FOOD AND FEEDING HABITS OF JUVENILES OF 'KOTH' *OTOLITHOIDES BRUNNEUS* (DAY) IN BOMBAY WATERS

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ABSTRACT

The food and feeding habits of juveniles of 'Koth' *Otolithoides brunneus* (Day), a sciaenid occurring along the coast of Bombay, were studied during the period January 1970 — December 1971. *O. brunneus* a macrophagous carnivore, fed on small teleosts and prawns. Index values for main food items during 1970 and 1971 were as follows: *Prawn remains*: 46.15, 40.33; *Coilia dussumieri*: 16.83, 28.43; *Acetes indicus*: 7.32, 15.47; *Bregmaceros macclellandi*: 18.06, 1.42; *Palaemon tenuipes*: 3.20, 5.22; and *Hippolysmata ensirostris*: 5.29, 0.32 respectively. Besides, teleosts like *Otolithes argenteus, Polynemus heptadactylus, Harpodon nehereus, Johnius* spp. and *Apogon* spp., and prawns, such as, *Solenocera indica, Metapenaeus affinis, M. brevicornis, Parapenaeopsis stylifera* and *P. hardwickii* were also noticed. The younger juveniles of the size group 7.0 — 13.9 cm preferred only prawns. With age *O. brunneus* showed a piscivorous tendency. The food index value of prawns as a whole decreased from the smallest to the larger size groups of 'Koth'. Feeding depended on the availability and no selective feeding was observed. Intense feeding in April, May and November, normal feeding during December, January and March and for the rest of the period low feeding seemed to prevail. The probable causes contributing to the intense feeding have been discussed.

INTRODUCTION

There are a number of commercially important and highly esteemed sciaenids in the waters of Bombay and they are mostly taken in trawl and 'dol' net fishing. The smaller varieties locally called 'Dhoma' include *Otolithes argenteus, Johnieops sina, J. vogleri, Johnius glaucus* and a few *Johnius* spp. and *Sciaena* spp. The larger growing varieties are 'Koth' *Otolithoides brunneus* and 'Ghol' *Pseudosciaena diacanthus*. 'Dhoma' forms nearly 30% of the offshore trawler catch; 'Ghol' and 'Koth' constitute nearly 5% and 3% respectively.

Although sciaenids contribute to the fishery all along the Indian coast, our knowledge about their food and feeding is still meagre. Gopinath (1942) studied the food and feeding of post-larvae of *Sciaena albida* from Travancore

coast. Mookerjee *et al* (1946) studied the food of adult *Sciaena albida* of Bengal. Chacko (1949) studied the food and feeding of *Sciaena albida, Sciaena glauca, Otolithus ruber* and *Otolithus maculatus* from the gulf of Mannar. Bapat and Bal (1952) gave an account of the food of *Sciaena miles, Sciaena albida, Sciaena semiluctosa, Sciaena glauca* and *Otolithus argenteus* of Bombay. Rao (1963) observed the food and feeding habits of 'Ghol' *Pseudosciaena diacanthus* while studying its biology. Kutty (1967) in his notes on the fishery and biology of 'Koth' *Otolithoides brunneus* briefly mentioned its food and feeding habits. Recently Suseelan and Nair (1969) while studying the food of demersal fishes from Bombay, gave a brief account of the food of *O. brunneus*. Detailed account on this aspect is still lacking and hence this investigation has been undertaken. In the present paper the food and feeding habits of juveniles of *O. brunneus* from Bombay region based on the data collected during January 1970 to December 1971 are dealt with.

Material and Methods

In the present investigation 'Koth' *O. brunneus* ranging from 8 to 70 cm have been studied. Material was collected from the local 'dol' and trawl net catch at Sassoon Dock and from the 'dol' net catch at Versova every week. Thus a total of 706 specimens of various size groups have been examined. They were classified into 9 size groups with 7 cm intervals. The gut contents were identified as far as possible upto the species level. The volume (displacement method) and the total number and frequency of occurrence of each item were noted. The Index of Preponderance (IP) method of Natarajan and Jhingran (1961) was adopted in the final analysis. Recently, Leo Pinkas *et al* (1971) while studying the food habits of albacore etc. in California waters put forward a formula which combined the numerical, volumetric and frequency of occurrence methods into one value called the Index of Relative Importance (IRI). Accordingly (N + V) F = IRI, where N, V and F represent percentages of number, volume and frequency of occurrence respectively. IRI of the food of 'Koth' has been computed and compared with the results obtained by IP.

