OBSERVATIONS ON THE CRAB FISHERY OF MANGALORE COAST*

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Introduction

Considerable quantities of crabs are caught in the inshore waters of Mangalore coast and from the river mouths of this zone during December-June period and these find a ready market in the towns. Crabs are brought to Mangalore town from the Ullal estuary and from Kasargod, Kumbla, Bengre and Mulki centres. The fishery is more active during February–April when fishing for the shoaling fishes reaches the waning period. Unlike in other towns in the south or in the north, crab meat is very much in demand in Mangalore. On estimation, it was found that as much as 22 tons of crabs are brought to Mangalore Webster market alone every season. It may be mentioned that the total production for the Malabar coast was estimated to be only about 23 tons (Chidambaram and Venkataraman, 1944). Crab meat is also sold at as high a price as any other esteemed variety of fish at this place unlike other centres where it does not fetch a high price.

There is no detailed account of the fishery on a countrywide basis although accounts of the crab fisheries of Malabar coast (Menon, 1952), of the Chilka lake (Jones and Sujansingani, 1952) and of the Mandapam coast (Prasad and Tampi, 1952) are available for comparison. Small notes on the fishery are seen in the earlier accounts of Rai (1933), Hora (1935) and Chopra (1936). A perusal of these papers shows that the fishery is not of the same species and that the seasons, gear employed, methods of fishing and disposal are not identical.

The species that contribute mainly to the local fishery are †*Neptunus sanguinolentus* (Herbst) and *N. pelagicus* (Linnaeus). Other edible crabs such as *Scylla serrata* and *Charybdis* spp. are also encountered in small numbers. Among the two species, the former has always been found to

† The genus *Neptunus* has been synonymised with the genus *Portunus* by Stephensen and Campbell (1959).

occur in large numbers, although during certain weeks, the latter recorded increased catches particularly during the closing months of the season.

Material and Methods

Weekly collections of crabs were made from the landing centres at the estuary and at the sea-shore and also from unsorted catches brought to Webster market for wholesale disposal, from December 1958. Regular catch statistics were maintained of catches brought to the market every day. The trawl catches made, off Mangalore, by the mechanised vessels operated by the training establishment of Mysore State Fisheries Department in depths between 4 and 12 fathoms were also studied. Measurements of crabs were made by noting the length between the tips of the largest spines, as was done by Menon (1952). The data relating to the fluctuations of the crab zoea were obtained through analysis of weekly plankton collections made off Ullal in the four-fathom zone for three consecutive years from 1957.

