# OBSERVATIONS ON THE FOOD AND FEEDING HABITS OF THE 'TORPEDO TREVALLY' *MEGALASPIS CORDYLA* (LINNAEUS) FROM VIZHINJAM BAY

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## ABSTRACT

A study of the food and feeding habits of *Megalaspis cordyla* based on an examination of 1692 specimens revealed that it is a pelagic carnivorous feeder, subsisting mainly on *Stolephorus* spp.; *Leiognathus* spp., *Gazza* sp., *Carangoides* spp., fish juveniles, fish larvae, alima larvae of *Squilla* spp., *Acetes* spp., amphipods, *Squilla* spp., *Lucifer* spp., megalopa larvae of crab, prawn juveniles, copepods, euphausids, pteropods, *Sepia* spp., and *Nereis* spp. were the other food items recorded. The intensity of feeding decreased with advancement of maturity. Feeding was observed to be comparatively higher during night than by day.

## INTRODUCTION

Biological information so far published on *Megalaspis cordyla* (Linnaeus) is very limited; except for the studies on the food and feeding habits by Tham Ah Kow (1950) from Singapore Strait, Datar (1954) from Bombay waters and Chacko and Mathew (1954) from Malabar area, only available account is on the food of larvae, juveniles and adults of *M. cordyla* by Kuthalingam (1959). Therefore the present investigation was taken up to study the food and feeding habits of this species in relation to different sizes, seasons and maturity. The importance of the present study is that it helps in understanding the suitable baits and time of operation for hooks and line gear by which the major portion of *M. cordyla* catch is landed.

## MATERIAL AND METHODS

The material consisted of 1692 specimens in sizes ranging from 100 mm to 379 mm fork length examined over a period of two years from July 1970 to June 1972 collected at Vizhinjam from boat seines, shore seines, drift nets and hooks and lines. Since there were not much differences in the composition of diet of fishes obtained from different gears (Table 1) the data for all the four gears are pooled together and presented.

The volume of stomach contents was determined by the displacement method and further analysis was by the method of 'Index of preponderance' (Natarajan and Jhingran, 1961). The variations of food in relation to size were studied by sorting the individuals into 20 mm groups.

TABLE 1. *Average percentage composition of food items of* M. cordyla *in different gears during the period July* 1970 *to June* 1972.

| Food items | Boat seines | Shore seines | Hooks and Lines | Drift nets |
|---|---|---|---|---|
| Fishes | 65 | 55 | 49 | 59 |
| Crustaceans | 7 | 25 | 26 | 32 |
| Molluscs | — | 20 | 25 | 9 |
| Polychaetes | 28 | — | — | — |
| Total | 100 | 100 | 100 | 100 |

The intensity of feeding was determined by the method described by Kuthalingam (1955). The degree of distension of the stomach was recorded for all the stomachs examined under the following catagories "little", "¼ full", "½ full", "¾ full", "full" and "gorged". To understand whether advancement of maturity has any bearing on the feeding intensity, the percentage occurrence of different categories of the latter was calculated for different stages of maturity, viz., juvenile, immature, mature, spawner and spent.

## FOOD COMPOSITION

The different food items comprising the diet of *M. cordyla* are given in Fig. 1.

### *Fishes*

*Stolephorus* spp., formed the main bulk of the diet contributing 49.2%. *Leiognathus* spp., *Gazza* sp., and *Carangoides* spp., were recorded occasionally. Juveniles of *Sardinella* spp., *Sciaena* spp., *Tetraodon* spp., *Mugil* spp., and *Sphyraena* spp., and fish larvae were also met with in the stomach contents occasionally.

### *Crustaceans*

Crustaceans formed the next important item of food. They were represented by alima larvae of *Squilla* spp., *Acetes* spp., amphipods, *Squilla* spp., *Lucifer* spp., megalopa larvae of crab, juveniles of prawns, *Corycaeus* sp., *Macrosetella* spp. and euphausids in the order of abundance mentioned.

### *Molluscs*

Pteropods and *Sepia* spp., were the components of the molluscan item of diet.

