

sizes recorded for males and females of *S. elliptica* caught in trawlnet in Cochin area are 129 mm and 119 mm respectively (Silas *et al.*, 1985) and in Veraval waters it is recorded as 149 mm (Kasim, 1993). Sivasubramanian (1991) has reported the maximum mantle length as 130 mm from the Bay of Bengal. The maximum length recorded during the present observations from Mumbai waters was 118 mm.

Silas *et al.* (1985) studied the biology of this species from Cochin waters and Kasim (1993) reported on the age, growth and stock assessment from Veraval waters. Sixteen specimens of *S. elliptica* were analysed for gut contents of which 14 were males and all of them had empty to trace stomachs and 2 specimens were females with 'half full' stomach. This species seems to be extensively feeding on prawns. Silas *et al.* (1985) observed that penaeid prawns form the main item of this species in Cochin waters and the other food items, which occur in the stomachs, are fishes, *Acetes*, crabs and stomatopods. In general, females were observed to be broader than males

and the overall dominance of males was observed in the catch from Mumbai. Similarly dominance of males is reported in Cochin waters also (Silas *et al.*, 1985). All the males examined were in second stage of maturity and the females were in third stage of maturity. Males and females of this species of Cochin area attain sexual maturity at a minimum size of 75 mm, and all individuals of the two sexes mature when they reach a size of 115 mm and spawning females as well as males were recorded from October to December (Silas *et al.*, 1985). Meiyappan *et al.* (2000) reported the size at 50% maturity in the west coast as 93 mm for males and 96 mm for females.

There is a definite migration pattern followed by cephalopods and hence further studies on this species during this period would ensure their fishery potential and trend. This being a new entrant to the cephalopod fishery off Mumbai waters, a close monitoring of this resource is essential, as they seem to contribute substantially to the cephalopod fishery in Veraval and Cochin waters.

By-catch of the gastropod *Tibia* spp. in gillnets operated along Gujarat coast

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The rocky coastal belt of Gujarat possesses an enormous potential resource of lobsters. Gillnets are regularly operated for lobster along the coast of Mangrol, Porbunder and Muldwarka. Gastropods such as *Tibia maculata* and *Tibia curta* occurred in large quantities as by-catch along with lobsters. Other gastropods such as *Archipecten* sp. and *Murex* sp. also make their occurrence in small quantities.

Mangrol

Lobster fishing is being regularly conducted using old gillnets in this area. The net is operated at a distance of 2 to 3 km at a depth of 20 to 25 m and it is allowed to remain overnight and the next day morning the fishermen usually collect the net

with all the fish, lobsters and the gastropods. The gastropods living in the muddy or nearer to rocky area also get entangled with the gillnet thus forming a fishery. On enquiry, it was told that these gastropods are available in large numbers during high tide after the post-monsoon season. The catch rate was also very high ranging from 15 to 25 kg per unit during September-December (Fig. 1) and it was considerably lower during January-March with each unit bringing about 5 to 8 kg of gastropods. The gastropods are mainly constituted by *T. maculata* (Fig. 2) and *T. curta* (Fig. 3), forming about 94% while the sun shell *Archipecten* sp. and *Murex* sp. form 3% and 2% respectively and the remaining 1% by other miscellaneous gastropods. Majority (71%) of the gastropods (*Tibia* sp.) were

