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22. ON THE HABITAT, HABITS AND FOOD OF *LAMBIS LAMBIS* AND *HEMIFUSUS COCHLIDIUM*

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ABSTRACT

Lambis lambis and *Hemifusus cochlidium* are two important marine gastropods of commercial value in India, which occur at several places along the south coast and are exploited for their shells. The habitat, habits and food of these gastropods occurring in Gulf of Mannar off Kayalpatnam, 30 km south of Tuticorin have been studied. The two species occur at depths of 2-12 fathoms in sandy muddy habitat with rocky outgrowths and are netted in bottom set gill nets (*singi valai*) laid for lobster. Direct observations have been made on their habits by SCUBA diving. The gastropods burrow in the sandy muddy bottom and sometimes climb over rocks and coral stones found in the area. The food of the two gastropods is similar and consists of polychaetes, small crustaceans and bivalve molluscs. The nature of sediments, the fauna and flora occurring along with the gastropods in their habitat and the behaviour of the two species in laboratory has been studied.

INTRODUCTION

Shells of a number of species of ornamental molluscs belonging to the Class Gastropoda with beautiful shells inhabit the coastal waters of India, including Andaman and Lakshadweep Islands (Nair 1974). These marine gastropods are fished in many parts of the world for food, bait, for their shells or manufacture of lime. *Lambis lambis* and *Hemifusus cochlidium* are of commercial value in India and occur at several places in large numbers along the southeast coast and are exploited for their shells. The two gastropods are collected, and the shells are cleaned, polished and sold as curios.

Hornell (1914, 1917, 1922 a, b, 1949 a,b,c and 1951) studied the molluscan resources of Indian coasts, especially those of composite Madras State, and published accounts of the distribution, habitat, fisheries and utilization of several gastropods of commercial value. Satyamurthi (1952) studied the gastropods from Krusadai Island, Gulf of Mannar and Rao (1958, 1969) stressed the importance of the shellfish, their fisheries and the shell-craft industry which has got great scope in India since it is possible to export the products to other countries, also.

The present paper gives an account of the diagnostic characters, distribution of the two gastropods, *Lambis lambis* and *Hemifusus cochlidium*, their habitat, habits, size-composition, food and bottom fauna and flora present in the area where these gastropods occur.

MATERIAL AND METHODS

The inshore areas from Rameswaram to Manapad in the Gulf of Mannar on the southeast coast of Tamil Nadu are the important grounds in which *Lambis lambis* and *Hemifusus cochlidium* occur in large numbers. Samples of *L. lambis* and *H. cochlidium* netted at depths 2-8 fathoms in bottom set lobster gill nets (*singi valai*) at Kayalpatnam, 30 km south of Tuticorin were transported alive to field laboratory and kept in glass tanks to study their diagnostic characters and habits in laboratory. Their habits in the natural habitat were also noted by direct observations using SCUBA diving apparatus by one of the authors (Pon Siraimetan).

Feeding experiments were conducted in the laboratory and it was studied whether *Lambis lambis* and *Hemifusus cochlidium* feed on live polychaetes and chopped clam meat. To study the feeding habits in the natural

habitat, a total of 70 *Lambis lambis* of the size range 110 mm-186 mm (length) and 56 *Hemifusus cochlidium* of the size range 71 mm-112 mm (length) were collected alive from bottom set gill nets which are mainly operated for lobsters at Kayalpattinam. The outer hard shells of the live animals were broken without causing any injury to the animals. The live animals alone were immediately preserved in 5% formalin and the gut contents examined.

Tests were conducted to study the survival of *L. lambis* and *H. cochlidium*. Healthy animals of the two species reared in sea water were kept outside water separately and their survival tested at every 24 h intervals. Bottom sediment samples were collected from the grounds inhabited by the gastropods off Kayalpattinam. The sediment samples were preserved in 5% formalin and bottom fauna and flora presented in them were identified. Experiments were also conducted to find out the response of the two gastropods species to light. The animals were kept in sea water in large plastic tanks and light was focussed in a limited area in the tank. Observations were made on animals at frequent intervals and their movements if any away, towards or away from light were recorded.

