

DAILY GROWTH INCREMENTS IN THE OTOLITHS OF *Dicentrarchus labrax*

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Abstract

Formation and periodicity of the daily growth rings in the otoliths of *Dicentrarchus labrax* were determined using larvae and juveniles born and reared in laboratory.

Growth rings began to be formed at 2 days of age and were laid down daily almost until 100 days of age.

The discontinuous layer of the daily growth ring was formed between 5-7 h A.M. (local time) during the scotophase.

Introduction

Fish otoliths grow by addition of layers of material differing in the relative amount of protein (otolin) and calcium carbonate in the aragonite form (DEGENS et al., 1969; PANNELLA, 1971). This results in growth units or increments composed of an incremental layer composed by aragonite and otolin and a discontinuous layer composed mainly by otolin, which appear as a dark band in the microscope.

The aim of the present paper is to demonstrate the presence of daily growth increments in the otoliths of *Dicentrarchus labrax* and to point out the exact hour when the different portions of each daily growth unit are formed.

Material and methods

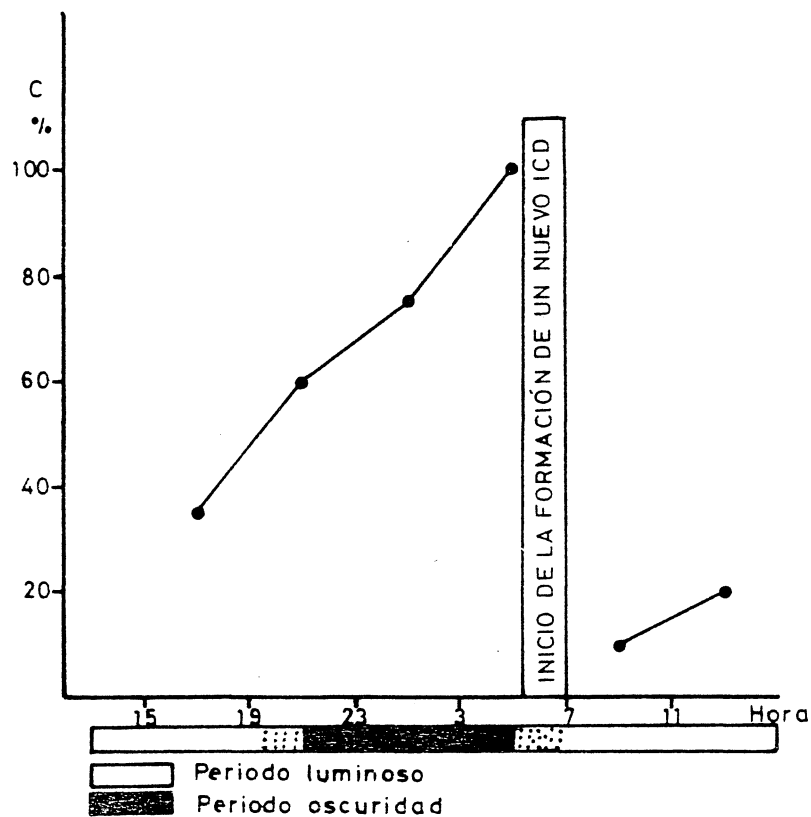
The formation of daily growth increments in the otoliths of sea bass were determined in fishes born in laboratory (Planta Acuicultura, Torre la Sal) and of well know age.

Otoliths were dissected from fishes and mounted in microscope sli-

des with Canada Balsam. When necessary otoliths were ground and polished.

Growth rings were counted with the aid of a microscope using magnifications ranged from 400 to 1000X. Each sagitta was counted 3 times and verification counts were also made at later time.

Fig.1- Index of completion for current increment (C) in the edge of the otolith.



Time of the formation of the continuous and discontinuous layers of each daily growth increment was determined in otoliths of sea bass 2 months old. After 48 h. starvation period, juveniles were sacrificed each 4 h. during 24 h. period. The degree of formation of the continuous layer in the edge was determined by the index of completion for current increment (C) (TANAKA et al. 1981).

$C = W_n / W_{n-1} \times 100$ where W_n = width of current increment

W_{n-1} = width of the previous complete increment.

Results

Correlationship between age and number of increments in the otoliths was high ($r^2=0,995$). Regression line between this 2 variables followed the equation:

$Y = 0,999 X - 1,770$ where X = age in days

$Y = n^\circ$ daily growth increments

The Tanaka index (Fig.1) varied from 35% to 100% between 17 h. and 5 h. and from 10% to 20% between 09h. to 13 h. (local time). The discontinuous layer of the daily growth increment was formed during the scotophase from 04 to 09 h.

Temperatures registered at the time of sampling remained almost constant ($17^\circ 5' \pm 1'$) during the 24 h. period. Juveniles, wich were feed ad libitum, were starved for the 48 h. period previously to sacrifices. In these case, feeding frequency and temerature fluctuations could not affect the periodicity of the daily growt ring formation. The photoperiod seemed to be the determinant factor in determining the formation of the growth rings.

Bibliography

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