ON THE OCCURRENCE OF THE JUVENILES OF THE INDIAN MACKEREL *RASTRELLIGER KANAGURTA* (CUVIER) IN THE INSHORE WATER OF KAKINADA

It is well known that a knowledge of the distribution, abundance and biology of the younger stages of fishes is necessary for a proper understanding of many problems such as spawning period, success or failure of year classes, population structure etc. Our present knowledge of the distribution of the young of the Indian mackerel *Rastrelliger kanagurta* along the Indian Coasts has been summarised by Rao (1962). He emphasized the importance of collecting additional information on juvenile mackerel as it would enable us to fill up certain lacunae at present existing in our knowledge of the biology of the Indian mackerel. Juvenile mackerel have been reported from the Arabian Sea off the Coasts of Ratnagiri, Karwar, Mangalore, Cannanore, Calicut, Ernakulam and Vizhingam; from the Bay of Bengal off Madras and Visakhapatnam and from the Andaman Sea off Port Blair. (Rao, 1962).

Since only a few records were made on the east coast of India, the present report about the occurrence of juvenile mackerel from the Kakinada area, from where no earlier record has been reported, should be of interest.

The present collection of juvenile mackerel, is represented by 3 samples (Fig. 1) obtained from 3 fishing centres where mackerel fishery is usually present

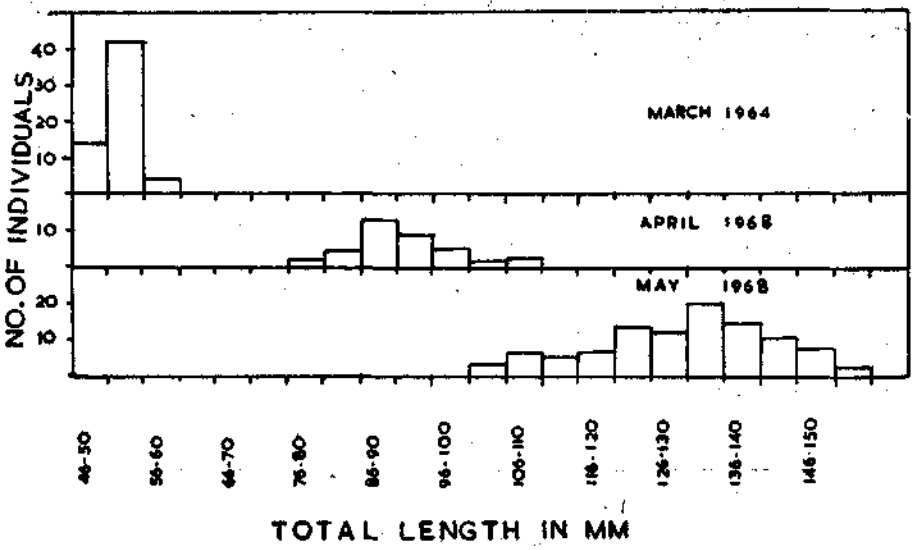

Fig. 1. Represents the length frequencies of 3 samples of juvenile mackerel.

during February to May period. A surface cotton gill net (*Javaka vala*) consisting of 10 pieces, each piece 10 metres wide and 40 meters long with a mesh size of 5 cms. is extensively used during this period to catch mainly adult mackerel. The mackerel landings by these nets are considerable in the above period. Measurements of the mackerel caught by these surface gill nets in April 1968 at Suryaraopeta showed a size range of 260-280 mm.

Sixty small juvenile mackerel measuring 46 mm.-57 mm. in total length (mode between 51-55 mm.) were collected from the shore-seine at Dummulapeta (lat. N.16° 59′ ; long. E.82° 15′) during March 1964. The shore-seines were operated in 6 meters of water about a kilometer from the shore. These young ones (*Chiru-Kanagurthalu*—vernacular name) were found in the catches along with white-baits.

