FOOD AND FEEDING HABITS OF SOME MADRAS FISHES

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(With 4 Tables)

CONTENTS

I—INTRODUCTION

The feeding habits of four common adult fishes occurring in Madras (*Upeneus indicus*, *Polydactylus indicus*, *Polynemus sextarius* and *Leiognathus ruconius*) were studied some time ago by the author (1955*a*) who also reviewed then the work done on other Indian species. In the present account the results of the analysis of the stomach contents of *Caranx affinis*, *Sciaena albida* and *Engraulis purava* are presented.

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II—MATERIAL AND METHODS

The material for the study was collected in the inshore waters of Chepauk, Royapuram and Santhome areas of the Madras coast. The fishes for study were collected only from the fishermens' nets. Collections were made three times daily—at 8 A. M., 1 P.M. and 5-30 P.M. to note the difference of diet during different parts of the day. They were immediately brought to the laboratory, identified and their stomachs were removed and the contents of the stomachs were examined under high power. The methods followed in the analysis of the stomach contents were those described by the author earlier (1955*a*).

A considerable number of specimens examined had their stomachs empty. Affalo and Martson (1904) had observed that many fishes have the habit of throwing up their last meal when captured. Ogilvie (1927) found that the shock of capture did not induce post-larval herrings to

throw ut food. The present author also, like Job (1940) and Pillay (1953), found no direct evidence in support of the observations of Affalo and Martson.

III—Results of Observations

The results of the analysis of the stomach contents of *Caranx affinis* showed that it is an omnivorous feeder, feeding almost on all prey available in the Madras inshore area. From Table 1, it is clear that Crustacea formed the main bulk of food of which Copepods seemed to be the commonest item of diet. The latter were identified as *Oithona* sp., *Acartia* sp., *Paracalanus* sp., *Calanoid* sp., *Euterpina* sp. Apart from these, the Crustaceans were represented by *Penaeus carinatus*, *P. indicus* and *Squilla mantis*. The examination of the stomach contents also revealed the presence of sand particles, Polychaetes and Foraminifera. The Foraminifera were identified as *Biloculina* and *Rotalia*, and the Polychaetes as *Axiothella*, *Diopatra* and *Ammotrypane* which are bottom-dwelling forms. The presence of bottom-dwelling Polychaetes, Gastropods and Foraminifera along with planktonic Crustacea such as Copepods, etc., as well as nectonic Crustacea like *Penaeus*, *Acetes*, etc., in the stomachs of *Caranx affinis*, on the other hand, indicates considerable vertical feeding in the case of these fishes. It may be presumed from the above inference that the fishes migrated from the upper layer of the sea to the benthic region. Being rovers into all layers of the sea, they can obtain the most and the best of food.

Sciaena albida is called "kathalai" in Tamil and is distributed in Indian seas up to the Malay Archipelago. From Table 2 it will be seen that Teleostei (*Engraulis grayi*, *E. indicus*, *E. dussumieri*, *E. hamiltonii*, *Mugil crenilabis*, *M. dussumieri*, *Stolephorous tri*, *Decapterus russelli*) form the main bulk of the food. The predaceous propensities on the part of these " Jew Fishes " are responsible for considerable damage to many food fishes especially to their spawn and young stages. The damage, however, does not seem to be so great as in the case of some of the freshwater perches described by Gunther (1880). Crustacea were represented by *Acetes* sp., *Penaeus* sp., *Squilla* sp., and Copepods. Polychaetes also were identified in the stomachs in the months of August, September and December. This fish arrives in Madras inshore waters in the month of August. All the fishes examined were in a well-fed condition. Their well-fed condition and the immature condition of gonads indicate that their visit in this area is probably for the purpose of feeding. By the end of February, when food became scarce in this area, not a single species of fish was landed in the Madras area. Even prior to their departure, the examination of the gonads revealed their immaturity. It is inferred from the above observations and the data collected that *Sciaena albida* migrated from elsewhere to the Madras waters in August. When food becomes scarce in that area, they leave the Madras inshore waters by the end of February for other places in search of fresh feeding grounds.

The Tamil name for *Engraulis purava* is " Poruva " It is distributed in seas of India up to the Malay Archipelago and beyond. The results of the analysis of the stomach contents showed that Crustacea dominated in the food (*vide* Table 3). The Copepods present were identified as *Acartia* sp., *Oithona* sp., etc. Other Crustacea were *Penaeus* sp., *Acetes* sp., *Squilla* sp., and *Lucifer* sp. In July, insect larvae

and minute appendages of insects were found in the stomachs of these fishes. It is possible that these fishes are estuarine in habit. *Engraulis purava* visits the Madras inshore waters in the month of July. Almost all the fishes examined were in a well-fed state with immature gonads. A remarkable feature is that when the gonads were well developed, feeding of these fishes was observed to be less, as is seen from Table 4. Just prior to the shedding of the germ cells *i.e.*, by the end of February, not even a single fish was landed on the whole of the Madras coast. An examination of the inshore plankton revealed no eggs of the species and hence it is probable that these fishes migrated from the Madras inshore waters to other areas in search of fresh spawning and nursery grounds.

IV—SUMMARY

558 specimens belonging to three genera of fishes from the Madras coast were examined and their stomach contents studied with a view to determine the type of food and also the migratory movements of these fishes. The results in brief are :

(i) *Caranx affinis :* Being capable of considerable degree of vertical feeding, often browsing on the bottom, they are less affected by the changes in the pelagic fauna. They are vertically migratory in their feeding habits and feed on all the prey that comes within reach.

