UNIT – IV

Phylum- Annelida- characteristics, classification:

- They are mostly aquatic; marine or freshwater some terrestrial, burrowing or tubicolous, sedentary or free-living, some commensal and parasitic.
- The body is elongated, triploblastic, bilaterally symmetrical, truly coelomate and vermiform.
- The body is metamerically segmented; externally by transverse grooves and internally by septa into a number of divisions; each division is called a segment, metamere or somite.
- Body organization is of organ grade system.
- The epidermis is of a single layer of columnar epithelial cells, covered by thin cuticle not made of chitin.
- The body wall is contractile or dermo-muscular consisting of outer muscle fiber circular and inner longitudinal.
- Appendages are jointed when present.
- Locomotory organs are segmentally repeated chitinous bristles called setae or chaetae, embedded in the skin. It may be bored by lateral fleshy appendages or parapodia.
- The presence of true schizocoelous coelom usually divided into compartments by transverse septa. Mostly well-developed in leeches. Coelomic fluid with cells or corpuscles.
- The alimentary canal is straight tube-like, complete, extending from mouth to anus. Digestion is entirely extracellular.
- Respiration occurs through moist skin or gills of parapodia and head.
- The blood vascular system is a closed type. Blood is red due to the presence of hemoglobin or erythromycin dissolved in plasma.
- Excretion is by metamerically disposed coiled tubes; nephridia which communicate the coelom to the exterior.

- The nervous system consists of a pair of cerebral ganglia; brain and double ventral nerve cord having segmentally arranged ganglia and lateral nerves in each segment.

- Receptor organs include tactile organs, taste buds, statocysts, photoreceptor cells and sometimes eyes with lenses in some.

- They are monoecious i.e. hermaphroditic or sexes separate cleavage spiral and determinate; dioecious or unisexual form also present.

- Their development is direct in monoecious form but indirect in dioecious form.

- Larva, when present is a trochophore is characteristics in case of indirect development, while in others this stage is passed through development.

- Regeneration is common.

- Asexual reproduction occurs in some.

Classification of Phylum Annelida

About 8,700 known species of Annelida are divided into four main classes, primarily on the basis of presence and absence of parapodia, setae, metameres, and other morphological features.

Class 1- Polychaeta (Gr., **poly=**many**, chaeta=**bristles/hair)

- Chiefly marine, some freshwater.
- Carnivorous
- Body segmentation is internal and external.
- Head consists of prostomium and peristomium and bears eyes, tentacles cirri, and palps.
- Setae numerous on lateral parapodia.
- The clitellum is absent.
- Cirri or branchiae or both may be present for respiration.
- The coelom is spacious usually divided by intersegmental septa.
- The alimentary canal provided with the eversible buccal region and protrusible pharynx.
- The excretory organ is segmentally paired nephridia.
- Sexes separate. Gonads temporary and in many segments.
- Fertilization external.
- Asexual reproduction by lateral budding.
- Trochophore larva present.

Polychaeta divided into two subclasses, Errantia and sedentaria after Fauvel (1959). However, according to Dab (1963), this division is artificial and not a natural one.

Subclass 1. Errantia

- Free-swimming, crawling, burrowing or tube-dwelling and predatory polychaetes.
- Segmentation similar, except at anterior and posterior ends.
- The prostomium is distinct with sensory organs.
- Parapodia, provided with cirri, are equally developed throughout.
- Pharynx protrusible, enlarged and usually with jaws and teeth.
- Examples: *Nereis*, *Aphrodite*, *Polynoe*, *Phyllodoce*, *Tomopteris*, *Syllis*, *Eunice* , *Histriobdella.*

Subclass 2. Sedentaraia

- Burrowing and tube-dwelling form.
- Body made of 2 or more regions, with unlike segments and parapodia.
- Head is small or much modified without eyes and tentacles, prostomium small.
- No acicula and compound setae.
- Pharynx non-protrusible without jaws and teeth.
- Gills, when present, localized to the anterior segments.
- Feeding on plankton or organic detritus.
- Examples: *Chaetopterus*, *Arenicola*, *Owenia*, *Sabella*, *Terebella*, *Sabellaria*, *Pomatocerous.*

