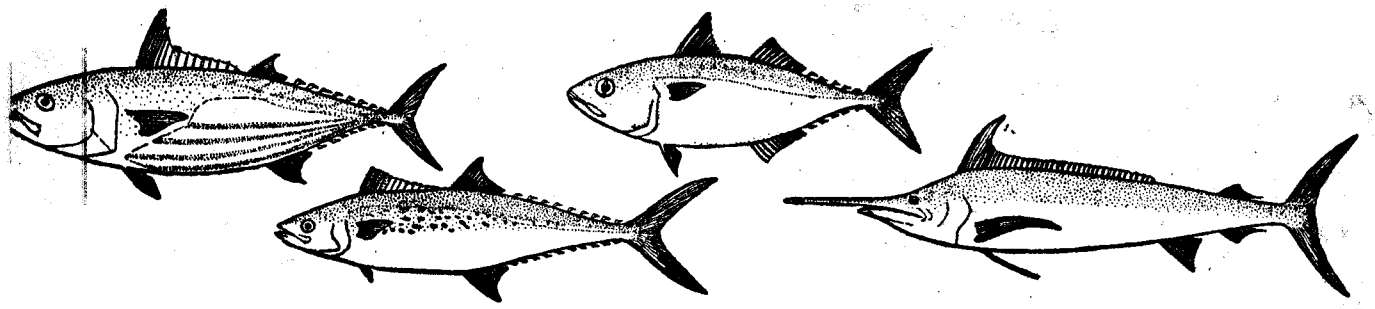
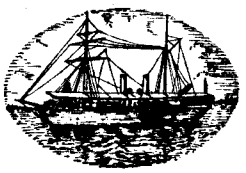


SYMPOSIUM ON SCOMBROID FISHES

PART II



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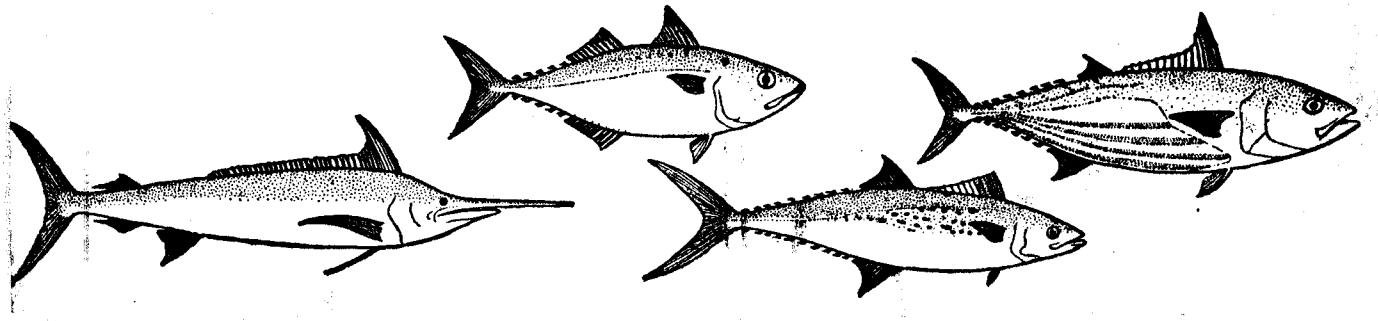

PROCEEDINGS OF THE

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HELD AT MANDAPAM CAMP FROM JAN. 12-15, 1962

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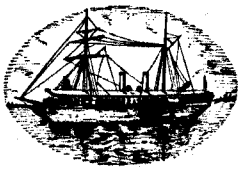

SYMPOSIUM SERIES I

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FOOD OF *KATSUWONUS PELAMIS* (LINNAEUS) AND *NEOTHUNNUS MACROPTERUS* (TEMMINCK AND SCHLEGEL) FROM MINICOY WATERS DURING THE SEASON 1960-61*

