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# Development of passive environmental DNA samplers for the detection of rare and elusive marine megafauna

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## Résumé

Our team is currently developing a set of passive samplers that can effectively trap environmental DNA (thereafter eDNA *ie* DNA naturally released by organisms) in marine ecosystems to detect low density and mobile megafauna through time and space. Classical eDNA inventories are based on boat transects and water pumping and have proven to be highly effective in marine waters to describe the local aquatic communities. However, mobile taxa and taxa with low abundance are prone to be underestimated or missed with this method.

Thus, an innovative interdisciplinary approach is conducted (molecular biology, physical oceanography, materials science, ecology) to tackle this challenge. We are optimising this passive sampler to trap and preserve from degradation the highest quantity of eDNA in order to maximise chances of detection of rare and mobile megafauna. With previous laboratory tests, mesocosm experiments and *in natura* studies, the goal is to propose an adapted sampling plan (number of samplers, localisation, depth, exposition time) in accordance with eDNA dispersion modelling in open sea. The space-time aspects of samplers immersion will be conditioned to targeted species and both biotic (biofouling) and abiotic constraints (temperature, dissolved oxygen...).

The mesocosm experiments consisted to expose for various times (2h, 8h, 24h) passive samplers in basins of 1 m<sup>3</sup> containing several densities of sea bass, *Dicentrarchus labrax* (1 fish, 5 fish, 10 fish and 100 fish). The passive samplers succeed to detect as low as one fish in 2 hours.

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\*Intervenant

The *in natura* studies that will be conducted during Summer 2024 aims to validate the detection of a mobile organism by a set of passive samplers in a French laguna. As a source of eDNA, water taken from basins with common carps (*Cyprinus carpio*) will be used. A set of passive samplers will be deployed in the laguna and a boat will pass this source of eDNA in the outside environment following a known itinerary. Currents will be measured during this experiment thanks to drifting alloys to connect the eDNA dispersion to the passive sampler's response.

This study can therefore provide new insights to evaluate the movements and the distribution of marine megafauna in the context of development of environmental genomics. In this presentation we will present the global project and the on-going results, especially concerning the sampling prototype validation.

**Mots-Clés:** environmental DNA, passive sampler, marine megafauna