Class 2- Oligochaeta (Gr., **oligos**=few**+ chaete=**hair**)**

- Mostly terrestrial or some freshwater forms.
- Body with conspicuous external and internal segmentation.
- Head indistinct, without sensory organs.
- Setae few, embedded in the skin.
- Parapodia absent.
- Glandular clitellum present for cocoon formation.
- The pharynx is not eversible and without jaws.
- Hermaphroditic i.e. sexes united.
- Testes anterior to ovaries.
- Development is direct. fertilization external (in cocoon); no larval stage.
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Order 1. Archioligochaeta

- Mostly freshwater form.
- The body consists of a few segments.

- Setae are present in bundles.
- The gizzard is poorly developed, non-muscular or absent.
- The clitellum is simpler consists of a single layer of cells and situated far towards.
- Eyespots are frequently present.
- Male reproductive openings lie in front of female reproductive openings.
- Reproduction asexual and sexual.
- Examples: *Tubifex*, *Aelosoma.*
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Order 2. Neooligochaeta

- Usually terrestrial forms.
- The body is large and many segmented.
- Setae are managed in a lumbricine Manner.
- The gizzard is well developed.
- The clitellum is composed of two or more layers of cells and never begins before twelfth segments.
- Female genital aperture is always on the 14^{th} segment and the male pore lies a few segments behind them.
- Vasa differentia are elongated extending over 3 or 4 segments.
- Eyespots are never developed.
- Reproduction sexual. Asexual reproduction is not known.
- Examples: *Pheretima*, *Eutypheus*, *Megascolex*, *Lumbricus*.

Class 3- Hirudinea (L., hirudo= a leech**)**

- Mostly ectoparasitic, blood-sucking or carnivorous. Few are marine, freshwater or terrestrial.
- The body is elongated and usually flattened and dorso-ventrally or cylindrical.
- The body consists of a fixed number of segments (33). Each segment breaks up into 2 to 4 rings or annuli.
- Segmentation external without internal septa.
- Par podia and setae are absent.
- Both anterior and posterior ends of the body with ventrally situated suckers.
- The mouth opens on the ventral surface on anterior suckers, while anus opens dorsal to the posterior suckers.
- Coelom much reduced due to filling by botryoidal tissues, and form haemocoelomic sinuses.
- Hermaphrodite with one male and one female gonopore.
- Fertilization internal.

- Asexual reproduction is not known.
- Eggs are always laid in cocoons.
- Development is direct without a free-swimming larval stage.

Order 1. Acanthobdellida

- Mostly parasitic on the fins of salmon fishes.
- The body comprises 30 segments only.
- They are primitive, without anterior suckers, proboscis, and jaws.
- Double rows of setae are present in 5 anterior segments.
- The body cavity is spacious and incompletely divided by septa.
- The vascular system consists of the dorsal and ventral vessels.
- Nephridial opening situated on the surface between the segments.
- Examples: a single genus and species (*Acanthobdella*) parasitic on salmon.

Order 2. Rhynchobdellida

- Parasites on snails, frogs and fishes, marine and freshwater form.
- Each typical body segment consists of 3,6 or 12 rings.
- The mouth is a small median aperture situated in the anterior suckers.
- A protrusible proboscis with no jaws.
- Coelom without compartments.
- Blood vascular system separated from coelomic sinuses.
- Blood is colorless.
- Examples: *Placobdella*, *Helobdella*, *Piscicola*, *Branchellion.*

Order 3. Gnathobdellia

- Freshwater and terrestrial form. Ectoparasitic blood-sucking leeches.
- Each typical body segment consists of 5 rings or annuli.
- Anterior suckers with 3 jaws, 1 median dorsal and 2 ventrolateral.
- The proboscis is absent.
- Blood is red-colored.
- Botryoidal tissues present.
- Examples: *Hirudo*, *Hirudinaria*, *Haemadipsa*, *Herpobdella*.
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Order 4. Pharyngobdellida

- Terrestrial and aquatic. Some predaceous.
- Pharynx non- protrusible. No teeth but one ore two styles may be present.
- Examples: *Erpobdella, Dina.*
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Class 4- Archiannellida (Gr., **arch**=first**)**

- Exclusively marine form.
- Body elongated and worm-like.
- Setae and parapodia are usually absent.

