GONADAL STUDY OF MANGROVE CLAM-GELOINA PROXIMA (PRIME, 1864)

Rajendra S. More
Assistant Professor,
Department of Zoology, Dapoli Urban Bank Senior Science College, Dapoli, District-Ratnagiri , Maharashtra(India)
Email: rsmore8181@gmail.com

Abstract:

The mangrove clam *G. proxima* is one of the indigenous bivalve of the Ratnagiri district and found distributed along the entire coastal belt having mangrove vegetation. The current study was undertaken to study gonads of this clam with a special emphasis on the its structure , position and its reproductive potential. For gonadal study few clams were dissected carefully to expose reproductive organs and were photographed with the help of digital camera model NICON D7000.

It is concluded that , in this clam , the sexual dimorphism is confirmed after removal of the any one of the two shell valves and on the basis of size and colour of the gonads. The females gonad was brown-black and male gonad was creamy white in colour. No any incidence of hermaphroditism found in these clams. Sexes were identifiable at total length of > 35 mm. It is also concluded that *G. proxima* is extensive breeder.

Keywords: Mangrove, Clam , Geloina proxima, Gonads.

I. INTRODUCTION :

Phylum Mollusca is the second largest animal phylum, next to Arthropoda.

The Molluscs are found in every possible habitat. They support valuable shell and pearl fisheries, and also the lime industry. Many of them form food of the local people as well. Phylum Mollusca comprises of seven classes, which are Aplacophora, Polyplacophora, Monoplacophora, Gastropoda, Scaphopoda, Pelecypoda or Bivalvia and Cephalopoda [1]. Class pelecypoda or bivalvia considered as economically the most important class of phylum Mollusca because, this class includes oysters, clams, mussels, scallops, ark shells and cockles occurring in abundance in the shallow coastal waters and most of them are used as food [2].

In India very scanty attention was paid to the biology of bivalves. Our knowledge on this group is mainly due to the contributions of [3] [4] [4] [6] The genus Polymesoda is the characteristic of the two major mangrove systems, Caribbean & the Indo-Pacific. The subgenus Geloina from the Indo-pacific seas has been given separate status of the genus & hence it is now separated from the genus Polymesoda [7] . This genus is mainly found in high-zoned mangroves [8] . The coast of Maharashtra popularly known as Konkan, that harbors significantly diverse natural resources. Konkan constitutes a narrow belt between the western mountain range (regionally known as Western Ghats) and Arabian Sea. The Coastal belt stretches about 720 km. The coastline is indented by several estuaries, river mouths, creeks and sandy, rocky, and muddy beaches.

Dapoli tehsil of Ratnagiri district is located at 170 North latitude and 730 East longitudes, having an elevation of 230 meters above mean sea level. This tehsil has about 54 km. long coastal belt covered by mangrove vegetation that shelters number of bivalves including the clam- Geloina proxima. Major coastal belt of Dapoli tehsil has occupied by the thick mangrove vegetation. The clam G.proxima is one of the indigenous bivalve next to oysters of the Ratnagiri district. Hence, it is distributed along the entire coastal belt having mangrove vegetation. Its occurrence is throughout the year along the entire Ratnagiri coastal belt and consequently in the villages near the coastal vicinity. Hence one can collect this clam in any season such pre- monsoon, monsoon and in post monsoon season. However, the clam size vary between the 30mm - 100 mm. G. proxima is more elongate, particularly posteriorly & does not possess flexure. Shells are equivalved, trigonal-ovate in outline, inequilateral, distinctly expanded posteriorly. The periostracum is yellow in young individuals.

The current study was undertaken to study the gonads of the mangrove clam G. proxima with a special emphasis on the study of its reproductive potential.

