FOOD OF SOME DEMERSAL FISHES FROM THE TRAWL GROUNDS OFF COCHIN

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ABSTRACT

The food habits of seven commonly caught demersal fishes from the Cochin region, namely, *Platycephalus maculipinna*, *Pseudosciaena sina*, *Otolithus argenteus*, *Lactarius lactarius*, *Saurida tumbil*, *Trichiurus lepturus* and *Nemipterus japonicus* have been studied during the period from February 1965 to October 1967.

It is seen that these fishes could be grouped into three categories on the basis of their food preferences. One group consisting of *L. lactarius*, *T. lepturus* and *S. tumbil* is largely piscivorous. The second category feeds on a variety of crustaceans and also fish. This includes *P. maculipinna*, *P. sina* and *O. argenteus*. The third category represented by the thread-fin bream *N. japonicus* consumes small crustaceans dominated by amphipods. Polychaetes and echiuroids form a significant proportion of the food of these fishes.

Smaller commercial penaeid prawns like *Parapenaeopsis stylifera* and *Metapenaeus dobsoni* were eaten by majority of the species studied. They were found in significant quantities in the food of *O. argenteus* and to a lesser extent in *P. sina*, *P. maculipinna* and *T. lepturus*.

INTRODUCTION

Trawling for demersal fish by medium size trawlers (30-60' length) has been intensively carried out within the 25-m line in the Cochin region for the last one decade. Approximately one-third of the catch from the Cochin grounds consists of prawns and the rest is formed by small-sized miscellaneous fishes. The dominant species of fishes are sciaenids, flat-heads, lizard-fishes, thread-fin breams, the big-jawed jumper etc.

The present study of the food of some of these species is aimed at assessing the general food preferences of these fishes with special reference to predation on prawns.

MATERIAL AND METHODS

Seven species, namely *Platycephalus maculipinna*, *Pseudosciaena sina*, *Otolithus argenteus*, *Lactarius lactarius*, *Saurida tumbil*, *Trichiurus lepturus* and *Nemipterus japonicus* were chosen for the study. The observations have been spread over a period

from February 1965 to October 1967. Weekly samples of the above fishes collected from the trawl catches at Cochin were regularly examined for qualitative and quantitative nature of the food inclusions. Usually fish for food studies consisted of 5 specimens each of the selected species taken at random from the sample brought for general biological studies. No attempt has been made to study the food of juveniles and adults separately. The fish were examined with regard to total length, sex and maturity, frequency of occurrence of different food items and their volumes. Volumes of the food items have been assessed by the displacement method with the aid of suitably graduated measuring jar. Since the object of the study has been to find out the feeding preferences of the species concerned in terms of volume and frequency of intake an 'index of preponderance' as suggested by Natarajan and Jhingran (1961) has been constructed taking into consideration the data for the whole period of observation. Observations made on each of the species are presented below.

OBSERVATIONS

Platycephalus maculipinna

One hundred and eleven specimens of the length range 95-272 mm (total length), in maturity stages 1-V were examined. Fish, crustaceans, polychaetes, squids, gastropods and sometimes cake urchins were the food items of this fish (Table 1A). Fish dominated, followed by *Squilla* sp. Among the fishes identified from the food were *Cynoglossus* sp., *Ambassis* sp. and *Anchoviella* sp. Unidentified post-larval fish remains were also encountered. *Parapenaeopsis stylifera*, one of the commercial prawns caught in the trawl grounds, were met with on some occasions in the stomachs. The fish, feeding on portunid crabs, polychaetes and cake urchins indicates some amount of bottom browsing. Among other crustaceans, caridean prawns and *Acetes* sp. were identified from the stomach contents.

Pseudosciaena sina

One hundred and twenty seven specimens ranging in length 75-172 mm and in maturity stages I-IV were examined. This species is one of the dominant sciaenids in trawl catches from the Cochin grounds. Post-larval fishes have been frequently met with in the food (Table 1 B). Next to fish, a variety of crustaceans such as amphipods, copepods, mysids, sergestids, megalopa and alima larvae and caridean prawns constituted a good proportion of the food. Remains of juvenile penaeids have been isolated from the stomach contents frequently. Other items of food favoured by this fish are crabs, echiuroids and polychaetes. The general picture of the food items of the species in the area agrees closely with observations of Venkataraman (1960) for the species from inshore area off Calicut.

