phylum Echinodermata is classified into two sub-phyla

Subphylum I Eleutherozoa

Subphylum II Pelmatozoa

The subphylum Eleutherozoa are free living forms, without a stalk, and have 4 living classes.

Class I Asterozoa e.g. Starfishes

Class II Ophiurozoa e.g. Bristle Stars

Class III Echinozoa e.g. Sea urchins

Class IV Holothuroidea e.g. Sea cucumbers

The subphylum Pelmatozoa are sessile forms, usually stalked, and are represented among the living echinoderms by the class Crinoidea e.g. Sea lilies and Sea feathers.

This phylum is of great interest on account of its affinity to the Phylum Chordata. Thus, 2 super phyla are recognized.

Super phylum I Annelid which include the phylum Annelids

Phylum Arthropods

Phylum Mollusca and

Super phylum II Echinoderm made up of phylum Echinodermata and phylum Chordata.

Phylum Chordata

The chordata form one of the most successful phyla of the animal kingdom.

The chordata are classified into 4 sub phyla.

Sub phylum I Hemichordata e.g. Acorn worms

Sub phylum II Urochordata e.g. Sea-squirts

Sub phylum III Cephalochordata e.g. Amphioxus

Sub phylum IV Craniata or vertebrata e.g. lampreys, fishes, amphibians, reptiles, birds and mammals.

The first three sub phyla are collectively called the PROTOCHORDATA which are entirely marine.

Among them, the cephalochordates are also called the ACRANIA in contradistinction to the CRANIATA, being without or with a cranium respectively. The Acrania and Craniata are sometimes grouped together and referred to as the EUCHORDATA.

The chordates have a common basic plan of organization with the following three main features.

1. The presence of a NOTOCHORD, an axial rod of the skeleton, which extends in the dorsal region of the body.
2. The CENTRAL NERVOUS SYSTEM is tubular, i.e. containing a cavity, and lies dorsal to the notochord.
3. The anterior part of the alimentary canal, THE PHARYNX, is perforated by a variable number of gill – slits which lead into the gills.

However, these characteristics may be modified to a greater or lesser extent, either early in development or in the adult form. Thus, the notochord may disappear in the post larval stage as in the adult Urochordates, or may be transformed by the addition of skeletogenous tissues into a jointed backbone or VERTEBRAL COLUMN, as is characteristic of the vertebrates.

The gills never function at any stage of development of the Amniota (reptiles, birds and mammals) nor in the adult of most Amphibia.

