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NOTE

An account on the fishery and biology of *Parapenaeus fissuroides indicus* Crosnier, 1985 recorded for the first time from Indian waters

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Abstract

The False Rose shrimp, *Parapenaeus fissuroides indicus* Crosnier, 1985 started supporting a minor fishery along Karnataka coast in recent years. The trawlers operating at a depth of 80-120m off Mangalore landed 11t, 4t and 127t at the fisheries harbour here during 2001 to 2003 respectively. *P. fissuroides* is the first record from Indian waters. It significantly differs from the species *P. fissurus*, earlier reported from India. *P. fissuroides indicus* is one of the three sub species of *P. fissuroides*, the other two being *P. fissuroides fissuroides* and *P. fissuroides erythraeus*. The paper describes with illustration the thelycum and petasma of *P. fissuroides indicus* indicating how this shrimp can be differentiated from *P. fissurus* and the other two sub species. The paper also gives an account of fishery and biology of *P. fissuroides indicus*.

Extension of shrimp trawling operations by multi-day trawlers in the fishing grounds beyond 100m depth has resulted in landings of new varieties of crustaceans all along the Indian coast. Along Mangalore coast, the "ridgeback shrimp", *Solenocera choprai*, which occurred in stray numbers in shrimp landings during early 90's became most dominant species by the turn of the decade. Like wise a new species of penaeid shrimp with a colour pattern similar to *S. choprai* was noticed in stray numbers in the fishery from January 2001. Going by old records of its morphological characters, this shrimp was treated as *Parapenaeus fissurus* (Bate), a species reported earlier from Indian waters by Mohamed (1973), Kurien and Sebastian (1976) and Silas and Muthu (1979). The present specimen significantly differs from *P. fissurus*, reported earlier. The species was caught from 80 m to 120 m depth off Mangalore where uniquely the sea bottom was reported to be sandy (Harkantra *et al.*,1980). During January 2001, this species was landed in good quantity and in 2002 the fishery season was extended up to March. The trend continued in 2003 also. Detailed studies on morphological and biological characteristics of the species were conducted during January, 2002 and February to June 2003. Based on these studies, it was concluded that the species is *Parapenaeus fissuroides indicus* Crosnier, 1985. Earlier *P. fissuroides* was reported from Arabian Sea off Pakistan by Tirmizi (1972) and Tirmizi and Bashir (1973) without assigning it to any subspecies. From the figures given in the paper, Crosnier (1985) expressed doubts that some of the specimen described might

belong to *P. fissuroides indicus*, but lack of availability of specimens for further confirmation made the studies inconclusive and the species was treated a simple form of *P. fissuroides*. The present report provides the first conclusive evidence of the presence of the species from Indian waters with illustrated proof of the diagnostic characteristics of the sub species. Results of the observations on length distribution, sex ratio, length-weight relationship, gut content analysis and maturity stages are also reported.

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Material and methods

Monthly estimates of catch and effort of shrimps landed at Mangalore Fisheries Harbour were made based on bi-weekly observations during 2001- 2003. Data on length range, sex ratio, length-weight relationship, gut content analysis and maturity stage analysis were noted from the random samples which was further analysed in the laboratory. For the identification of the species, information and identification keys provided by Crosnier (1985) and Chan (1998) were used. For length-weight relationship, the linear equation ($log\ W = log\ a + b\ log\ L$) was fitted for both sexes separately. Regression analysis was performed to determine the constants, *a* and *b*. The correlation coefficient (r) was determined to know the strength and pattern of association between the two variables. Feeding condition was noted by the degree of extension of the gut (proventriculus) and was classified as poorly fed (> 25% extension of gut), moderately fed (25 - 50% extension) and actively fed (> 50% extension of gut). The gut contents were quantified by identifying the remains of the food which were found in crushed form as a result efficient mastication. Food items were identified following Gosner (1978). For studying the feeding behaviour 'Index of Preponderance method' (Natarajan and Jhingran, 1961) was used. The maturity stages were classified as immature, early maturing, late maturing, mature and spent, based on the colour and size of the ovary.