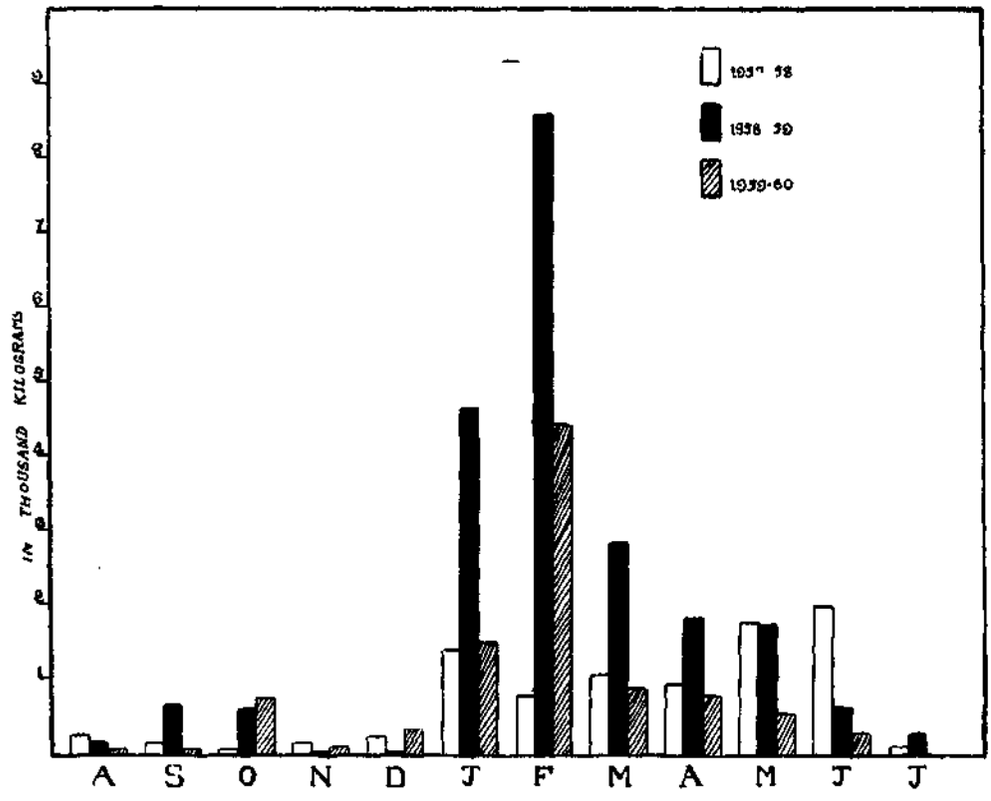
The Fishery

The crab fishery commences from January in each year although small quantities of crabs are always found in the market. During the active monsoon months crabs are fished from the river-mouths. The main season of the fishery is from February to April and comes to a close early in June, more or less coinciding with the commencement of the South-West monsoon (Text-Fig. 1). Crabs are sold by numbers in the retail sales whereas they are sold by baskets by wholesale agents. Fishing is carried out in the estuaries and in the inshore waters extending up to five or seven fathoms and the mechanised boats bring catches from depths up to 15 fathoms. The great bulk of the catches, however, are made in the shallow inshore seas within two or three fathoms and within a mile from the coast.

Fishing Methods

Crabs are caught in the *Rampani* nets, in the *Kairampani* and in the cast nets. They were recently caught in appreciable numbers from the trawl nets operated from the mechanised boats also. The indigenous gear used almost exclusively for crab fishing are the modified *Kanthabale* and *Aiburle* which are locally called *Aedi bale* (crab net). Except in the case of *Kanthabale* and *Aiburle*, the other nets are not specially designed for crab fishing although crabs along with other fishes are caught in appreciable numbers in these nets also, during certain seasons.

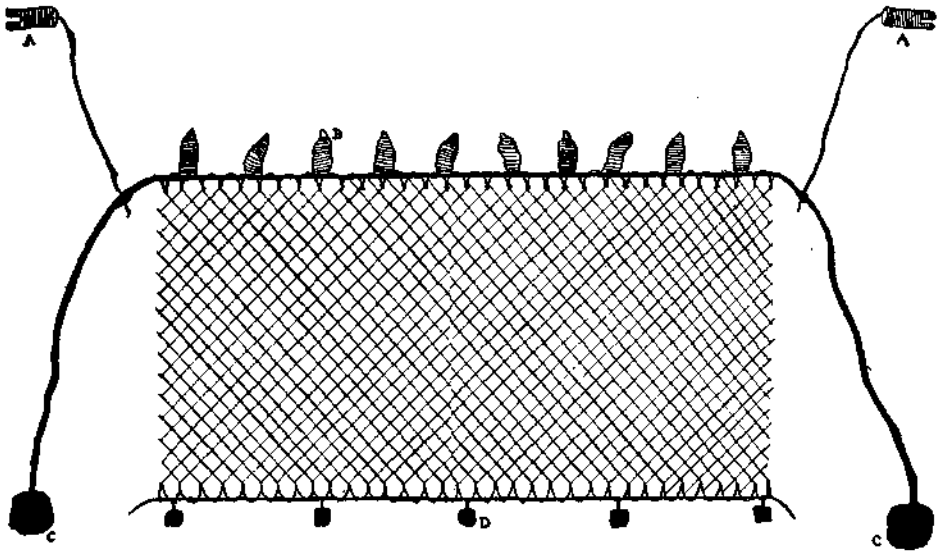
Menon (1952) has stated that boat-seines, gill-nets and cast nets have been used in crab fishing. Prasad and Tampi (1952) have described the *Nandu valai* used in Mandapam area to catch *N. pelagicus* and Jones and Sujansingani (1952) have given details of the *Noli jal* which is more or less similar to the *Nandu valai* with slight modifications. At Ullal and all along the Mangalore coast, fishing for crabs is carried on a very extensive scale during the summer months by employing *Kanthabale* which is a type of anchoring gill-net (Text-Fig. 2).