The various stages of fulness of stomachs were classified as gorged, full, ¾ full, ½ full, ¼ full, ⅛ full, trace and empty. The percentage occurrence of various distensions of the stomach was calculated from the total number of stomachs examined and compared with the monthly average volume to find out the intensity of feeding.

Composition of Food

Teleosts and prawns formed the major part of the diet. Altogether 10 species of teleosts were noted, viz., *Coilia dussumieri, Bregmaceros macclellandi, Otolithes argenteus, Harpodon nehereus, Polynemus heptadactylus, Johnius* spp. and *Apogon* spp. Among crustaceans both penaeid and non-penaeid prawns

belonging to 8 species viz., *Acetes indicus, Palaemon tenuipes, Hippolysmata ensirostris, Solenocera indica, Metapenaeus affinis, M. brevicornis, Parapenaeopsis stylifera* and *P. hardwickii* were encountered. Teleost parts and prawns which could not be identified formed a considerable part of the gut contents.

Fish diet

Teleosts were prominent during January, February and November 1970 and January, February, April, November and December 1971 (Fig. 1) *C. dussumieri* formed the prominent item of food throughout the year. (Table 1 & 2). The maximum values of preponderance viz., 57.45 and 69.05 were observed during February 1970 and November 1971. *B. macclellandi* was encountered more frequently during 1970 and reached a maximum preponderance value of

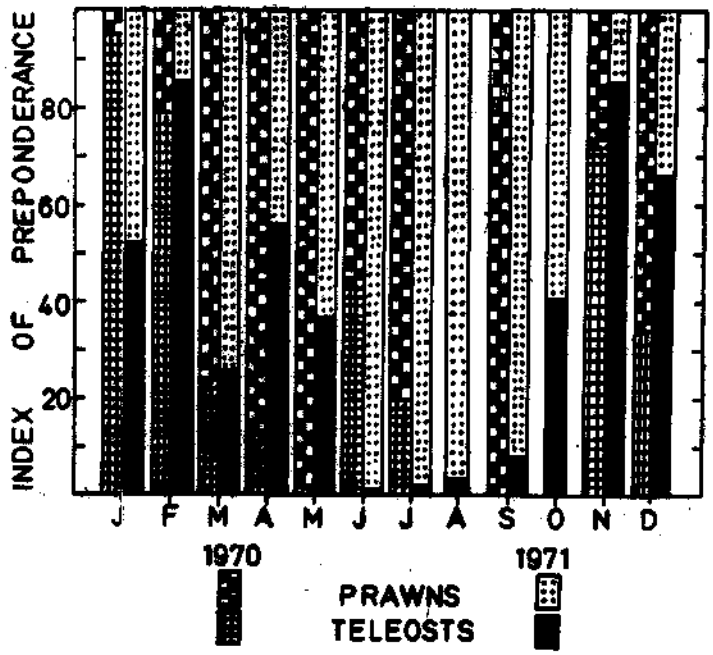

FIG. 1. Index of Preponderance of prawns and teleosts in the diet of *O. brunneus* for 1970 and 1971.

33.46 in June. *H. nehereus* was encountered during January, March and November 1970 and in August and September 1971, the maximum value observed being 12.99 during January 1970 and 7.17 in August 1971. *Apogon* spp. were observed only during March 1971 with a preponderance of 8.57. *Thrissocles* spp., *Trichiurus* spp. and *Stolephorus* spp. were rare among food items. Teleost remains were noticed throughout the year and the highest values observed being 10.97 and 49.0 in 1970 and 1971 respectively.

TABLE 1. *Month-wise Index of Prepondérance of various food items of* O. brunneus *for* 1970.

