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The age determination of the mackerel (Scomber scomber L.) from the otoliths by means of top and sub stage illumination.

by

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A review of the attempts to determine the age and growth of the mackerel (Scomber scomber L.) has been made by Steven (1952). Because mackerel scales are easily rubbed off the fish, if they are to be used reliably for age determination the mackerel must be caught individually by hook and line and each kept in a separate container. Steven (1952) read the scales and otoliths from each of 1,343 fish caught in this way, and in only 1.1% did the readings differ. Because of this satisfactory agreement between scale and otolith readings he discontinued age determination from the scales and used only the otoliths. He states that: "Otoliths from a total of 8,422 fish obtained over the years 1936-1940 and 1948 have been examined. Of these, readings have been possible from 6,261 fish, and 2,161 (25.7%), mainly from individuals over six years of age, have been unreadable." His readings were of the zones and rings "obtained at the blunt posterior end of the otolith".

The purpose of this paper is to give an account of a method which has been developed whereby, with suitable lighting, it is possible to determine the age of mackerel by direct reading up to the age of 10 and over, using the pointed anterior end of the otoliths.

The pairs of otoliths are removed from the fish, cleaned, and mounted in "Auto-plax" polyester resin number 101, within celluloid rings of 5/16 in. internal diameter and 1/32 in. thickness which are then covered with a 3/8 in. diameter cover slip.

The apparatus - a lamp, a $3\frac{1}{2}$ in. x $2\frac{1}{2}$ in. prism mounted on a rotatable arm held in a pipette stand and a Watson "Bactil" binocular microscope - is then set up as shown in Figures 1a and b. The light is focussed to a spot and passed through the prism which is rotated until the light falls via a plano-convex lens on the centre of the slide to be examined, set in plasticene on the stage, Figure 1a. Under this form of top stage illumination the opaque zones in the otolith appear white and the rings dark. By rotating the prism in a clockwise direction, the beam of light is passed to the mirror of the microscope, and is reflected to the underside of the slide, thus giving sub-stage illumination,

Figure 1b. The opaque zones in the otolith now appear as dense brown areas. Views of top and sub-stage illumination of the same otolith from a ~~seven~~ 10-year-old fish are given in Figures 2 and 3, and from a ~~ten~~ 7-year-old fish in Figures 4 and 5. On switching by means of rotating the prism from top to sub-stage illumination, secondary markings usually disappear and only the opaque zones are seen. This is shown in Figures 6 and 7 which are of a pair of otoliths taken from a three-year-old fish.

Age determination by these means has been carried out on drift-caught mackerel landed at Newlyn for the years 1960-1963. The number of otoliths which could not be read for reasons of damage, deformity or difficulty amounted to 278 out of 4,152 or 6.7%. The resultant lengths for age and the percentage age composition for each year are given in Table 1.

Reference

Steven, G. A. 1952 Jour. Mar. Biol. Assn. XXX, pp.549-568.

Length (cm) for age, and percentage age composition (underlined) of drift-caught mackerel

Year	Age as summer zones	2	3	4	5	6	7	8	9	10+	No. unread-able	Total
1960	length cm	31.8	32.9	33.7	34.1	35.7	36.0	36.9	37.1	38.1	96	818
	%	1.2	9.3	15.3	40.6	7.6	6.0	5.4	1.3	1.6	11.73	
1961	length cm	31.6	32.2	33.8	35.1	35.1	36.4	36.9	37.8	38.4	49	1,040
	%	2.6	12.0	9.7	16.2	29.7	10.4	6.7	3.1	4.8	4.71	
1962	length cm	31.6	32.7	33.5	34.6	35.5	36.6	36.9	37.3	39.3	66	1,538
	%	11.37	27.3	21.3	10.7	6.9	12.8	2.6	1.6	0.9	4.29	
1963	length cm	31.8	33.1	33.9	34.4	35.6	36.[illegible]	37.0	38.3	38.7	67	756
	%	2.8	24.3	27.2	16.1	6.5	7.0	5.4	2.4	2.0	8.9	