TEXT-FIG. 1. Histogram showing the monthly fluctuations of market arrivals of crabs in Mangalore for the period 1957–60.

The Kanthabale.—The *Kanthabale* is operated fairly widely on the Kanara coast particularly at Mangalore, Malpe and Hosabettu for inshore fisheries during the post-monsoon season. It is not uniform in piece-length or mesh size at all the centres. The one operated at Ullal, near Mangalore, for crab fishing is a hemp net with a mesh size of 50–60 mm.

The net is generally used with at least two pieces joined together. The mode of operation is the same as described by Prasad and Tampi (1951) for *Nandu valai*. Usually two or three fishermen conduct fishing operations from dug-out canoes. Generally the net is set in shallow water at a depth of nearly one to two fathoms and about 150–200 yards from the shore, about dusk. The net is anchored in position by placing heavy stones on the foot rope and the head rope is kept afloat with the help of light wooden floats. These are left overnight and the nets are hauled up early next morning before sunrise. The crabs are thus brought to the shore alive and they are removed from the nets with great care and skill.



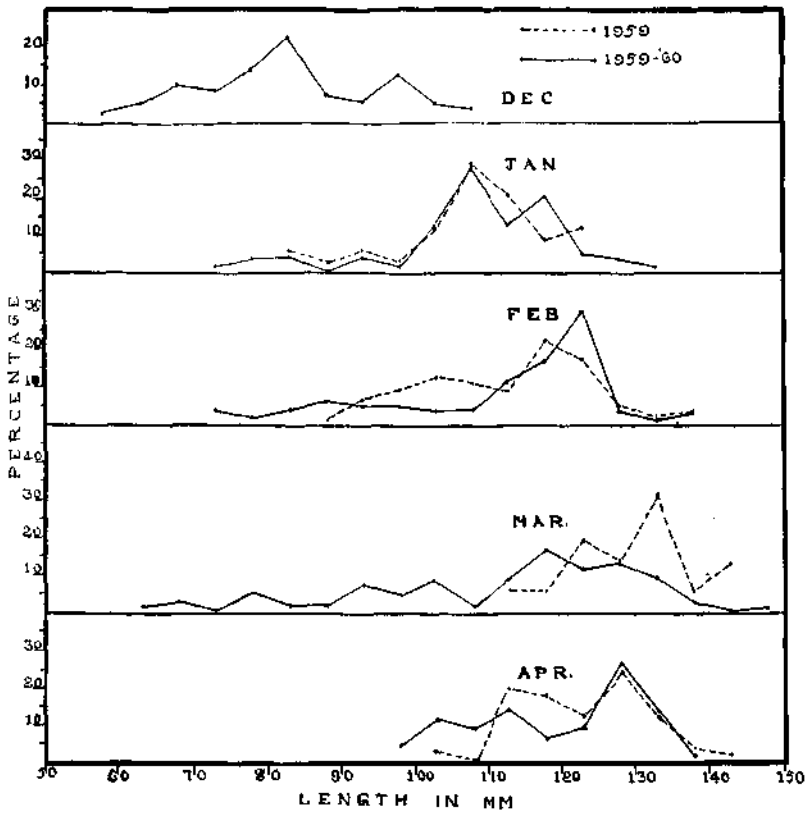
TEXT-FIG. 2. Diagrammatic sketch of *Kanthabale* operated along Mangalore coast. (A) Bamboo float. (B) Wooden float. (C) Stone weight. (D) Small stone weight.

Aiburle.—The *Aiburle* is also an anchored gilling net and resembles *Kanthabale* in structure and mode of operation but has a larger mesh size (120 mm.), increased width and is made of thicker threads. The wooden floats are longer but narrower and is operated in slightly deeper waters.

