

SeaTraceOmics: Revolutionizing SEAfood TRACEability using a multi-OMICS approach

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Abstract:

Marine ecosystems are experiencing a severe anthropogenic impact, and this scenery is overcomplicated by the increasing global demand for seafood. Yet, the seafood supply-chain is susceptible to geographic provenance inaccuracies, making consumers exposed to fraud events. These issues are of primary concern both for producers and consumers, due to their socio-economical, environmental, and health implications. An emblematic case study is the giant red shrimp *Aristaeomorpha foliacea*, which has a wide geographical distribution in the world. However, it is prone to frauds because of a value differentiation of the species in relation to different origins and effective tools to trace geographic origin are not available.

To address this issue, SeaTraceOmics project aims at harnessing the power of omics tools coupled with AI approaches (e.g. machine learning). To do that, we are carrying on a double approach: on one hand, host genotyping to identify differential SNPs profiles comparing different *A. foliacea* populations; on the other hand, host-associated microbiome analyses to pinpoint the environmental signature on the target species.

Our numbers now account for about 300 specimens of confirmed origin collected, 1500 DNA extracts, several Giga of data generated, 1 experimental protocol developed, 1 master thesis, several stakeholders involved (and among them 2 research bodies). All the molecular data will be used to train an algorithm based on a supervised machine learning approach to extract the significant information related to geographic origin. This will pave the way for the development of an innovative and industrially transferrable traceability tool for seafood items, in order to monitor geographic origin. Also, through the link between “biodiversity - ecosystem functioning”, SeaTraceOmics outcomes will strongly support environmental sustainability. On the whole, SeaTraceOmics can be used to promote novel food traceability schemes based on an environmental footprint, which can be implemented on a large scale following all the applicable FAIRness best practices.

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