- External segmentation is slightly marked by faint, while internal segmentation is marked by coelomic septa.
- Prostomium bears 2 or 3 tentacles.
- Sexes usually separate, hermaphrodite.
- Usually trochophore larva.
- Examples: *Polygordius*, *Dinophilus*, *Protodrilus.*

Arthropoda Characteristics

The arthropoda characteristics are mentioned below:

1. The body is triploblastic, segmented, and bilaterally symmetrical.
2. They exhibit organ system level of organization.
3. The body is divided into head, thorax, and abdomen.
4. Their body has jointed appendages which help in locomotion.
5. The coelomic cavity is filled with blood.
6. They have an open circulatory system.
7. The head bears a pair of compound eyes.
8. The exoskeleton is made of chitin.
9. The terrestrial Arthropods excrete through Malpighian tubules while the aquatic ones excrete through green glands or coaxal glands.
10. They are unisexual and fertilization is either external or internal.
11. They have a well-developed digestive system.
12. They respire through the general body surface or trachea.
13. They contain sensory organs like hairs, antennae, simple and compound eyes, auditory organs, and statocysts.

Classification of Phylum Arthropoda

The classification of phylum arthropoda are as follows:

Crustacea

1. They are aquatic, terrestrial, or parasitic.
2. The head is fused with the thorax region known as the cephalothorax.
3. Respiration occurs through gills or general body surface.

4. The body is covered by a single large carapace.
5. They possess two pairs of antennae and five pairs of appendages.
6. They excrete through green glands or antennal glands.
7. They have a pair of compound eyes and gonopores.
8. Development is indirect. Larval stage is present.
9. Eg., Daphnia, Palaemon

The subphylum Crustacea is divided into six classes-

- Branchiopoda
- Remipedia
- Chephlocarida
- Maxillopoda
- Ostracoda
- Malacostraca

Myriapoda

1. These are mostly terrestrial.
2. The body is elongated with numerous segments.
3. The head is provided with antennae, two pairs of jaws, and a pair of simple eyes.
4. They contain numerous legs.
5. The upper lip of the mouth contains epistome and labrum, and the lower lip contains a pair of maxillae.
6. A pair of mandibles is present inside the mouth.
7. They respire by trachea and excretion occurs by Malpighian tubules.
8. Eg., Julus, Scolopendra

The subphylum Myriapoda is divided into the following classes:

- Chilopoda
- Diplopoda
- Pauropoda
- Symphyla

Hexapoda

1. They are mostly terrestrial.
2. The body is differentiated into head, thorax, and abdomen.
3. Head bears a pre-segmental acron.
4. The thorax is divided into three segments.
5. The abdomen has 7-11 segments.
6. They have three pair of appendages.
7. It has a pair of compound eyes
8. They respire through gills and trachea.
9. Malpighian tubules are the excretory organ.
10. Development is indirect, and the larval stage is present.
11. Eg., Tabernus, Mosquitoes, Ants.

The subphylum Hexapoda is divided into two classes:

- Insecta
- Entognatha

Chelicerata

1. They are mostly found on land.
2. The body is differentiated into cephalothorax and abdomen.
3. Antennae are absent.
4. The abdomen is divided into 13 segments.
5. It has four pairs of interior appendages.
6. They respire through trachea or gills.
7. The Malpighian tubules help in excretion.
8. Eg., Aramea, Limulus

The subphylum Chelicerata is divided into the following classes:

- Arachnida
- Merostomata
- Pycnogonida

Onychophora

1. These are small-sized, terrestrial arthropods.
2. The body is divided into segments.
3. Excretion occurs through nephridia.
4. They respire through the trachea.
5. Eg., Paripatus

Trilobitomorpha

1. These are primitive arthropods and are extinct.
2. They were found in abundance during the Paleozoic era.
3. The body was divided into three lobes- one median and two lateral lobes.
4. Head bore a pair of compound eyes and a pair of antennae.
5. There was no structural differentiation of the body parts.
6. The body was divided into head, thorax and pygidium.
7. Appendages are biramous.

