WKARA2 – Workshop on Age reading of European anchovy (*Engraulis encrasicolus*)
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Criteria for age determination of anchovy otoliths in Sub-division IXa North: analysis of the rings biometric measures.

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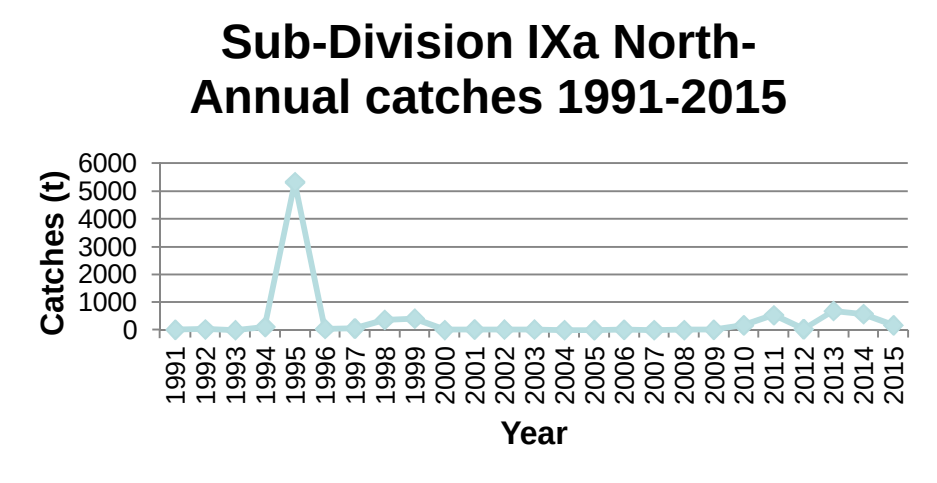
Backgraund

Occasional fishery with phenomena of sporadic and high increases in the availability of anchovy in the IXa-N region (area covering the coasts of western Galicia and northern Portugal).

The largest catches always in the summer months.

The catch of anchovy from the IEO annual acoustic survey (PELACUS, March-April) is very scarce.



Probably the increased availability of anchovy in the IXa-N region is due to an exceptional increase in local residual populations. But it could also be that the increase in the availability of anchovy in the IXa-N region is a consequence of the increase of banks coming from one of the established populations (Division IXa or SubArea VIII).

Still without confirming which of these hypotheses is the true one

Biological sampling and otoliths reading only in the years of higher catches.

Typical Length range: 11-17 cm; Age range: 1-3 years

Otoliths of this area have never been included in the exchanges or workshops

Objectives of this work

To study the growth pattern of the anchovy otoliths in the Sub-division IXa North:

1. Age was determined by identifying and measuring growth rings formed on the sagitta otoliths in Sub-division IXa North, in order to support the identification of the true annual rings: The otolith radius of the hyaline rings was measured and used as a gauge for exclude the presumed checks in ageing older individuals.

2. Also, the nature of the edge (hyaline or opaque) was also recorded.

Material and Methods

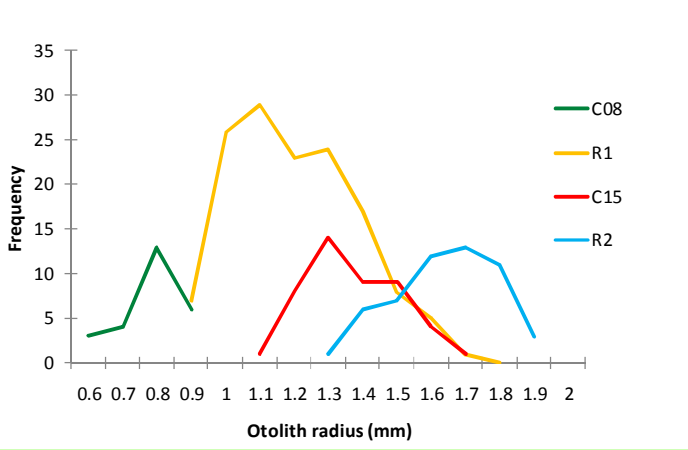
To attain the first objective, 141 whole otoliths from commercial sampling in 2016 were analysed under a reflected light, using a microscope applied to an image analyzer (NIS-Element). Macroscopically visible rings distances were measured (C08, C15, R1, R2) along the same axis used to estimate the age of the fish.