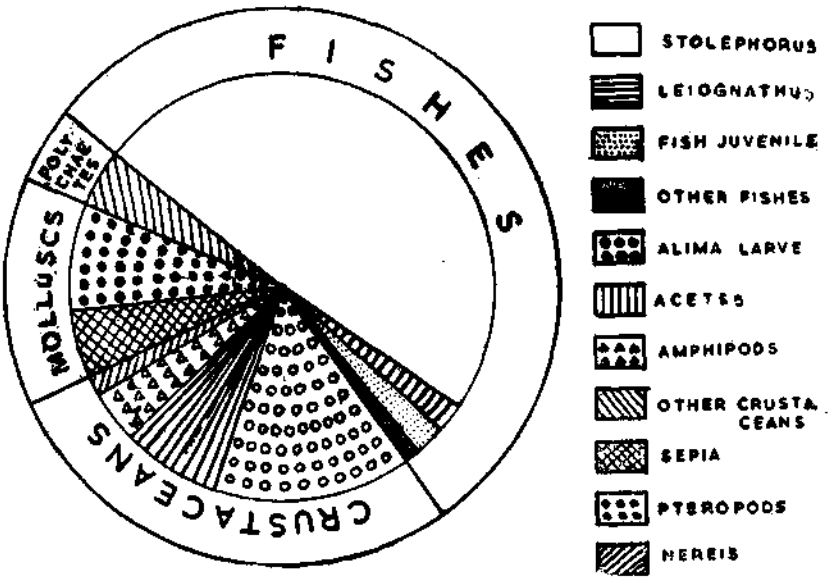


FIG. 1. Average percentage (Index of preponderence) of different food items of *M. cordyla* during the period July 1970 to June 1972

*Polychaetes*

Polychaetes were represented in the food by *Nereis* spp.

*Food composition in relation to different months*

The variations in the compositions of food of *M. cordyla* during the years 1970-72 (Fig. 2) revealed that fishes particularly *Stolephorus* were dominant in September, October, November, March and July in the diet. The

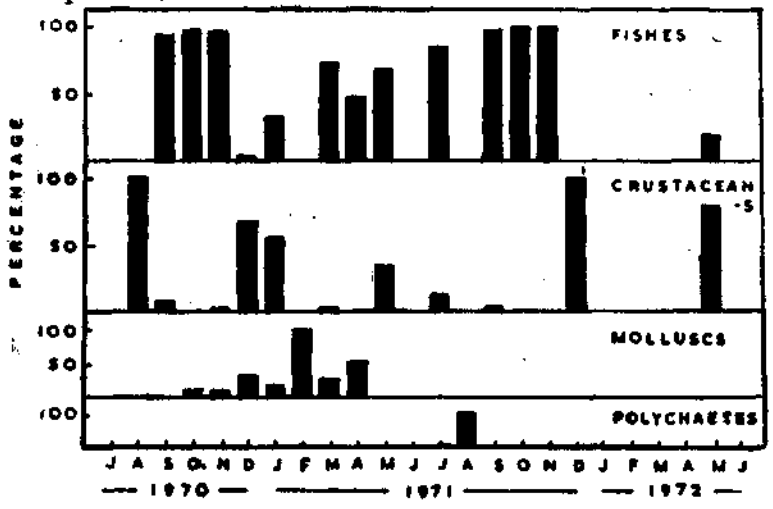


FIG. 2. Food composition of *M. cordyla* in different months.

fluctuations in the percentage composition of 'fishes' in the food of *M. cordyla* coincided more or less with the fluctuations in the landings of *Stolephorus* at Vizhinjam. So the governing factor to account for the percentage composition of fishes in the food of *M. cordyla* was the availability of *Stolephorus* spp., in the nearby region. Whenever *Stolephorus* spp. were absent in the fishery, the stomachs had zoo-plankton as the major content. *M. cordyla* thus shows some sort of preference to *Stolephorus* spp. among fishes.

During December and January crustaceans formed the main bulk of the diet whereas during February and August molluscs and polychaetes respectively dominated the food. The data indicate that the composition of the diet of *M. cordyla* depends mostly on the availability of the food organisms.

*Food composition in relation to size groups*

Relative importance of different food items in relation to different size groups (Fig. 3) showed that 70% of the diet was contributed by the fish food in all the size groups except in 100-119 mm group where polychaetes were found to be dominant. Crustaceans were also represented in the diet of both the larger and smaller individuals. Molluscs were found in small quantities in length groups of 160-179 mm and 220 to 339 mm groups.

