

FEEDING HABITS AND RATE OF GROWTH OF MULLET
FINGERLINGS IN THE KAYAMKULAM LAKE, KERALA, INDIA*

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ABSTRACT

Studies on the biology of mullets in the Kayamkulam Lake were conducted with emphasis on growth and feeding habits.

The occurrence of mullet fingerlings in large numbers with *Mugil troscheli* Bleeker, as the dominant species from October to March and their sudden disappearance after March attracted the attention of the author. An attempt was made to analyse this phenomenon based on the study of their habits. The data collected indicated that 1 - 3.5 cm length groups are mainly plankton feeders forming large surface shoals locally called 'Thuli'. The stomach contents of 4 - 5 cm length groups showed for the first time spirogyra filaments and bits of aquatic weeds, apparently indicating that they have partially adapted to a semidemersal habit. In 5.5 - 7.5 cm and above length groups, the food mainly consisted of *Oscillatoria*, *Spirogyra*, etc. But there was the continuous presence of sand particles and aquatic weed remains. This seems to indicate that the fingerlings have completely given up the planktonic habits and have become semidemersal living partly by browsing on the aquatic weeds and by nibbling at the detritus and films of *Oscillatoria* found covering the bottom of the lake.

INTRODUCTION

MULLETS constitute one of the major brackish water fisheries in India (Luther, 1968), especially so in Kerala with its large number of lakes adjoining the coast. A lot of work has been carried out in Europe, America, Australia and South Africa (Hardy, 1959; Schultz, 1946; Thomson, 1954; Smith, 1935), regarding the economics of mullets. In India also the group has attracted much attention due to the economic possibilities (Chacko and Venkataraman, 1945; Jacob and Krishnamurthy, 1947; Sarojini, 1951; 1954; Chidambaram and Kurien, 1952; Pillay, 1953; Kuthalingam, 1956; Thampi, 1959). But as yet very little work has been done to study the habits of the miriads of mullet fingerlings that yearly make their appearance in the Kerala Backwaters.

Till quite recently, they were considered as a dwarf species of mullet locally known as 'Thuli'. Later on, after the establishment of a Research Station at Ayiramthengu on the banks of the Kayamkulam Lake, attention was drawn to the probability of their being the young ones of the local larger *Mugil* species. It was therefore decided to verify the same based on scientific observations—one of the chief aims of the above research station being the conservation and development

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of the existing mullet fisheries. The observations recorded here were made during the years 1947 to 1949 when the author was the Fresh Water Biologist at the above research station.

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OBSERVATIONS AND RESULTS

The Kayamkulam Lake is a narrow stretch of backwater on the west coast of peninsular India, between latitudes $9^{\circ} 07'$ and $9^{\circ} 16'$ North and longitudes $76^{\circ} 20'$ and $76^{\circ} 28'$ East.

The main body of the lake is nine miles long and half to one and a half miles wide and runs parallel to the sea from which it is separated by a narrow strip of sandy beach one to three furlongs wide. An arm of the lake originating opposite the bar extends for five miles in the north-easterly direction upto the town of Kayamkulam. The bar mouth is open except for about two to four months between January and May.

Two streams and a canal empty into the lake and during the monsoon, some of the flood waters of the Pamba and Achenkoil rivers flow into the lake through the commercial canal.

The floor of the lake is formed of fine sand and clay. Narrow stretches of mud flats are laid bare along the margins in summer. The surface soil of the greater part of the lake is formed of soft clay mixed with decaying organic matter. There are isolated patches of mangrove swamps.

The average depth during the dry season is only $1\frac{1}{2}$ to $3\frac{1}{2}$ feet except in the commercial waterway channel between Quilon, Kayamkulam and Alleppey. During the southwest monsoon, the level is 2 to $2\frac{1}{2}$ feet above the summer level and the bar is cut open at this time. Due to the limited extent of the lake, the influence of the tides is felt in all regions of the lake and during the dry season both the salinity and pH are more or less the same as that of the seawater (Mary John, 1958).

Regular examination of the mullet catches brought to light the fact that many of the *Mugil* species were found to be in roe from September to January. 'Thuli' made their appearance visibly in shoals from September end onwards till April. The individuals in the first 'Thuli' shoals in September had an average length of 1 cm. A weekly study of the plankton was made, which showed that the water was teeming with fish fry from September right on till March, after which they were conspicuous by their absence.

Putting all the above facts together, it was deduced that the 'Thuli' and fry in the plankton were the young ones of the local breeding mullets. It was therefore decided to verify the same by rearing them in experimental tanks set apart for the purpose. Due to the exceedingly great similarity of the various species in the initial stages, only specimens measuring 1 cm and above were identified and taken for the present study.

Accordingly in September, Tank F of the above Station was stocked with 337 'Thuli' of 1 cm average length. The tank was maintained with a sufficient growth of water weeds. About 5 kg of *Oscillatoria* scum was also fed to them on alternating days. Measurements were taken every month and by December they had an average length of 6 cms. On reaching a length of about 9 cms in January, they were also fed on small quantities of decaying leaves, cow dung-ox blood cakes and bran oil cakes, in addition to an increased supply of algal scum. They were left to grow undisturbed. By July they had grown to an average length of 18 cm, weighing about 0.5 kg (Fig. 1). The fish were now identified as *Mugil troscheli*. The common mature mullets in the lake consisted mainly of *Mugil troscheli* with a few of *Mugil longimanis* and *dussumieri*.

