

Age validation of Atlantic chub mackerel (*Scomber colias*) in the Northeast Atlantic Area

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1. Introduction and Objectives

Population abundance and distribution in Portuguese waters of the Atlantic chub mackerel (*Scomber colias*) significantly fluctuate over time. The dynamics of this species within the pelagic ecosystem in Atlantic Iberian waters are poorly known and the understanding of the growth pattern is relatively limited.

The present work attempts to validate the growth increments formation periodicity on chub mackerel otoliths by the means of the widespread Marginal Increment Ratio (MIR) and Edge Type Analysis.

2. Methods

- A random samples of 30 otoliths were collected from fish of commercial catches in the Portugal coast from July 2014 to February 2016 at monthly intervals.
- After the otoliths being mounted and photographed, age was assigned according to [1] criteria, and edges were classified as opaque (O) or hyaline (H), according to the criteria described in [2] and MIR was calculated following [3]. A total of 501 otoliths were used in the analysis.

3. Results

- The monthly proportion of edge type indicates an annual periodicity in the formation of the hyaline and opaque annuli, with opaque edges mainly appearing from May to August (Fig.1a).
- The hyaline annulus seems to be formed from September to February (no samples available in March) (Fig.1a).
- Few sample size makes not possible to conclude differences in the formation of opaque edge when considering age classes (Fig.1b).
- Higher values of MIR were observed in summer months with the dominance of opaque edge (Fig.1).
- In other studies, a gradient in the edge formation seems to be observed with earlier beginning of the opaque edge in southern areas (Fig.2).

4. Discussion and Conclusions

- The results showed to be in line with studies from adjacent areas which give some support and consistency to our study findings.
- This study results will be improved by increasing the sampling; the opaque edge formation along different age classes and the frequency distribution of the distances from the otolith nucleus to growth increments will be considered.
- Age and growth studies are fundamental to allow more robust assessments in the future. The results presented in this study provide important data for improved chub mackerel assessment and management in the future.