By P. T. THOMAS

Central Marine Fisheries Research Institute, Mandapam Camp, India

INTRODUCTION

THERE is a fairly extensive literature dealing with the food of the oceanic skipjack *Katsuwonus pelamis* and the yellowfin tuna *Neothunnus macropterus* from various parts of the Pacific Ocean ; Kishinouye (1917), Walford (1937), Herald (1949), Welsh (1949), Reintjes and King (1953), King and Ikehara (1956), Tester and Nakamura (1957) and Yuen (1959). Investigations on the food of these species from Indian waters have been initiated only recently. A detailed account of the food of *Katsuwonus pelamis* from Minicoy for the period 1958-59 is being given elsewhere (Raju 1962). The food of *N. macropterus* caught on troll lines at Tuticorin (S. India) is also being dealt with elsewhere (Silas 1962). A brief study on the food of the two species from Minicoy waters has been made herein by the analysis of stomach contents.

MATERIAL AND METHODS

The material for this study was obtained from the pole and line catches of the oceanic skipjack and yellowfin tuna in Minicoy during the season 1960-61. As soon as the fish was landed, the stomachs were collected and preserved in 10% formalin. In the laboratory they were washed to remove excess of formalin and then the stomach contents removed carefully. The organisms were identified and the number of each species or group of organisms was recorded. Each subdivision was then measured volumetrically by the displacement of water in a graduated cylinder of appropriate size.

As the fish were caught by the pole and line method after chumming them with live-bait fishes, a number of stomachs contained bait fishes also in addition to the natural food. The bait used to capture them have not been considered in this study.

The advantages and disadvantages of the various methods of evaluating food components have been discussed by Reintjes and King (1953). They conclude that ' those food items which rank large in number, large in volume and high in frequency of occurrence are important foods at the time and in the area sampled.' In this study, both the percentage-of-occurrence and the percentage-of-volume measurements have been used.

STOMACH CONTENTS OF *Katsuwonus pelamis*

The skipjack ranged in size from 28 cm. to 70 cm. in total length. For the purpose of this study, the fish were divided into two groups, with 50 cm. as the separating point. Altogether 280 skipjack stomachs were examined of which 99 belonged to the smaller size and 181 belonged to the larger size group. Of the specimens below 50 cm., 39.4% of the stomachs were empty. The average volume of the stomach contents was 2.98 c.c. The composition by volume of the stomach contents is shown in Fig. 1. Fishes formed 48.07%, crustaceans 46.69%, and miscellaneous items 5.24%. Stomatopod larvae alone constituted 21.63% of the total food volume, Megalopa larvae

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of crabs 11.82% and other crustaceans like mysids and *Lucifer* 13.24%. Among the miscellaneous items are included squids, *Pyrosoma*, medusae, molluscs and plant material. The fishes belonged to the families Dussumieridae, Gempylidae, Balistidae, Tetrodontidae, Dactylopteridae, Carangidae, Exocoetidae, Ostraciontidae, Apogonidae, Pomacentridae and Syngnathidae.

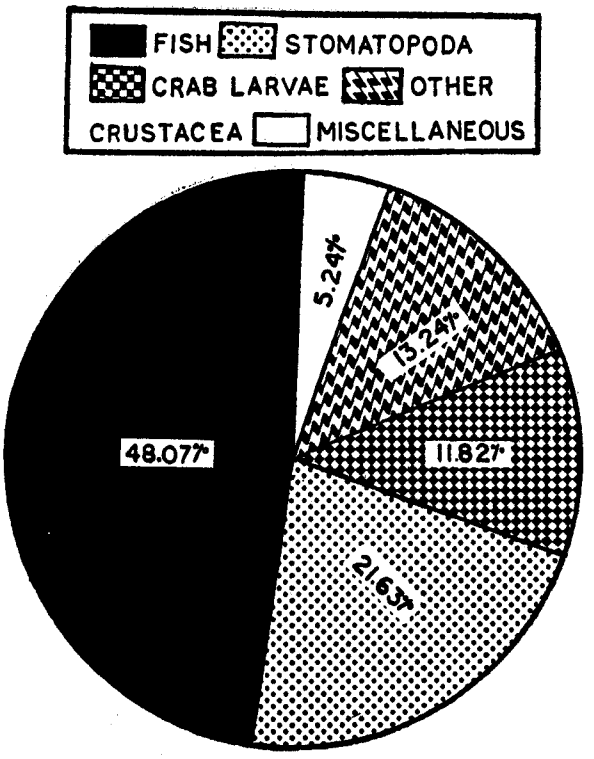

Fig. 1. Diagram illustrating the composition by volume of the stomach contents of *Katsuwonus pelamis* of total length below 50 cm. from Minicoy, during the season 1960-61.