For the second objective, 1122 whole otoliths from commercial sampling in 2015 and 2016 were analysed. The nature of the edge (hyaline or opaque) was recorded.

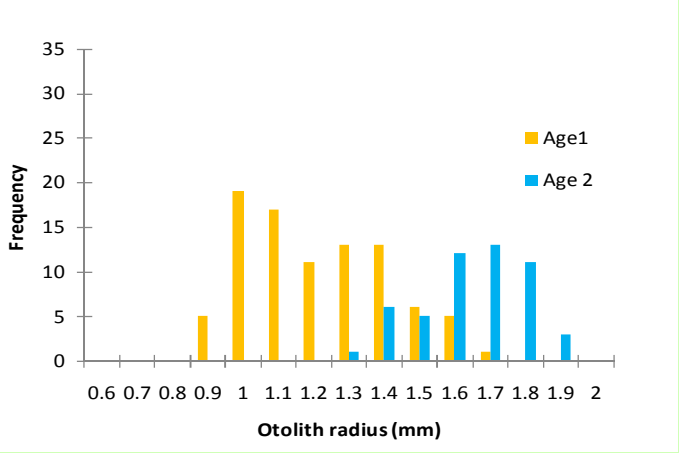
An expert reader determined the age of fish by counting the number of seasonal increments on an annual basis following the criteria of Uriarte et al. 2002, Uriarte et al., 2016 and WKARA, 2009.

