B.Sc First year Zoology (Honours)

Paper-1

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LARVAL FORMS IN ECHINODERMS

In echinoderms eggs and sperms are released in water and fertilization takes place in water forming zygote. Echinoderms are deuterostomes and hence cleavage is radial, holoblastic and indeterminate. The larvae hatch in water and feed and grow through successive larval stages to become adults. The larvae of echinoderms are bilaterally symmetrical but lose symmetry during metamorphosis. Different classes of echinoderms show structurally different larval stages and their comparisons can reveal their evolutionary ancestry.

LARVAE OF ASTEROIDEA

There are three larval stages in Asteroidea in the course of their development to adult stage. **Earlybipinnaria** appears like hypothetical dipleurula. It has oval body without arms and ciliary bands for locomotion. It has well developed alimentary canal for feeding and grows to become bipinnaria.

Bipinnaria larva possesses 5 pairs of ciliated arms which do not have any skeletal support inside. These arms are used for swimming in water while feeding on planktons. Preoral and postoral ciliary bands are also present. This larva resembles auricularia larva of Holothuroidea in general appearance.

Brachiolaria larva is formed after 6-7 weeks of life and growth of bipinnaria. This larva is sedentary and remains attached to a hard substratum for which it possesses three brachiolarian arms having adhesive discs at the tip. Ciliated arms get reduced and become thin and functionless, while mouth, anus and gut are well developed. It has axocoel, hydocoel and somatocoel that later on give rise to water vascular system.

Development of starfish takes place inside the sedentary brachiolaria which ruptures and releases tiny starfish into water.

LARVAE OF HOLOTHUROIDEA

Class Holothuroidea demonstrate two larval stages, namely, auricularia and doliolaria larvae.

Auricularia larva has striking resemblance with bipinnaria of Asteroidea as it also possesses 4 or 5 pairs of ciliated arms for swimming and has a well-developed mouth, gut and anus.

Doliolaria larva is the next stage after auricularia. It has barrel like body with 5 ciliated bands surrounding it. Mouth or vestibule is on the ventral side for feeding. There is neural sensory plate on the anterior side and an apical tuft of cilia for balancing while swimming. Doliolaria transforms into adult but in some holothurians doliolaria stage may be absent.

LARVAE OF ECHINOIDEA

There is a single larval stage in echinoidea called **Echinopluteus** which is bilaterally symmetrical. The larva has oval body and long paired ciliated arms that are supported by calcareous skeletal rods. **Preoralarm** is present but posterolateral arm is absent. The other three arms are anterolateral, postoral and posterodorsal arms. Mouth, anus and gut are well developed.

LARVAE OF OPHIUROIDEA

Ophiopluteus is the only larva of Ophiuroidea that resembles echinopluteus larva of Echinoidea in general features. Instead, it has very long posterolateral arms. All arms are supported by calcareous skeletal rods. This larva metamorphoses to become adult.

LARVAE OF CRINOIDEA

Pentactula is the basic larval stage of Crinoidea but it passes inside the egg. There is one or two larval stages in sea lilies. **Doliolaria** larva, which is also called Vitellaria

larva, is found in some sea lilies. It resembles doliolaria of holothuroids but has an **adhesive pit** on the ventral side with which it attaches to substratum and becomes sedentary. This larval resemblance demonstrates close evolutionary relationship between crinoidea and Holothuroidea.

Pentacrinoid larva is sedentary and attaches to substratum with an attachment plate. Body is supported by a stalk. There are 10 cilia bearing tentacles which are used for capturing food. Both mouth and anus are on the same side of the disc.

The affinities among larval stages of echinoderms demonstrate evolutionary relationships among different classes. However, the same relationship cannot be shown in the cladistic classification of echinoderms, which is based on adult characteristics. Adults are highly modified organisms in echinoderms.

LARVAL FORMS IN ECHINODERMATA