In April 1968, 35 young mackerel measuring 80-109 mm. in total length (mode between 86-90 mm.) were collected from the boat-seines (*Iraga vala*) operating at a depth of 7-10 meters, 3-6 kilometers from the shore at Suryaraopeta (lat. N.17° 2′ long. E.82° 17′). These specimens occurred along with white-baits and silver-bellies.

98 juvenile mackerel measuring 101 mm. to 168 mm. in total length (mode between 131-135 mm.) were collected from the boat-seines at Rajavaram (lat. N.17°-18′ long. E.82°-36′) during May 1968. These were caught along with white-bait, *Dussumieria* sp., *Gerres* sp., *Sciaena* sp. and *Acetes* sp. The boat-seines were operated at a depth of about 5 meters within a distance of 300 meters from the shore.

In general the period of occurrence of juvenile mackerel along the east coast of India is from March to August (Rao *op. cit.*) and the present collections conform to this general pattern of occurrence.

Jones and Silas (1962) established the presence of *Rastrelliger brachysoma* (Bleeker) in the Bay of Bengal, off Andamans. This species can be easily separated from *R. kanagurta* from greater depth of body. In Fig. 2 are plotted the

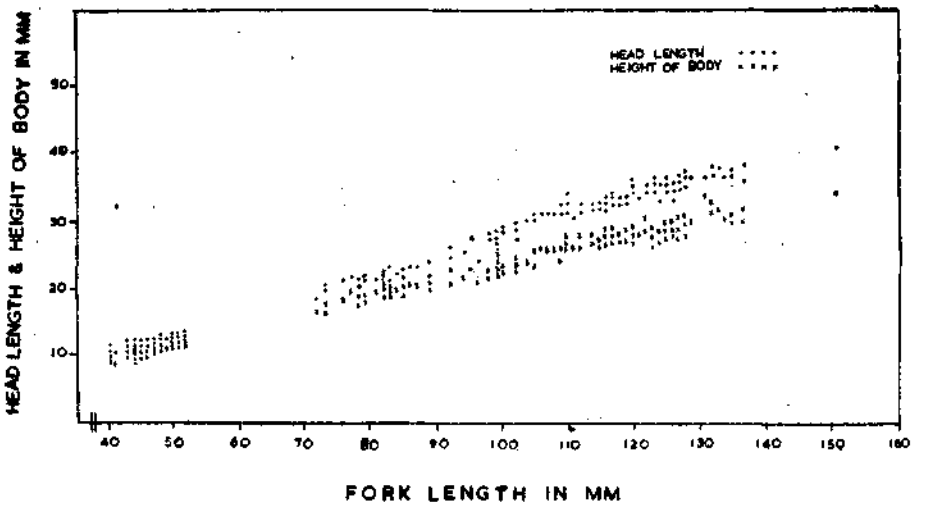

FIG. 2. Graph showing height of body and head length against fork length.

greatest height of body and head length against fork length. It is evident from the figure that head length is distinctly greater than the greatest depth of body, which confirms that the juveniles studied here are those of *R. kanagurta*.

Gut contents of 32 specimens ranging in size from 49-148 mm., were studied in detail (Table I). The intensity of feeding was high in April and May 1968 and

poor in March 1964. Majority of the stomachs contained diatoms, copepods, medusae, dinoflagellates, amphipods and *Acetes*. Only four specimens contained

TABLE I

Size group in mm. (Total Length)	*Month and Year*	*Major food elements observed*
49 - 60	March 1964	Stomachs 1/4 to 1/3 full. Mainly unrecognisable matter. A few copepods, amphipods and fish scales.
76 - 105	April 1968	Stomachs 3/4 to full. Mainly medusae, diatoms, fish scales and copepods. A few dino-flagellates, amphipods fish egg (white bait), diatoms and lamellibranch larvae.
106 - 125	May 1968	Stomachs 3/4 to full. Mainly Acetes (Semi-digested) and diatoms. Some unrecognisable greenish matter and sand grains. In a 116 mm. fish one bottom living polychaete measuring 145 mm. was found.
126 - 150	May 1968	Stomachs 3/4 to full. Mainly diatoms, copepods lamellibranch larvae and a few gastropod larvae, tintinnids, sand particles cypris larvae and some unrecognisable greenish matter.

