ULTRA STRUCTURE OF THE OTOLITHS FROM *PAGELLUS ACARNE* (RISSO)

by

Beatriz MORALES NIN
Instituto de Investigaciones pesqueras
P° Nacional s/n - Barcelona - Spain

Most of our present knowledge about the structure of otoliths is based on histological studies. The techniques generally employed are light microscopy, which requires the previous decalcification of the sample surface are used.

However, the recent application of the scanning electron microscopy technique to otolith research, a technique wich allows direct observation of the surfaces under study, opens a wide field of possibilities for elucidating the fine structure of the Teleost otolith.

The present work is concerned with the determination, by scanning microscopy, of the sparid *Pagellus acarne* otolith microarquitechture.

Methods and materials.

The otoliths we have studied are the sagittae because they are largest ones and very easy to handle. After extraction the sagittae are cleaned and kept dried in absorbent paper envelopes.

The sagittae are mounted by embedding them in the plastic resin Epon 812, using metallic moulds covered with a thin layer of parafine.

The mounted otoliths are grinded and polished to the vertical mid sagittal plane with a graded series of silicon carbide. The polished surface is etched with 0,1 normal HCL before being rotary coated in a vacuum evaporator with several Amstrongs of carbon followed of gold.

The electron microscope used in this study is a Stereoscan 160, Cambridge scientific Instruments.

Results.

Our study on *Pagellus acarne* otoliths shows that these sensory organs are formed by :

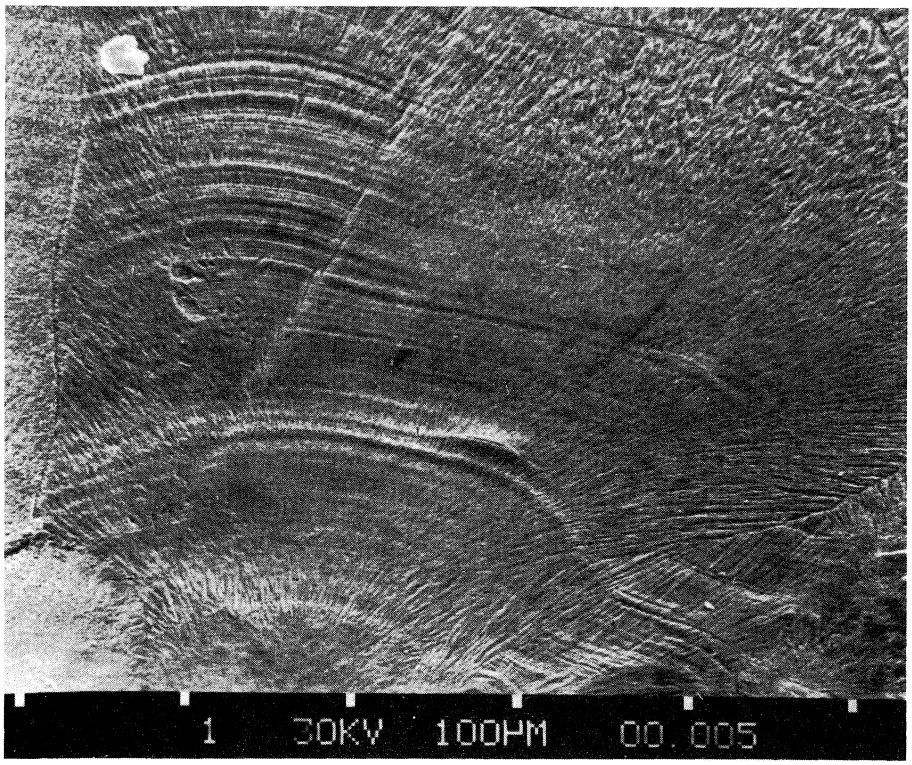

Fig. 1. — Structure of the otolith. Concentrix and radial proteic fibres.

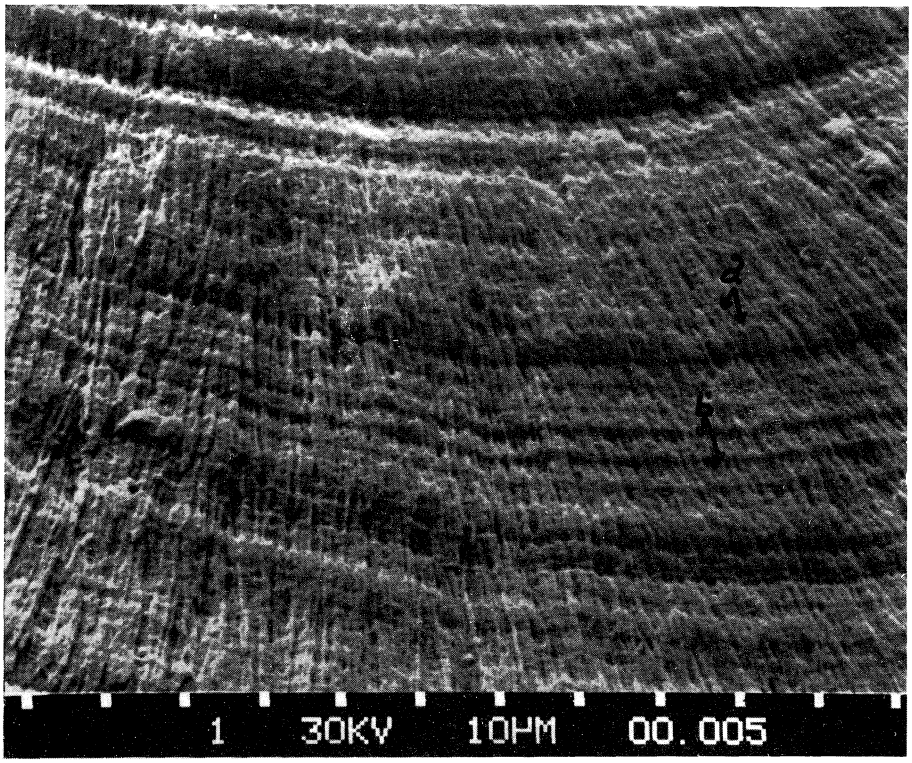

Fig. 2. — Proteic matrix of the otolith. a : radial fibers, b : concentrix fibers.