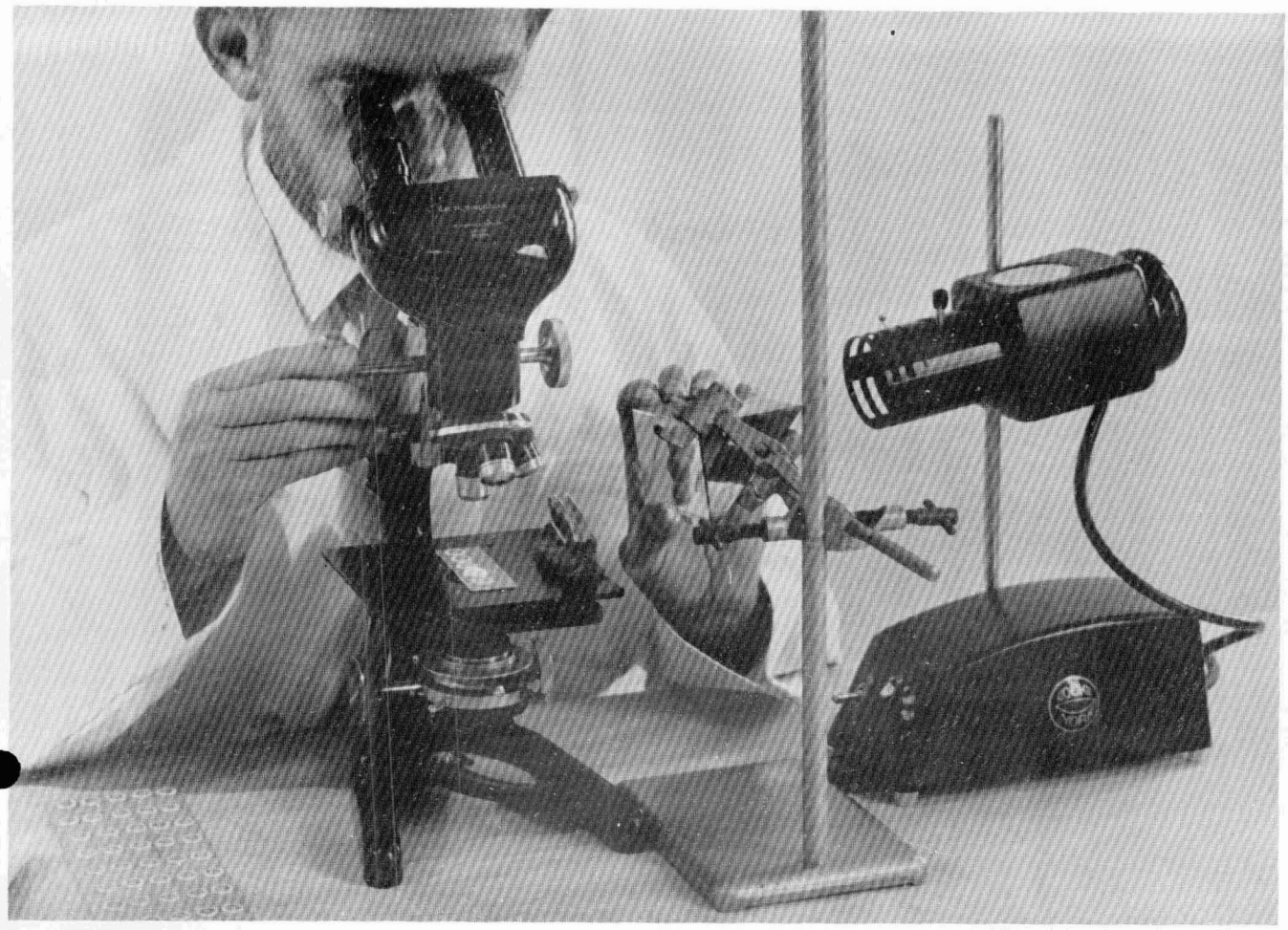

Fig. 1a

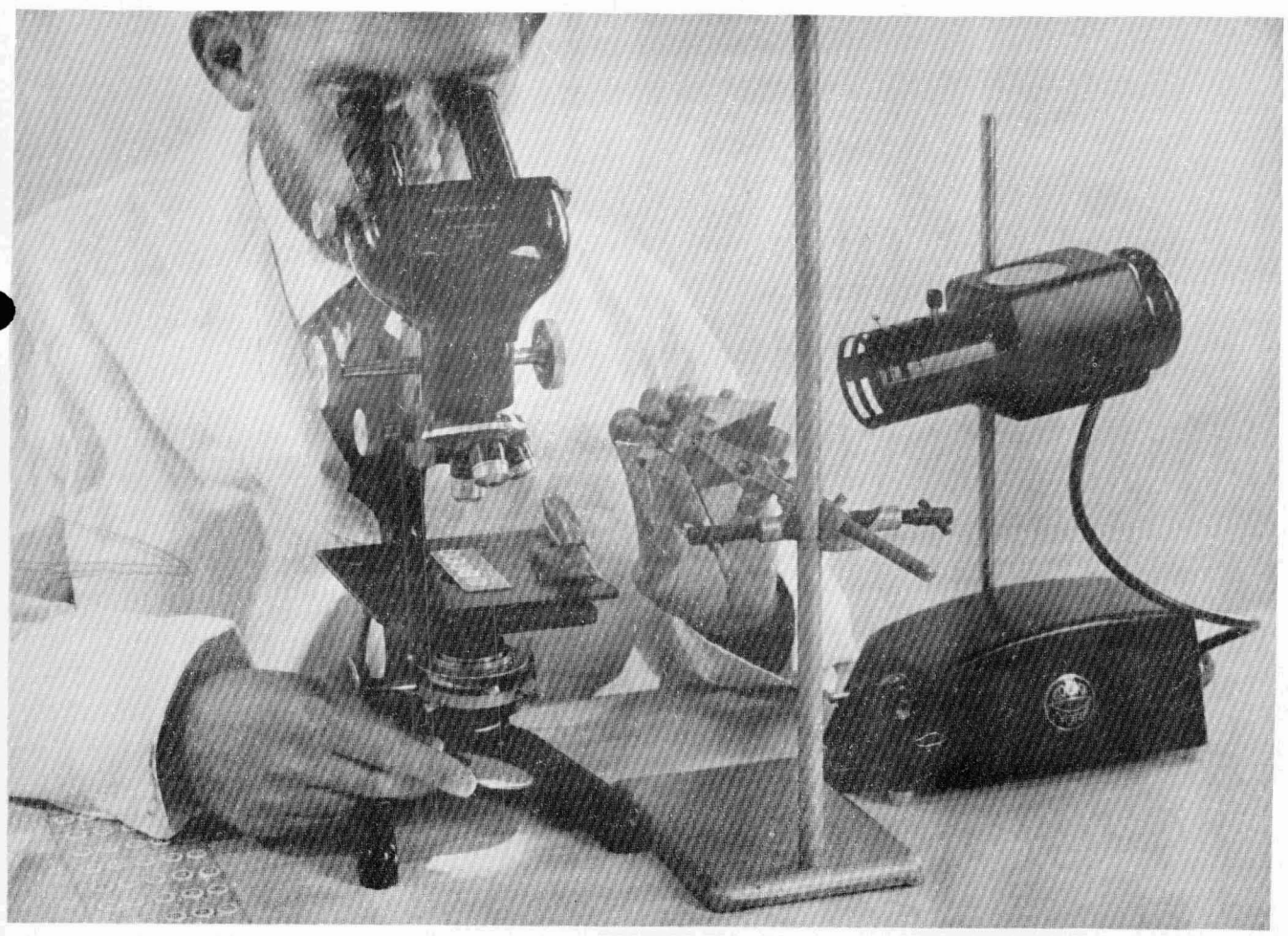

Fig 1b

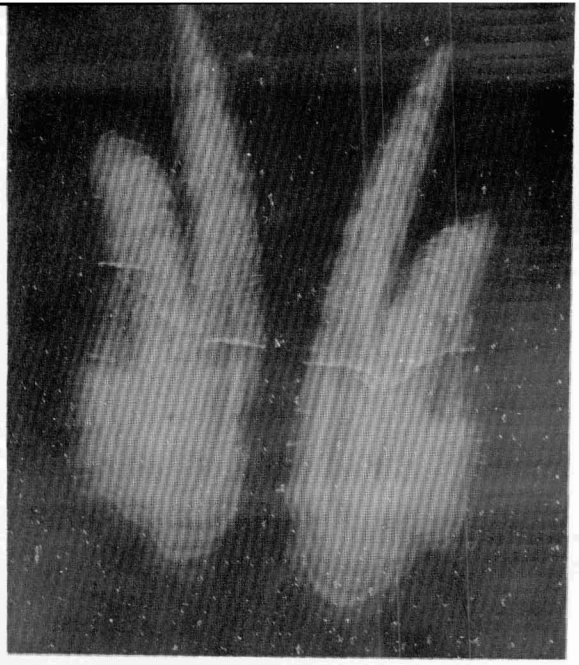

Fig 2