Results

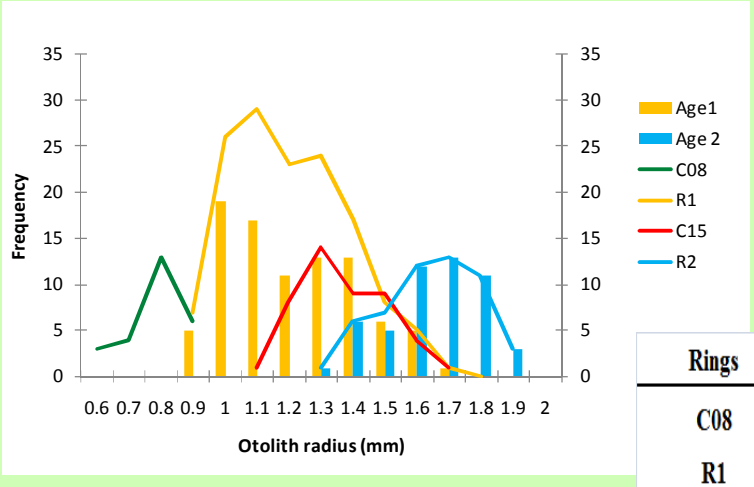
Rings biometric measures



Frequency distribution of rings distances C08, R1, C15, R2

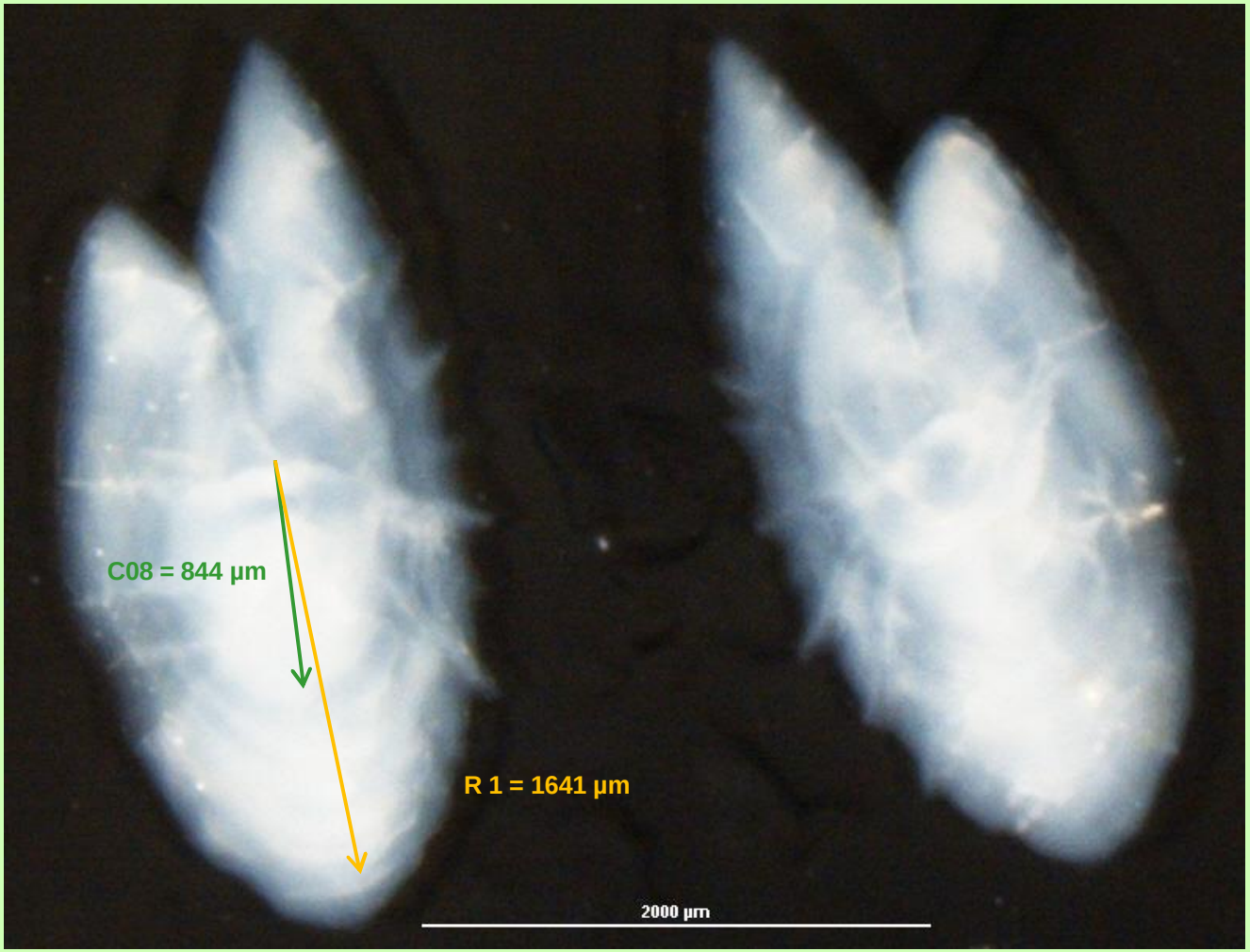