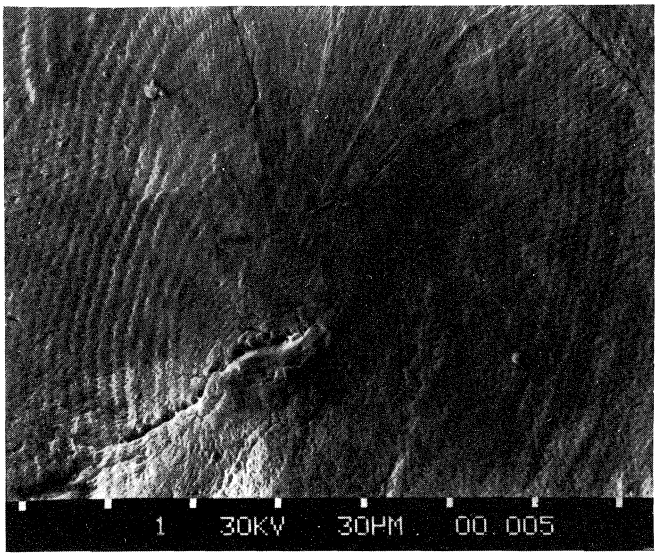

Fig. 3. — Nucleus of the otolith.

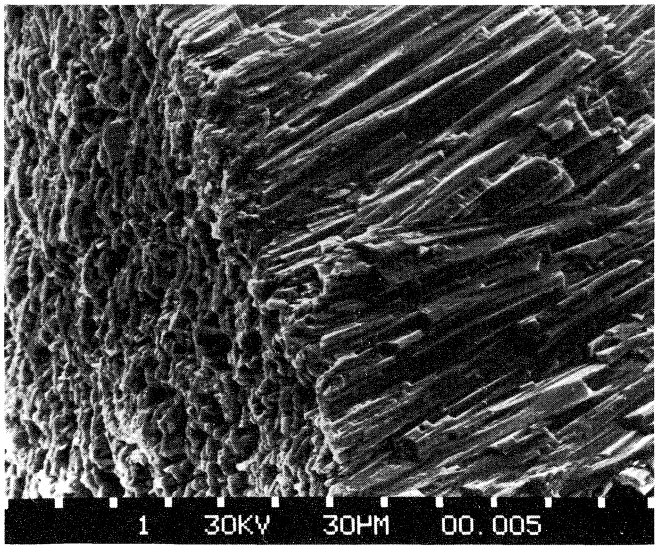

Fig. 4. — Aragonite crystals.

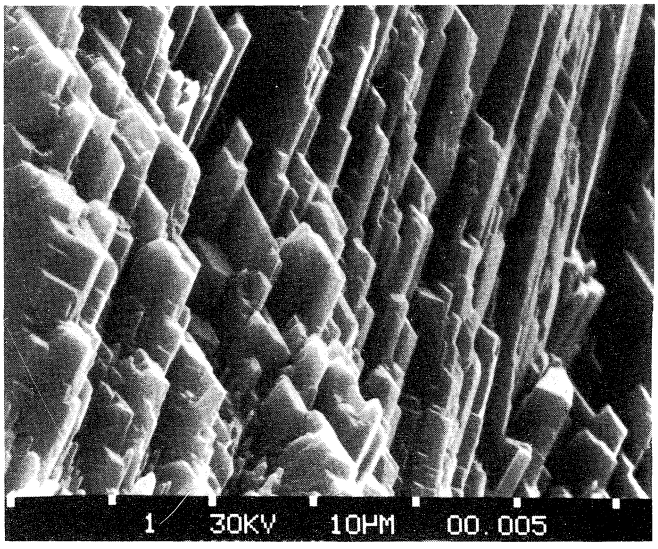

Fig. 5. —An electron micrograph showing the edge of a transverse section of the otolith. Left side external surface, right side a section of the sagitta showing the aragonite crystals.

I-A fibrous protein organized in a matrix form. This structure can be seen in fig. 1, 2 and 3 at different magnifications. This matrix is composed of radial fibres, oriented from the center to the edge of the otolith (fig. 2 a) and slightly thicker concentric fibres surrounding the nucleus (fig. 2 b, 3).

The otolith nucleus shows an homogeneus central zone (fig. 3) which corresponds to larval period, surrounded by a very regular pattern of proteic fibres. This structure appeared in the otoliths after completion of yolk-sac absorption.

The space betbeen the proteic bands, during the slow-growing period is about 1,5 µ and the same is 2µ during the fast-growning period.

This differences of proteic concentric fibers caused the formation of seasonal annuli in the otolith.

The proportion of proteic fibres is bigger in the slow-growing period. This chemistry differentiation produced the hialine aspect of this annuli.

II-Calcic carbonate,which crystallizes in ortorrombic rod like prisms of a laminar nature (fig.4). The intergrowth of aragonite crystals give rise to a zig-zag pattern, which allows a greather cohesion in the crystalline structure of the otolith (fig. 5). These crystals, which can reach a size of several and include hundreds of growing units, are not physically stopped in their growth by the proteic bands.

The external structure of the otolith has a reticular appearance with small alveoli (fig. 5).

LITERATURE CITED

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