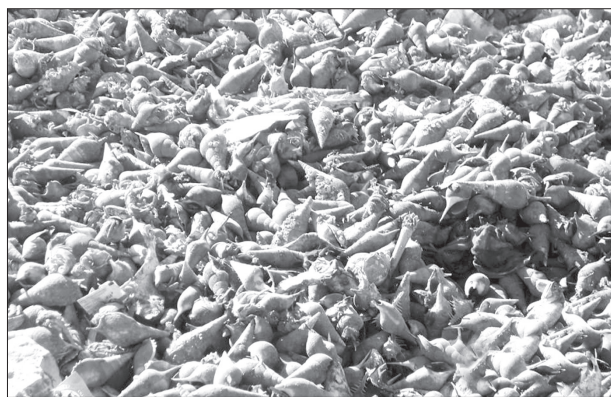


Fig. 1. Bulk landings of *Tibia maculata* by gillnets at Mangrol

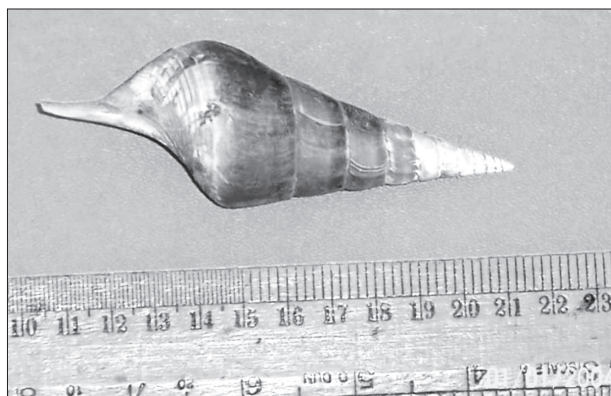


Fig. 2. *Tibia maculata* landed as by-catch at Mangrol by gillnets



Fig. 3. *Tibia curta* caught as by-catch along with lobsters by gillnetters at Mangrol

alive and 29% were dead and were mostly occupied by the hermit crabs. The size range of the gastropods varied between 71 and 136 mm with

the size group 80-84 mm forming 17% and the size range 80-104 mm contributing to 68% of the population.

Porbunder

Similar observations were made on the gastropod fishery at Porbunder Landing Centre also. Majority of the gastropods recorded were *Tibia* sp. (Fig. 4) and other gastropods such as *Archipecten* sp. and *Murex* sp. were found to be in negligible numbers. In Porbunder, gillnets are operated in the morning hours and hauling is done in the afternoon after a duration of 5 to 6 h wherein lobsters are got along with fish and gastropods. The percentages of live and dead gastropods were 82 and 18 respectively. The size group of the gastropods ranged between 117 and 146 mm with the dominant size group being 140-144 mm forming 34.5%. About 79% of the gastropods were found to be between 125 and 144 mm.



Fig. 4. *Tibia maculata* and *T. curta* landed by gillnets along with lobsters at Porbunder

Muldwarka

There are about 300 gillnets in Muldwarka and 40 units are regularly deployed for lobster fishery. The fishermen usually shoot the net in the evening at a depth of 20 m and at a distance of 2 to 4 km from the shore. The net is hauled during the next day or even after two days. Regular catches were contributed by lobsters along with a by-catch of gastropods and fishes such as sciaenids, eels, *Cynoglossus*, *Lethrinus*, *Epinephelus*, *Lutjanus*, *Thryssa*, etc. Sometimes the fishes were observed in putrified condition while the net was being hauled after two

days and they were discarded in the landing centre itself. The gastropods showed a similar trend as in Mangrol. The size of *Tibia* sp. varied between 76 and 142 mm with the dominant size group 85-89 mm forming 18%.

These gastropods are kept in heaps at the landing centres, sundried and after cleaning and painting they are used for aesthetic purposes. The shells are very neatly and beautifully embedded in cement on the compound walls of temples and houses in and around Mangrol (Fig. 5).



Fig. 5. Cleaned and painted shells of gastropods embedded on the compound walls of temples

Improved mechanisation in dolnetting along the Saurashtra coast

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The dolnetters of Jaffrabad, Rajapara and Nawabunder until 2000 were using engine drive for transport and other fishing operations (shooting, piling and hauling). This was done manually and required 6-9 persons per trip with increased effort and reduced catches which necessitated multiday operations and multinet/multihaul operations. Hence, from 2001 onwards, the dolnetters gradually switched over from stone pillars to portable iron pillars. Further, they used winches driven by boat engines to haul the dolnets. The winches varied in size and were applied mostly by new large vessels having OAL of 12-14 m and driven by 87-105 HP engines. They are driven by an axle rod with bearing and teeth attached to boat engine with an alternate gear regulator. The net drums are 3-4 ft in

length, 2 ft in height and the axle rod diameter is 2 inches.

The advantages of this improved method are as follows:

- Saving the expense on two crew numbers
- Additional dolnet could be used with the same effort and manpower

Table 1. Percentage variation for improved mechanisation in dolnets

Centres	2001	2002	2003	2004	2005	2006	2007	2008
Nawabunder	5	8	15	20	25	40	50	60
Rajapara	10	12	18	25	40	50	60	65
Jaffrabad	25	30	40	50	60	70	75	75



Fig. 1. Improved mechanisation in dolnetting along the Saurashtra coast