Nereis

Nereis or *Neanthes* is a marine polychaete annelid that lives in burrows in sea bottom and comes out in night to prey upon small animals. *N. virens* (Sandworm), *N. pelagica* (Type-species) and *N. succinea* (Clam worm) are common species of *Nereis*.**Continue Reading Zoology Notes On – Life History Of Nereis – For W.B.C.S. Examination.**

Body of *Nereis* is dorsoventrally flattened, segmented and 30-40 cm long having 80 to 120 segments and divisible into acron, trunk and pygidium**. Acron** is divisible into anterior prostomium and posterior peristomium and a mouth in between on the ventral side. **Trunk** is metamerically segmented and segments are called metameres or somites each one of which bears a pair of parapodia. The last segment is called **pygidium** that bears an anus slightly on the dorsal side and a pair of thread like anal cirri and several minute sensory papillae on the dorsal side.

PARAPODIUM

Parapodia are paired locomotory organs of the body attached on the lateral side of each trunk segment. Each parapodium is made of two lobes, viz. dorsally placed *notopodium* and ventrally placed *neuropodium*. Both lobes carry thread-

like appendages called dorsal and ventral cirri. The two lobes of parapodium are supported internally by two chitinous rods known as *aciculum*, on the apical part of which there are bundles of long, chitinous setae or chaetae which project beyond the outer margin. Nephridiopore is situated on the parapodium near the ventral cirrus.

SKIN

Skin is made of tall columnar cells and scattered glandular and sensory cells and is richly supplied with blood vessels. Outer surface of epidermis is coated with a layer of tough cuticle which carries a number of small pores for glands. Below the epidermis there are circular and longitudinal muscles in bundles and some oblique strands that help to carry out lateral undulation of body.

COELOM

The coelom is schizocoelom but true perivisceral cavity that is made of an outer parietal peritoneum and an inner visceral peritoneum that surrounds the alimentary canal. Coelom is divided into compartments by intersegmental septa and is filled with coelomic fluid containing amoeboid *coelomocytes*.

LOCOMOTION

Nereis can crawl, burrow and swim actively. Crawling is done by parapodia, while swimming involves lateral undulations of body, brought about by wave-like contractions of longitudinal muscles and use of parapodia in oar-like fashion.

DIGESTIVE SYSTEM

Alimentary canal is a straight tube extending from anterior to posterior end of the body. The anterior opening is the mouth and posterior opening the anus. *Mouth* is located on ventral side of peristomium and opens into the buccal cavity, which carries teeth or *dentacles*. Pharynx is a large chamber and is lined internally by cuticle. One pair of jaws is present at the posterior end of pharynx. *Pharynx* can be protruded out of mouth by protractor muscles and can be withdrawn by retractor muscles. *Oesophagus* occupies five segments and receives a pair of glands. It communicates with stomach–intestine, which is a more or less straight tube that is constricted in each segment. A distinct stomach is absent in *Nereis*. Epithelial lining of mid-gut contains gland cells which secrete digestive enzymes. Rectum is the last part of intestine and opens to outside by anus. Nereis is a carnivore and feeds on small animals such as crustaceans, molluscs, sponges and other animals.

Prey is captured by the eversion of pharynx, which brings the jaws in front to grasp the prey. Retraction is caused by contractions of retractor muscle which brings the prey deep into the pharynx. The ingested food is masticated in the buccopharyngeal region by denticles. Food passes through the intestine by peristalsis and digestion is mainly extracellular and the food is digested by the digestive juices secreted by the oesophageal glands and the glands in the epithelial lining of stomach-intestine. Absorption of digested food also occurs in the stomach-intestine. The undigested food passes into rectum from where it is egested through anus.

