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Editorial: Marine microalgae and biotoxins

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Editorial on the Research Topic
Marine microalgae and biotoxins

Harmful algal blooms (HABs) and their impact in aquaculture, services and aquatic ecosystems in coastal areas are a major concern. The occurrence of these natural phenomena is expected to increase due to the growing pressure of anthropogenic activities, the projected climate trends, and their effects in the marine environment (Kazmi et al., 2022; Zhang et al., 2022). Methodological advances in monitoring systems for a fast and precise detection of biotoxins, together with a better knowledge on oceanographic conditions suitable for development of HABs, contributed to a more efficient and cost-effective management of aquaculture and fishery resources (Ruiz-Villarreal et al., 2022).

Nonetheless, in the context of global warming, new challenges arise. New unregulated biotoxins, possibly related to the presence of non-indigenous toxic microalgae, are emerging together with previously unreported toxic syndromes. Their study and the vigilance and monitoring of their expansion in coastal areas will be of great importance. In parallel, new techniques for a precise detection of harmful taxa, or the identification of biomarkers associated with toxins production will be essential to improve the efficiency of monitoring programs in the near future. Furthermore, the appearance of new biotoxins may be of paramount importance for the discovery of new cellular targets and biochemical pathways. These compounds may also become of therapeutic importance in diseases (both related and unrelated to the toxicological profile that guided the discovery of a given biotoxin), such as the treatment of tumours or neurological diseases. Some of the biotoxins we know have greatly contributed to our knowledge of the molecular structure and functioning of voltage-sensitive ion channels, neurotransmitter receptors, ionic pumps, protein phosphatases, etc. (Novelli et al., 2021). Thus, the discovery of new marine biotoxins may further help us to expand our knowledge.

Particularly, in this special volume the following aspects have been covered. A first report on the presence of palytoxin-like compounds in *Prorocentrum borbonicum* from the Colombian Caribbean is presented. The toxin profile was analysed by HPLC-HRMS to confirm the presence of borbotoxins and 42-hydroxy-palytoxin and constitutes the first report of palytoxin-like compounds in another dinoflagellate genus than *Ostreopsis*. It is also the first record of the presence of *P. borbonicum* in Colombia and the Caribbean region (Arteaga-Sogamoso et al.). As stated by Arteaga Sogamoso et al., the identification of harmful taxa *should serve to strengthen the Benthic Harmful Algae Blooms (BHABs) monitoring and design and implement an early warning system*. Another example is the study by Spielmeyer et al. concerning ciguatoxins (CTXs) and more specifically regional toxin profiles. This research reports the toxin profile of tissue samples of the species *Lutjanus bohar* (Lutjanidae), a common ciguatoxin vector, from two distant regions of the Indian Ocean and the Pacific Ocean. The LC-MS/MS analysis revealed a generalized presence of ciguateric toxins belonging to CTX3C-group with an indistinguishable toxin profile between both regions, which could be related either to species-specific ciguatoxin metabolism or the emergence of an interoceanic ciguatoxin profile. Thus, it is evidenced that the classification of ciguatoxin congeners based on oceanic regions remain imprecise, as much as the extension of screening to all known congeners in ciguatera poisoning investigations. An important family of toxins is that of okadaic acid (OA) due to its economic and public health consequences. These are among the causative agents of diarrheic shellfish poisoning (DSP). The lack of rapid and sensitive detection methods of okadaic acid in shellfish prompted Qin et al. to develop a new okadaic acid highly sensitive detection method based on immunological technology. This specific okadaic acid-time-resolved fluoroimmunoassay will certainly contribute to the field of marine biotoxin detection. Nonetheless, despite the toxic mechanisms and the effects of biotoxins on human health have been described, more efforts are required to correlate aspects as of the number of poisonings in humans, sequelae following acute exposure, and effects during chronic exposure. Under such premise, Sinno-Tellier et al. propose the application of a national surveillance program to improve monitoring of neurotoxins which includes clinical and environmental data in France. This collaborative monitoring model will allow to have a more complete view of underreported phycotoxin human exposures, and to implement measures to protect consumers.

Still, this complex and multidisciplinary field poses new challenges to overcome. All these improvements are crucial for a better understanding of the evolution of natural processes linked with the marine environment and resources, to protect consumers and allow a sustainable development of human activities in coastal regions.

Author contributions

AD-M designed and drafted the manuscript. All authors contributed in summarizing the articles edited, writing, reading, edited, and approved of the final version of the editorial.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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