Otolithus argenteus

Ninety seven fishes ranging in length 103-295 mm and in maturity stages 1-V were available for examination. The species is found to feed on good amounts

TABLE 1. *Occurrence index, volume index and the 'Index of preponderance' of food items of different species of trawl fishes*

Food items*	% of occurrence oi (occurrence index)	% of volume vi (volume index)	vi oi	Index of preponderance $\frac{vi\ oi \times 100}{\Sigma\ vi\ oi}$
				A. *Platycephalus maculipinna*
1.	27.14	27.90	757.21	45.40
2.	11.43	13.37	152.82	9.16
3.	5.71	9.30	53.10	3.18
4.	—	—	—	—
5.	12.86	32.94	423.61	25.40
6.	35.71	7.17	256.04	15.35
7.	2.86	0.39	1.12	0.07
8.	—	—	—	—
9.	2.86	7.94	22.71	1.36
10.	1.43	0.97	1.39	0.08
	100.00	99.98	1668.00	100.00
				B. *Pseudosciaena sina*
1.	24.42	38.97	951.65	45.71
2.	16.28	14.08	229.22	11.01
3.	6.98	7.04	49.14	2.36
4.	3.49	1.41	4.92	0.24
5.	—	—	—	—
6.	38.37	20.18	774.31	37.19
7.	5.81	5.16	29.98	1.44
8.	3.49	11.74	40.97	1.97
9.	1.16	1.41	1.64	0.08
10.	—	—	—	—
	100.00	99.99	2081.83	100.00
				C. *Otolithus argenteus*
1.	30.26	35.69	1079.98	34.05
2.	35.53	53.72	1908.67	60.18
3.	—	—	—	—
4.	—	—	—	—
5.	1.32	0.39	0.51	0.02
6.	26.30	6.47	170.23	5.37
7.	—	—	—	—
8.	3.95	2.74	10.82	0.34
9.	1.32	0.59	0.78	0.03
10.	1.32	0.39	0.51	0.02
	100.00	99.99	3171.50	100.01
				D. *Lactarius lactarius*
1.	72.10	88.17	6357.06	97.85
2.	6.98	6.10	42.58	0.66
3.	—	—	—	—
4.	—	—	—	—
5.	0.77	0.18	0.14	—
6.	18.60	5.18	96.35	1.48
7.	—	—	—	—
8.	—	—	—	—
9.	—	—	—	—
10.	1.55	0.37	0.57	0.01
	100.0	100.00	6496.70	100.00

* Food items: 1-Fish, 2-Penaeid prawns, 3-Crab, 4-Amphipods, 5-*Squilla*, 6-Other crustaceans, 7-Polychaetes, 8-Echiuroids, 9-Molluscs, 10-Others.

TABLE 1. (*Continued*)

Food items*	% of occurience oi (occurrence index)	% of volume vi (volume index)	vi oi	Index of preponderance $\frac{vi\ oi \times 100}{\Sigma\ vi\ oi}$
				E. *Saurida tumbil*
1.	71.43	81.94	5852.97	96.29
2.	22.22	8.84	196.42	3.23
3.	—	—	—	—
4.	—	—	—	—
5.	—	—	—	—
6.	3.17	0.38	1.20	0.02
7.	—	—	—	—
8.	—	—	—	—
9.	3.17	8.84	28.02	0.46
10.	—	—	—	—
	99.99	100.00	6078.61	100.00
				F. *Trichiurus lepturus*
1.	79.41	56.73	4504.93	86.83
2.	16.18	42.07	680.69	13.12
3.	—	—	—	—
4.	—	—	—	—
5.	—	—	—	—
6.	2.94	0.72	2.12	0.04
7.	—	—	—	—
8.	—	—	—	—
9.	—	—	—	—
10.	1.47	0.48	0.71	0.01
	100.00	100.00	5188.45	100.00
				G. *Nemipterus japonicus*
1.	9.20	12.63	116.20	9.66
2.	4.29	7.79	33.42	2.78
3.	7.98	3.79	30.24	2.51
4.	24.54	8.84	216.93	18.04
5.	3.68	1.68	6.18	0.51
6.	23.31	16.21	377.86	31.42
7.	12.27	13.05	160.12	13.32
8.	7.36	32.42	238.61	19.84
9.	0.61	0.21	0.13	0.01
10.	6.75	3.37	22.75	1.89
	99.99	99.99	1202.44	99.98

* See foot-note below Table I for the list of species.

of penaeids and fish (Table 1 C). Among the penaeid prawns *Parapenaeopsis stylifera* has been dominant in the food. Mysids, *Squilla* sp., *Acetes* sp., *Lucifer* sp. etc. were met with sparsely. Squids and echiuroids were also met with occasionally. Venkataraman (1960) observed in the case of the allied species *O. ruber* studied at Calicut that teleosteans formed a major item of its food, prawns being the next dominant item. In the case of *O. argenteus* studied presently the prawn component dominated. Rao (1964) noticed only a minor proportion of teleosts (1.9%) in the food of this fish at Waltair, the dominant components having been *Squilla*, prawns and crabs.