Respiration:

Since the animals are confined to the tube, the appendages of the head become modified to form palp and gill filaments which aid in breathing. (3). Reduction in Locomotion: Because of the absence of locomotion, locomotory organs, such as parapodia are lost. (4). Reduction of Sense Organs: Sense organs are also comparatively reduced. (5) Prey Catching Device: Since the parapodia are reduced, they cannot bring about locomotion effectively during the time when the burrowing annelid crawl freely on the sea bed. So eversible pharynx is provided with papillae and it helps in caterpillar like movement of the annelids. The eversible pharynx is an adaptation, which has a double function i.e., catching the prey and helping in locomotion

Reproductive System

1. Gonads -

Most species of Nereis are dioecious (unisexual). Sexes are separate. Gonads (testes and ovaries) are neither distinct nor permanent organs. They are seasonal and develop only during the breeding season i.e, in the summer months. Gametes are shed as spermatogonia in male and as oogonia in female into coelomic fluid where they undergo maturation to develop into spermatozoa and ova, respectively. Spermatozoa or sperms are small cells with a minute rod-shaped head and a long vibratile tail. Ova are somewhat large and rounded and packed with yolky globules.

2. Gonoducts –

In Nereis there are no gonoducts Ripe sperms and ova are discharged to outside sea water mostly through metanephridia by the action of cilia borne by nephrostomes and nephridial tubules.

3. Dorsal ciliated organs –

A pair of dorsal ciliated organs occurs in each segment in close relation to the dorsal longitudinal muscles. It has been said that during sexual maturity, funnels open to the exterior by temporarily acquired minute apertures opposite to them in body wall. However, the real function of ciliated funnels remains controversial.

Respiration

Respiration Gills or any other special organs of respiration are lacking in Neanthes. The parapodia with their rich blood supply and body wall with its plexus of blood vessels sub serve the function of blood respiration. Gaseous exchange takes place at the surface of these organs. Oxygen diffuses from the surrounding water into the blood through the integument or parapodia surface due to great partial pressure in comparison to blood. Similarly, from the blood carbon dioxide diffuses ino the surrounding water due to great partial pressure than the surrounding water.

Blood Vascular System

Blood Vascular System Neanthes has a well-developed and closed type of circulatory system consisting of a fluid tissue, called blood which circulates throughout the body through a system of closed tubes or blood vessels. The blood vessels are filled with blood of bright red colour. The red colour of the blood is due to the presence of a respiratory pigment erythrocruorin, which is like hemoglobin in its plasma.

Blood -

It consists of fluid medium called plasma containing numerous nucleated, colourless amoeboid cells or corpuscles and dissolved hemoglobin.

(2) Blood Vessels –

The chief blood vessels are – Longitudinal vessels: There are three longitudinal vessels running along the entire length of the body. These are:

1. Dorsal Blood vessel: This vessel serves as the main collecting vessel and runs mid-dorsally from one end of the body to the other end above the alimentary canal. It carries blood from posterior to anterior end.

2. Ventral Blood vessel: It is the main distributary vessel running mid ventrally from one end of the body to the other below the alimentary canal. It conveys blood from anterior to posterior end.

3.Neural blood vessel: This is a delicate longitudinal vessel accompanying the ventral nerve cord.

