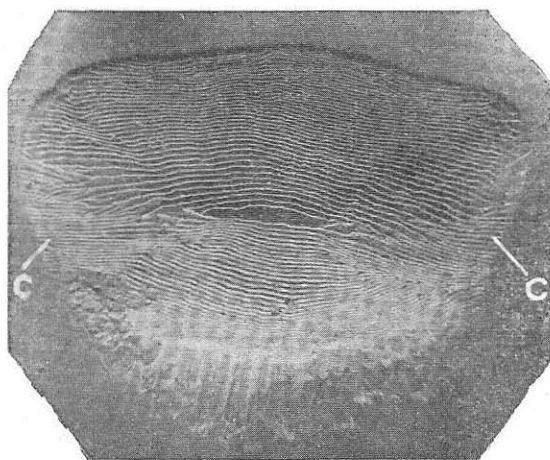


## OCCURRENCE OF GROWTH CHECKS IN THE SCALES OF THE INDIAN MACKEREL, *RASTRELLIGER CANAGURTA* (CUVIER)\*

AGE and growth studies form an essential part of fishery biological research. Owing to the well-known limitations of the length-frequency method in these studies the need has been frequently felt for other suitable methods. While in the temperate countries scales, otoliths and other bony structures have proved to be useful tools in such work, these structures have not been so readily useful in the tropical countries. But the possibility of the scales or otoliths being useful age-indicators in some species even in tropical waters has been demonstrated by some recent investigations.<sup>1-9</sup>

The great importance of searching for suitable age and growth indicators in the mackerel was stressed by the *Rastrelliger* Sub-Committee of the Indo-Pacific Fisheries Council at its Penang session in September 1956, in connection with the large-scale researches planned by most of the Indo-Pacific countries on this very important commercial fish of the region. It was therefore considered useful in this connection to examine the scales of the Indian mackerel (*Rastrelliger canagurta*) and a preliminary investigation on this aspect was taken up by the author in Karwar during the period October-December 1957. While this investigation is now being extended and more material from different parts of the Indian coast is still under examination, it is interesting to report here that the material collected from the Kanara coast during the above period has

revealed clear growth checks or rings in the scales of the largest sizes, in the form of breaks in the sculpturing of the scales parallel to and near the margins. In practically all cases† there was only one ring in the scale; in some the upper sculptured layer stopped short of the lower unsculptured layer, the edge of the former marking the ring; but in a large majority of individuals there was a well-marked upper



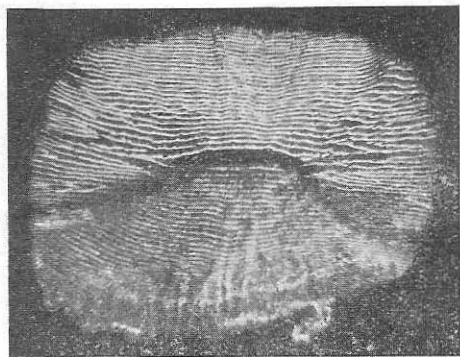
PHOTOMICROGRAPH I. A scale of *Rastrelliger canagurta*. (Female. 24.6 cm. dated 20-11-1957),  $\times 14.5$ . Mark C indicates the growth check.

Months	Sizes (Total length in cm.)	Males		Females		Sex not known		Total	
		Nr. examined	Nr. with clear rings	Nr. examined	Nr. with clear rings	Nr. examined	Nr. with clear rings	Nr. examined	Nr. with clear rings
October	22.0 and below	8	0	9	0	11	0	28	0
	22.1 to 23.0	0	..	1	0	0	..	1	0
	23.1 to 27.0	11	11	15	15	0	..	26	26
	Total ..	19	11	25	15	11	0	55	26
November	22.0 and below	84	0	82	0	8	0	174	0
	22.1 to 23.0	4	1	5	1	2	0	11	2
	23.1 to 27.0	40	40	44	44	0	..	84	84
	Total ..	128	41	131	45	10	0	269	86
December	22.0 and below	16	0	10	0	7	0	33	0
	22.1 to 23.0	0	..	0	..	0	..	0	..
	23.1 to 27.0	4	4	8	8	0	..	12	12
	Total ..	20	4	18	8	7	0	45	12

(sculptured) layer also outside the ring, often with a change of pattern.

The accompanying photomicrographs show scales of the Indian mackerel with and without the growth checks.

Three hundred and sixty-nine individuals were examined in all from the North Kanara coast during the above period and the table shows the distribution of the scale rings in the different size-groups examined. It will be noted that rings were completely absent in all individuals below 22.0 cm. in all the three months while all individuals above 23.0 cm. showed clear rings. In the size-groups 22.1-23.0 cm., twelve specimens were examined; only two of these had clear rings in the scales. What may be described as false rings were occasionally noticed in all sizes but could be



PHOTOMICROGRAPH 2. A scale of *Kastrelliger canagurta* (Male, 20.7 cm. dated 20-11-1957).  $\times 14.5$ . easily distinguished from the usual rings, the number of scales difficult to interpret being small. One is confronted here with a case of regular ring formation only in the larger sizes, the smaller sizes not showing rings although both groups have clearly passed through at least one monsoon. The rings are thus not comparable to the monsoon rings of *Cynoglossus semifasciatus*.<sup>2-4</sup>

Practically all the individuals with clear rings in the scales in the present work were adults in Stage I (or near Stage I) of maturity resting or recovering after a spawning. According to Pradhan<sup>10</sup> and the observations of other workers on the North Kanara coast (unpublished work at the Karwar Unit of the Central Marine Fisheries Research Station), the spawning season for the mackerel of that coast is generally from June to September; Pradhan<sup>10</sup> also states that the size of the mackerel at first maturity is 22.4 cm. Considering the above distribution of the scale rings in the different sizes in the light of these facts it seems very likely that the rings reported here are spawning marks occurring as a rule in the older individuals and may prove useful not only in age and maturity studies but also in raciation studies in view of the reported variation in the size-distribution and spawning period of the species in different parts of Indian coast.

Central Marine Fisheries                      G. SESHAPPA.  
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\* Three specimens measuring 25.0, 25.4 and 25.7 cm. had two rings in the scales near the margins in December but such cases are still to be studied in detail and are not classified here separately.

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