II. Materials and method:

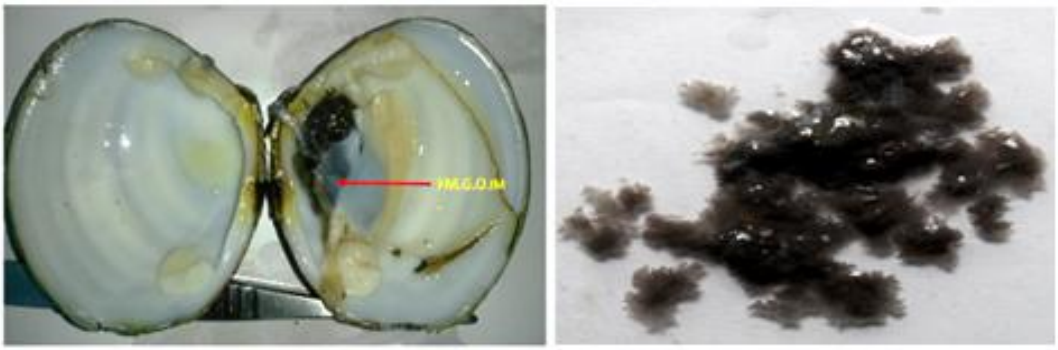
For the purpose of study, frequent field visits were carried out to the entire Coast of Dapoli during the duration of the study- July 2013 to June 2014 and live animals were collected by threshing sickle on the mud flat.
Collection usually was done during the low tides, when sufficiently large intertidal region was exposed off . The shells were washed carefully with the estuarine water and brought to the laboratory. For gonadal study few clams were dissected carefully to avoid any injury to the shell and internal organs. The reproductive organs of *G. proxima* were exposed carefully and photographed with the help of digital camera model NICON D7000.

III. Results and Observations:

The Sex is determined on the basis of size and colour of the gonads. The gonad is brown- black in females and creamy white in males and are showed in Fig. No.1 and Fig. No.2

Female Gonad:

In case of female *G. proxima*, the ovary is a racemose tissue, situated within the intestinal coil. Ovary is lined by capsular lining, below which there is a lining of germinal epithelium that proliferates ova. The capsular lining around ovary gives rise to several septa- like particles at various levels which traverse in to the interior of the ovary. In the young individual of size group 35- 45 mm. the gonads are somewhat faint drown coloured and found sparsely distributed over the visceral mass . As the clam becomes older, the gonads becomes dark brown to black coloured and the gonadal mass occupies the entire visceral cavity. The gonadal mass shows the eggs with various stages of development. A matured ovum, when magnified, shows a prominent nucleus in the center with granular appearance surrounded by the cytoplasm.



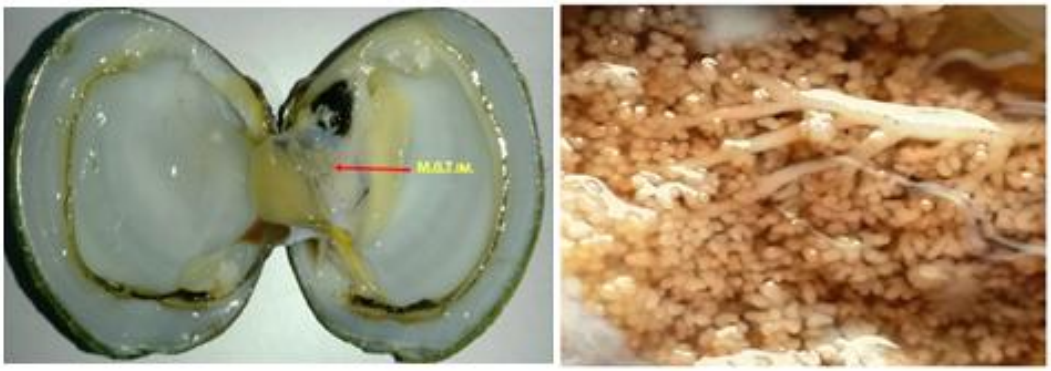
G proxima: Female gonad – Ovary (Immature)
(FM.G.O.IM- Female Gonad Ovary Immature)

G proxima: Female gonad – Ovary (mature)

Fig. No.1 : *G. proxima*: Immature and mature female gonad – Ovary.