Adaptive Radiation in.Annelida Phylum Annelida includes three classes; Polychaeta, Oligochaeta and Hirudinea. Of these, the Polychaeta do not h?ve clitellum; the Oligochaeta and Hirudinaria are clitellate. Now you should recollect the classification and characters of Annelida which you have studied in Unit 4, Block 1 of this course. The early annelids are supposed to I have been marine worms burrowing in the'bottom, in sand and mud on the shore. - Adaptive Radiation I Adaptation and &havioural Polychaetes comprise the marine species which continued their life in the sea diversifying Pattern into various niches there; Oligochaeta include the line which led to the fresh water forms and to the earth worms; Hirudinea includes the leeches which arose from some fresh water oligochaetes. Adaptive Radiation in, Polychaeta Having evolved from some small, annelid worm-like creatures adapted for burrowing and crawling life in oceans, the group diverged into two main branches on the basis of their food habits; a group of active food seekers and another line of sedentary animals. The former actively sought after the food either scavenging or preying upon it whereas the laver gave rise mainly to burrowing or tubicolous forms. In this section we will discuss the polychaete groups adapted to various modes of locomotion, habitation and nutrition. Errant Polychaetes: Worms such as nereids or hesionids are rapid crawling worms that crawl beneath stones and shells in rock and coral crevices and among algae and sessile animals. In these worms the head is well.

Pelagic Polychaetes: Certain families of polychaetes are adapted to life in oceans*and thus are pelagic or planktonic. In these worms head is well developed and parapodla are large that are used as paddles to aid in swimming. Like other planktonic animals these polychaetes are pale or transparent. These worms are generally carnivores, e.g. Rhynchonerella angelina . Tomopteris renata. Gallery Dwellers: These polychaetes are adapted to live in burrows made of sand or mud. The gallery dwellers make extensive burrow system or galleries that open to the surface at many points. These burrows are lined by the mucus secreted by the worms that prevent the collapsing of burrows. The prostomium of these worms can be a simple lobe or of conical shape and lack the eyes and other sensory organs.

Adaptive Radiation Pelagic polychaete Rhynchonerella angelina (a) and its para podium (b) Burrow system of a gallery dweller worm GIycem olbo showing the worm lying in wait for the prey. b) Anterior end of the gallery dweller Drilonereis showing the conical prostomium that lacks eyes and sensory appendages. The worms usually move in the burrows by peristaltic movements, and the parapodia are reduced and help to anchor the segments by gripping the walls of the burrow. The septa and circular muscles are well developed. However, some of the gallery dwellers may crawl with the help of parapodia. They may be chrnivorous or non- selective d$posit feeders and consume the substratum through which the burrows are made. Glycera, is the best studied gallery dwelling polychaete and is also used as fishing bait. These worms lie in wait in the gallery system and when the prey moves across the surface creating pressure waves, the worm moves to a nearby opening. Blood worms have a long proboscis that is shot out with explosive force to seize the prey . Sedentary Burrowers: Certain polythaetes make simple burrows that have only one or two openings to the outside . These worms move about very little when the move, they also go by peristaltic contractions only. Parapodium is reduced to hook like setae that help in gripping the burrow wall. The prostomium is devoid of most of the sensory structures. However, special

feeding appendages may be present. Some of the sedentary burrowers are nonselective.deposit feeders while others are selective deposit feeders. L-ug worms (Arenicola) nonselective deposit feeders, live in L-' shaped burrows and ingest the sand at the bottom with an eversble pharynx. At fixed intervals the worm comes out of its burrow and defecates at the surface as a casting. After this the worm resumes feeding and ventilating. Ventilation occurs because peristaltic contractions bring in the water current. =,- Adaptation rod Behavieural Pattern Anterior end of Glycem showing the everted pharynx. .

Peristomiurn, Prostomium- The Lug worm (ArenlcoIa) with its pharynx everted (a). Worm in the burrow (b) In selective deposit feeders there is no eversible pharynx. Instead they have special head structures that pick bp the organic matter from the surrounding sand grains. For example Amphitrite has a great mass of long tentacles that spread over the surface from the opening of the burrow. The detritus material adheres to the mucus'on the tentacles and is then passed on to the mouth in a ciliated tentacular gutter with'the help of tentacular contraction. Tentacles Adaptive Radihtion Anphitrite in its burrow with outstretched tentacles on the surface. Also shown is.the food particles trapped in the tentaclesthat are rolled up to form a ciliary gutter. Tube-Dwelling Polychaetes: Tube dwelling is more widespread habit among the polychaetes as compared to other animal groups. The worms can make the tubes in the sand or in firm and exposed substrates such as algae, rock, coral or shell. The tube may be completely made up of hardened material secreted by the worm or composed of foreign material cemented together. Thus, a tube will remain intact ylhen dug out of the sand.

