

# VIDYASAGAR UNIVERSITY



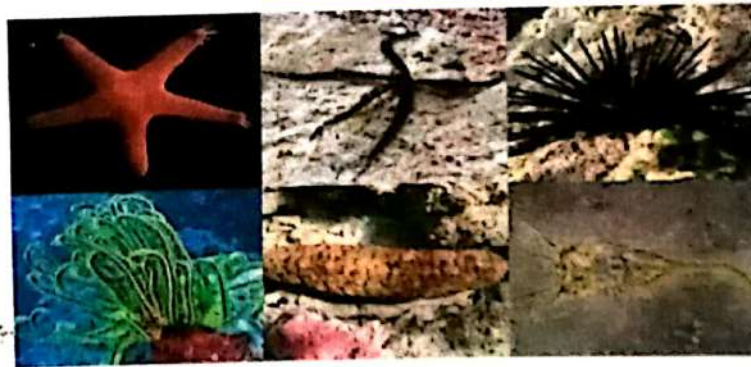
MUGBERIA GANGADHAR MAHAVIDYALAYA

Bhupatinagar :: Purba Medinipur

B.Sc. Zoology (Honours)

*A Project on Echinodermata Larva, their  
Evolution & phylogenetic analysis*

SEMESTER - II ;



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Certificate of Completion

This is to certify that Arcpita Maity.....Roll.1122129 No  
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successfully complete a dissertation/project entitled  
Echinodermata larva their evolution & phylogenetic analysis for the paper  
AECC 2 in the year 2023.

  
Signature of HOD 14.9.23

  
Signature of Principal 19.9.23





*Microgaster spangolii* (sp. nov.) (Smith, 1978)

*Hydrobia ulvae* (L.)

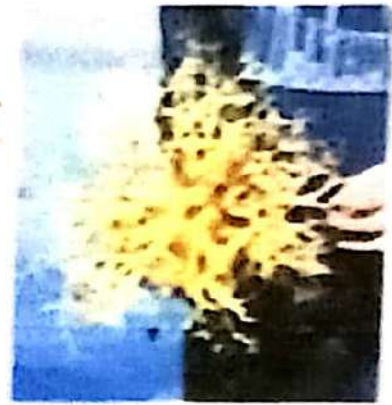


*Hydrobia ulvae* (L.)



*Hydrobia ulvae* (L.)

*Hydrobia ulvae* (L.)



# Echinodermata

# ACKNOWLEDGEMENT

We would like to express my sincere gratitude and respect to my supervisor, prof. Dr. Kousik Mandal, who has given me this opportunity to do this scientific project work under zoology Department, Mughberia Gangadhar Mahavidyalaya.

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- ① Echinoderms are unisexual animal.
- ② Sexual dimorphism is absent
- ③ Fertilization takes place in water
- ④ The larval form is bilaterally symmetrical
- ⑤ Spine present
- ⑥ Water vascular system present
- ⑦ Endoskeletal made by calcium carbonate
- ⑧ Locomotory organ - Tube feet present



## LARVAL FORMS OF ECHINODERMATA

The larval forms of all classes in Echinodermata will show general resemblance. The ctenoidea larva differs from this pattern. In general, all the larvae show that they might have come from same ancestor. Hence, the common ancestor is coelomate bilaterally symmetrical and free swimming.

These larvae also show resemblance with Trochocoria of Balanoglossus. Thus the study of echinoderm larva has a phylogenetic significance.

## BIPINARIA LARVA

### ⊗ Systematic position:

Kingdom - Animalia

Sub-kingdom - Metazoa

Phylum - Echinodermata

Sub-phylum - Asterozoa

Class - Asteroidea

Specimen - Bipinnaria larva

### ⊗ characters of specimen (Bipinnaria larva)

① Free swimming larva, bilateral symmetrical.

② Dorsal median and dorsal-lateral arms present.

③ Mouth and anus present.