DIAGNOSTIC CHARACTERS AND DISTRIBUTION

Lambis lambis (Linnaeus)

The shell is large, spindle shaped, moderately heavy and covered by a brown horny periostracum. Body whorl has angular shoulder with well developed nodules near the suture; some nodules are present lower below on the whorl. Surface of body whorl coarsely sculptured with closely set spiral ridges; on the whorls of spire ridges are closely set together. Outer lip of aperture broad, extends upwards over the surface of spire and is prolonged at its outer edge into seven elongated finger-like grooved processes. Columella and interior of shell smooth, bright and white or buff coloured. Outer surface whitish with brown markings. (Fig. 1.A)

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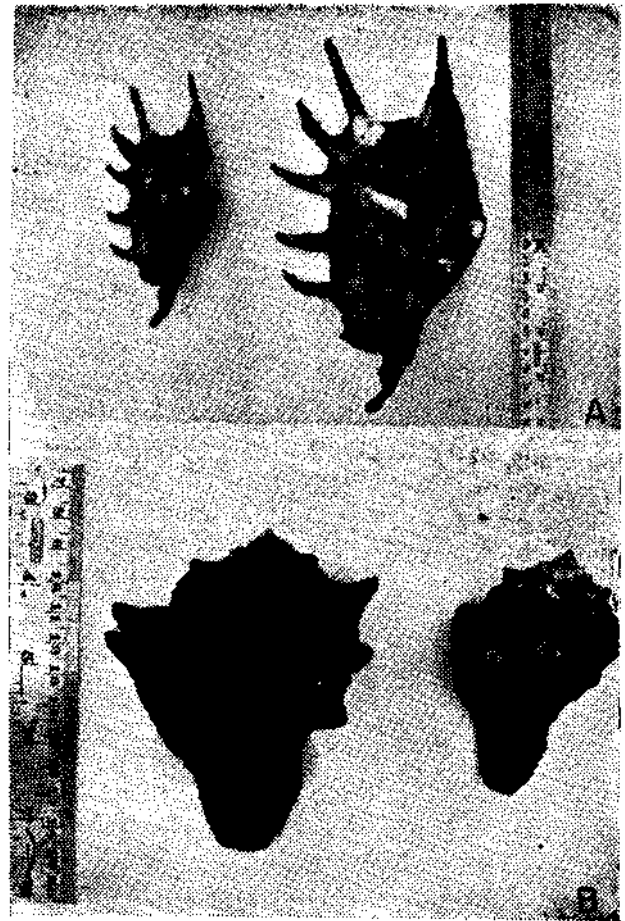


Fig 1. *Lambis lambis* (A) and *Hemifusus cochlidium* (B) caught in lobster net (Singi valai) off Kayalpattinam, Southeast coast of India.

This species is distributed from East Africa to Micronesia and eastern Melanesia. In India it occurs from Tuticorin to Pondicherry. The fishing season for this species is from April to October in Palk Bay and from November to February in Gulf of Mannar. Common Names; EngliBh—Five fingered chank, Tamil—Aivirali or Aiviral sangu.

Hemifusus cochlidium (Linnaeus)

Shell large, thick and pear shaped. Surface periostracum. Spire short- Whorl predominantly angularly shouldered. The shoulders particularly those on the body whorls bear well developed outer-posteriorly compressed tubercles. Whorls of spire sculptured with fine, spiral ridges; only a small number of thin spiral ridges are present

on the body whorl. Aperture is elongated and columella border concave. Anterior canal moderately elongate. Outer surface of shell dark orange red and columella and interior of aperture light yellowish red (Fig. 1, B).

The species is distributed in coastal waters including trawling grounds of Palk Bay and Gulf of Mannar. The fishing season of this species is the same as that for *L. lambis*. Common names: English—Red chank, Tamil—Mulli, Nagamulli sangu, Segappu mulli, Erathi mulli.

HABITAT

Lambis lambis and *Hemifusus cochlidium* are found to occur along the southeast coast of India and they are abundant in the shallows of Palk Bay and Gulf of Mannar. They inhabit the sandy and muddy areas and are very common at depths of 6-12 fathoms.

