Subject: Validation of the temporal stability of isotopic signature ($\delta^{13}C$ and $\delta^{15}N$) from fossil otoliths in order to investigate long-term trophic changes.

Key-words: Fossil otoliths, $\delta^{13}C$ and $\delta^{15}N$, amino-acids, trophic ecology

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There is now strong evidence that the environmental changes induced by natural or anthropogenic pressures cause major alterations in aquatic ecosystems, species diversity and population demography. Better understanding the factors and the mechanisms of these alterations is an essential step to efficiently protect aquatic ecosystems and the services they provide to human societies. However, although crucial to understand species demography and ecosystem functions, little is currently known about the effects of these environmental disturbances on trophic interactions.

The lack of knowledge regarding change in trophic ecology can be mainly attributed to the difficulty of monitoring accuratly trophic interactions in aquatic habitats, this task requiring either a lot of human ressources or expensive materials. This limitation can now be overcome thanks to the method recently developed by Grønkjær et al. (2013[1]), which demonstrated that $\delta^{13}C$ and $\delta^{15}N$ from otoliths organic matter mirror prey isotopic signature and hence can be used to reconstruct important diet characteristics. Combining this technique with fossil otoliths will allow major advances on many research fields (e.g. fish metabolism, archeology, effects of the climate change ot fishery on prey-predator interactions).

However, in the context of analyzing stable isotopes from fossil otoliths, the stability of the otolith signature even after long term storage in soil or water has to be first validated. The main objective of this project is therefore to check for this temporal stability. To this aim, we will compare the amino-acid composition of recent otoliths of *Sciaena deliciosa* to that of fossil otoliths collected among kitchen middens in South America (6000-9000 BC). The second step of this projet will investigate the temporal modifications of *S. deliciosa* trophic ecology by comparing the $\delta^{13}C$ and $\delta^{15}N$ from recent and fossil otoliths.

This study, being the first using a cutting-edge method to investigate long-term change in trophic ecology, will have major implications on the value of the technique to reconstruct the individual diet based on fossil otoliths.

1 Grønkjær P, Pedersen JB, Ankjærø TT, Kjeldsen H, Heinemeier J, Steingrund P, Nielsen JM & Christensen JT. 2013. Stable N and C isotopes in the organic matrix of fish otoliths: validation of a new approach for studying spatial and temporal changes in the trophic structure of aquatic ecosystems. *Can. J. Fish. Aquat. Sci. 70:143-143*