NOTES

UNDERWATER ECOLOGICAL OBSERVATIONS IN THE GULF OF MANNAR OFF TUTICORIN

VI. On the Habitat, Movements and Breeding Habits of the Chank, *Xancus pyrum* (Linnaeus)

While carrying out the underwater survey of the sea bottom off the coast of Tuticorin the habitat and movements of chanks, their copulating habits and the process of spawning were carefully observed by the present authors for the first time. It was felt that the following account of observations would be of some interest.

Habitat of chanks : The habitat of chanks was believed to be comparatively shallow water region and the greatest depth at which it was taken was stated to be 11 fathoms (Moses 1923). This statement was based on the information about the maximum depth at which the local skin divers safely operated for chank fishing. Observations by the authors now show that the chanks are present in the sandy stretches up to 27 metres depth limit. It was not possible to venture beyond this due to lack of safety diving equipments. Chanks live in the shoreward areas also at depth range 10-12 metres but such instances are comparatively rare and rarer still are the chanks taken from very shallow waters. The sandy bottom between 10-27 metres can be broadly divided into

(*a*) Coarse sand region with plenty of worn out, drifted, brown coloured, broken shells of the species of *Arca, Anomia, Cardium, Crucibulum, Bulla, Meretrix, Nassa* and *Dentalium* along with small molluscs, echinoid spines, quartz grains and a few foraminiferan shells. This area extends from 8 metres up to 13 metres limit.

(*b*) A region with sand grains of brownish colour in between coarse and fine grade, inhabited here and there by *Clypeaster humilis, Salmacis bicolor, Holothuria atra* and *Murex tribulus.* The percentage of broken shells was less while that of the foraminiferan shells was higher than in the previous region. The area extends from 13 to 17 metres.

(*c*) A region of fine sand of silky texture, superficially muddy coloured with loosely lying small corals, dense growth of *Solenocaulon* sp., *Pteroides* sp., *Virgularia* sp., tests of *Echinolampus* sp., *Clypeaster humilis*, occasional *Astropecten* sp., *Rhabdocynthia* sp. and sea anemones like *Stoichactis giganteum.* Broken shells were rare while foraminiferan shells were fairly rich. The area extends between 18 and 23 metres. The sandy bottom appeared furrowed.

(*d*) A region of very fine, loose sand in furrowed formation with *Rhabdocynthia* sp., alcyonarians, pennatulids, a few *Holothuria atra*, filamentous green algae etc. This region extends from 23 to 27 metres. The floral population here often consisted of *Avrainvillea* sp., *Halophylla ovata* and *Cymadocea* sp.

(*e*) A region of sand, spread along the periphery of the rocky areas. This showed a mixture of all conditions seen in (*b*), (*c*) and (*d*). Here the sand was

spread 6"-12" over the hard bottom. *Porolithon* sp., dead coral pieces, scattered calcareous sea-weed *Halimeda* sp., algae belonging to mostly Rhodophyceae group grown here and there and dead shells were seen in addition.

It is mostly in the last three types of environments that the chanks were found congregating. A few were found at random in region (b) while in (a) they were not seen. The calcium content of the bottom zone especially in areas (c), (d) and (e) ranged from 10,490-12,930 per gm. at/l (Malupillai 1962). This value was considered to be fairly high when compared to other areas in the Gulf of Mannar. Rough analysis of known unit of sand collected from the various categories showed in addition to the features already described for each, that the polychaete fauna, sand dwelling amphipods, small ophiuroids, filamentous green algae and the foraminiferan shells were abundant in categories (c) and (d). The vegetable and animal debris constituted good amount of the materials. Examination of the gut contents of few chanks revealed vegetable and animal debris, a few cut algal filaments and polychaete segments indicating the nature of the diet that the animal had ingested.

Judging from the various factors above it appeared reasonable to state that the environments (c), (d) and (e) constitute the chank grounds where a great proportion of the available food material as well as the calcium dissolved in the surrounding water would help in building up the heavy shell of the animal.

Chank movements : The similarity of the colour of the muddy brown periostraetum of chank to that of the sand in which it lived often made it difficult to perceive the chank at first sight. Very often the chanks were overgrown with seaweeds, anemones like *Adamsia* sp. and polyzoan colonies. But the track or the rut that the animal left behind when slowly crawling about was a very characteristic mark on the ground. In order to determine the direction, rate and purpose of the movement observations were made while diving.