LARVAL FORMS OF CRUSTACEANS

NAUPLIUS LARVA

Discovered by Muller in 18th century, the Nauplius larva is the first fundamental stage in all crustaceans that sometimes hatches from the egg

and sometimes passes inside the egg. Body is oval in shape and unsegmented with a large cephalothorax and rudimentary abdomen. There are three pairs of appendages, namely, antennules, antenna and the mandible; the last two pairs are biramous and are used for swimming. There is a single median eye. It has a well developed digestive system for feeding on planktons. In Branchiopoda and Copepoda, Nauplius hatched from eggs.

METANAUPLIUS LARVA

In some Branchiopods such as *Apus,* the nauplius larva transforms into metanauplius, which is slightly larger than nauplius and has cephalothorax and abdomen and a caudal furca. It also has a single median eye. Antennule is uniramous and sensory but antenna is large, biramous and locomotory in function. Mandibles reduce in size and are used for chewing food. In addition, 2 pairs of maxillae and 2 pairs of maxillipedes make their appearance in metanauplius for handling food.

PROTOZOEA LARVA

In the case of marine prawns and lobsters, eggs hatch into protozoea which has a large cephalothorax and elongated unsegmented abdomen with a caudal fork and a pair of small uropods. Antennule is uniramous and segmented while antenna is biramous. There is a single median eye. Mandibles are small and masticatory in function. There are 2 pairs of maxillipedes for food gathering. Three pairs of thoracic limbs make their appearance as buds. Cephalothorax is covered by a carapace.

ZOEA LARVA

Zoea is the common larva of decapods and hence it has variations in its features in different species. It has a large cephalothorax that is covered with

a helmet-like carapace that also sports spines and it protruded into a rostrum in front. There is one pair of compound eyes. Antennule and antenna are short and sensory in function. First and second maxillipedes are large and biramous, used for swimming. Thoracic appendages are still in bud form and non-functional. Abdomen is 6-segmented, without appendages and has a caudal furca on the tip along with a telson.

In some Malacostraca, zoea changes in to **metazoea**, which grows abdominal appendages for swimming.

MYSIS LARVA

In shrimps and some lobsters zoea transforms into mysis that resembles *Mysis* in general features. It has a cylindrical and elongated body bearing a cephalothorax and 6-segmented abdomen. Carapace is produced in front into a pointed rostrum. Antennule and antenna are sensory in function. There are 6 pairs of biramous thoracic appendages for locomotion and 6 pairs of abdominal appendages for swimming, out of which the last one is modified as uropod. There is a pointed telson on the tip of abdomen.

SCHIZOPODA LARVA

Some crustacean decapods, such as *Homarus, Nephrops,* have this larva which is similar to megalopa and mysis. It has cylindrical body with biramous swimming pleopods on the abdomen and biramous appendages on cephalothorax.

PHYLLOSOMA LARVA

In spiny lobsters, the egg hatches into phyllosoma larva in which body is divisible into head, thorax and abdomen. There is a pair of stalked compound eyes and a pair each of antennules and antenna as sense organs. Body is

dorsoventrally flattened and transparent. The first maxillipede is rudimentary and the second one is uniramous. The third maxillipede is large, biramous and is used for swimming. The abdomen is small, segmented and does not bear appendages. Three pairs of thoracic appendages are very long and their tips are flattened oar-like for swimming near the surface of water.

CONNECTING LINK BETWEEN ANNELIDA - ARTHROPODA:

The living animals which possess some characters of two different groups of animal are called connecting link. Peripatus is a primitive arthropod having joined paired legs, compound eyes and tracheas like other arthropods but also displays certain annelidan characteristics, such as worm-like segmented body, non-chitinous cuticle and segmental nephridia.It forms a connecting link between Annelida and Arthropoda and is considered as the living fossil, which regards the animal as zoologically important.