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Food items | No. Examined	10	8	7	7	6	47	26	—	6	—	14	27
C. dussumieri	32.49	57.45	11.53	1.14	8.31	—	—	—	—	—	53.52	13.87
B. macclellandi	25.94	—	7.65	7.95	—	33.46	—	—	—	—	1.88	6.35
O. argenteus	—	—	—	—	—	—	—	—	—	—	0.47	—
Johnius spp.	—	—	—	—	—	0.97	—	—	—	—	—	3.08
H. nehereus	12.99	—	3.84	—	—	—	—	—	—	—	3.76	—
Apogon spp.	—	—	—	—	—	—	—	—	—	—	—	—
P. heptadactylus	3.24	—	—	—	—	—	—	—	—	—	3.76	—
Thrissocles spp.	—	—	—	—	—	1.42	—	—	—	—	—	—
Stolephorus spp.	—	—	—	—	—	—	—	—	—	—	—	1.73
Trichiurus spp.	2.16	—	—	—	—	—	—	—	—	—	—	—
Teleost parts	6.49	0.76	—	—	—	—	10.97	—	—	—	0.47	1.47
A. indicus	16.24	41.79	26.80	—	—	—	—	—	—	—	16.89	4.51
P. tenuipes	—	—	7.65	—	83.38	5.69	73.16	—	1.67	—	—	—
H. ensirostris	—	—	—	—	—	43.31	—	—	—	—	—	8.11
S. indica	—	—	—	—	—	—	—	—	—	—	—	0.96
M. affinis	—	—	—	—	8.31	—	—	—	—	—	—	—
M. brevicornis	—	—	—	—	—	—	—	—	—	—	—	—
P. stylifera	—	—	—	—	—	0.58	—	—	—	—	0.94	—
P. hardwickii	—	—	—	—	—	—	—	—	—	—	—	1.73
Prawn remains	0.45	—	42.53	90.91	—	14.57	14.65	—	98.33	—	18.31	58.19
Digested matter	—	—	—	—	—	—	1.22	—	—	—	—	—

TABLE 2. *Month-wise Index of Preponderance of various food items of* O. brunneus *for* 1971.

Months / Food items | No. Examined	Jan. 29	Feb. 16	Mar. 13	Apr. 11	May 56	June 53	July 40	Aug. 118	Sep. 51	Oct. 81	Nov. 48	Dec. 32
C. dussumieri	29.58	30.20	1.84	46.54	39.67	0.19	—	1.16	11.14	21.09	69.05	25.57
B. macclellandi	17.75	—	—	—	0.10	—	—	—	—	—	6.37	6.42
O. argenteus	—	—	—	—	—	—	—	—	—	—	0.60	0.34
Johnius spp.	—	—	—	1.87	2.03	—	—	0.91	—	—	—	0.34
H. nehereus	—	—	—	—	—	—	—	0.06	7.17	—	—	—
Apogon spp.	—	—	8.57	—	—	—	—	—	—	—	—	—
P. heptadactylus	—	—	—	—	1.03	—	—	—	—	—	—	2.03
Thrissocles spp.	—	—	—	0.27	—	—	—	—	—	—	2.06	—
Stolephorus spp.	—	—	—	—	—	—	—	—	—	—	—	—
Teleost remains	3.91	49.00	7.71	—	1.83	0.15	4.51	0.31	—	37.34	2.11	6.92
A. indicus	37.74	0.67	—	38.52	24.05	15.62	1.99	0.18	0.06	—	9.37	57.09
P. tenuipes	—	—	—	0.80	4.22	3.64	70.79	9.02	42.18	—	—	—
H. ensirostris	—	—	—	—	—	2.79	0.81	0.15	7.60	—	—	0.16
S. indica	—	—	—	—	0.20	—	—	—	—	—	—	0.54
M. affinis	—	—	—	5.36	4.07	—	5.66	1.75	14.99	—	—	—
M. brevicornis	—	—	—	—	—	—	—	—	—	0.52	—	—
P. stylifera	—	—	1.83	—	—	—	—	0.87	1.82	3.92	0.70	—
P. hardwickii	—	—	—	—	—	—	—	—	—	—	—	0.32
Prawn remains	11.02	20.13	24.96	0.53	20.97	76.22	13.72	85.59	14.87	26.75	8.69	0.27
Squilla spp.	—	—	—	—	—	1.39	—	—	—	—	—	—
Sepia spp.	—	—	—	—	—	—	—	—	—	—	0.96	—
Digested matter	—	—	55.09	6.11	1.83	—	2.52	—	0.17	10.38	0.09	—