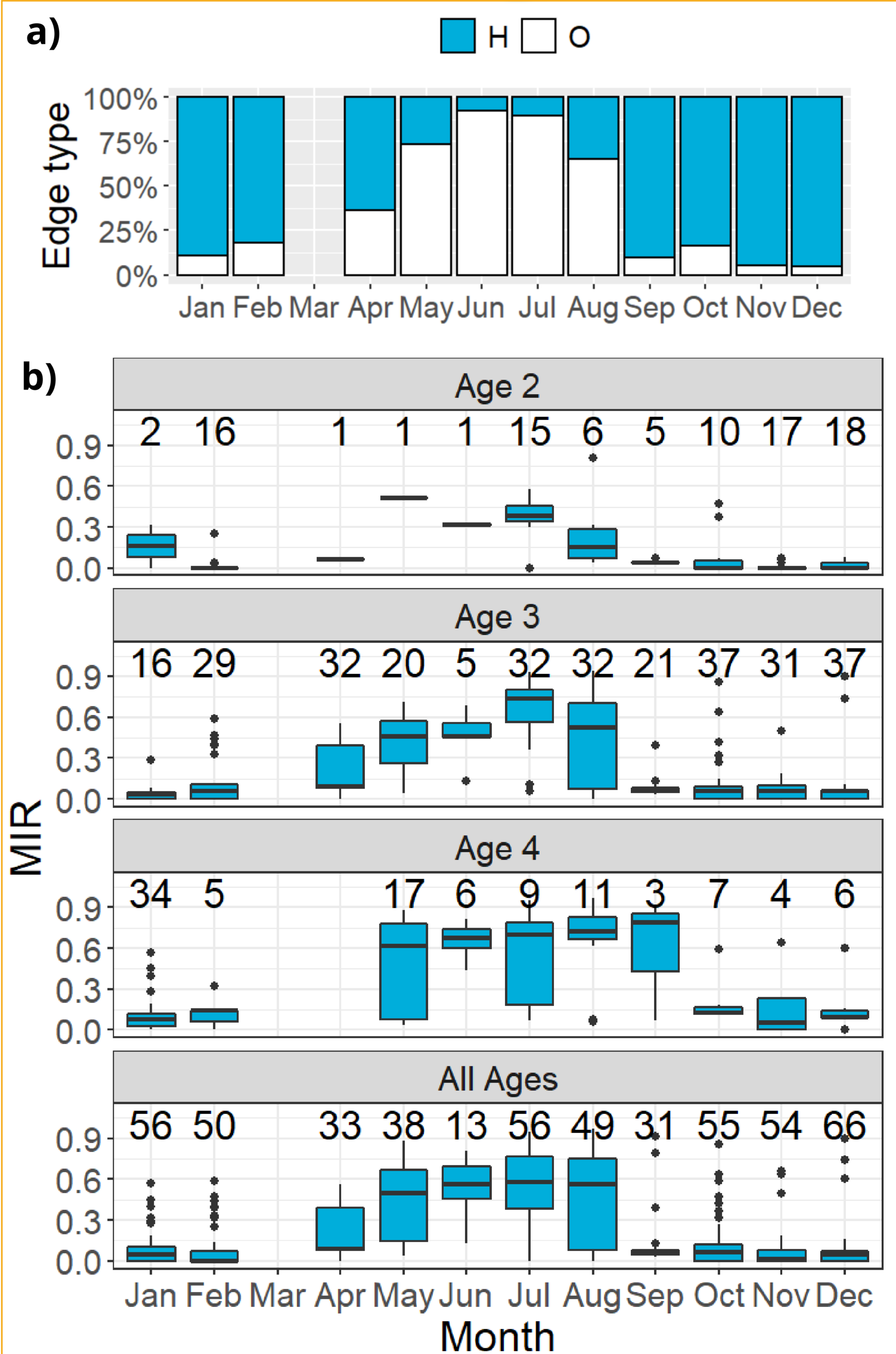


Figure 1. Monthly variation of chub mackerel (a) edge type analysis, hyaline (H) and opaque (O); (b) marginal increment ratio (MIR) by age classes and all ages combined, numbers on top correspond to sample size. The boxplots represent the median, 1.5x the interquartile range, minimum and maximum and outliers.