1 or 2 whitebait eggs. A few lamellibranch larvae, tintinnids, cypris larvae, gastropod larvae, fish scales and sand grains were also found. Unrecognisable greenish matter was usually observed in the stomachs. Although the occurrence of medusae in the diet of mackerel is reported (Hardenburg 1955), the presence of a bottom living polychaete measuring 145 mm., in the stomach of a 116 mm. juvenile mackerel, is very interesting. It may be mentioned that Rao and Luther (reported by Rao 1962) recorded polychaete remains from juvenile mackerel collected from Port Blair. This shows that besides feeding on plankton, the juvenile mackerel may at times resort to bottom feeding in the inshore waters.

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A NOTE ON THE FOOD OF MALABAR TREVALLY, *CARANGOIDES MALABARICUS* (BLOCH & SCHNEIDER) FROM THE NORTH-WESTERN BAY OF BENGAL

Carangoides malabaricus (Bloch & Schneider) is the most important carangid landed by the trawlers operating in the north-western Bay of Bengal. It is observed in the trawl catches at all hours of the day. Preliminary observations on the food and feeding habits of the fish collected during 1964-66 show that it is essentially a carnivore and a column feeder and that *Acetes*, prawns, *Squilla*, crabs and miscellaneous small fishes are the important items of food besides small quantities of mysids, amphipods, other crustaceans, squids and cuttle fish. However, sometimes the food exclusively consists of only one of the items mentioned above.

On 18th July, 1964 and 8th August, 1966 an unusual item of food was found in the stomachs of *C. malabaricus* and was identified as *Euphausia distinguenda* Hansen. The euphausiids were very fresh and majority mature, as shown by well developed petasma in males and spermatophores attached to the thelyca in females. Details regarding the collection of fish samples and percentage composition of the feed on the days of occurrence of the euphausiids in the stomachs of the fish are given below.

TABLE

Date.	18-7-1964.	8-8-1966.
Vessel.	M.T. Ashok.	M.V. Champa
Area.	Lat. 18° 35'N., Long. 84° 35'E.	Lat. 17° 35'N., Long. 83° 25'E.
Time of fishing.	0630-1115 hrs.	0800-1200 hrs.
Number of stomachs examined.	8	24
Length range of fish in mm.	124-172	122-190
Number of stomachs in which euphausiid is seen.	2	24
Average number of euphausiids per stomach	53	168
Length range of the euphausiid in mm.	7.0-8.05	7.5-13.5

Percentage composition of the feed in the stomachs in which euphausiids were seen.

(*a*) Euphausiids	75.0%	69.9%
(*b*) *Squilla* sp.	20.0%	—
(*c*) Crabs	5.0%	0.7%
(*d*) Prawns	—	0.9%
(*e*) Fish juveniles	—	1.5%

It is interesting to note that 21 out of 24 stomachs examined on 8-8-1966 contained only euphausiids. Most of the stomachs were full. The quantity of the feed indicates that the fish had fed on a thick patch of the euphausiid while the freshness of the feed shows that the fish had fed on the euphausiids just before they were caught. Examination of the stomachs of *C. malabaricus* collected a few days before and after 8-8-1966 revealed no euphausiids in them but mainly or only *Acetes*. The present observation also indicates that *C. malabaricus* is not particularly selective in regard to food.

A review of the literature shows no reports on the occurrence of *E. distinguenda* Hansen in the guts of fish from Indian waters although this species is reported to be abundant in the Arabian Sea (Illig, 1930 ; Tattersall, 1939 ; Brinton, 1963 and Pono-