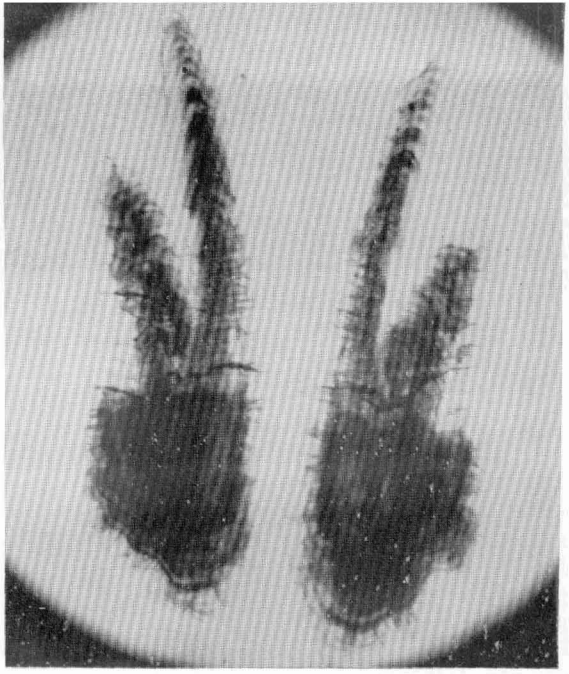

Fig 3

16 ~~8~~ years old

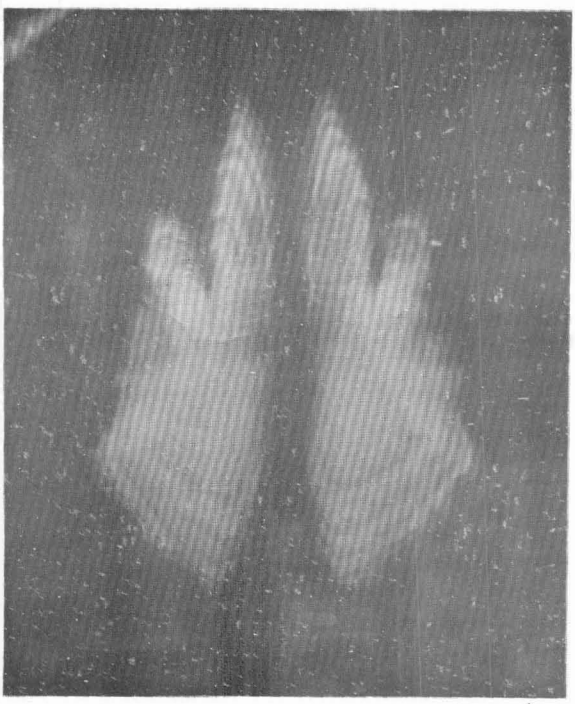

Fig 4

Fig 5

7 ~~10~~ years old