Considering the frequency of occurrence, 78.33% of the stomachs had fish in them, 46.66% had crustacea and 8.33% had miscellaneous items in them.

In the group of skipjack of total length above 50 cm., 54.7% of the stomachs were found to be empty. The dominant item of food in this group also was fishes. The percentage of fish among the food items was found to be higher than in the previous group. The composition by volume of the stomach contents is given in Fig. 2. 69.5% was formed by fishes, 27.89% by crustacea and the rest by miscellaneous items. The average volume of food in one stomach was 3.13 cc. Stomatopoda formed 8.9% of the total food volume, larvae of crabs 1.84% and other crustaceans 17.1%. The fishes belonged to the same families as in the previous group.

According to the frequency of occurrence, fishes were found in 67.1% of the stomachs, crustaceans in 49.0% of the stomachs and miscellaneous items in 13.5%.

Stomach Contents of *Neothunnus macropterus*

The stomach contents of 122 specimens of yellowfin tuna have been analysed. The fish ranged in size from 27 cm. to 800 cm. The majority of the fish were immature and a few only were in the maturing stage. 58.2% of the stomachs were empty. The composition by volume of the stomach

contents is shown in Fig. 3. Fishes formed 72.04%, crustaceans 26.28% and miscellaneous items 1.7%. The same families of fishes which form the food of skipjack were represented in the stomach

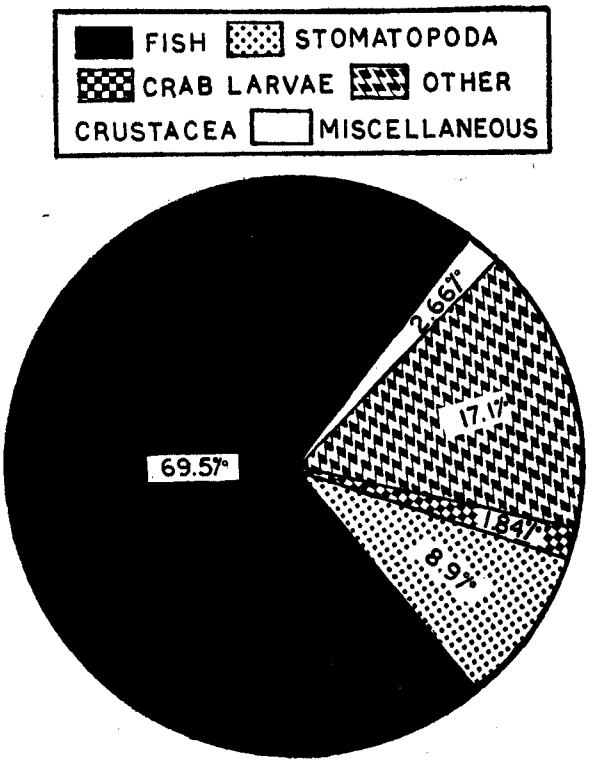

Fig. 2. Diagram illustrating the composition by volume of the stomach contents of *Katsuwonus pelamis* of total length above 50 cm. from Minicoy during the season 1960-61.

contents of yellowfin also. But stomatopod larvae were not so prominent an item of food as was found in the skipjack. According to the frequency of occurrence fishes were found in 24.6% of the total number of stomachs examined, mysids in 14.7% of the stomachs, stomatopods in 8.2%, and megalopa larvae in 6.5%.

Parasites of the genus *Hirudinella* were found in most of the stomachs. They ranged in size from a few mm. to 30 mm.

Discussion

Though the number of specimens examined is small, it is possible to see a pattern of feeding in both the species. Both feed mainly on fishes and macrozooplankton. The number of empty stomachs is very high. It is higher in larger skipjack than in small specimens. As these fishes are caught by the pole and line method they are probably drawn from very large surface schools, which may be the reason for obtaining very low values for the volume of food. Stomatopod and other crustacean larvae form a major item of food for both the species. Whether the abundance of these organisms near the island attract the tunas, is not known. As all the specimens have been caught very near the island and as no material is available from regions farther away, it is not possible to draw comparisons.