A chosen spot in the chank ground at 20 metres depth was buoyed up on a calm day and a good number of chanks were left near the anchor stone at the close of the day's work. After an interval of 24 hrs. dives were made at the spot to look for the chanks. Many chanks had moved away from the stone anchor. The marks left behind by the chanks ran in all directions making irregular lines or straight lines or semicircles. Some of the tracks measured 6 metres in length. Similar observations made on subsequent occasions in different localities of (c), (d) and (e) showed varying degrees of movement of restricted nature. The direction of the surface and the bottom current of the sea-water on all days of observation was north to south.

Remarks : It was seen that the movements of chank were not directly governed by the direction of the current. Chank moved in any direction of its choice which may suit its needs. There was no evidence of any mass or collective movement. The movement was neither uniform nor constant and it appeared to be for choosing better spots of food concentration. The fact that the tracks left behind in (c) and (d) were short during the days of observation was suggestive that the area provided enough food material for them without necessitating them to exert much before the food was found. It may be said that the density of the population of chanks feeding on the food, the extent of feeding grounds, rate of feeding and the seasonal fluctuation of the food materials would perhaps govern their movement from place to place.

Breeding : Large-scale breeding of chanks in chank beds was seen during the

trimester January-March. Several instances of chank copulation were seen within a short distance of one another during the last week of January to the middle of February thereby indicating this to be a favourite season.

Thomas (1884) and Hornell (1921) have stated that the sexes are separate and that the females are larger than the males. Observations now have confirmed this. The females were the larger of the copulating pair. In many cases they were one and a half times more than the diameter of the males (Photograph 1). The globose female was surrounded by, in majority of the cases, four to five males of smaller size (Photograph 2). There were instances when there was only one male. The

PHOTOGRAPH 1. Male and female chank which had copulated. The egg capsule with the base extruded first may be noted.

copulating male with its apex turned towards the direction of the opercular canal of the female lay by the side of the female in such a way as to bring the genital organ of the male to as advantageous a position as possible (Photograph 3). When the body of the male extended out of the shell the penis, situated on the right side of the head region, established contact with the genital aperture of the female and copulated. The exact role of the other males surrounding the female was not quite clear. In one case it was seen that the chank (with an overgrowth mark of a solitary coral, *Trochocyathus* sp. on the shell) which was earlier in the copulating position was

found to have moved to the other side of the female while its place was taken by another waiting male chank. This made us to suspect polyandry among the chanks. The circumstances which made the first male to move was not clear.

PHOTOGRAPH 2. Female chank (large one) surrounded by males before copulation.

Another interesting observation made on the breeding habit of chanks was that the male and the female still appeared to be in union even as the egg case was being pushed out* (Photograph 3). When the male was disturbed in this condition it quickly retracted its penis. Further laying of the capsule chambers was stopped perhaps due to the disturbance. It may be that the male in question might have been attempting to copulate again after the female had earlier copulated and begun laying the egg chambers. Unfortunately the entire process of copulation from the beginning to the end was not observed in any particular case.