Frequency distribution of two annual age ring distances



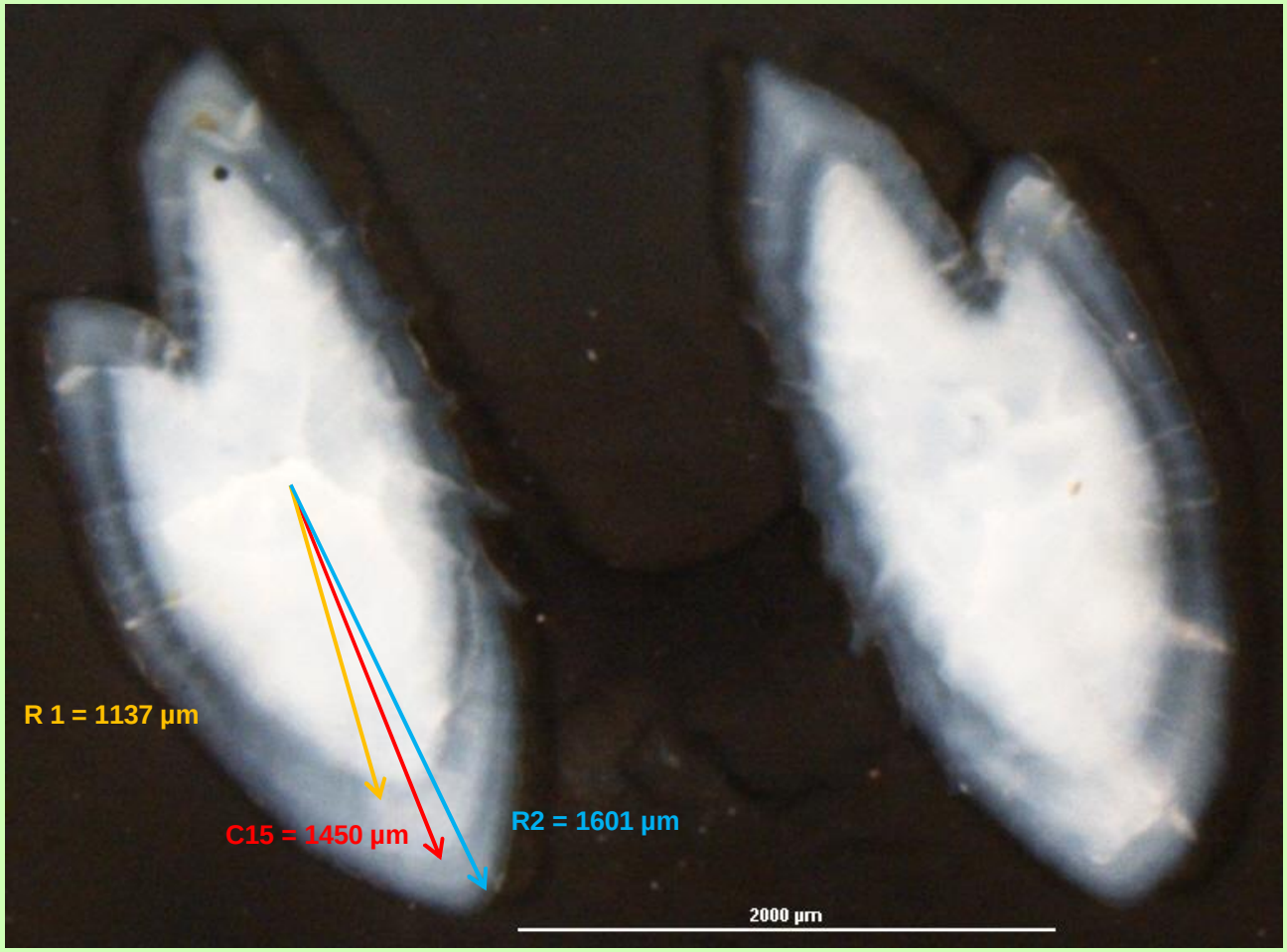
Rings	Average (µm)	s.d	Minimun (µm)	Maximun (µm)
C08	779	95	573	946
R1	1213	186	928	1715
C15	1370	136	1125	1671
R2	1643	147	1341	1908

