

**Age determination of Mediterranean Hake and Sardine :
Recommendations of an International Workshop (Palma de Mallorca,
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The age Reading Workshop on Mediterranean Hake (*Merluccius merluccius*) and sardine (*Sardina pilchardus*) was held at the Centro Oceanográfico de Baleares del Instituto Español de Oceanografía on April 1989, sponsored by F.A.O. and with the participation of scientists of nine countries corresponding to west and east Mediterranean areas (Oliver, P. et al., 1989). The techniques used in the various laboratories, the relevant information on the species life cycles and other aspects of age determination were discussed. Practical otolith interpretation exercises were held and the interpretation criteria discussed.

HAKE

The main problem found in hake age determination is the attribution of the 1st annual ring. The capture of big hakes up to 87 cm length by long-lines and cast nets on Catalonia and Gulf of Lion and by trawling in Adriatic Sea raised the question of hake growth rates. The following hake otolith interpretation criteria were recommended:

1-The nuclear otolith zone previous to the first annual ring may be characterized by 2-3 pelagic rings and a demersal ring. Sometimes fishes born in summer might not laid down these false rings in their otoliths. The 1st annual ring might correspond to the hyaline ring laid down after the demersal ring when it corresponds to a fish of 12cm or more. this interpretation has to be supported by the length frequency distributions of the recruited fish and the spawning periods.

2-Annual rings are laid down at regularly decreasing intervals, generally annual rings are laid down in fishes over 35 cm length, while annual opaque zones and hyaline rings are laid down in younger fishes.

3-True winter annuli are identified by their good definition around the otolith. The winter ring could consist of a single hyaline band or a series of 2-3 clustered ones. In the last case measurements should be taken to the outermost ring in the series.

4-Hyaline rings are enumerated for age determination and are considered completely formed when the next opaque ring formation starts.

5-Taking 1st January as arbitrary birth date and winter as the period of hyaline ring formation, otoliths of fish caught between 1st July and 31st December with an hyaline ring in the edge are assigned to an age group by counting all the hyaline annulus except the last one. If the fishes are caught after 1st January all the hyaline annulus are counted.

SARDINE

The species behaviour and long spawning period and the fisheries characteristics highly conditioned the sardine available material. The sardine interpretation criteria were defined as follows:

1-The birth date is 1st January.

2-Each year an opaque and a hyaline ring are formed.

3-Annual growth rings are laid down at regularly decreasing intervals as the fish becomes older.

4-Otoliths with opaque edge during the first semester or hyaline edge during the second semester, are considered to belong to the previous age group.

RECOMMENDATIONS

From the above mentioned discussions and otolith readings the following recommendations were elaborated:

Mediterranean Hake

-The use of thin otolith cross-sections for age-reading of hake bigger than 20 cm in case than the annuli are not clear on whole otoliths.

-In order to make possible direct comparison between the studies conducted in various geographic zones the use of the standard terminology and notation for otolith interpretation of Jensen (1965) was recommended.

-To reduce the risk of errors of interpretations, the interpretation should be done independently following the same criteria by two persons trained in otolith reading, or more than once by the same reader with a time interval between readings. The coincident interpretations should be used for preparing the age-length keys.

-Due to the heterogeneity of data, and the necessity to clarify the 1st annual ring formation, regular sampling, determination of the annual cycle of reproduction and determination of the length distribution of the commercial catches are necessary. When possible, recruitment surveys should be held.

Mediterranean sardine

-Otolith lecture should be done unfixed without mounting the otoliths with Eukitt.

-Statistical procedures should be applied to study the errors on the estimations of growth parameters from the age-length key.

-Studies on daily growth ring in the otoliths could be implemented to verify growth during the first year of life.

-In order to determine the precise spawning season ichthyoplacton surveys should be held.

-An interchange program on otoliths should be started between different countries to discuss material facing another international meeting.

REFERENCES

- JENSEN, A.C., 1965. A standard terminology and notation for otolith readers. ICNAF Res. Bull., 2: 5-7.
OLIVER, P., ALVAREZ, F. and MORALES-NIN, B., 1989. Report of the age-reading workshop on mediterranean hake and sardine. Palma de Mallorca, España, 10-15 April 1989. Inst. Esp. Oceanogr. (mimeo): 102 pp.