In the Gulf of Mannar, off Kayalpattinam the two gastropods occur in areas with sandy muddy bottom at a depth of 2-8 fathoms which are about 2.5-10 km from the coast. The fauna are rich in these areas and comprise of various groups like polychaetes, amphipods, bivalves, corals, sponges, holothurians, hydroids, gastropods, isopods, crabs, hermit crabs, echinoderms and fishes.

HABITS

Lambis lambis The animals are active, shallowly burrowing in sand or gravel and graze on animal matter present in the mud as mentioned by Morton (1979), They can be recognized at the bottom by the presence of five spiny digitate processes of the shell. They move quickly by the active muscular movements of the foot.

Hemifusus cochlidium This species crawls slowly with the help of its foot over short distances leaving a mark on the bottom. It usually inhabits sandy muddy habitat with rocky outgrowths with benthic animals which form their main food. The species soon attaches itself sometimes to the substratum firmly with its thick and broad foot.

OBSERVATIONS

The two gastropods were reared in rectangular fibreglass tanks (210 X 110 X 50 cm) with sand at bottom to a height of 3 to 4 cm. The animals were observed at intervals and their behaviour was noted.

Lambis lambis The animal is seen with protruded optic tentacles, prominent eyes and proboscis. It retracts these organs if disturbed. The proboscis is tubular in shape dark brown in colour and retractable. The animal moves from one place to another by step by step movements by vigorously shifting the foot by which the front side of the animal is lifted up and the animal progresses by a series of forward runs. At every step it stops for a short time. Within 2-3 minutes *L. lambis* moved sideways along the walls of the rearing tank and covered a distance of about 55 cm in 8-10 steps. The track left behind by the animal in the sand consists of thin, narrow and zig-zag lines like the marks left by the feet of small birds on land.

Hemifusus cochlidium The animal usually rests in one place with protruded proboscis. The latter is tubular in shape, dark brownish red in colour and is movable. It moves clockwise, anticlockwise as well as in downward and upward directions. The animal retracts the proboscis inside if touched or disturbed. Some animals are seen attached to the walls of the tank below the water level and at times above the water level with the help of their thick muscular foot. On attachment the animal expends its muscular foot on the front and back sides and moves slightly in clockwise and anticlockwise directions. The animal moves slowly on the muddy bottom by the muscular movements of the foot leaving a characteristic track in the sand which is narrow, curved or straight and looks like a narrow channel.

Direct underwater observations made with SCUBA diving apparatus revealed that the bottom where the two gastropods occur was sandy muddy with rocky outcrops. The bottom

is covered with a mixture of coarse and medium sand of pale brown colour with plenty of broken shell bits. Very often the two species of gastropods were overgrown with seaweeds, barnacles, egg masses of gastropods etc. The gastropods burrow in the sandy muddy bottom and sometimes climb over rocks and coral stones found in the area.

FEEDING EXPERIMENTS

Individuals of the two species of gastropods of identical size were kept separately in rectangular plastic tanks (65 x 45 x 30 cm) with sand at the bottom to height of 10-15 cm. The tanks were filled with sea water to a level of 5 of the tank and a known quantity of feed was given daily at a fixed time. The rejected food material was collected and weighed next day. The experiment was repeated with live, polychaete feed and chopped clam meat.

Lambis lambis Two animals of the size 158mm and 155 mm in length were used in this study. The animals were kept separately and 5.0g of live polychaetes was given to each animal daily. The results indicated that the animals have consumed 55% of the live polychaetes daily out of 5.0 g provided.

Later the same animals were given 5.0g of clam meat daily. The animals showed poor response to clam meat and consumed 16% of the meat daily out of 5.0 g.

Hemifusus cochlidium Two animals of size 108 mm and 110mm in length were used. The animals have taken 42% of the live polychaetes daily out of 5.0g. But they have not fed on clam meat and a total rejection to clam meat was noted.