Examples of measures: Age 1 with a check C08



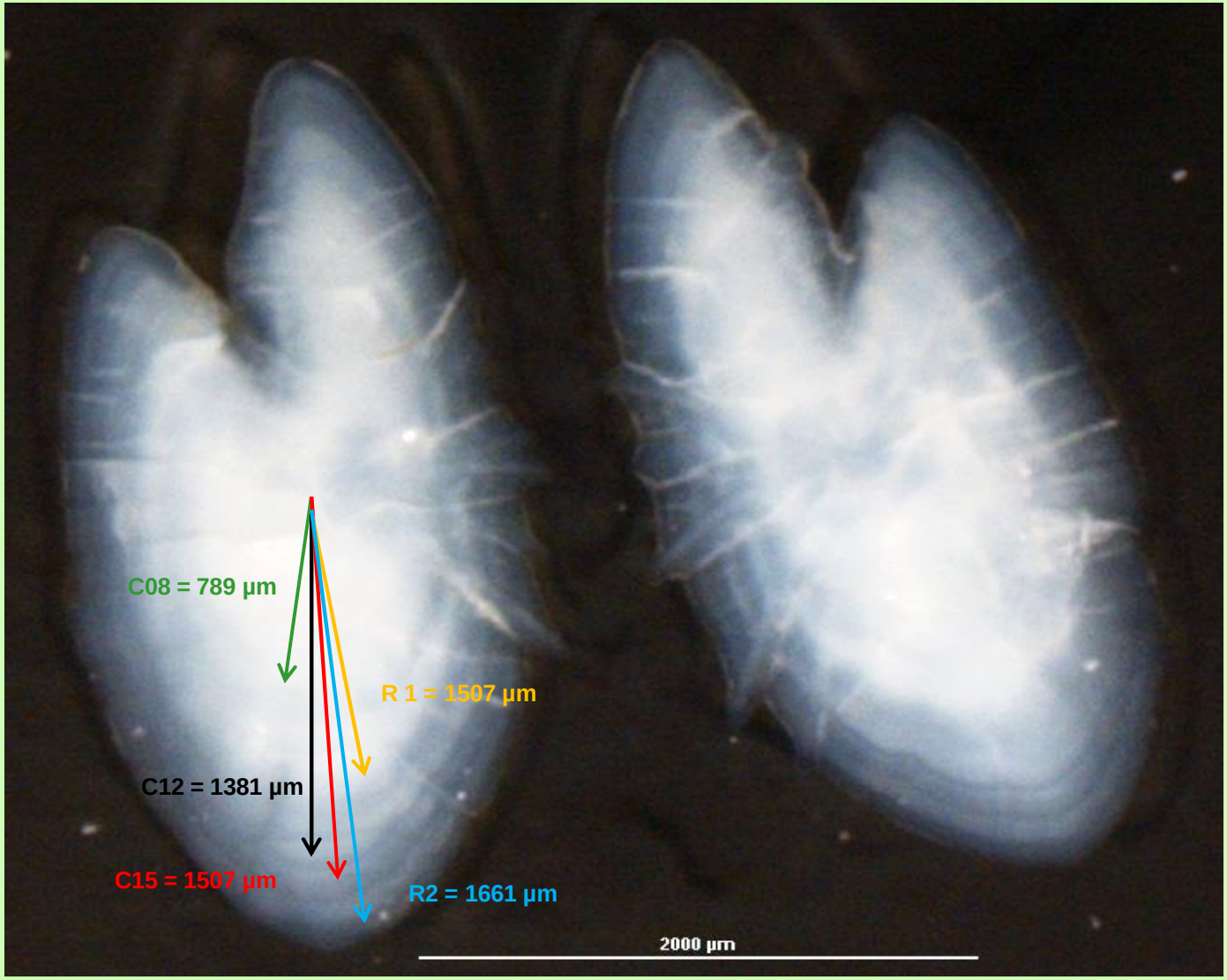
22/06/2016. Nº 44, 132mm. Check C08. Hyaline. Age1

