# A METHOD FOR THE AGE DETERMINATION OF TWO MEDITERRANEAN SCIAENIDS, *SCIAENA UMBRA* (LINNAEUS, 1758) AND *UMBRINA CIRROSA* (LINNAEUS, 1758).

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**Abstract**

A method for the age determination of two Mediterranean sciaenids *S. umbra* and *U. cirrosa* by means of stained thin sections of the otoliths is described. The staining enhances the contrast between opaque (fast growth) and hyaline (slow growth) zones in the otolith sections. *S. umbra* up to 19 years of age are easily aged.

*Key-words: Growth, Teleostei, Adriatic Sea*

The family Sciaenidae is present with three genera, *Argyrosomus*, *Sciaena* and *Umbrina*, and five species in the Mediterranean Sea (1). *Sciaena umbra* and *Umbrina cirrosa* are rather common fishes along the coast of the Mediterranean sea: they generally inhabit inshore waters on rocky and sandy bottoms at depths ranging from the shoreline to about 100 m (1; 2, 3). They are locally important commercial fishes, in particular for small scale artisanal fisheries (4).

Age of fishes can be determined from different hard structures such as scales, vertebrae and otoliths. By far the otoliths (sagittae) are the most common and widespread hard structure used. Various otolith preparation techniques are available and their applicability depend on the specific characteristics of fish otolith. The large size and thickness of the otoliths in sciaenids make them difficult to age just by inspecting the whole otolith under reflected or transmitted light. The dense calcium carbonate deposition reduces light transmission, making very difficult to distinguish hyaline and opaque zones (5). Because it was impossible to examine the whole otolith also in Mediterranean sciaenids, different otolith preparation techniques (grinding, polishing, sectioning and staining) were tried in order to find the best method for age determination.

The specimens of *S. umbra* and *U. cirrosa* used for this study come all from the Central Adriatic and have been collected at IRPEM (Istituto di Ricerche sulla Pesca Marittima) during various scientific activities at sea such as artificial reef studies, inshore trawling studies and from landings of the commercial fishing fleet at the port of Ancona. Otoliths were removed, cleaned and stored dry. As preliminary trials of grinding and polishing the internal side of the otolith were unsuccessful, it was decided to prepare otolith sections. The right otolith was embedded in epoxy resin (6) using semi-rigid plastic moulds sprayed lightly with a silicone spray to facilitate subsequent extraction (7). The resin block was examined with a dissecting microscope at low magnification and the central area of the otolith containing the core was marked on the resin. This was done to achieve a careful positioning on the saw of the resin block for the cut. Transverse sections 0.7-0.8 mm thick were obtained by means of a low speed saw (Remet Micromet) equipped with two diamond blades separated by a metallic spacer. Otolith sections were then stained for about 20 minutes with the histological stain Neutral Red Solution (Sigma) which was prepared adding 1% of Sodium Chloride and acidified with 0.5% of acetic acid (R. Millner, pers. com.). Stained sections were rinsed in tap water, dried and then observed with a dissecting microscope at low magnification under reflected light. An alternating pattern of white and dark zones appears both in *S. umbra* (Fig. 1) and in *U. cirrosa* (Fig. 2). The dark zones corresponds to translucent zones in not stained sections and can therefore be considered as winter (slow growth) zones. Validation of annual deposition of the dark zone has been obtained for *S. umbra* in the Adriatic (Arneri, in preparation) and can be reasonably assumed for *U. cirrosa*. As these two sciaenids reproduce in spring and summer in Mediterranean (8) and the dark zone is laid down in winter thus one white and one dark zone can be considered as an annulus and age determined consequently by counting the number of dark zones on the section.

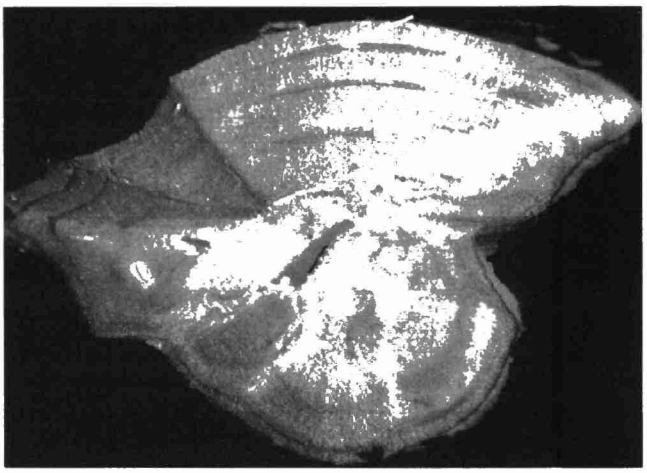

Fig 2 - Stained thin section of otolith of Umbrina cirrosa (total length 67 cm , weight 3200 g) aged 3 years old: arrows indicate winter zones (magnification 13x).

In Figs. 1 and 2 otolith sections of three years old *S. umbra* and *U. cirrosa* are shown. The otoliths of Sciaenids present an inner surface smooth and convex (top in Figs. 1 and 2) and an outer surface covered with large granules (9) which tend to cluster together with growth. False rings are seldom observed in both species and only in the first two years of life. In older individuals annuli are easy to detect toward the inner surface of the otolith (top of sections in Figs. 1, 2 and 3). The huge difference in size of the individuals certainly reflect a

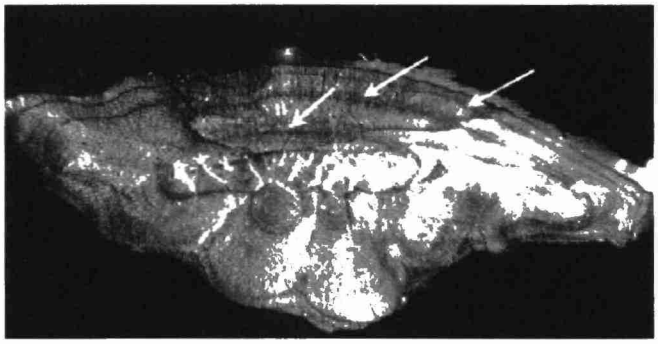

Fig 1.- Stained thin section of otolith of Sciaena umbra (total length 36.5 cm , weight 818 g) aged 3 years old: arrows indicate winter zones (magnification 13x).

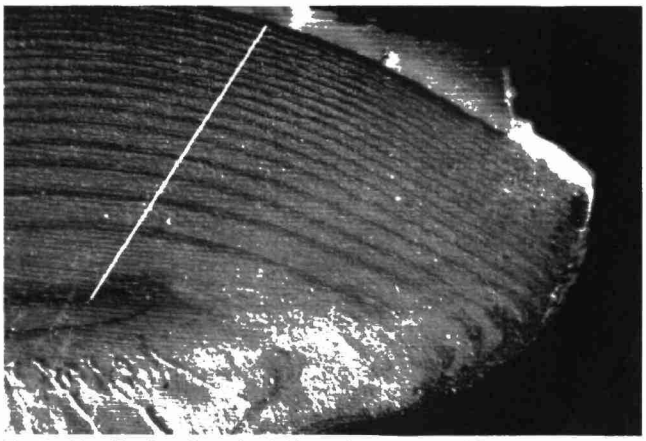

Fig. 3 - Magnification of a stained thin section of otolith of Sciaena umbra (total length 46.5 cm , weight 1612 g) aged 19 years old (magnification 20x). The white line shows the profile along which the light luminance has been measured by Image Video Analysis.