Male Gonad:

Male reproductive system of the *G. proxima* consists of a single gonad which is called as testes. It is in the form of racemose gland like structure, situated within the intestinal coiling. Generally, due to intestinal coil, gonads divides in to two chamber lobes, an outer larger lobe and a posterior short lobe. Posterior lobe is more broader in size. Testes has a membranous lining over the outer extremity. As shown in Fig. No. 2**,** the gonad is in the form of branched and rebranched strands. It is situated at the base of digestive diverticula's and extends in the visceral mass. In the matured clams, it occupies entire space present in the visceral cavity. The male gonads are whitish in color. In early stages, they are milky white in appearance. Then it changes to the white solid mass. In early stages, it shows the plug formation of the sperms which get separated in further development. The sperms when matured swim in the visceral mass.



G proxima: Male gonad – Testis (Immature)
(M.G.T.IM- Male Gonad Testes Immature)

G proxima: Male gonad – Testis (Ripped)

Fig. No. 2: *G. G. proxima*: Immature and ripen male gonad – Testes

IV. Discussions:

In *G. proxima* is have separate sexes. It is difficult to identify the male and female clams by observing the external morphology *G. proxima*. The sex of all adult clams could be determined based on gonadal state. Therefore, it is preferred to dissect clam to confirm the sex of the clam. It can be identified after removal of the any one of the two shell valves. There is no any incidence of hermaphroditism found in these clams. The gonads were not developed in the small specimens (< 35mm). The indication of few sperms in males and developing ova in females were within the size class of 35-40 mm shell length. Sexually ripe clams were found in all sizes above 35 mm. Sexes are identifiable at total length of > 35 mm. The smallest sized clam with identifiable sex, a male specimen recorded in this study was 35.1 mm. shell length.

The changes structural changes in gonads of males and females clams occur during breeding and non-breeding seasons. [9]

Observations of gonads can be used as supportive events for the determination of the maturity of the clam and spawning period. *G. proxima* shows prolonged spawning period. [10]

V. Conclusion:

Therefore, it is concluded the sex of the clam is confirmed after removal of the any one of the two shell valves. It is also noted that , there is no any incidence of hermaphroditism found in these clams. Sexes are identifiable at total length of > 35 mm. It is also concluded that *G. proxima* is extensive breeder. The matured ovum as per the breeding and non breeding and the observed sequence of sexual phases.

VII. References:

1. Stephen A. Harley and John B. Harley (2002): Zoology, 4th Edition, Tata McGraw-Hall Edition, Page-317-336.
2. D.V. Bal and K.V. Rao, (1990): Marine fisheries of India, first revised edition, Tata McGraw-Hill Publishing Compani, New Delhi, Page No. 386.
3. Prashad, B. (1918a): Studies on the anatomy of Indian Mollusca,1. The marsupium and Glochidium of the genus Physunio. Rec. Indian Mus., 14: 183-186, pl. Xxii.
4. Prashad, B. (1918b): Studies on the anatomy of Indian Mollusca, 2. The marsupium and Glochidium of some Unionidae and on the Indian species hitherto assigned to the genus Nodularia. Rec. Indian Mus., 15: 141-148.
5. Prashad, B. (1919a): Studies on the anatomy of Indian Mollusca. The soft part of some Indian Unionidae. Rec. Indian Mus., 16: 289-296, Text- figs. 1-7.
6. Prashad, B. (1919b): On the generic position of some Asiatic Unionidae. Rec. Indian Mus., 16: 403-411.
7. Morton, B.(1976): Canadian J. Zool. 54, 482- 500.
8. Castaing A., Jimenez, J.M. and Villalobos, C.R.(1980): Rev. Bio. Trop. 28 (2), 323-339.
9. Mala M.Khann (2002),Ph.D.Thesis ' On histological and histochemical aspects of Scutus unguis (Linnaeus), submitted to the University of Mumbai. Page No.58-117.
10. Kale R.B. (1997): Zoophysiological studies on mangrove bivalve *Geloina proxima* (prime). Shivaji University, Kolhapur, Ph. D. Thesis. 155 – 220.