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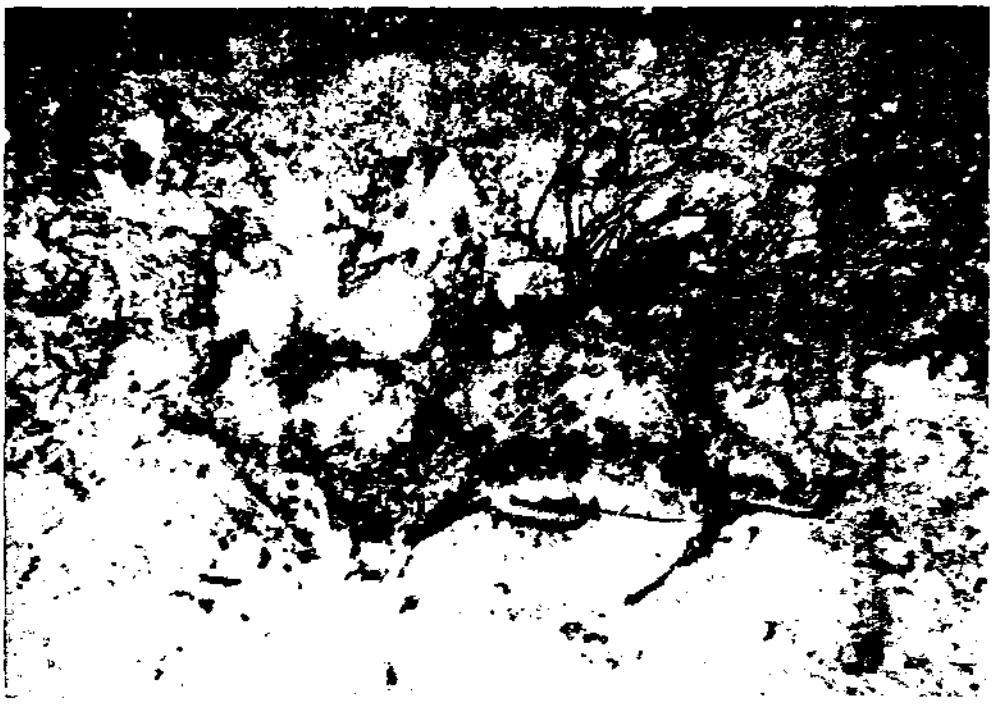
* Dr. Salvadori has also observed the same feature in 1961.

As the chambers were pushed out one after the other they were soft and pliable and almost translucent. Coming into contact with the sea-water these changed to light lemon shade subsequently becoming yellow. The egg case had been



PHOTOGRAPH 3. Copulation in progress. The arrow indicates the male. The female is extruding the egg capsule.

described in detail by Hornell (1921, 1951) Moses (1923) and Natarajan (1955). On an average each egg capsule measured 250 mm.-310 mm. in height and consisted of 28-34 chambers.

Most of the copulating males measured from 53-57 mm. diameter, whereas the females measured 70-80 mm. Since the copulating female was seen to be above 55 mm. the present fishable size limit** imposed to conserve the fishery might result in ripe males getting a slight edge over the female in escaping the fishing and completing the biological ideal of contributing their part in the perpetuation of progeny by copulating at least once before being removed by divers. On the other hand the female of *Xancus pyrum* stands the danger of being fished out even before it finds the partner. But once they are found in copulation by the divers they are not disturbed. Further research seems to be warranted to verify the exact size at which the male and the female attain first maturity.

Indication about the polyandry amongst the chanks was provided by a lone instance only. Although polyandry among gastropods does not seem to be

** Present size restriction prohibits fishing of chanks below 2 3/8" (i.e.) 55 mm. diameter.

uncommon,* especially nudibranchs and Ascoglossa, confirmation is to be further obtained to substantiate this feature among chanks.

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ON AN ANOMALY IN THE CHELIPED OF THE PORTUNID CRAB, *PORTUNUS PELAGICUS* (LINNAEUS)

Portunus pelagicus is the dominant species and contributes substantially to the crab fishery along the Palk Bay and Gulf of Mannar coasts in the vicinity of Mandapam. On 23rd February 1966, a male specimen of this species with the carapace measuring 59 mm. in length and 132 mm. in breadth which had two additional dactyli on the left cheliped (Fig. 1) was collected from the gill net (*Nandu valai*) catches from Gulf of Mannar landed near the jetty of the Central Marine Fisheries Research Institute. Such an anomalous condition of the cheliped which appears to be rare has not been reported hitherto in this species and therefore a brief description is given below. The right cheliped of the specimen was unfortunately broken before collection.

The cheliped measures 156 mm. and the propodite (up to tip of thumb) 85 mm. in length. About midway along the inner margin of the original dactylus an additional branch takes its origin which in turn gives rise at its base, on the outer margin to another branch (Fig. 2). Both the additional dactyli are immovable but possess well developed teeth along their inner margins like the thumb and original dactylus. While the first branch lies parallel and in apposition to the distal part of the original dactylus, the second one has a transverse course, lying external to the thumb. Although the second dactylus appears to form a ' miniature claw ' with the distal part of the original dactylus, it is not functional as the former is immovable by

* Personal communication from Shri K. Virabhadra Rao.