Examples of measures: Age 2 with a check C15



22/06/2016. Nº 12, 130mm. Check C15. Hyaline. Age 2

Examples of measures: Age 2 with checks C08, C12 & C15



10/05/2016. Nº 4, 138mm. Checks C08, C12, C15. Hyaline. Age 2

Results

Nature of the edge

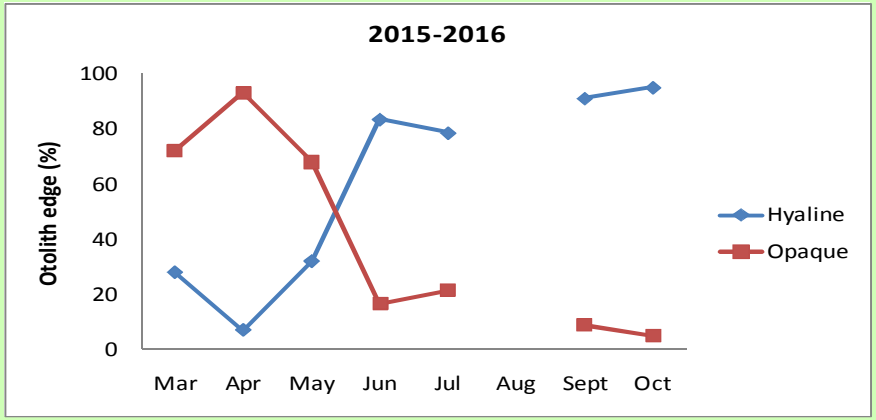
The monthly proportion of edge type of *E. encrasicolus* in the IXaN, indicates an annual periodicity in the formation of the hyaline and opaque annuli, appearing the hyaline edge mainly from June to October.

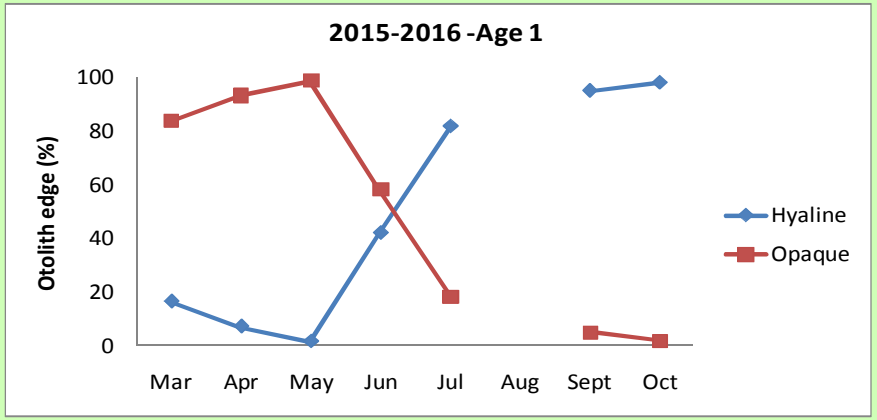
At age 1, the highest frequency of occurrence of opaque edge is in winter, descending in summer. This could be assumed as a stop growth at age one, in summer.

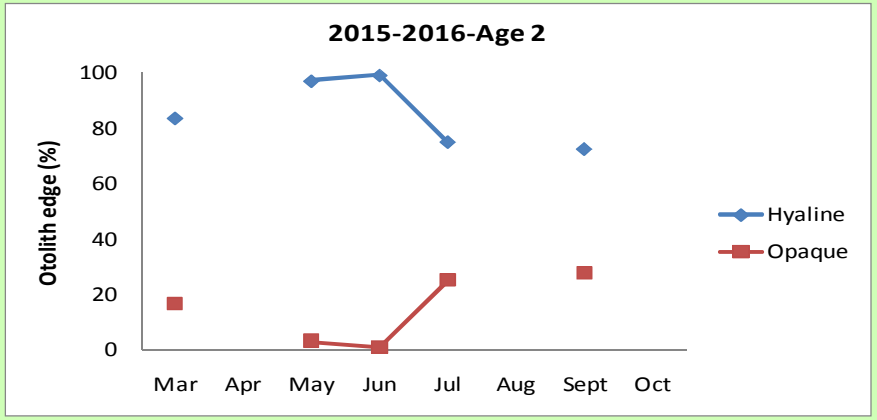
At age 2, the highest frequency of occurrence of the opaque ring is in summer.

These results, contrary to expectations, could be due:

- An misinterpretation of nature of edges at age 1.
- A greater influence in that area of the upwelling, mainly in summer, causing a decrease of the temperature.