Crustacean diet

Prawns, both penaeid and non-penaeid formed the major food items from March to September and December 1970 and in March and May to October 1971 (Fig. 1). Prawn remains have been found to occur throughout the period. The maximum preponderance values were 98.33 and 85.59 during 1970 and 1971 respectively. Among the non-penaeid prawns *Acetes indicus* occurred almost throughout the year. The index value ranged from 4.51 to 41.79 in 1970 and from 0.06 to 57.09 in 1971. The highest value of 83.38 was recorded for *P. tenuipes*. It was encountered from March to September. *H. ensirostris* was observed during the third quarter and in December with higher index value in 1970. From April to September *M. affinis* occurred and reached a maximum value of 14.99 during 1971. *P. stylifera* was present in the post-monsoon months, and in greater numbers during 1971. (Table 1 & 2). Other items such as *S. indica, P. hardwickii, M. brevicornis, Squilla* spp. and *Sepia* spp. were rather infrequent.

Variation in food

The Index of Preponderance and Index of Relative Importance (Table 3) worked out for both the years showed close agreement in the end result. Prawn remains, *A. indicus, C. dussumieri, B. macclellandi, P. tenuipes* and *H. ensirostris* formed the main contents of the gut in that order of importance. Prawns dominated the diet during both the years and their index values were 46.15 and 40.33 for 1970 and 1971 respectively. Compared to that of 1970 higher index value for *C. dussumieri*, 28.43 was observed in 1971, whereas *B. macclellandi* showed a higher value during 1970. *A. indicus* and *P. tenuipes* registered an increase in the index value during 1971.

Food in relation to length

The IP was applied to different size groups to get a clear picture of their food and feeding habits (Table 4). In the smallest size group 7.0 — 13.9 cm prawns alone were encountered. From the next size group a number of teleosts started occurring together with prawns. Among teleosts the index value for *C. dussumieri* increased with the 'Koth' size. But in the case of *B. macclellandi* the next abundant item, the index values were higher in the smaller size groups. *Johnius* spp. occurred except in the very small 'Koth'. *H. nehereus* occurred in the middle sizes. *O. argenteus* was absent below the 35 cm size 'Koth'.

A. indicus and *P. tenuipes* were encountered in almost all sizes. The former showed an increase in the index value with size of 'Koth' while reverse was the case with the latter. *M. affinis* was found in the larger size groups only. Smaller prawns like *H. ensirostris* and *P. stylifera* occurred in most of the size groups. Index value of prawns as a whole decreased from the smallest to the larger size groups of 'Koth', while there was gradual increase in the intake of teleosts. (Fig. 2).

TABLE 3. *Index of Preponderance and Index of Relative Importance during* 1970 *and* 1971.