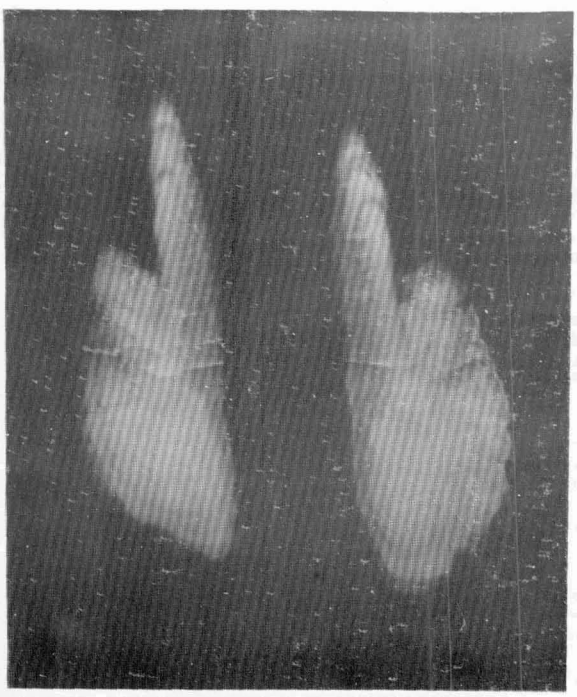

Fig 6

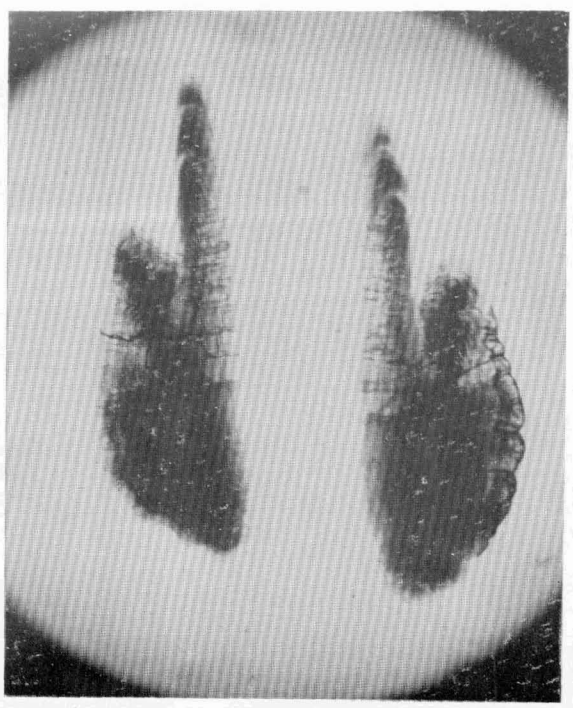

Fig 7

3 years old

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