DIVERSITY OF THE DINOFLAGELLATE GENUS *ALEXANDRIUM* IN THE MEDITERRANEAN SEA

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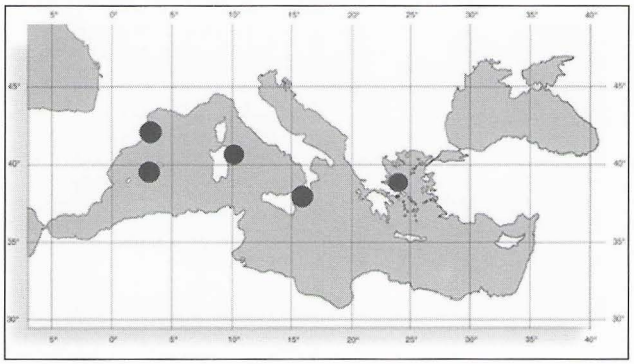
Abstract

Harmful Algal Blooms (HAB) are a growing problem in the world. The dinoflagellate *Alexandrium*, with 12 species recorded from the Mediterranean Sea, is one of the most important genera causing HAB. Some *Alexandrium* species produce potent Saxitoxins that may enter the food web through filter feeding mollusks, and cause intoxications in humans.

Alexandrium may also produce massive blooms in confined areas like beaches or harbours, that, even when non toxic, affect tourism, an important industry in the Mediterranean.

Keywords : Harmful Algal Blooms, Alexandrium, Mediterranean

The EU project strategy ((EVK3-CT-2001-00046) (http://www.icm.csic.es/bio/projects/strategy) focuses on the dinoflagellate genus *Alexandrium*. This genus includes species causing Paralytic Shellfish Poisoning (PSP), and most Harmful Algal Blooms (HAB) in the Mediterranean. Problems associated with this genus have increased in the last decade. The project analyzes different aspects of *Alexandrium* in the Mediterranean in order to develop a theoretical framework of its expansion. A sampling network has been developed in four areas along the northern Mediterranean (Fig.1), and a database has been created with the input of the STRATEGY network. One of the objectives of this network is to follow the progress of *Alexandrium* species in the region and to compare areas with the same bloom events.



The propagation of the genus *Alexandrium* within the Mediterranean is difficult to assess as reliable distributional information is scarce. Routine monitoring (mainly related to shellfish farming) is not addressed to elucidate if an increment or/and a species propagation is actually occurring. Identification of the blooming species requires taxonomic expertise and careful examination of the plate pattern, uncommon in routine analysis of plankton samples, so we suspect some reports may be misidentifications. Most bloom descriptions are published in the "grey" literature and in most cases, only the first detection in a specific area is described. Therefore a key point in the study of the expansion of *Alexandrium* is to learn how many species are present in the Mediterranean, and to trace their actual distribution.

Nine species of *Alexandrium* have been obtained in culture from vegetative cells or from resting cysts, that, in addition to another species already in culture, make an important collection of strains, and the source of material for works in progress. With two other species, already reported from the Mediterranean, a total of 12 species is known from the sea. Balech (1) has divided genus *Alexandrium* in two subgenera: *Alexandrium* and *Gessnerium* depending on the contact of plates 1' and Po which is direct in the first and absent in the second. The type species of the genus is *A. minutum*, described from Alexandria, Egypt (2), but widespread in the Mediterranean, and known from blooms elsewhere in the sea. This species is toxic (PSP). *Alexandrium catenella*, a very toxic species frequently causing summer blooms in harbours (3) or in coastal lagoons with shellfish farms, is more common in the western Mediterranean. Among the non-toxic species of concern to recreational use is *A. taylori*. This species blooms in the pristine waters of highly frequented beaches turning the water turbid, and providing a source of complaints by tourists that think it is some kind of pollution (4). *Alexandrium* cf. *peruvianum* was found in the Catalan coast but its potential toxicity is yet unknown, but of concern as *A. peruvianum* is a close relative of *A. ostenfeldii*, a species which is toxic in the North Atlantic. *Alexandrium tamutum*, a new species (5), was already observed in the northern Adriatic, off Naples, Sardinia and the Catalan coasts. The other species are not so important as some of them are very rare or non toxic, and hence harmless.

List of species:

Subgenus *Alexandrium*

A. minutum - Widespread in the Mediterranean. Toxic bloom species.
A. catenella - Western Mediterranean. Very toxic bloom species.
A. tamutum - Adriatic, Tyrrhenian, and Catalan coast. Non Toxic.
A. tamarense - East and West Mediterranean. Toxic and non toxic strains.
A. affine - Alboran Sea. Non toxic.
A. andersonii - Italy and Greece. Toxic and non toxic strains.
A. cf. *peruvianum* - Catalan coast. Toxicity unknown.

Subgenus *Gessnerium*

A. taylori - East and west Mediterranean. Non toxic bloom species
A. pseudogonyaulax - Western Mediterranean - Unknown toxicity
A. margalefi - Western Mediterranean. Unknown toxicity
A. balechii -Tyrrhenian Sea. Non toxic.
A. foedum. -Tyrrhenian Sea. Toxicity unknown.

References

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