	1970							1971						
	N	V	F	$\frac{VO}{\overline{VO}} \times 100 = IP$	*	$(N+V)F = IRI$	*	N	V	F	$\frac{VO}{\overline{VO}} \times 100 = IP$	*	$(N+V) = IRI$	*
C. dussumieri	4.62	18.15	11.91	16.83	3	271.00	4	4.90	30.47	10.50	28.43	2	371.39	3
B. macclellandi	9.25	14.62	15.87	18.06	2	379.00	3	3.27	3.45	4.62	1.42	6	31.04	6
O. argenteus	0.32	0.18	0.79	0.01	17	0.39	17	0.17	0.96	0.42	0.04	15	0 49	16
Johnius spp.	1.23	2.37	2.38	0.44	9	9.00	9	0.65	4.05	1.47	0.53	10	6.91	10
H. nehereus	0.92	4.02	2.38	0.75	8	12.00	8	0.32	1.24	0.84	0.09	13	1.31	13
Apogon spp.	—	—	—	—	—	—	—	0.09	0.88	0.22	0.22	17	0.21	17
P. heptadactylus	1.23	2.02	1.59	0.25	11	5.00	10	0.41	1.57	0.84	0.12	12	1.00	12
Thrissocles spp.	0.32	1.27	0.79	0.08	14	1.00	15	0.17	2.22	0.42	0.08	14	1.00	14
Stolephorus spp.	0.32	1.64	0.79	0.10	13	2.00	14	—	—	—	—	—	—	—
Trichiurus spp.	0.32	0.38	0.79	0.02	16	0.55	16	—	—	—	—	—	—	—
Teleost remains	2.46	2.41	4.76	0.89	7	23.00	7	4.33	4.36	10.92	4.25	4	94.89	5
A. indicus	57.40	9.13	10.33	7.32	4	687.00	2	61.04	13.59	12.81	15.47	3	956.01	1
P. tenuipes	5.86	5.18	7.94	3.20	6	88.00	6	5.07	7.00	8.40	5.22	5	101.38	14
H. ensirostris	3.70	6.58	10.33	5.29	5	106.00	5	0.82	1.74	2.10	0.32	11	5.37	11
S. indica	0.32	0.93	0.79	0.06	15	1.00	15	0.24	0.63	0.63	0.63	16	0.54	15
M. affinis	0.61	4.38	0.79	0.27	10	4.00	11	0.91	6.86	2.10	1.28	7	16.31	9
M. brevicornis	—	—	—	—	—	—	—	0.09	0.63	0.22	0.04	15	0.15	18
P. stylifera	0.61	0.93	1.59	0.12	12	2.44	13	2.04	3.12	3.78	1.05	9	19.50	8
P. hardwickii	0.32	1.66	0.79	0.10	13	3.14	12	0.08	0.29	0.22	0.01	18	0.08	19
Prawn remains	9.87	24.09	24.60	46.15	1	835.41	1	13.02	13.58	33.40	40.33	1	888.44	2
Squilla spp.	—	—	—	—	—	—	—	0.17	0.19	0.42	0.01	18	0.15	18
Sepia spp.	—	—	—	—	—	—	—	0.17	0.52	0.42	0.02	17	0.28	17
Digested matter	0.32	0.06	0.79	0.06	15	0.38	18	2.04	2.65	5.25	1.24	8	24.62	7

N, V and F represent percentages of number, volume and frequency of occurrence. * Relative position.

TABLE 4. *Index of Preponderance of food items in relation to different size groups of* O. brunneus 1970 & 1971.

Size groups (in cm)	7.0—13.9	14.0—20.9	21.0—27.9	28.0—34.9	35.0—41.9	42.0—48.9	49.0—55.9	56.0—62.9	63.0—69.9
No. examined	13	162	177	123	130	52	35	9	5
C. dussumieri	—	0.03	11.46	20.28	49.43	14.23	35.23	77.01	51.76
B. macclellandi	—	6.42	1.68	5.08	3.62	2.61	0.52	2.39	—
O. argenteus	—	—	—	—	0.03	0.07	—	2.42	—
Johnius spp.	—	1.29	—	0.17	0.37	2.14	—	—	18.81
H. nehereus	—	—	0.15	0.07	0.15	—	—	11.51	—
P. heptadactylus	—	0.22	—	0.07	—	3.71	—	0.72	—
Apogon spp.	—	—	—	—	—	0.75	—	—	—
Thrissocles spp.	—	—	0.12	0.03	—	—	—	—	—
Stolephorus spp.	—	—	—	—	0.06	—	—	—	—
Trichiurus spp.	—	—	—	—	0.49	—	—	0.48	—
Teleost remains	—	3.13	1.17	5.30	5.77	8.21	—	—	—
A. indicus	5.56	0.15	2.11	27.95	21.32	35.70	31.81	—	1.19
P. tenuipes	—	6.32	14.69	9.61	0.68	0.75	5.02	0.53	—
H. ensirostris	—	5.92	1.81	1.12	0.29	—	—	—	5.88
S. indica	—	—	0.09	—	0.05	0.12	—	—	—
M. affinis	—	—	1.54	2.26	—	4.29	11.72	3.12	—
M. brevicornis	—	—	—	0.25	—	—	—	—	—
P. stylifera	—	2.00	1.74	0.34	0.32	—	—	0.25	3.54
P. hardwickii	—	—	—	—	—	0.24	—	—	—
Prawn remains	94.44	74.27	62.73	27.32	16.27	26.94	13.36	0.14	7.07
Squilla spp.	—	—	0.09	—	—	—	—	—	—
Sepia spp.	—	—	—	—	—	0.12	—	1.43	—
Digested matter	—	0.25	0.62	0.15	1.15	1.12	2.34	—	11.75