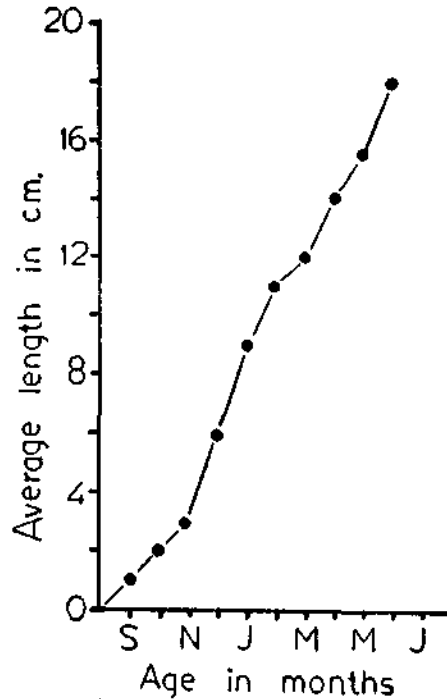


Fig. 1. Growth of fingerlings of *Mugil troscheli* Bleeker, during the first ten months in experimental tanks.

The facts recorded above added new interest to the 'Thuli' shoals in the open lake. *Mugil troscheli* is the common species in the lake which grows to a good size. Random collections of 'Thuli' were therefore taken twice a week from a definite locality in the lake known for its intense population of *Mugil troscheli* locally called 'vezha maala'. 150 specimens of *Mugil troscheli* fingerlings were identified and measured from each collection with a view to study the rate of growth in the open field and the measurements were in agreement with those obtained from the experimental tanks. Specimens were then sorted out into length groups ranging from 1 cm to 7.5 cm. The stomach contents of 5 specimens in each length group were analysed with a view to studying the feeding habits.

[3]

DISCUSSION AND CONCLUSIONS

On examining different sizes of fingerlings the main or common items of food in the various length groups, were found to be as follows :

(1) In 1 cm to 2 cm length group, the main items of food consist of very small forms like *Desmids* sp., *Microcystis* sp. with *Diploneis* sp., *Pleurosigma* sp., *Cymbella* sp. and *Oscillatoria* sp. forming the minority.

(2) In 2 cm to 3.5 cm length group, the diet consists mainly of diatoms, particularly species of *Pleurosigma*, *Cymbella*, *Navicula*, *Nitzschia*, *Diploneis* and *Oscillatoria*. But from the 3 cm length group onwards, detritus makes its appearance indicating a slight change from the plankton feeding habit.

(3) From 4 cm to 4.5 cm the diet is composed for the first time of *Spirogyra* filaments in addition to *Pleurosigma*, *Cymbella* and *Diploneis*. Here for the first time there is the presence of aquatic weed remains. The presence of *Spirogyra* and aquatic weed remains gives the impression that a semidemersal habit has been attempted here for the first time.

(4) From 5 cm to 7.5 cm the diet is mainly of *Diploneis* and *Spirogyra* with a little of *Pleurosigma* and *Oscillatoria*. Here there is the continuous presence of sand, sometimes abundant and aquatic weed remains, which show that the fingerlings are no more true plankton feeders. They seem to have developed a definite semidemersal habit and live partly by browsing on the aquatic weeds found in plenty in the shallow waters and partly by pecking at the detritus and film of *Oscillatoria* found covering the bottom of the lake.

The fry of *M. troscheli* in the Kayamkulam Lake seem to be plankton feeders like those of many other species—*Liza macrolepis* (Luther, 1962); *M. parsia* (Mookerjee *et al.*, 1946; Sarojini, 1954); *M. waigiensis* (Chidambaram and Kurien, 1953); *M. tade* (Pillai, 1953); *M. dussumieri* and *M. caeruleomaculatus* (Kuthalingam, 1956).

Chidambaram and Kurien (1953) have recorded that the fry of *M. troscheli* in the Krusadi area are surface and mid water feeders. In the present study it is found that the fry are purely surface feeders, but there is a difference in the species composition of the gut contents probably due to availability in the region.

The observations on the fry and fingerlings of *M. troscheli* are in broad agreement with those of Luther (1962) in his studies on the fry and fingerlings of *L. macrolepis*. But he noted that the early juveniles feed at the surface only till the 16 mm length stage, after which they gradually changed over to the bottom feeding habit. In the Kayamkulam Lake with the bar mouth open for over 8 months each year, the shallow warm waters supporting a rich and varied plankton and with an abundance of floating masses of decaying organic matter—ilitrophic layer (Sarojini, 1954)—there is plenty of readily available food for the fingerlings. They are found to change to the semidemersal habit at about the 5 cm length stage.

The huge shoals of these fingerlings locally called 'Thuli' can be easily sighted as dark shimmering patches on the lake's surface and form a subsidiary catch in the small meshed seine nets during the season.

[4]

The sand grains make their appearance in the stomach content of *L. macrolepis* as early as the 17 mm stage, but in *M. troscheli* only at the 5 cm stage. This seems to indicate a prolongation of the surface feeding stage in *M. troscheli* and also accounts for the sudden disappearance of the 'Thuli' shoals at this stage.

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