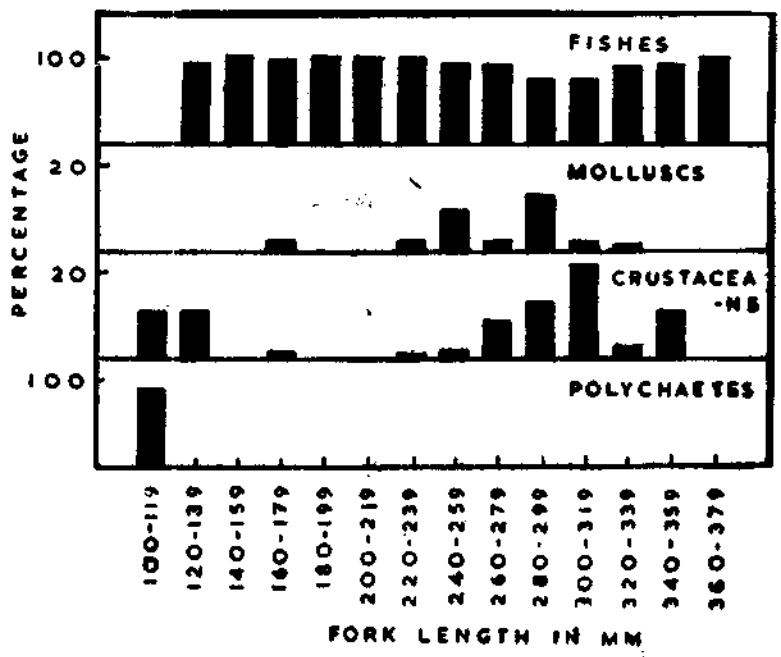


FIG. 3. Food composition of *M. cordyla* in different size groups during the years 1970 — 72.

## Feeding Intensity

Specimens were considered heavily fed when they were with gorged and full stomachs, moderately fed when they were with ¾ full and ½ full and poorly fed when they were with ¼ full and little contents.

*Feeding intensity in relation to months*

Percentage occurrence of different degrees of fullness of stomach in different months during the year 1970-72 are given in Table 2. A comparison between years show that feeding was higher in the second year than in the

Table 2. *Percentage occurrence of different intensities of feeding in* M. cordyla *in relation to months.*

| Months | Number of specimens examined. | Gorged | Full | ¾ Full | ½ Full | ¼ Full | Little |
|---|---|---|---|---|---|---|---|
| 1970 | | | | | | | |
| July | — | — | — | No data | — | — | — |
| August | 71 | — | — | — | — | 5 | 95 |
| September | 85 | 27 | 13 | — | 2 | 11 | 47 |
| October | 38 | 36 | 36 | 9 | 9 | — | 10 |
| November | 186 | 24 | 18 | 6 | 4 | 8 | 40 |
| December | 162 | — | — | 4 | 22 | 15 | 59 |
| 1971 | | | | | | | |
| January | 156 | 11 | 6 | 6 | 9 | 11 | 57 |
| *February | 54 | — | — | — | — | — | — |
| March | 132 | 20 | 7 | 33 | 7 | 20 | 13 |
| April | 95 | 25 | 25 | — | — | 25 | 25 |
| May | 75 | — | 23 | — | 9 | 23 | 45 |
| June | — | — | — | — | — | — | — |
| July | 73 | 51 | 20 | 5 | 9 | 2 | 13 |
| August | 30 | — | — | 100 | — | — | — |
| September | 124 | 10 | 43 | 10 | 17 | — | 20 |
| October | 56 | 68 | 11 | 6 | 4 | — | 11 |
| November | 99 | 5 | 11 | 26 | 37 | 5 | 16 |
| December | 62 | — | — | — | 50 | — | 50 |
| 1972 | | | | | | | |
| January | — | — | — | No data | — | — | — |
| *February | 45 | — | — | — | — | — | — |
| *March | 40 | — | — | — | — | — | — |
| *April | 45 | — | — | — | — | — | — |
| May | 40 | 21 | 21 | 16 | 26 | 5 | 11 |
| *June | 24 | — | — | — | — | — | — |

* Months in which examined stomachs were empty.

first year. The monthly feeding intensity showed more or less similar type of fluctuations in both the years. Feeding intensity was high in July, October, November, January and March; moderate in September, May and April and poor in December, August and February. Feeding intensity was better during post-monsoon months and is in conformity with that of the observations made by Venkataraman (1960) among inshore fishes of Calicut.

