

It appears probable that he has included the false rings also in his counts, which could be distinguished from the true rings by the characteristics given by Walford and Mosher (1943) for the Californian sardine, *Sardinops caerulea*. The conclusions of these authors, therefore, are so widely different that the span of life of the oil sardine, which ranks as the best known commercial fish of this country has been in doubt.

In view of the prevailing contradictory opinions on the age of the oil sardine, as judged by the study of the scales, special attention was given to the study of otoliths and scales, particularly to the former to determine their value in age determination. Contrary to the statement made by Hornell and Nayudu that "no definite lines of growth can be made out even when the otoliths are ground to thin flakes," the presence of distinct periodical growth rings has now been detected on the otoliths of the oil sardine. These rings can be made out faintly even in wet otoliths immediately after removal from the fish, but they become more pronounced after treatment in the following manner. They are subjected to upgrading in different strengths of alcohol, drying, treating with xylol and mounting in canada balsam on slides, provided with a circular piece of bristol board having two punched circular holes, in each of which an otolith is placed. It may be mentioned here that when the otoliths are in alcohol and xylol, the white opacity of the growth zones and the translucency of the growth rings respectively become more pronounced. The degree of opacity of the growth zones can be easily controlled by varying the period for which the otoliths remain in alcohol. Such preparations, when viewed under the low power of the binocular microscope with reflected light, show the growth rings as translucent dark zones concentric with the margin of the otolith, while the intervening growth zones appear opaque white. The photomicrographs of otoliths reproduced here are taken with reflected light and show clearly the first, the second and the third growth rings. Sometimes false rings also appear, but these could be easily distinguished by their line-like appearance and tendency to join a growth ring. Occasionally otoliths fail to show the growth rings for reasons not at present known. In the majority of the otolith preparations only the first and the second growth rings are seen and in a few preparations the third ring is also seen at the posterior broad end of the otolith. My study of the otoliths of the oil sardine inclines me to the view that these rings are formed annually, probably during December to April when scarcity of planktonic food has been noted by Hornell and Nayudu, and that the average life of the fish is about three years. Judging from the size of the fish, the number of growth rings and the width of the last growth zone on the otoliths, it can be stated that the size at maturity, of 15 cm., is reached when the oil sardines are about two years old.

A detailed account of these investigations will be published elsewhere.

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ON THE OCCURRENCE OF THE 'MRIGAL'. *CIRRHINA MRIGALA* (HAMILTON) IN THE RIVER GODAVARI*

THE 'Mrigal', *Cirrhina mrigala* (Hamilton), is one of the major Indian carps that is extensively used for cultural purposes in central and northern India. According to Day¹ the 'Mrigal' is common in "Rivers and tanks in Bengal, Deccan, N.W. Province, Punjab, Sind, Cutch and Burma, growing to 3 feet in length. It is an excellent species for stocking tanks with".

When engaged on an investigational tour in Rajahmundry during December 1947, two fingerlings of *C. mrigala*,[†] each about 8 inches long, were collected from the river Godavari, at the Dhoulaiswaram anicut. Enquiries then made of the local fishermen indicated that the fish, which is locally called 'Yerramenu', is rather common in the river system. Since the occurrence of the 'Mrigal' in the Godavari was hitherto unknown, an attempt was made in February 1948, to check up the reported availability, and the Godavari system was surveyed from Rajahmundry to Kotipalli.[‡]

The fish was fairly common in the local fish markets, being caught from the river as well as the connected tank system, and was highly esteemed. Enquiries revealed that 'Yerramenu' (Red-skinned fish) has been available in the Godavari for the past several years, like *Catla* or *Labeo*. Local fishermen have seen specimens measuring 3 feet in length, but the largest specimen in the present collection is only 2 feet long. Fingerlings, 5 to 8 inches in length, were available in the Ramachandrapuram tanks and were transported to Madras for rearing. Large, oozing specimens were found commonly caught in the Rangoon nets and the large drag nets at Bobberlanka and Kotipalli, during July 1948.

The survey thus definitely confirms the reported occurrence of *C. mrigala* in the river Godavari. The facts that *C. mrigala*