④ Present of pre-oral and post-oral arms

⑤ Locomotory organ is cilia



## ECONOMIC IMPORTANCE

Asteroidean have an important role as large scale detritus feeders. They cycle up to 90% benthic biomass in ocean.

Died sea Asterias are an important food source and flavoring source in Asia. Before during the sea Asterias are boiled and bodies contract and thicken and organs are expelled. Sometimes sea Asterias are considered an aphrodisiac.

Matured sea Asterias that release the toxin asteroidean with the cuvierian tubule.

# BRACHIOLARIA LARVA

## ① Systematic position:

Kingdom - Animalia

Sub-kingdom - Metazoa

Phylum - Echinodermata

Sub-phylum - Asterozoa

Class - Asteroidea

Specimen - Brachiolaria sp.

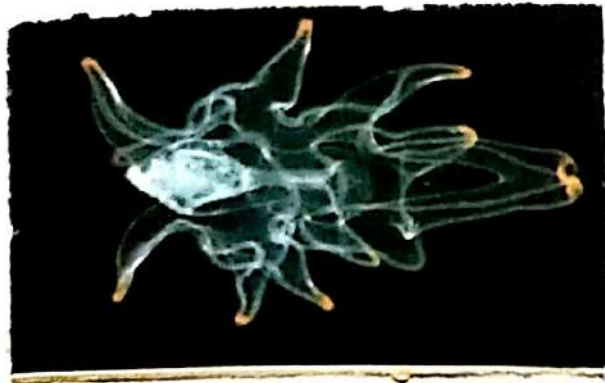
## ② Characters of specimen:

① Bilaterally symmetrical free swimming

② Arms are devoid of calcareous rods and have tube feet.

③ Brachiolaria and pre oral arms present

④ Mouth and anus present.



## ECONOMIC IMPORTANCE

Asteroidean have an important role as large scale detritus feeders. They cycle up to 90% benthic biomass in ocean.

Died sea Asterians are an important food source and flavoring source in Asia. Before during the sea Asterians are boiled and bodies contract and thicken and organs are expelled. Sometimes sea Asterians are considered an aphrodisiac.

Matured sea Asterians that release the toxin asteroidean with the ciliary tube.



# OPHIOPLUTEUS LARVA

① Systematic position:

Kingdom - Animalia

Sub-kingdom - Metazoa

Phylum - Echinodermata

Class - Ophiuroidea

Specimen - Ophiopluteus larva

② Character of specimen (Ophiopluteus larva)

① Differentiated into oral and aboral plate.

② Body distinct with central disc and present five arms.

③ Madreporite is oral

④ Presence of two slits in each bursa.



## ECONOMIC IMPORTANCE

Echinoderms are efficient scavengers of decaying matter on the sea floor and they prey upon a variety of small organisms. There by helping to regulate their numbers. When present in large numbers, sea urchins can devastate sea grass beds in the tropics. Adversisly affecting the organisms dwelling within. Other tropical species of sea urching how ever control the growth of sea weets in coral reefs.

## ECHINOPLUTUS LARVA

### ⊗ Systematic position:

Kingdom - Animalia

Sub-kingdom - Metazoa

Phylum - Echinodermata

Class - Ophiurtoidea

Sub-class - Echinoidea

Specimen - Echinopluteus  
larva



### ⊗ Character of Specimen

① Microscopic

② The skeletal rods simple or thorny or enestriated or branched.

③ The posterolateral arms are very short and directed.

④ Arms five or six pairs, pigmented and supported by calcareous skeleton.

⑤ The supported by calcareous rod.  
( $\text{CaCO}_3$ )



## ECONOMIC IMPORTANCE

Echinoderms are efficient scavengers of decaying matter on the sea floor and they prey upon a variety of small organisms. Thereby helping to regulate their numbers. When present in largest numbers, sea urchins can devastate sea grass beds in the tropics. Adversely affecting the organisms dwelling within others, tropical species of sea urchins however control the growth of sea weeds in coral reef.