*Feeding intensity in relation to time of the day*

In order to understand the difference in feeding activity during different times of the day, which will be helpful to understand the suitable time of operation of hooks and lines, the data for specimens collected during morning (which were caught during night hours) and after-noon period (fish caught during sunrise to mid-day) were compared. Pooled data for two years are given in Fig. 4 which show that feeding in *M. cordyla* occurs during day and night and percentage contribution of heavy and moderate feeding was high in night samples than in day samples. Such instances of occurrences of feeding activity during day and night and active feeding during night hours were earlier reported by James (1967) in *Eupleurogrammus intermedius* and Watanabe (1958) in *Thunnus obesus* respectively.

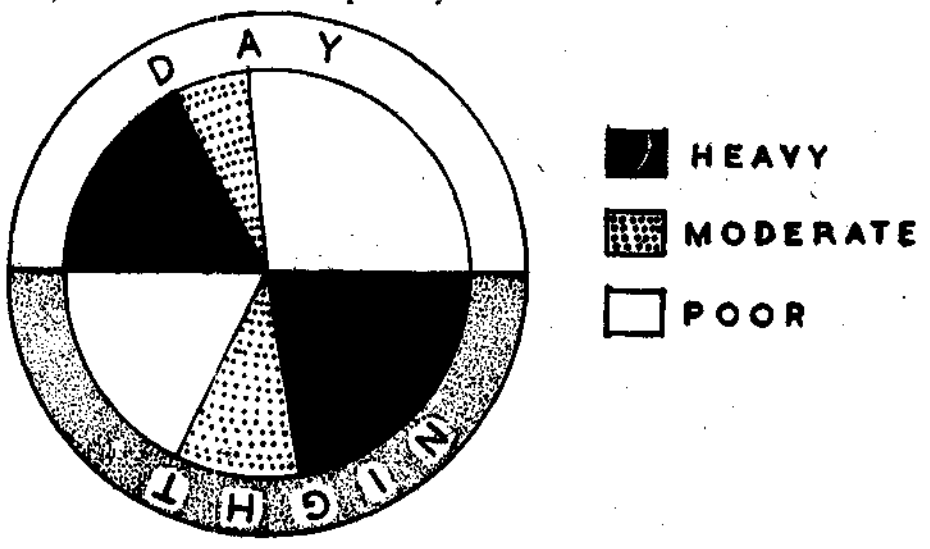


FIG. 4. Different conditions of feeding in relation to day and night (pooled data for the years 1970 — 72) in *M. cordyla*.

*Feeding in relation to maturity*

Percentage occurrence of different conditions of feed for juvenile, immature and mature specimens are given in Fig. 5. Spawners and spent individuals were not met with in the samples during the period of study. The feeding intensity was more in juveniles than in immature and least in mature individuals.

## Discussion and General Remarks

Tham Ah Kow (1950) recorded *Stolephorus* spp. and *Acetes* spp., in the stomach contents of *M. cordyla*. Datar (1954) concluded that *M. cordyla* was a carnivorous feeder, feeding mainly on prawns, fish larvae, crustacean larvae, fish eggs, stomatopod larvae, isopods, *Sagitta, Sepia* and also copepods and amphipods. Chacko and Mathew (1954) observed that the food of this species consisted of *Anchoviella, Sardinella fimbriata* and *Metapenaeus dobsoni*. Kuthalingam (1959) who described the food of larvae and adults of *M. cordyla*, found that in the post-larvae and sizes upto 140 mm the food consisted of

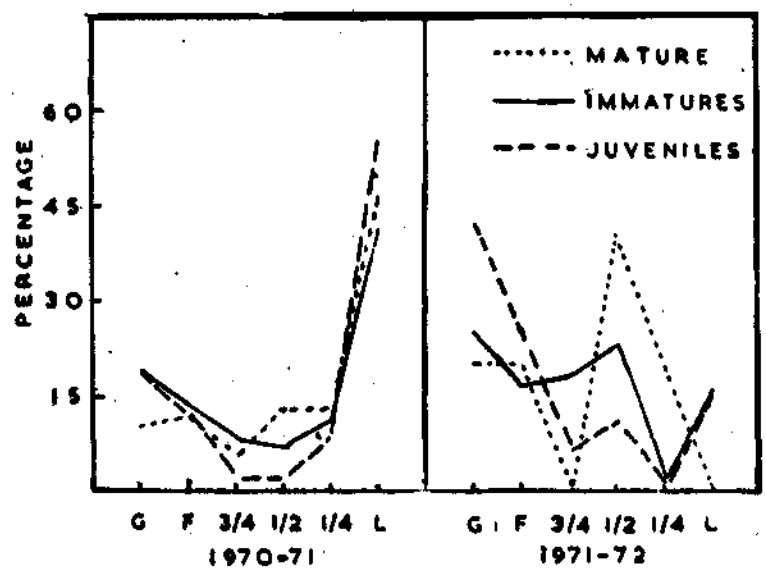


Fig. 5. Percentage occurrence of different conditions of feed in *M. cordyla* of different stages of maturity.
G : Gorged F : Full ¾ : ¾ Full ½ : ½ Full ¼ : ¼ Full L : Little