Results

Fishery

P. fissuroides indicus was caught from 80 - 120 m depth off Mangalore. From GPS readings collected from commercial trawlers it was learned that the fishing area is between the Lat. 12° 30′ - 13° 00′N and Long. 74° 00′ - 74° 30′E (Fig.1). The fishing ground at these depths is found to have sandy bottom. During 2001, the species was landed in good quantity in January (11 t) but during the rest of the months it was not observed in the landing. In 2002, it was found to occur during January, April and May but the total landing during the year was less (4 t)

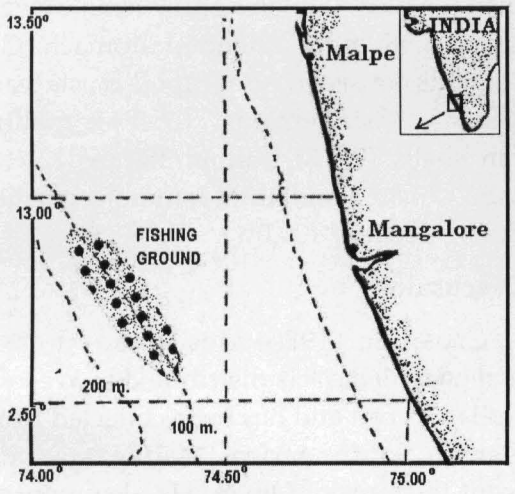

Fig. 1. *Map showing fishing ground for* Parapenaeus fissuroides indicus *in the Arabian Sea*

compared to the previous year. During 2003, the fishing season extended from February to June and the total catch for the year was 127 t.

Morphological characters of the species

Rostrum is smooth. Carapace with both longitudinal and vertical sutures. Number of dorsal teeth six to seven and without any ventral teeth. Branchiostegal spine present and situated at anterior edge of carapace (Fig. 2). Epigastric spine distinctly behind the level of hepatic spine (Fig. 3). Telson with two fixed lateral spines (Fig. 4). In males, sub distolateral lobes of petasma distinctly bifurcate (Fig.5). The median part of the thelycum bears a pair of longitudinal swellings which distinctly differ from other sub species of *P. fissuroides* with the presence of a posterior protuberance (Fig. 6). Colour: Rose coloured body and appendages.