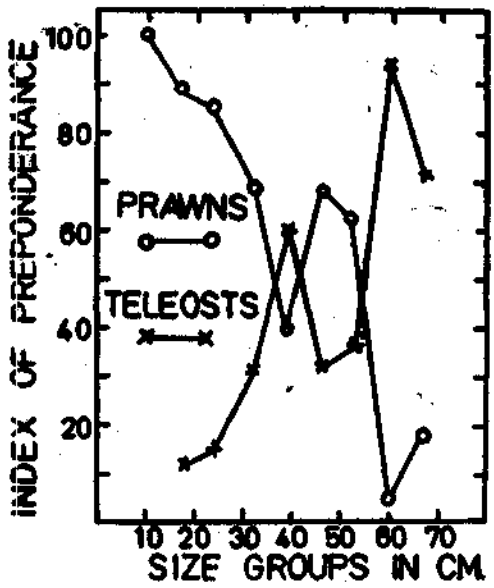

FIG. 2. Index of Preponderance of prawns and teleosts in the diet of *O. brunneus* in relation to different size groups during 1970 and 1971.

INTENSITY OF FEEDING

Intensity of feeding was determined on the basis of average volume| stomach and the percentage occurrence of fullness of stomachs in different months (Fig. 3). Percentage of empty stomachs was low during April and May. During February and June their percentages were as high as 37.50 and 34.04 during 1970 and for 1971 the same amounted to 50.00 and 37.73 respectively. Percentages of full, ¾ full, ½ full, stomachs were higher during March — May and November than the rest of the months. Average volume|stomach during 1970 and 1971 were 1.72 and 1.46 cc respectively. In all the months except during February, June and July the average volume|stomach was higher than the yearly average. From this the intensity of feeding through the two years was found to be as follows: primary peak in April — May followed by a secondary peak in November; normal feeding in December, January and March and low feeding activity in the rest of the period.

DISCUSSION

'Koth', *O. brunneus* is a carnivore, with a mixed diet comprising of small sized teleosts and prawns. Altogether 10 species of teleosts and 8 species of prawns formed the principal diet. *C. dussumieri* was more frequent during the fourth quarter followed by the first and second quarters. *B. macclellandi* and *P. heptadactylus* were absent in the third quarter. Among crustaceans *A. indicus*