The results obtained in the present study are in agreement with those obtained by Welsh (*op. cit.*) from samples collected from the Central Pacific adjacent to Oahu island. He found fishes to be the most important item of food by volume. For skipjack ranging in size from 40 cm. to 61.1 cm., Tester and Nakamura (*op. cit.*) found cephalopods (squids) to be the most important

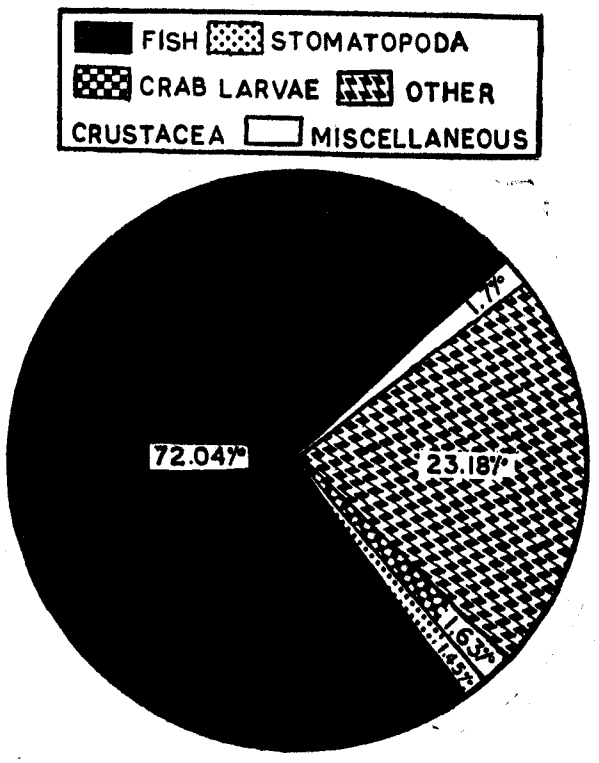

Fig. 3. Diagram illustrating the composition by volume of the stomach contents of *Neothunnus macropterus* from Minicoy during the season 1960-61.

item. Fishes had the highest frequency of occurrence, but they came second only in volume. Yuen (*op. cit.*) found that the food of the skipjack of various size groups was alike and consisted of fish, molluscs and crustaceans, but in different proportions. He found that fish accounted for 91% by volume of the larger skipjacks' diet but contributed less to the food of smaller skipjack. In the stomachs of skipjack 50 cm. long, the composition of fish was 70% and in skipjack less than 50 cm. long 40%. He found molluscs and crustaceans increasing in importance in smaller skipjack. Stomach contents of 1351 skipjack from the Eastern Tropical Pacific Ocean contained 62.4% by volume of crustaceans, 33.4% fish and 4% cephalopods. Fifty per cent of the stomachs were empty (Schaefer 1959).

The food of the yellowfin does not differ much from that of skipjack in Minicoy waters, except in the proportion of the major food elements. This may be owing to the same habitat of the two species. Cephalopods reported as a main item of the food of both the species elsewhere, was found to be of only minor importance, in the present study. Both feed on such fast moving fishes as the flying gournards (Dactylopteridae) and the flying fishes and also on slow moving ones as the pipefishes and on crab larvae, within broad size limits. It would appear that they take advantage of whatever food is available in the area.

SUMMARY

This study is based on the quantitative analysis of the stomach contents of 280 skipjack and 122 yellowfin caught by pole and line gear in Minicoy waters during the season 1960-61. The food of skipjack of larger size was found to be similar to that of smaller ones except in the proportion of the major items of food. Fish was found to be the main item of the food of both skipjack and yellowfin, crustaceans coming second in importance, followed by squids, *Pyrosoma*, medusae, molluscs and plant matter. The similarity in the food items may be owing to the same habitat of the two species. A large percentage of the stomachs was found to be empty. The food volume per stomach was also found to be very low in comparison with the observations from the Pacific.

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