SPAWNING AND DEVELOPMENT OF SOME MARINE GASTROPODS FROM BOMBAY WATERS

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ABSTRACT

Spawning and early development of 4 species of prosobranchs namely *Nerita oryzarum*, Recluz, *Gyrineum natator* (Roding), *Thais margariticola* (Broderip) and *T. rugosa* (Born) from the rocky shores of Bombay were studied during Sep. '74 – Feb. '75. All the 4 species spawned both in the laboratory and in the field during this period. Their spawning behaviour, egg capsules, larval development and hatching have been discussed in this presentation.

INTRODUCTION

Studies on spawning and early development of 4 species of gastropods namely *Neita oryzarum* Recluz, (Arachaeogastropoda) *Gyrineum natator* (Roding) (Mesogastropoda), *Thais margariticola*) (Broderip) and *T. rugosa* (Born) (Neogastropoda) which are commonly found on the rocky shores of Bombay were undertaken as very little information is available on the subject. Natarajan (1957) reported breeding habits, egg masses and early developmet of 32 species of prosobranch molluscs from Gulf of Mannar and Palk Bay. Virabhadra Rao (1961), Desai (1962) and Ganapathi and Sastri (1973) have also discussed spawning and development of some gastropods. The present study deals with the life histories of 4 species of prosobranchs about which nothing is known previously.

MATERIAL AND METHODS

The specimens of *N. oryzarum* and *T. margariticola* of Manory Island, and *G. natator* and *T. rugosa* from Madh Island were collected from Bombay waters. Adult snails were brought to the laboratory and kept in the aquarium tanks and in glass troughs with sea water which was changed frequently. The spwning behaviour of each species was observed and the freshly laid egg masses were removed and transferred to separate containers. The embryos at different stages were fixed periodically in 5% formalin.

RESULTS AND DISCUSSION

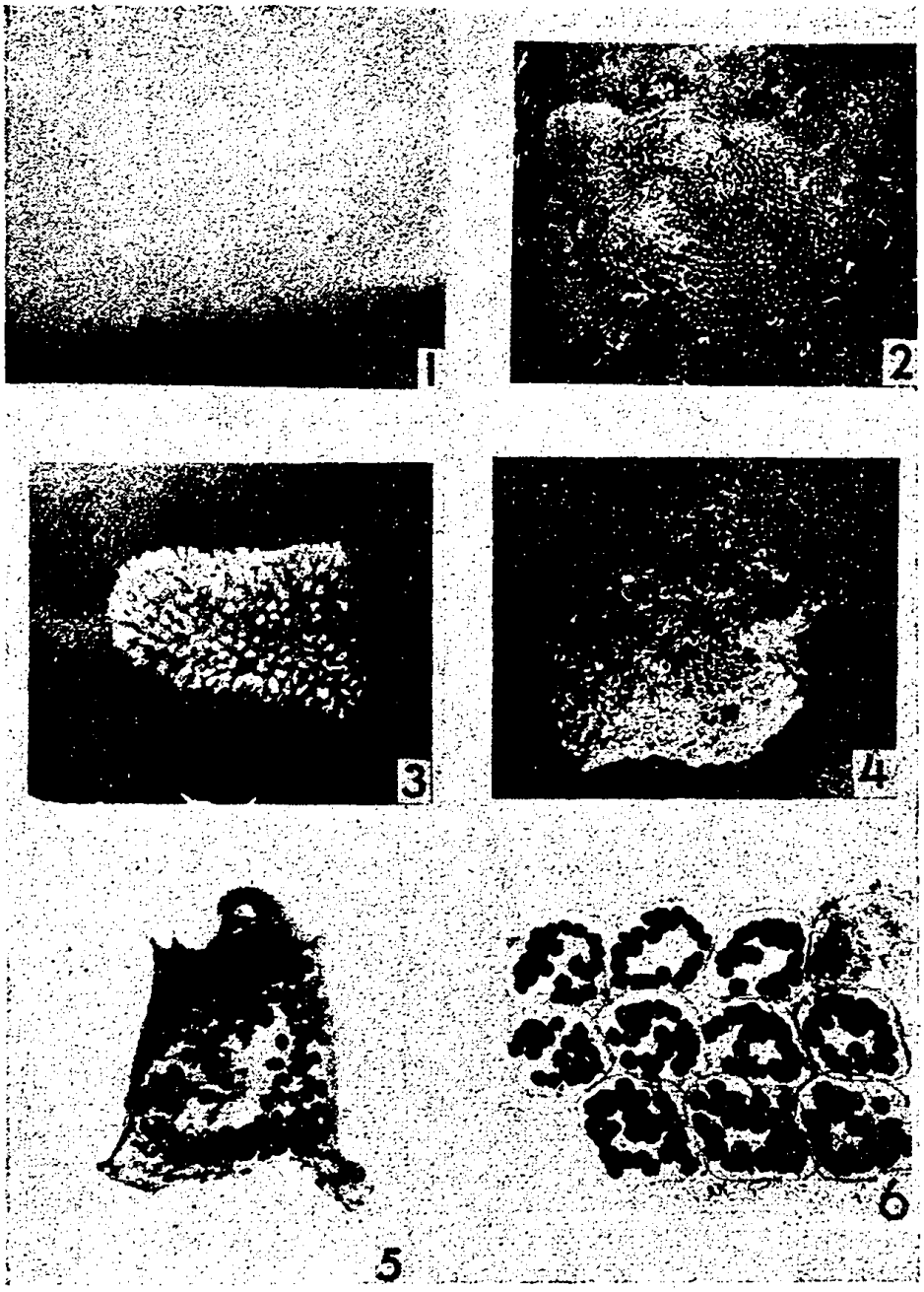
Nerita oryzarum : The breeding, spawning, egg capsules and larval development of neritaceans have been intensively studied by Risbec (1932), Andrews (1935), Bondesen (1940),