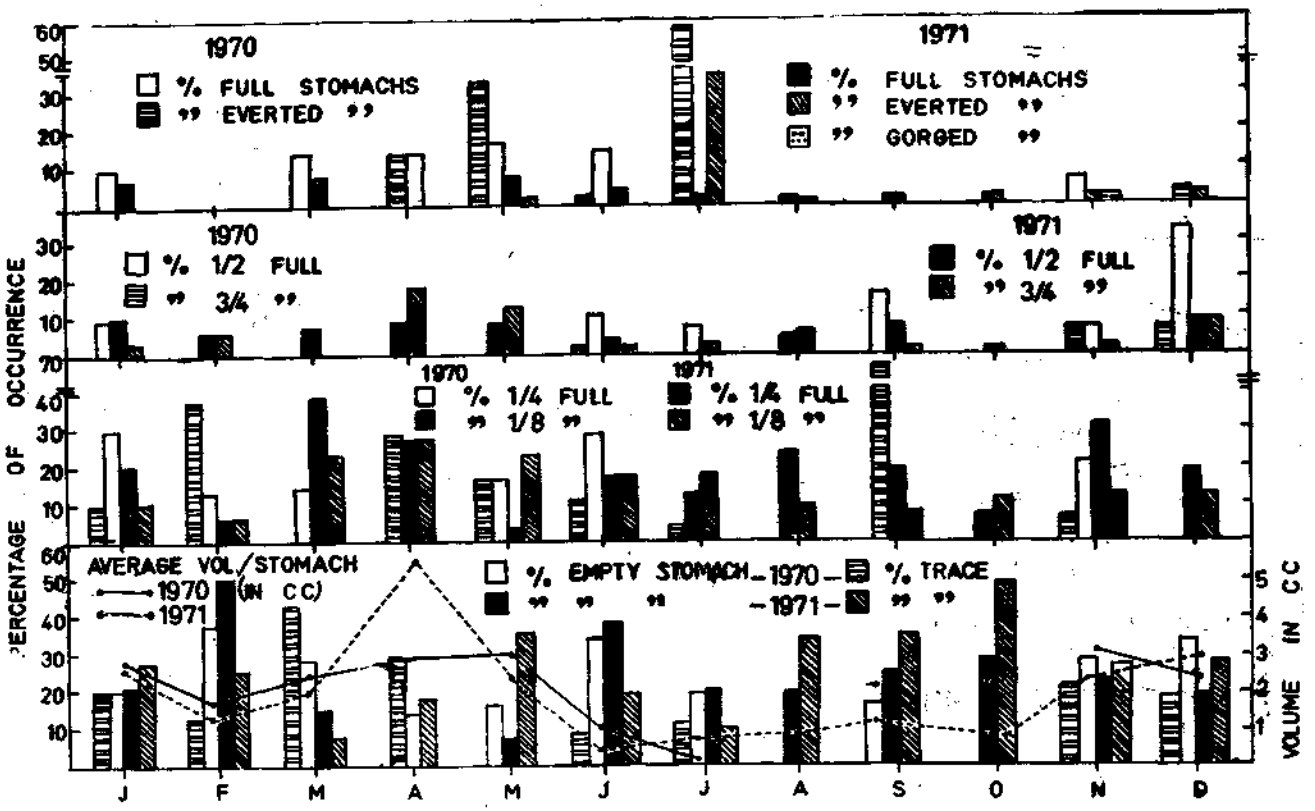

FIG. 3. Monthly percentage occurrence of stomachs in different degrees of fullness and average volume|stomach in *O. brunneus* for 1970 and 1971.

showed high index values during the first, second and fourth quarters. *P. tenuipes* and *M. affinis* were mostly observed during the second and third quarters. *H. ensirostris* was encountered during the third quarter and in December. Likewise other teleosts and prawns also were noticed only during certain months. These fluctuations in the food of 'Koth' were not due to any selective feeding. The natural fluctuations in the abundance of food items in the feeding grounds were reflected in the feeding of 'Koth'. Abundance of a particular item in the food of 'Koth' always coincided with its abundance in the feeding grounds also. (Table 5). *C. dussumieri* was abundantly available during the fourth followed by the first and second quarters, and predominated the diet in these periods. This was also the case with *B. macclellandi* and the intake by 'Koth' was found to coincide with its availability. The same type of periodicity in the availability was noticed in the case of other major food items like *A. indicus, P. tenuipes, H. ensirostris, M. affinis* and with also other minor items. This correlation between the food items found in the stomachs and their abundant availability in the environment showed that 'Koth' exerted no selectivity and fed on whatever came its way. A comparison of the gut contents with the catch in the trawl and bag nets in and around the feeding grounds of 'Koth' revealed very little selection from the natural nekton communities in feeding except in the size of the food organism. It was the small teleosts and prawns that formed the main food of 'Koth' and whenever available, juveniles of large sized teleosts were also taken.

