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INSIGHTS INTO XENOBIOTIC CONTAMINATION IN MEDITERRANEAN DEEP-SEA MEGAFAUNA WITH EMPHASIS ON THE SUBMARINE CANYON DOHRN

Settore scientifico disciplinare: *BIO/07*

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ABSTRACT

The Mediterranean Sea is considered a biodiversity hotspot because it hosts a huge variety of marine species but is also characterized by high amounts of persistent organic contaminants.

The effects of contamination are, in fact, well known in the coastal and pelagic domains, but there's still a lack of information regarding their effects on the deep-water environment, the largest, less know and more vulnerable habitat of the planet.

The focus of this PhD project is to carry out the first assessment of the contamination of the deep waters of the Tyrrhenian Sea, one of the most anthropized area of the Mediterranean basin, by the analysis of the cartilaginous fish fauna, one the most important consumers of marine environments but at the same time one of the most threatened taxa.

The International Union for Conservation of Nature (IUCN) Red List considers pollution threat as, in the Mediterranean subpopulations but also at global level, a threat only for few different chondrichthyan species. One of the first objectives was to highlight the lack of information about pollution in cartilaginous fishes which play a key role in aquatic ecosystem.

Five chondrichthyan species were collected from the deep sea of the Ligurian and North Tyrrhenian Sea (in the Geographic Sub Area 9, GSA9) and of the Dohrn Canyon (Gulf of Naples) and investigated from a toxicological point of view: in particular, we focused our attention on legacy organochlorine compounds (OCs) such as hexachlorobenzene, polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) and its metabolites. The use and production of these contaminants is banned since the Stockholm Convention on Persistent Organic Pollutants (POPs); despite this, due to their chemical-physical properties (high boiling point, persistence, lipoaffinity, etc.) as well as to the exemptions for their use, their unregulated use in some States, or their marketing with "small" changes in the composition for which they escape the regulations, they still remain a priority for the health status of living organisms.

The toxicological analysis conducted in the sampled species revealed the presences of all the three POPs investigated, both in the Canyon and in the GSA9. The prevalence of PCBs in the samples confirmed that the species are more subjected to an industrial-type of contamination but, one of the principal findings was that from the DDT isomers analysis, resulted the recent use of the industrial DDT, an enriched *op'* isomers formula,

which is still unregulated or is used to produce other pesticides. Moreover, due to the detected maternal transfer of all the three POPs, these species are stressed from the very beginning, causing an additional threat to their conservation. Levels detected in the Dohrn Canyon were significantly lower than those in the GSA9 suggesting that the hydrodynamism of such environment may help in pollutant dispersion, subjecting non-migratory species to minor contamination. However, further studies on different species with different home ranges should be conducted in order to corroborate this hypothesis.

This is the first assessment of the occurrence of organochlorine contaminants in the deep environments of the Tyrrhenian Sea, and it stresses once again the urgency of further focused long term researches, mixing different data from different sources, in order to monitor and better understand the future trends of this impact in the marine environments. Moreover, this study underlines the importance of the role of the marine scientists at the international political level, in order to request further conservation measures for marine species, also for those living in deep sea environments.