Fretter (1946), Natarajan (1957), Lewis (1960), Kolipinski (1964), Adegoke *et.al.*, (1969). Berry *et. al.*, (1973) and Govindan (1974). The species of *N. oryzarum* occurs in large numbers in almost the entire inter-tidal rocky belt at Madh and Manory Islands. It was observed to spawn during September to December both in the laboratory and in the field. The egg capsules were laid around rock pools at the high water level. In the laboratory they were laid on the sides of the aquarium tanks, glass troughs, stones and the shells of other snails (Fig. 1). The process of egg laying was discontinuous and the snail laid about 15 to 20 egg capsules at a stretch during a single spawn. These capsules were laid scattered and thus, no regularity in the fixation of egg capsules to the substrate was observed. The breeding and spawning habits of *N. oryzarum* appear similar to those of *N. albicilla* (Natarajan, 1957, Govindan 1974). The structure of the egg capsule was the same as described by Andrews (1935) and Fretter (1946) for the neritaceans. It was spherical, milky white in colour and measured 0.8 to 1.0 mm in diameter. The number of embryos in a capsule ranged from 28 to 42. The capsules were much smaller and contained less number of embryos when compared to those of *N. albicilla* (Natarajan, 1957, Govindan, 1974). The egg capsule of *N. oryzarum* changes its colour during development from milky white to dark brown thus resembling the egg capsules of the other neritaceans reported by Andrews (1935) and Govindan (1974).

The fertilised egg attained trochophore stage in about 8 days. The embryo became a well developed veliger in about 2 weeks. At this stage the active movements of the veligers inside the capsule were clearly seen through the capsule wall under a binocular microscope. The veligers hatched out from the egg capsule in about 5 weeks. Invariably, lids of all the hatched out egg capsules were found to contain a small hole at the centre. But still, the hatching mechanism and the formation of the hole in the lid of the capsule are not known. At the time of hatching the veliger shell was light brown in colour and measured 95-110 µm in diameter. Soon after hatching the veliger swam very actively with the movements of the velar cilia. The time of hatching out of the embryos closely resembled *N. ablicilla* (Govindan, 1974) and *N fulgurans* (Kolipinski, 1964). A small hole found on the lid of the capsules after hatching appeared very characteristic in *N. oryzarum*. The velum was prominent, bilobed and white in colour (Fig. 7). At the posterior region a brown coloured mass represented the digestive gland. The larvae thrived in the laboratory for 5 days.