SEASONAL AND ANNUAL FLUCTUATIONS

As has been pointed out already, the season for crab fishery starts from December although smaller quantities are fished practically throughout the year. During 1957–58 about 9 metric tons of crabs are estimated to have been brought to the main market alone, whereas during 1958–59 season the catch almost more than doubled to 22 metric tons. But during 1959–60

season the fishery suffered a set-back and the catches came to the value obtained during 1957–58, to about 10 metric tons. It is not, however, possible at this stage, to state precisely the factors that bring about such sharp annual fluctuations.



TEXT-FIG. 3. Size frequency distribution of *Neptunus sanguinolentus* in the commercial catches for the period 1958–59 and 1959-60.

The active season was observed to be from January-March in all the three years of study. The highest catches were obtained during February and March in almost all the three years. The fishery comes to a close soon after the onset of the monsoon in June. Thereafter, fishing is limited to the estuary only and the small catches obtained seldom reach the main markets. Since the fishery is active at a time when the pelagic fishery season is at its closing period, the crab catches form a significant part of the edible sea food for local consumption. This is another reason for the comparatively high price for crabs at this place.

Observations on Breeding and Maturity‡

Berried females start appearing in the catches from December and their number increases as the fishery progresses, and as much as 60% of females noticed during March and April of 1960 were berried ones. During April and May 1959 the percentage rose as high as 83%. During the peak months of February-April, it can be said that nearly half the number of females caught were in berried condition. The minimum size of berried crab recorded at Mangalore during these years was 84 mm. It may, however, be recombered that Menon (1952) has recorded a still smaller size (78 mm.) for Malabar coast.

An analysis of the sexes obtained in the samples collected showed the proportion to be 54·7 : 45·3 for females and males respectively during 1959 registering small increase in proportion for females. But during 1960 season, a heavy preponderance of females was observed (63·4 : 36·6). It may perhaps be due to factors pointed out by Mackay (1946) as quoted by Menon (1952). The maximum size obtained for female was 138 mm. and for male 149 mm. The proportion of sexes obtained during the season for 1959 and 1960 are tabulated below:—

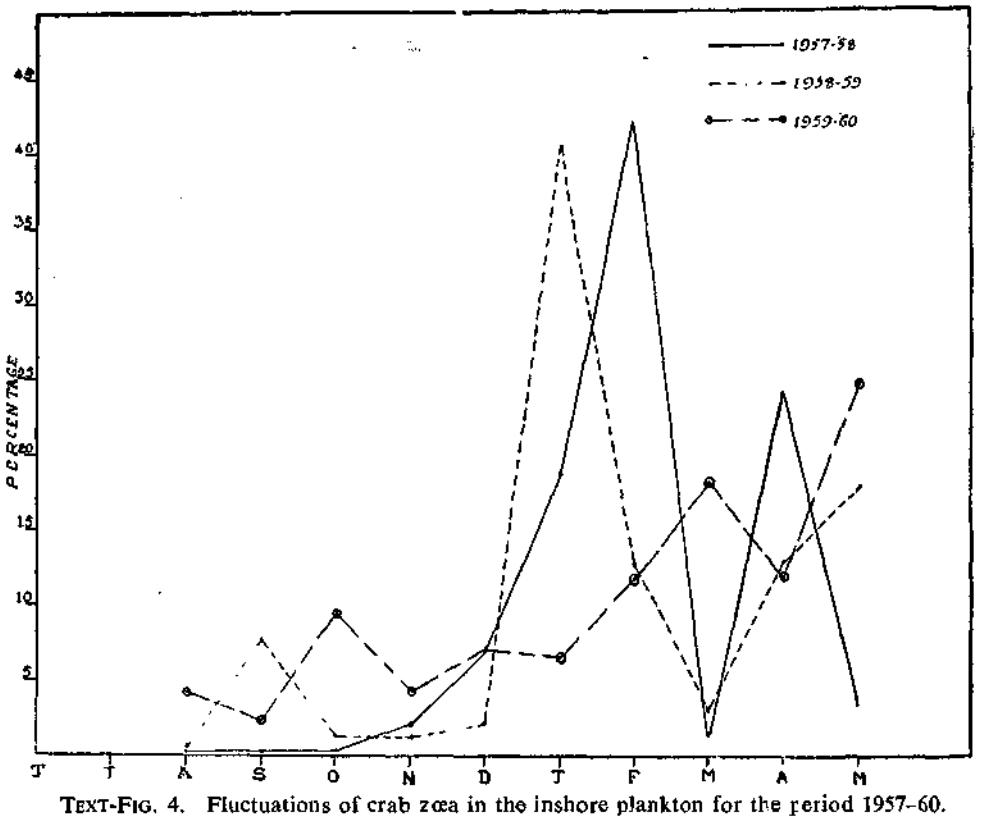
	1959		1960	
	Female	Male	Female	Male
December	..	..	52·5	47·5
January	86·2	13·8	72·2	27·8
February	63·5	36·5	70·4	29·6
March	43·8	56·2	55·8	44·2
April	46·2	53·8	67·7	32·3
May	13·3	86·7	..	..

