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A new technique of sawing otoliths

by

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When using otoliths for ageing fishes, the otoliths have to show clear ring formations first before an interpretation of rings and determination of age is possible.

Depending on the size, thickness and transparency, the structure of otoliths is either immediately visible or has to be made visibly. Different techniques as immersing in liquids, burning, breaking, and grinding as well as cutting have been developed in order to make the ring formations visible. (HOLDEN and RAITT,1974)

A lot of otoliths as e.g. eel or redfish however give no satisfactory results by using one of the above mentioned methods. Eel otoliths as demonstrated during an age reading symposium in Holland by Deelder and Utrecht (1972) are easily to read if very thin polished slices are being prepared.

According to Kosswig (1971) thin slices of red fish otoliths allow in connection with the polarized optical method an age determination like in cod (Schmidt 1924). As the way of preparing such slices however was too much time consuming until now, this method has shown to be not suitable for a routine age determination.

Since few months a new technique of sawing otoliths has been developed providing thin slices of 0.1 mm thickness in an easy way.

The cutting mashine

Two sawing blades (corund) of about 0.4 mm thickness and of 7.0 cm diameter are fixed onto the axis of a high speed electrical motor (5000 rpm). The distance of the two sawing blades can be altered according to the need by inserting small plastic discs of various thickness in between. The thickness of the slices vary accordingly. A sufficent flow of water through a thick injection needle is necessary for wetting the sawing blades and the object to be cut.

Since otoliths of small or larger size, of irregular and bent shape are not easy to hold firmly in a claw when sawing, the otoliths are embedded in polyester resin. Embedding of otoliths in polyester resin is also necessary in order to prevent small pieces from breaking off the otoliths during the process of sawing.

Embedding of otoliths in polyester resin

A square mould or a piece of half splitted plastic hose can be used for embedding the otoliths. A thin layer of polyester resin is poored into the mould. After the resin has become nearly hardened the otoliths are being placed one by one in a row and later on covered by resin completely.

By using several mouldes an unlimited number of otoliths can be embedded a day before the cutting takes place.

After the resin has become dry and hardened the plastic sticks with the otoliths embedded in the center are easily to be removed from the mould. (The mould should consist of a material which allows the resin stick easily to be removed).

The cutting of the resin sticks.

The resin stick is placed on a table which is being moved foreward into the running saw by a screw thread. A sharp metal pointer fixed to the frame of the machine and adjusted before is a helpful means to cut exactly the center of the otolith. Since the resin sticks are completely transparent the center of the otoliths can be easily detected.

The sawing process takes only few seconds due to the high speed of the motor and results in a thin slice of 0.1 mm polyester resin with the section of the otolith in the center perfectly polished.

Mounting the slices on glass plates.

The thin slices are afterwards being mounted on a black ar transparent glass plate (12 x 9 cm) by polyester resin for reading the otoliths in transmitted or reflected light.

Another glass on top coveres the slices and allows a better reading without any light reflections. The labelling of the otolith section can be achieved by writing with a diamond pencil at the top glass plate. By mounting the slices on glass plates up to several hundreds of otoliths depending on species and size can be stored in an easy way without using envelops or plasticine anymore.

Otoliths of different species have been cut by this method as cod, haddock, whiting, plaice, witch, lemone sole, halibut, gray gurnad, redfish and salmon. In all cases the otolith slices were mounted on a glass plate and vieved against a black background, the ringformation of all the otoliths could clearly be seen.

Although for several species like North Sea gadoids or young flat fish etc the present methods in use are satisfactory in most cases, there are some species whose age determination could be improved by using thin slices. Several otoliths of species (tropical fishes), which have not been subject to biological studies so far, mainly due to problems in age readings will be tried out by using the new technique.

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