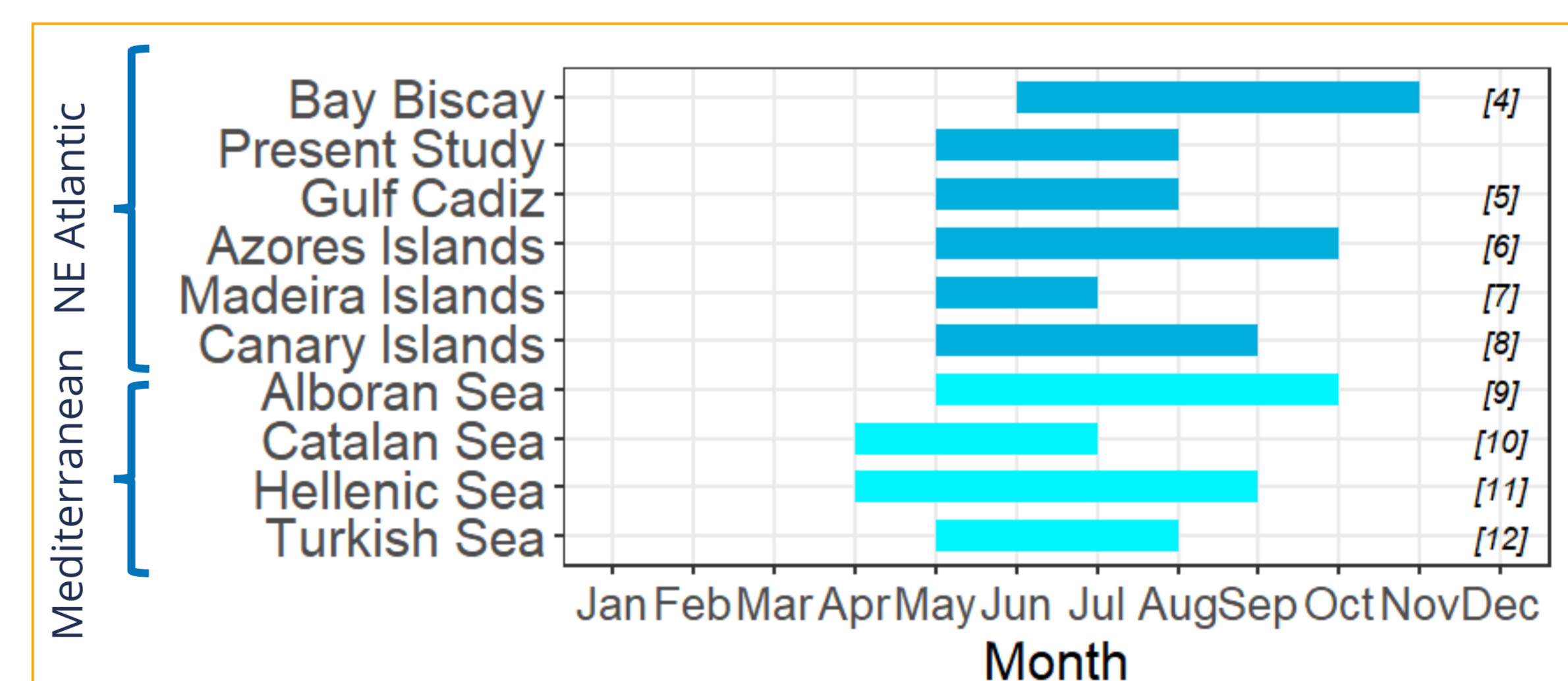


Figure 2. Monthly periods of opaque edge formation (beginning to end) of chub mackerel in different areas of NE Atlantic and Mediterranean Sea. Numbers correspond to bibliographic references from each area study (see References).

References

1. ICES (2015): Report of the Workshop on Age Reading of Chub mackerel (*Scomber Colias*) (WKARCM). ICES Expert Group reports (until 2018). Report. <https://doi.org/10.17895/ices.pub.8624>
2. Panfili, J.; Pontual (de), H.; Troade, H.; Wright, P.J. (eds), 2002. Manual of fish sclerochronology. Brest, France: Ifremer-IRD coedition, 464 p.
3. Samadé, M. 1977. Determinación de la edad y crecimiento de la sardina *Sardinops sagax* (J). Boletín-Instituto del Mar del Perú 3: 95-112.
4. Navarro, M.R.; Landa, J.; Domínguez-Petit, R. First approach to the growth and age corroboration of Northeast Atlantic chub mackerel in Northern Iberian waters.
5. Rodríguez-Rodríguez, J. 1982. Biología de la caballa (*Scomber*), *Scomber (Pneumatophorus) japonicus* Houttuyn (1782) del golfo de Cádiz. Investigación Pesquera. 46 (1): 143-159, 1982.
6. Carvalho, N.; Perrotta, R.G.; Isidro, E.J. 2002. Age, growth and maturity in chub mackerel (*Scomber japonicus* HOUTTUYN, 1782) from the Azores. *Live and Marine Sciences*. 19(2): 93-99.
7. Vasconcelos, J.P.R. 2006. Contribuição para o conhecimento da biologia da cavala, *Scomber japonicus* Houttuyn, 1782 do Arquipélago da Madeira. Tese submetida para a obtenção do grau de Mestre em Ciências da Terra e da Vida. Universidade da Madeira.
8. Lorenzo, J.M.; Pajuelo, J.G. 1996. Growth and reproductive biology of chub mackerel *Scomber japonicus* off the Canary Islands. *South African Journal of Marine Science* 17: 275-280, 1996.
9. Velasco, E.M.; Arbol (del), J.; Baro, J.; Sobrino, Sobrino, I. 2011. Age and growth of the Spanish chub mackerel *Scomber colias* off southern Spain: a comparison between samples from the NE Atlantic and the SW Mediterranean. *Revista de Biología de Biología Marina y Oceanografía*. Vol. 46, Nº1: 27-34, 2011.
10. Perrotta, R.G.; Carvalho, N.; Isidro, E. 2005. Comparative study on growth of chub mackerel (*Scomber japonicus* HOUTTUYN, 1782) from three different regions: NW Mediterranean, NE and SW Atlantic. *Invest. Desarr. Pesq.* 17: 67-79 (2005).
11. Kipparisis Kipparisis, S.; Tserpes Tserpes, G.; Tsimenidis Tsimenidis, N. 2000. Aspects Aspects on the demography demography of Chub Mackerel Mackerel (*Scomber Scomber japonicus japonicus* Houttuyn 1782) in the Hellenic Hellenic Seas. *Gelg. J. Zool.* 130 (1): 3-7, 2000.
12. Tugue, M. 1957. On the biology of the *Scomber colias* Gmelin. *Studies and Reviews. General Fisheries Council for the Mediterranean* 4: 145-159

Acknowledgements

This work was funded by the projects SARDINHA2020 (MAR-01.04.02-FEAMP-0009), and the European Commission's Data Collection Framework (Council Regulation EC no. 199/2008). Ana Rita Vieira is supported by Fundação para a Ciência e a Tecnologia through research contract CEECIND/01528/2017. Additionally, authors want to thank all team involve in the chub mackerel biology collection.



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