# AURICULARIA LARVA

## ① Systematic position

Kingdom - Animalia

Sub-kingdom - Metazoa

Phylum - Echinodermata

Sub-phylum - Echinozoa

Class - Holotheroidea

Specimen - Auricularia larva

## ② Characters of specimen (Auricularia larva):

① The externally bilaterally symmetrical larva is present in holotheroidea and is characterized in present having a single longitudinal ciliated band.

② The pre oral lobe is very small well developed.

③ There are no calcareous rods

④ The hydrocoel becomes lobulated forming primary tentacles and communicated with the hydropore by a canal.

⑤ Gut with mouth, saciform stomach and right and left stomachs, anus.



## ECONOMIC IMPORTANCE

Holothurians have an important role as large scale detritus feeders. They cycle up to 90% benthic biomass in ocean.

Dried sea cucumbers are an important food source and flavouring source in Asia. Before drying the sea cucumber and thickeners and organs are expelled. Sometimes sea cucumbers are considered as aphrodisiac.



## DOLIOLARIA LARVA

### ⊕ Systematic position:

Kingdom - Animalia

Sub-kingdom - Metazoa

Phylum - Echinodermata

Sub-phylum - Echinozoa

Class - Holothuroidea

Specimen - Doliolaria larva

### ⊕ Characters of specimen (Doliolaria larva)

① The externally bilaterally symmetrical larva is present in Holothuroidea and is character in having a single longitudinal ciliated band.

② The pre-oral and lobe is very well formed.

③ The larva form is observed in holothuroidea.

## ECONOMIC IMPORTANCE

Holothurians have an important role as large scale detritus feeders. They cycle up to 90% benthic biomass in ocean.

Died sea cucumbers are an important food source and flavouring source in Asia. Before drying the sea cucumbers, and ~~thickness~~ and organs are expelled. Sometimes sea cucumber is considered as ophiroidisac.





## Pentacarinoida larva

⊛ Systematic position:

Kingdom - Animalia

Phylum - Echinodermata

class - Crinoidea

specimen - Pentacarinoid larva

character of class Crinoidea:

ⓐ Body is star shaped

ⓑ Tube feet without suckers

ⓒ Madriporite absent

ⓓ Anus and mouth present in oral surface

character of Pentacarinoid larva:

ⓐ This larval stage is also present in crinoids. It is the second larval stage of crinoid.

ⓑ It looks like a sea lily.

ⓒ It has a stalk.

ⓓ The stalk develops from the pre-oral lobe of dolio larva.

ⓔ The ciliated depression becomes a closed ectodermal vesicle is gradually shifted to the free end.

ⓕ The floor of the depression is perforated mouth and with the disappearance of the roof the mouth and tentacles becomes exposed.

## Distribution :

They are found in almost all depth latitudes and environment in the area ocean, specific an Atlantic oceans including all around the world. Usually they are found near coral reef.

## Economic importance :

Asteroidae have an important role as large scale detritus feeders. They cycle up to 90% benthic biomass in ocean.

Died sea Asterias are as an important food source and flavoring source in Asia. Before during the sea Asterias are boiled and bodies contract and thickness and organs are expelled. Sometimes sea Asterias are considered as aphrodisiac.

Matured sea Asterias that release the toxin asteroidae with the cuvierian tubule.



## CONCLUSION

④ In ~~the~~ echinoderms eggs and sperms are released in water and fertilization takes place in water forming zygote.

④ Echinoderms are deuterostomes and hence cleavage is radial, holoblastic and indeterminate.

④ The larvae are bilaterally symmetrical but lose symmetry during metamorphosis.

④ Different classes of echinoderms show structurally different larval stages and their comparison can reveal their evolutionary ancestry.

Shakya.  
10/10/23



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G. S. A