

OCCURRENCE OF GROWTH RINGS  
ON THE OTOLITHS OF THE INDIAN  
WHITING, *SILLAGO SIHAMA*  
(FORSKÅL)

STUDIES on otoliths and scales for determining the age and rate of growth of Indian fishes have been reported only during comparatively recent years. It is well known that the otoliths and scales of several species of fishes in the temperate region possess distinct annular rings. This character has been extensively used in determining the year class composition of fish populations. The fishery worker in the tropical region is at a disadvantage as the otoliths and scales of most tropical fishes do not indicate such clear markings. There are, however, a few instances where growth rings on otoliths and scales have been observed in tropical fishes.<sup>1-4</sup>

During the course of investigations on the biology of the Indian whiting, *Sillago sihama* (Forsk.), very clear growth rings have been observed on the otoliths, and in most cases it is even possible to make out the complete rings with the naked eye. These otoliths, after cleaning, were evenly ground on carborundum with a drop of glycerine, dehydrated in various grades of alcohol, and finally cleared in xylol. The boundary lines between successive zones are well marked in many cases. The rings appear in dark translucent zones, concentric with the margin of the otolith, whereas the intervening zones appear white and opaque. False rings can be easily distinguished from the true rings by the characteristics given by Walford and Mosher<sup>5</sup> for the Californian sardine, *Sardinops caerulea*.

The whiting catches landed along the coast of Rameswaram Island comprise individuals ranging in size from 2-29 cm., the commercial size being 16-23 cm. Observations made during the last 7 months indicate that this species of fish attains sexual maturity at a length of 13-14 cm., when they are perhaps one-year-old.

Examination of this one-year-old fish shows a single ring on the otolith, while those of 16-20, 20-24 and 24-28 cm. size groups reveal distinctly two, three and four rings respectively. The photomicrographs of otoliths reproduced here

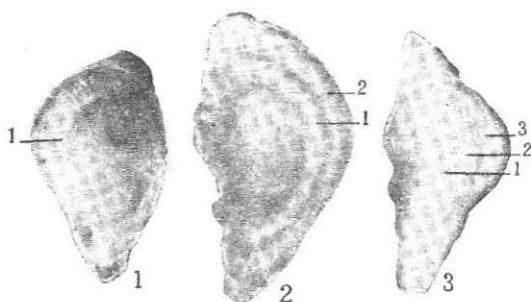


FIG. 1. Otolith of *Sillago sihama* (Forsk.) showing one growth ring. Body length of fish 14.2 cm., caught Oct. 10, 1953.

FIG. 2. Showing two growth rings. Body length of fish 19.5 cm., caught Oct. 28, 1953.

FIG. 3. Showing three growth rings. Body length of the fish 23.3 cm., caught Oct. 6, 1953.

were taken with reflected light and show clearly the first, the second and the third growth rings. There are instances where some of the otoliths failed to show distinct rings at all for reasons not yet clear or conclusive. In most of the cases only the first and the second rings are seen and only in a few examples were the third and fourth rings clearly marked. In this connection the scales of the fish were also examined and some of them show the formation of clear annuli, particularly in the advanced size groups, while in the earlier stages these annuli are not clear.

The results obtained from the length frequency distribution were checked with the growth zones on the otoliths and scales. A well represented mode in the 14-15 cm. size group coincides with the series of specimens which denote one ring on the otolith. The other modes are not clearly marked although there are indications of modes which will be clarified with further data.

It is difficult to explain the exact significance of the formation of rings on the scales and otoliths, but a more critical study is being made particularly in relation to the feeding habits of the fish. It is probable that reduced feeding and the maturation of gonads occurring simultaneously may perhaps play a part in the formation of the growth checks found in the otoliths and scales. Details of the work will be published elsewhere.

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