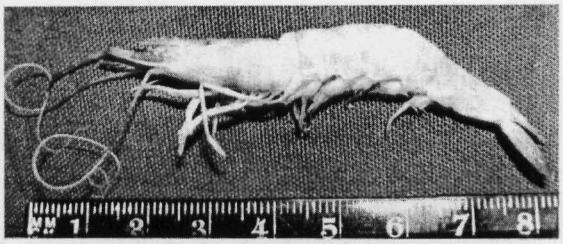

Fig. 2. *Parapenaeus fissuroides indicus* Crosnier, 1985

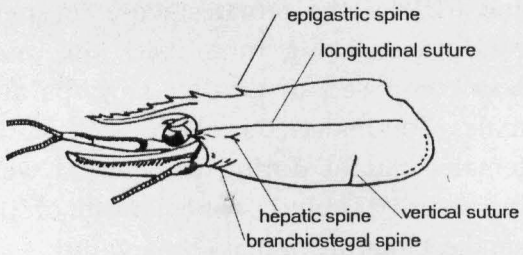

Fig. 3. *Carapace of* Parapenaeus fissuroides indicus

Fig. 4. *Telson of* Parapenaeus fissuroides indicus

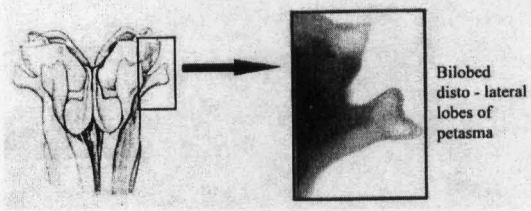

Fig. 5. *Petasma of* P. fissuroides indicus

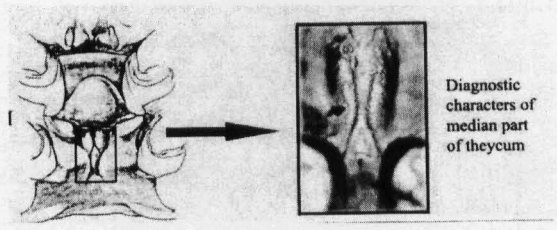

Fig. 6. *Thelycum of* P. fissuroides indicus

Size range and female maturity

Observations on the sex ratio, size range and female maturity were conducted during January 2002, and February and June 2003. Nearly 384 shrimps were used for these studies. It was observed that during January the catch was composed of comparatively bigger shrimps and 81% of the females were in spent condition. During June, 2003, the catch was composed of smaller shrimps and males dominated the catch. 15% of the females caught during this period were immature (Table.1). The length of the smallest mature female was 74mm.

Length- weight relationship

The linear equations (*log W = log a +b log L*) derived from the regression of the length-weight measurements of males (n= 66), females (n= 71) and pooled are

Males: Log W = -11.62 + 2.94 Log L (r = 0.98)

Females: Log W = -10.89 + 2.77 Log L (r = 0.99)

Pooled: Log W = -11.21 + 2.84 Log L (r = 0.99)

Gut content analysis

Gut contents of 40 males and 40 females were analysed during March 2003 out of which 45 (56.3%) were actively fed. Males were found feeding more actively than females. 15 males and 9 females were found with fully extended stomach. Gut contents consisted of decapod crustaceans (38.4%), "fish remains" (25.5%), molluscan shells (9.6%), foraminiferans (2.7%), sand (3.8%) and unidentifiable crushed mass, detritus (20.0%).

Discussion

Crosnier (1985) described that *P. fissuroides indicus* is distributed in Western Indian Ocean and has been collected from, Kenya, South Africa, Madagascar and from the Gulf of Oman. He also reported that these shrimps are generally distributed at a depth between 170 - 300m. But off Madagascar and South Africa they were caught from lower depths, between 64 - 84 m. During the present study the species was caught from a depth of 80 - 120m off Mangalore. The size ranged from 66-89 mm and 64-98 mm for males and females respectively. Crosnier (1985) reported a maximum length of 104 mm for males and 129 mm for females collected from Western Indian Ocean at a depth of 170 - 300m. Chan (1998) by analysing the collections from Japan and Indonesia reported that the maximum length observed for female and male was 140 and 117 mm respectively with majority between 70 and 110mm.

Table 1. *Length range and maturity stages of* P. fissuroides indicus *landed at Mangalore Fisheries harbour.*

Month	Males		Females		Female maturity (%)				
	Nos.	Size range (mm)	Nos.	Size range (mm)	Imm.	Em.	Lm.	Ma.	Sp.
Jan'2002	45	68-89	63	76-98	0	16	3	0	81
Feb'2003	66	69-86	111	74-92	0	45	8	0	47
Jun'2003	74	66-76	27	64-89	15	56	29	0	0

Since it is an emerging resource no other details on the biology of the species are reported from any part of the world. The present study showed that *P. fissuroides indicus* is a carnivore. From the higher percentage occurrence of spent females during January (81%), than those present during February (47%) and June (0%) it appeared that the species spawns during January.

Chan (1998) while commenting on the fishery status of the species stated that at present the fishery is of limited commercial importance as it occurred as a by-catch in trawl from deeper waters. But in future, with the development of a deep-sea fishery its economic importance may go up. At Mangalore, the species fetches a price of rupees 30-40 per kg at present and is used for domestic consumption and export.

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