Gyrineum natator: An account of the spawning and development of the members of the family Cymatiidae has been made by Anderson (1959) D'Asaro (1969), Houbrick & Fretter (1969), Laxton (1969), Ganapathi and Sastri (1973) and Kasinathan *et. al*, (1974).

The spawning of *G. natator* was observed both in the field and in the laboratory during October to December. Invariably the spawning was observed during the cooler part of the day either early morning or late evening.



Figs. 1. Egg mass of *Nerita oryzarum*.
2. Egg mass of *Gyrineum natator*.
3. Egg mass of *Thais margariticola*.
4. Egg mass of *Thais margariticola*.
5. One egg enlarged *(Thais margariticola)*.
6. Few egg capsules enlarged *(Gyrineum natator)*.

In the laboratory the snails laid their egg capsules on the sides of the glass trough and on the stones (Fig. 2). In the field, the egg masses were usually found attached to plastic papers and leather pieces etc., floating in the water. The snails laid a circular mass of capsules bound together by tough fibrous girdle which cemented them to the substratum. The basic structure of the egg mass of *G. natator* resembles that of *Cabestana spengleri* and *Monoplex australasiae* described by Laxton (1969). It differs from the egg mass of *Cymatium pileare* (Ganapathi and Sastry, 1973) and *Distrotrix cancellinus* (Kasinathan *et. al.*, 1974). It was observed that a single female laid about 73 egg capsules in about 2½ to 3 hours in the laboratory. *G. natator* took about 2 to 2½ minutes to lay a single egg capsule.

The egg capsule was leathery, hemispherical, (Fig. 6) and measured 800 µm in diameter. The freshly laid egg capsules were white in colour but slowly changed to yellow during development. The number of embryos per capsule ranged from 30 to 38. The eggs of *G. natator* developed within the capsule until they attained veliger stage. These veligers were released at an advanced stage and subsequently complete their development in the plankton. The embryos attain the veliger stage in about 10 days and spent a further period of 5 days within the capsule before hatching out. The larvae emerged out through a hole on the dorsal surface of the capsule. The newly hatched veliger swam actively by means of the velum. Black eyes, white tentacles and brownish digestive glands were quite prominent and the veliger shell measured about 200 m (Fig. 9). The veliger thrived in the laboratory for about 10 days.

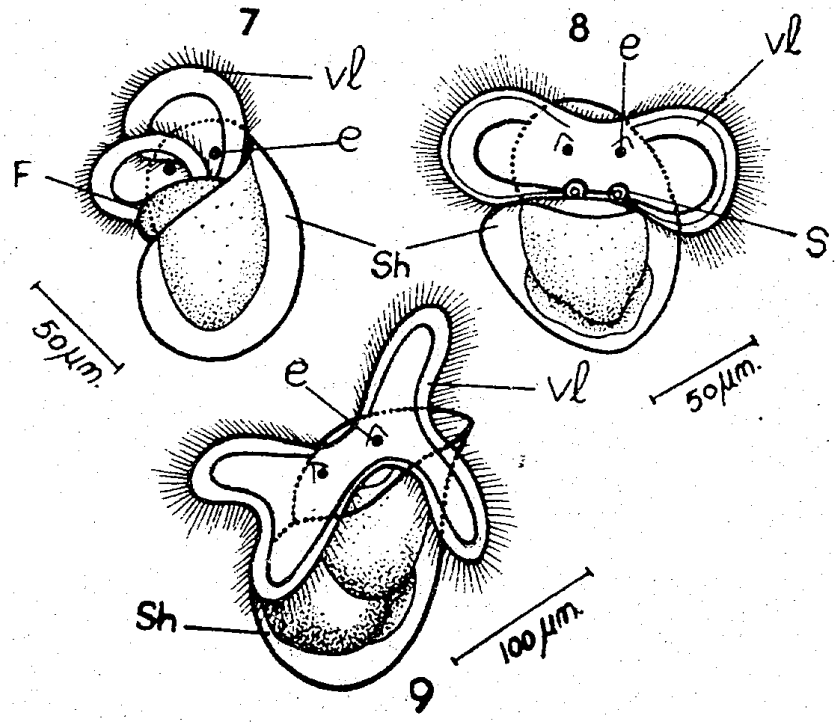
Thais margariticola : Breeding, spawning and developmental studies of the family Muricacea have been reported by Burkenroad (1931), Lebour (1937), Thorson (1940) and Natarajan (1957).