Feeding Habits.—The food of crabs, on analysis, was found to consist of detritus, polychæte remains and bits of prawns and molluscs. There was no significant variation in the food of the adult and juveniles.

‡ The biological studies reported in this paper relate only to *N. sanguinolentus* unless otherwise stated.

Size Composition

Measurements were taken regularly from the catches at the landing places and data analysed for the two seasons of 1959 and 1960, and the results are plotted in Text-Fig. 3. It may be seen from this that there is a progressive increase in size as the commercial season advances. The shift in position of the modes may be partly due to increase in growth and may also be due to migration of larger individuals belonging to the same year-class moving into the fishing area.



Text-Fig. 4. Fluctuations of crab zœa in the inshore plankton for the period 1957–60.

While there was no significant difference in size composition in the catches brought from the indigenous crafts operating close to the shore irrespective of the gear employed, the trawl catches, brought from 10 fathoms and beyond, showed increase number of smaller sized individuals. This might indicate that the mature ones migrate into the inshore zone and the movement may mainly for spawning. Menon (1952) has indicated the possibility of an annual migration. A comparative study of the trawl catches in the deeper waters and the *Kanthabale* catches of inshore waters confirm

this inference. It is likely that the juveniles may go to deeper waters and return to the inshore ground when they are mature indicating an inward-outward migration off Mangalore for this species. This view has gathered further strength due to the increased proportion of berried females in the inshore catches and their insignificant representation in the trawl catches. The proportion of berried crabs obtained in the trawl catches and in the indigenous crafts during the season for 1959 and 1960 are tabulated below:—

	1959		1960	
	Indigenous craft	Mechanised vessel	Indigenous craft	Mechanised vessel
December	..	..	9·5	..
January	56·0	..	38·5	..
February	55·0	..	55·0	36·1
March	57·1	..	60·0	16·6
April	83·3	16·7	47·8	20·0
May	81·1	20·0	..	..

The total frequencies of the species showed only a single mode of 116–125 mm. during both the years indicating a single size-group dominating the fishery during the commercial season.

Fluctuations of Crab Zœa in the Inshore Waters

The zœa of *N. sanguinolentus* was described by Naidu (1955), from Waltair coast and she has used the structure of the antennæ as the diagnostic character to differentiate the three species. However, in this account no attempt is made to study the fluctuations of the zœa larvæ of the different species and the larvæ are treated as one unit for study.

On analysis of the weekly plankton collections made at the four-fathom area off Ullal, Mangalore, it has been found that the brachyuran zœa start appearing in the plankton soon after the S.-W. Monsoon. But during these post-monsoon months up to December their number remain appreciably low except for a small rise during the September-October period. But larvæ start appearing in the plankton in fairly large numbers from January onwards and during February, March and April, a peak of larval occurrence is observed. The case was found to be similar in the subsequent years also (*see* Text-Fig. 4). The season of occurrence of increased numbers of berried

crabs in the fishery almost coincides with this peak in occurrence of crab zœa in the plankton.

The occurrence of larvæ continues up to May and thereafter they are scarce; but the collection maintained during the rainy season from the estuary reveals smaller numbers of them up to the end of June. The megalopæ and juvenile crabs appear in the dredge collections made from August onwards. Very small crabs are found to congregate near Ullal bridge up the estuary soon after the vigour of the monsoon subsides. This is in general agreement with the observation of George (1958) in Cochin waters that brachyuran zœa are present in large numbers during December-May reaching the peak in January and February, with a minor peak during October.

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