(ii) *Sciaena albida :* The presence of this immature " Jew-Fish " in August clearly showed that they immigrated to the Madras inshore waters for the purpose of feeding. By the end of February, as the food becomes scarce in this area, they migrate to the off-shore areas in search of fresh feeding grounds. Prior to their departure, the examination of the gonads revealed an immature condition.

(iii) *Engraulis purava :* They visit the Madras inshore waters in July and feed well till October. When the gonads become mature they feed less and by the end of February none was to be seen. It is inferred that they migrated elsewhere in search of spawning grounds.

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TABLE 1.—*Showing the average total volume of food, number of fishes examined each month and also the percentage average of the various food items of* Caranx affinis.

Particulars	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	Apr.
Volume of stomach contents in c.c.	0·8	1·1	1·2	0·8	1·2	1·3	1·3	0·9	0·8	0·6	0·7
Number of fishes examined	28	22	24	18	21	20	20	18	22	19	18
Copepods	18·2	8·6	11·2	19·4	10·7	8·6	7·8	11·9	12·4	10·2	9·0
Cancer larva	2·4	3·8	..	..	2·4	..	5·8	..	6·6	8·2	9·7
Mysis sp.	6·4	2·8	5·0	1·1	5·4	..	12·8	..	7·3	6·4	4·3
Lucifer sp.	2·8	..	8·8	..	4·8	9·3	8·9	12·9	..	9·4	6·9
Entomostraca	8·6	12·4	4·8	..	..		7·6	14·6	..	8·6	7·1
Brachyura	..	10·8	..	8·3	14·3	12·6	13·4	10·1	8·2	10·2	12·8
Vegetable matter	8·6	4·0	18·2	10·0	11·6	14·4	..	17·0	10·0	11·6	10·2
Squilla sp.	18·6	8·2	12·6	9·3	..	15·6	17·8	..	12·5	..	14·2
Penaeus sp.	10·6	16·7	13·3	20·3	12·3	..	20·3	18·5	26·4	18·6	14·8
Mollusca	6·8	10·4	4·6	8·6	10·4	6·8	..	2·5	2·6	8·4	..
Foraminifera	4·4	6·8	11·6	10·2	3·8	14·2	..	3·6	6·7	..	2·4
Broken shell pieces	4·0	8·2	..	2·5	4·6	4·1	..	2·4		..	..
Polychaetes	6·8	5·3	8·8	10·7	12·6	2·8	4·6	5·5	7·2	8·0	7·6
Sand particles	2·0	1·1	1·6	1·1	1·6	1·0	1·0	1·1	1·4	1·0	

TABLE 2.—*Showing the average total volume of food, number of fishes examined each month and also the percentage average of the various food items of* Sciaena albida.

Particulars	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb
Volume of stomach contents in c.c.	1·3	1·4	1·9	2·4	1·4	1·0	0·8
Total number of fishes examined	22	28	21	28	21	19	18
Crustaceans	27·3	23·4	28·4	22·6	18·4	28·6	21·8
Penaeus sp.	16·6	19·6	28·2	14·6	17·6	20·2	18 8
Acetes sp.	12·4	10·0	..	8·4	10·4	..	8·2
Teleosteans	33·7	27·6	34·6	22·6	32·6	42· 4	39·2
Polychaetes	4·4	8·4	..	..	1·0	..	..
Decapods	1·6	6·4	6·8	8·6	12·8	1·6	12·0
Copepods	4·0	4·6	2·0	7·4	7·2	..	..

TABLE 3.—*Showing the average total volume of food, number of fishes examined each month and also the percentage average of the various food items of* Engraulis purava.

Particulars	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
Volume of stomach contents in c.c.	3·1	3·3	3·4	3·5	2·2	0·8	0·6	0·4
Number of fishes examined.	24	22	28	21	20	18	18	19
Crustaceans	29·1	40·4	30·2	29·8	30·9	28·2	31·9	38·2
Aceles sp.	11·4	..	8·6	11·2	..	18·4	23·1	11·1
Lucifer sp.	14·2	11·6	..	10·2	10·1	..	11·3	10·7
Copepods	16·2	20·6	18·2	12·2	22·0	28·4	24·6	20·8
Decapods	2·1	..	12·8	8·6	7·0	4·0	..	8·2
Macrura	6·0	..	8·2	8·0	10·3	8·2	6·4	6·8
Amphipods	7.2	10·4	12·4	6·4	19·7	12·8	..	4.2
Vegetable matter	..	12·8	7·4	7·6	4·6	..	2·7	..
Insect larvae and appendages.	8·8	..	..	..	..	..	..	..
Miscellaneous animal matter.	5·0	4·2	2·2	6·0	5·4	..	..	2·3

TABLE 4.—*Showing the condition of feed and also the length of the fishes examined during mature and immature stages.*

Condition of feed	Length of fishes					
	7 cms. mature	11 cms. immature	12 cms. mature	17 cms. immature	17 cms. mature	21 cms immature
Empty . .	12	..	8	1	8	1
little .	13	1	12	..	9	2
¼ full	6	2	3	2	3	1
½ full .	..	9	1	6	1	12
¾ full .	1	6	2	11	..	6
full . .	..	12	1	8	2	8