The egg clusters of *Thais margariticola* (Fig. 3) were observed from September to December both in the field and in the laboratory. A single female snail, in the field laid an egg cluster which consisted of about 50-60 egg capsules. The spawning was also observed in the laboratory on several occasions. The capsules were laid usually on the sides of the acquaria. But, it was found that the small egg clusters laid in a scattered position in the laboratory consisted only 3 or 4 egg capsules in contrast to the large egg clusters with 50 or more egg capsules found in the field. However, in one case a large egg cluster was noticed in the laboratory. Several number of egg clusters were noticed in the field immediately after the full and new moon periods and thus showing a probable periodicity in the spawning activity. The egg-clusters were glued on their dorsal surface. The egg capsule was milky white, thick, leathery and pentagonal, pillar shaped (Fig. 5). An exit hole was observed in the top portion on the centre of the capsule. The horn like projections surrounded the top portion of the capsule. The exit hole measured 1 mm in diameter. The average length of the egg capsule was 3½ mm and breadth about 2½ mm. The

number of embryos embedded inside the capsule ranged from 82-110. The size of the uncleaved egg was 75-85μm in diameter. They hatched out as veligers in about 7 days. The freshly hatched out veligers were active and their velum broader, bilobed and light brown in colour (Fig. 8). The veligers were kept in the laboratory for about 6 days.

Thais rugosa: The spawning of *T. rugosa* was observed only on one occasion in the field even though the egg clusters were collected (Fig. 4) from the field many times. A single female laid an egg cluster consisted of 83 egg capsules in about 2 hours duration. Each egg capsules was laid in about 1½ minutes. The freshly laid egg capsule was milky white in colour but after five days it turned brown and at the time of hatching it appeared pink.

It was leathery, hard, longer than broad and appearing like a cylindrical pillar with one side flattened out. The top portion was broad than its narrow shaped and flattened base. The exit hole on the centre of its top portion measured 1 mm in diameter. Unlike that of the egg capsule of *T. margaritiicola* the top portion of the egg capsule in *T. rugosa* was completely flattened and smooth without any horn like projections. The egg capsule measured 5 mm in length and 2 mm in breadth. The number of embryos per egg capsule ranged from 70 to 80.



Figs. 7. Veliger of *Nerita oryzarum.* 8. Veliger of *G. natator.*
9. Veliger of *Thais margariticola.*

e - eye; F - Food; S - Statocyst; Sh - Shell; Vl - Telar lobs.

The size of the uncleaved egg was 50 µm in diameter. The embryos hatched out as veligers in abont 10 to 12 days. The freshly released veligers were active with the help of a broad bilobed velum. The eyes were black and prominent. The digestive gland was brown and the alimentary canal was light brown. Veligers lived in the laboratory for 5 to 7 days.

The pattern of arrangement of the capsules of *Thais margariticola* and *T. rugosa*, in general, resembles very close to each other and also to *T. bufo* and *T. tissoti* (Natarajan, 1957). Both the species of *Thais* studied presently pass through a pelagic life. The species of *T. haemostoma* has been reported to pass through pelagic phase in Lousiana and non-pelagic life in West Indies (Burkenroad, 1931). An exit hole has been reported for the two species of *Thais* presently studied.

The egg capsples of *Nerita oryzarum* resemble the egg capsules of *Gyrineum natator* in size, shape, colour and the number of embryos inside the egg capsule. Both in *Nerita* and *Gyrineum* the embryos hatched out at the veliger stage and led a pelagic life. Thus the neritaceans approached the mesogastropods in their method of spawning and development. But the egg capsules of *N. oryzarum* and *G. natator* greately differ from the egg capsules of the two species of *Thais* presently studied. The embryos hatched out in a shorter duration in the two species of *Thais*, as compared to those of *Gyrineum* and *Nerita*.

ACKNOWLEDGEMENT

We are grateful to Dr. S. Z. Qasim Director, National Institute of Oceanography, for his encouragement and his keen interest in the work.

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