

Reconstructing environmental history of water off the southern coast of Sicily with bomb radiocarbon validated longevity coupled with trace elements analysis in otoliths of *Dentex gibbosus* (Sparidae)

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Otoliths are mostly used for age determination and in the past two decades as an application to record time and environmental conditions. A large specimen of pink dentex, *Dentex gibbosus* (Rafinesque, 1810) (TL = 114.5 cm), caught in the waters around one of the largest petrochemical complexes in southeastern of Sicily (central Mediterranean Sea), was aged using both the whole otolith and a thin transverse section. As an independent estimate of validated age, the otolith was aged blind with bomb radiocarbon (¹⁴C) dating. Trace elements were detected by Excimer Laser Ablation Inductively Coupled Plasma Mass Spectrometry (ELA-ICP-MS). The isotopic concentration of a suit of elements has been measured along the identified "annuli", providing the opportunity to reconstruct environmental histories and/or migration patterns of this specimen. The two replicate ¹⁴C assays were diagnostic for age validations relative to the recently established regional ¹⁴C reference, providing a new validated longevity of 46 years. Concentration of the suite of trace elements investigated were quite constant, but boron and lead showed an inversely related trend while the temporal trends of strontium may represent a migration pattern. Starting from the novel validated longevity of this species provided by bomb ¹⁴C dating, the overlap between the back-calculated time-trends of the three trace elements and the time-steps adopted in the innovation of the production cycles in the petrochemical complex, confirm the suitability of the pink dentex otolith as a reliable "chemical biomarker" for reconstructing regional trends in the marine environment.

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