copepods, diatoms, cirrepeds, megalopa larvae, *Lucifer, Sagitta* and pluteus larvae. In the size group of 142 mm to 220 mm crustaceans formed the major food item and in specimens of above 220 mm from off-shore region fishes were the main food items.

Presence of minute teeth on jaws in bands and well developed gillrakers numbering about 30 (in total) in the uppermost (near opercle) arch indicate that *M. cordyla* is adapted to feed mainly on smaller organisms, and this fact is confirmed by the present observations, which show that *M. cordyla* is a pelagic carnivore, feeding mainly on small fishes, crustaceans, molluscs and polychaetes.

The habit of *M. cordyla* taking actively moving fishes like *Stolephorus, Leiognathus, Gazza* and *Carangoides* as food indicates that sight plays an important role, while the habit of taking the artificial baits which are coloured

inanimate things devoid of smell shows that sense of smell is of little help in the feeding activity. The active feeding during night in *M. cordyla* can be explained in the light of observations of Talbot and Penrith (1963) on *Thunnus obesus,* which have indicated that search for food can be accomplished even in low illumination, and that therefore, the active feeding is not uncommon during night hours also among fishes in which feeding was usually by sight.

The diet composition shows that *M. cordyla* is mainly a piscivore, fishes forming the major component of food in different size groups as also in different months. The importance of fishes in the diet of *M. cordyla* was observed by Tham Ah Kow (1950) and Chacko and Mathew (1954) while Datar (1954) and Kuthalingam (1959) did not emphasize it.

During the course of the present investigations a large number of fishes were found with empty stomachs. Such occurrences of empty stomachs in high percentages have been recorded earlier (*vide* Kagwade, 1972) for many species of fishes. The frequent occurrences of empty stomachs or stomachs with little contents may be probably dependent on the ratio between the size of the fish and size of the prey as cited by Allen (1935) or on the calorific value of the diet as explained by Longhurst (1957) ie., where fish is an important food item, the daily intake will be less, because of the higher calorific value of the diet and as such empty stomachs will be more common. The occurrences of empty stomachs in *M. cordyla* did not show any relation either to season or to the size of the fish. However, more empty stomachs were found in mature specimens than in immature and juvenile fish and their percentage occurrence was very high in specimens obtained from hooks and lines and relatively lesser in drift nets, boat seines and shore seines in the decreasing order of abundance.

In Vizhinjam area, hooks and lines are the major gear which contribute the bulk of the landings of *M. cordyla.* These are operated mainly from catamarans; but plank-built boats are also often used. The operation was mainly during day time, from sunrise to midday. The hooks of size 14 and 15 are used for *Megalaspis* sp., *Caranx* spp., *Nemipterus* spp., tunas and some other fishes. Artificial baits made of small nylon fibres coloured green or blue and large enough to cover the hooks are used. Natural baits consist mainly of fishes like *Stolephorus* spp., *Leiognathus* spp., etc., and molluscs *Sepia* spp. and *Loligo* spp. Crustaceans baits are not normally used. More recently artificial baits are being more commonly used because of their advantage of easy handling and availability. A more or less steady increase in the landings of *M. cordyla* from 1,78,917 Kg in 1969 to 2,06,448 Kg in 1970 and 1,91,883 Kg in 1971 (Fishery Survey Register maintained at C.M.F.R. Substation, Vizhinjam) indicates that usage of different baits did not affect the landings. But catch per unit of effort for the same period did not show such steady rise (5.82 in 1969, 3.81 in 1970 and 2.84 in 1971) indicating that increased effort was perhaps the reason for increase in the landings. Since the natural baits used at Vizhinjam are more or less the same as the food

items preferred by *M. cordyla* (though crustaceans, the important food item, next of fishes are yet to find a place) a change in the baits may not have significant effect, but a change in the timings of operation of hooks and lines from day time only to night time also (during which time active feeding was observed) may prove to be having beneficial impact on the fishery.

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