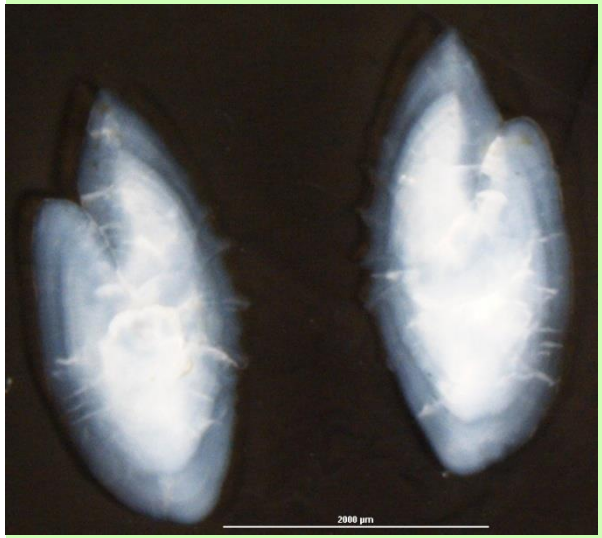




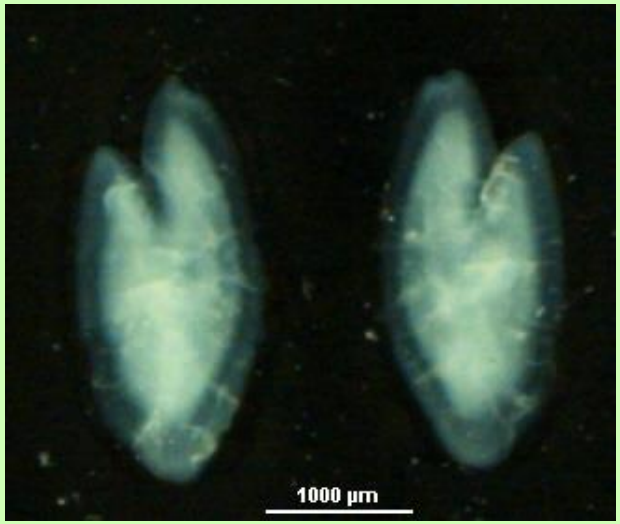


Examples of age 1 with opaque growth in March, April and May

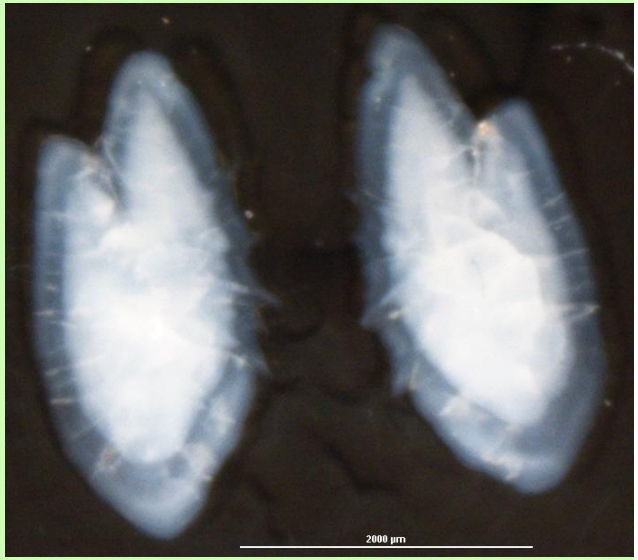
March 16, 2016. **11.7 cm**



April 21, 2016. **12. 8 cm**



May 10, 2016. **12.5 mm**



Or are they 2 years old, with sizes so small?

Conclusions

The biometric measurements of the growth rings (true and false) of the anchovy otoliths in the North IXa (C08 = 779µm, R1= 1213µm, R2=1649), appear to be in agreement with the anchovy otoliths of the Bay of Biscay (C08 = 852µm, R1= 1295µm, R2=1589, Hernandez et al., 2013).

It is necessary to investigate more in depth the analysis of the nature of the edge, since it seems to indicate that the growth is greater in the months of winter than in summer.

This could be explained by the drop in temperature by the upwelling phenomena in this area in summer and therefore influenced by a lower anchovy growth? Or is it simply a misinterpretation of the edge?