FOOD OF THE TWO SPECIES COLLECTED FROM OFF KAYALPATTINAM

The gut contents of *L. lambis* and *H. cochlidium* netted in bottom-set gill nets were examined and the food of the two species was found to be similar. The animals are carnivorous

and fed chiefly on polychaetes, bivalves, small crustaceans, foraminifers, isopods and gastropods. Sandgrains, polychaetes and digested matter were the dominant items found in the guts of *Z. lambis* and *H. cochlidium* (Table. 1)

TABLE 1

Percentage occurrence of food in the gut contents of *L. lambis* and *H. cochlidium* netted in bottom set gillnets (singi valai).

Food	<i>Lambis lambis</i> %	<i>Hemifusus cochlidium</i> %
Sand grains	34	46
Polychaetes	25	12
Digested matter	22	24
Bivalves	7	10
Small crustaceans	6	4
Broken shell bits	4	—
Foraminifers	1	1
Isopods	1	—
Gastropods	0.6	3

SURVIVAL

Normally the gastropods can thrive for a certain period outside seawater. In order to study the survival of the two species outside sea water, six series of experiments were conducted at 24 h, 48 h, 96 h, 120h and 144 h intervals. The two gastropods were kept separately in cleaned glass tanks without water and at the end of each experiment the animals were put under sea water to test their survival by close observation. The experiments were repeated for each series of time interval.

Lambis lambis Individuals of the size group 142-145 mm in length were used. The study revealed that till 120 h the animals were alive, slightly active and retracted foot inside but at 144 h, they were confirmed to be dead.

Hemifusus cochlidium In this study specimens of size 98-100 m were used. The results indicated that the animals were alive till 96 h, and were confirmed to be dead at 120 h.

BOTTOM FAUNA AND FLORA

Bottom sediment samples were collected from the lobster grounds at depths of 2-7 fathoms off of Kayalpattinam from where the gastropods occur. The mud samples were washed with water several times and the washings were filtered through sieves. The fauna thus filtered was sorted out and identified.

The bottom fauna consisted mostly of sponges, calcareous algae, bivalve shells, coral pieces, oyster shells, amphipods, polychaetes Amphioxus, isopods, hermit crabs (juveniles), decapod larvae, pteropods, ostracods, foraminifers, *Alpheus* and caprellids and the flora comprised mostly of the algae *Sargassum* spp, *Hypnea* spp and the sea grass *Cymodocea*.

Some observations were also made in the laboratory to find out the response of the two gastropods to light. The animals were kept separately in sea water in large plastic tanks and light was focussed in one corner of the tank. The experiment was started by placing the animal opposite to the lighted area and the movements of the gastropods were observed at frequent intervals.

Lambis lambis These always showed movement towards light. They moved from the shade place to lighted area when tested repeatedly.

Hemifusus cochlidium It was interesting to note that these animals exhibited very limited movement and did not show movement towards light.

EPIFAUNA AND EPIFLORA

Barnacles, polychaetes, sea-anemones and egg masses of some molluscs are often seen attached on the surface of the two gastropods. Algae such as *Gracilaria*, *Hypnea*, *Padina* and

Sargassum are also seen as epiflora attached to the outer surface of shells of these gastropods.

REMARKS

The foregoing observations show *L. lambis* are more active than *H. cochlidium*. The five fingered chank does not have foot attaching mechanism. But in the case of the latter the animal gets attached firmly on the surface and moves very slowly.

The two gastropods showed some response to live polychaete feed than clam meat. Analysis of the gut contents revealed that the food of the two gastropods collected from the lobster gillnets is similar since they live and feed in the same habitat. The predominant items among diet of the two species are polychaetes, bivalves and small crustaceans.

L. lambis exhibits positive phototropism and moves towards light from shaded area. But *H. cochlidium* does not prefer to move towards lighted area.

Analysis of bottom mud samples collected from the sandy muddy habitat indicate that the bottom fauna present in its natural habit plays a vital role by forming the food of the two gastropods.

Except in the case of sacred chank, *Xancus pyrum* (Mahadevan and Nayar 1966) and a few others (Hornell 1949 a, b, c) which has been studied to a limited extent, the habits and biological aspects of gastropods of Indian region have received very little attention. A thorough study of the behaviour and biology of gastropods of Indian seas which are of commercial importance is needed to have a better understanding of the populations which are exploited commercially.

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