'Koth' as mentioned earlier feeds on small teleosts like *C. dussumieri, B. macclellandi* etc. These in turn feed on small planktonic organisms like copepods, chaetognaths, salpids etc. The feeding intensity of 'Koth' is high when the teleosts are abundant which in turn are abundant when the plankton is abundant. Thus there is an indirect relation between the plankton abundance and the feeding intensity in 'Koth' notwithstanding the fact that this fish is not a plankton feeder. Sudarsan (1964) observed two plankton maxima in Bombay waters, one after March and the other during the post-monsoon months, October and November. The intensity of feeding in 'Koth' also is found to be high in the periods succeeding these plankton blooms.

Study of the food in relation to length showed that 'Koth' became more ichthyophagous with age. Rao (1961) stated that juveniles of 'Ghol' *P. diacanthus* like those of 'Koth' showed a predominance of prawns in their diet. Karandikar and Thakur (1951) observed that sciaenoids were carnivorous and fed on fish, crustaceans, molluscs and annelids. Kutty (1967) and Suseelan and Nair (1969) observed that the juvenile 'Koth' like 'Ghol' mainly fed on prawns and teleosts. During the present study a number of teleosts like *O. argenteus, Apogon* spp., *Thrissocles* spp. and crustaceans such as *S. indica, M. brevicornis* and *H. ensirostris* were recorded anew besides those reported in earlier works.

TABLE 5. *Variation in the abundance of food organisms of* O. brunneus *in the feeding grounds.*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
C. dussumieri	*	*	**	**	*	*	*	*	*	**	**	**
B. macclellandi	***	**	*	*	*	*	*	*	—	—	**	**
O. argenteus	*	*	*	*	*	*	*	*	*	*	*	*
Johnius spp.	*	*	*	*	*	*	*	*	*	*	*	*
Polynemus spp.	*	*	*	—	—	—	—	—	—	—	—	*
H. nehereus	*	**	**	**	*	*	*	*	**	***	***	*
Thrissocles spp.	—	—	—	*	*	*	*	*	—	—	—	—
Stolephorus spp.	*	*	—	—	—	—	—	—	—	—	—	*
Trichiurus spp.	*	*	***	***	**	—	—	*	*	*	*	*
A. indicus	***	***	***	**	*	*	*	*	*	*	**	***
Palaemon tenuipes	*	*	*	***	***	***	*	**	*	*	*	*
H. ensirostris	*	*	*	*	*	***	***	***	**	*	*	*
S. indica	***	***	***	***	*	*	—	—	—	*	**	***
M. affinis	*	*	*	**	**	*	*	*	**	***	***	*
M. brevicornis	*	*	—	—	—	—	—	**	**	**	**	*
P. stylifera	*	*	—	—	—	—	**	**	**	***	***	*
P. hardwickii	*	*	*	—	—	—	*	*	*	**	**	**
Squilla spp.	*	*	*	***	***	***	**	**	*	*	*	*

— Absent, * Present, ** Abundant, *** Very abundant.

Mohamed (1955) reported disgorging and extrovertion of the stomachs in 'Ghol' *P. diacanthus* and *O. argenteus*. Meenakshisundaram and Marathe (1963) observed the same phenomenon in *Ilisha filigera*. Rao (1961) observed that 95% of the adult 'Ghol' had extroverted stomachs. This phenomenon was observed in *O. brunneus* from April to July and December 1970, whereas during 1971 it occurred in March and from May to December, in varying proportions. It was minimum in August 1971 and the maximum incidence of 57.69% and 35.0% was observed in July 1970 and 1971 respectively. The shock and changes to which the fish are subjected while being trapped in the trawl net and subsequent hauling probably cause such high incidence of extrovertion of stomachs.

'Koth' *O. brunneus* is macrophagous, that is, its food is composed of large sized forms. As such it tends to be rather 'high' in the food web in the sea, being far from the primary producers and this has significance in the low productivity of its fishery unlike the sardine or mackerel. 'Koth' is ecologically a sub-surface demersal fish and the total absence of crabs and molluscs and sand or mud in the gut contents proves that it is not a bottom feeder.

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