Lactarius lactarius

One hundred and thirty seven fishes in the length range 67-257 mm have been examined. Maturity stages ranged from I to IV. The species is found to feed mostly on fish. As seen from the indices (Table 1 D) components other than fish form only a small portion. Certain items like caridean prawns, mysids, *Squilla* sp., *Acetes* sp., megalopa larvae, caprellids etc. were infrequently met with. Remains of penaeid prawns were found only on a few occasions in the stomach of this dominantly carnivorous fish. Rao (1964) observed 42% fish components in the food of *Lactarius lactarius* caught in trawl off Waltair, other dominant items noticed by him being alima larvae, prawns and *Acetes* sp.

Saurida tumbil

One hundred and five specimens of the length range 114-357 mm and of maturity stages I-V have been examined. The fish is found to be a predominantly piscivorous species which occasionally resorted to feeding on commercial penaeids such as *Parapenaeopsis stylifera* and *Metapenaeus dobsoni*. Mysids and young squids have also been met with in the food of this fish (Table 1 E). The present observations corroborate the findings of Rao (1964) that this species is of piscivorous habit.

Trichiurus lepturus

The species is found to feed mainly on teleostean fish. Earlier workers (Venkataraman, 1944; Vijayaraghavan, 1951; Prabhu, 1955; Rao, 1964; and James, 1968) have pointed out that *Trichiurus lepturus* (syn. *T. haumela*) is a carnivore feeding predominantly on fish. Penaeid prawn remains and material definitely identifiable as parts of *Metapenaeus dobsoni* have been met with in the stomachs on some occasions. Stomatopod larvae were also seen occasionally among the food (Table 1 F).

Nemipterus japonicus

A wide variety of organisms formed the constituents of the food of this species, dominant among them numerically and volumetrically being amphipods and echiuroids (Table 1 G). Polychaetes, mostly *Prionospio* sp., were also quite

important in the food of this fish. Teleostean fish, caridean prawns and small crabs were the other items of importance. One of the caridean prawns, *Leptochela robusta*[1], has appeared in the stomachs in good quantities (incidently this is the first record of this species from the Arabian sea). *Lucifer* sp., young bivalves, alpheids, *Squilla* sp. and mysids were also met with among the stomach inclusions. Prawn remains referable to penaeids were observed in the stomachs on a few occasions. One species, *Parapenaeopsis acclivirostris*, which however is not of commercial significance, has been identified from the food. The qualitative nature of the food of the species as observed by Rao (1964) at Waltair generally agrees with the present observations, though crabs and prawns were the dominant quantitative elements noticed by him.

REMARKS

From a gross study of the food elements met with in the stomachs of the seven fishes dealt with above, it is seen that these fishes could be grouped into three categories based on their food preferences. One group may be called piscivorous as they, for the most part, take fishes in their diet. *Lactarius lactarius*, *Trichiurus lepturus* and *Saurida tumbil* belong to this group.

A second category eats a variety of crustaceans and also fish. These are *Platycephalus maculipinna*, *Pseudosciaena sina* and *Otolithus argenteus*.

A third category, represented by the thread-fin bream, *Nemipterus japonicus*, consumes a variety of crustaceans dominated by amphipods. Polychaetes and echiuroids form a significant proportion of the food of these fishes.

The inclusion of polychaetes, echiuroids and also crabs as regular items of the diet of this fish indicates clearly the bottom-browsing habit. The first category of fishes appears to be more of the column feeding type and bottom dwelling organisms are seldom met with in their diet. The second category also resorts to browsing on the bottom to some extent, as indicated by the presence of small quantities of echiuroids, polychaetes, crabs etc. in their food. *Nemipterus japonicus* differs in its food habits from the other fishes, being caught usually in comparatively deeper waters outside the conventional shrimp grounds.

Commercial penaeids like *Parapenaeopsis stylifera* and *Metapenaeus dobsoni* or their remains were encountered in the food of the majority of the species studied. Such materials were found in significant quantities in *Otolithus argenteus* and to a lesser extent in *Pseudosciaena sina*, *Platycephalus maculipinna* and *Trichiurus lepturus*. These fishes which are an integral part of the fish community of the shrimp grounds off Cochin thus include some of the commercial prawns also in their food. This is only to be taken as a normal phenomenon with regard to the feeding of these carnivorous fishes placed in such an environment, and the impact of this process on the population of prawns should be considered as insignificant.

1. Thanks to Dr. M. J. George for the identification of this prawn.

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