# SURVEY OF ALGAL CYSTS IN RECENT SEDIMENTS OF THE TRIESTE (ADRIATIC SEA) AND MILAZZO (TYRRHENIAN SEA) PORTS

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## Abstract
Harbours are generally considered as areas of build-up of algal cysts which can function as potential seeds for pelagic algal populations. In the autumn 2006, a sampling programme of phytoplankton and sediments was carried out in the ports of Trieste (Adriatic Sea) and Milazzo (Tyrrhenian Sea). In both ports, the analyses of water samples revealed a high specific diversity of the phytoplankton community. At the same way, in sediments many cyst morphotypes were identified. Water and sediment analyses confirmed the importance of these areas as potential reservoir of plankton diversity as well as of harmful species.
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The risk of the introduction of non indigenous plankton species including those of species potentially harmful for the environment and humans has been widely documented in many areas of the world [1]. Considering the potential role of the ballast water as vector for marine introductions [2], ports can represent areas potentially at risk for the high number of ships they receive each year. To analyze the composition of phytoplankton community and algal cyst assemblage in the ports of Milazzo (Tyrrhenian Sea) and Trieste (Adriatic Sea), a sampling programme was carried out from 6 to 7 and from 12 to 14 September 2006, respectively. In seven and eight stations, respectively, phytoplankton nets and sediment cores were collected. The analysis of phytoplankton nets revealed a relatively high specific diversity along the water column in both ports, with more of 120 taxa identified belonging mainly to Bacillariophyceae and Dinophyceae. Various toxic species, such as DSP and PSP species, were identified. Finally, in the Milazzo port, the presence of *Ostreopsis* sp., an epiphytic dinoflagellate responsible for respiratory problems since some years along the Italian coasts, was recorded in many stations. In the port of Trieste, cyst abundance ranged from 459 ind $g^{-1}$ DW recorded at the st. 6 to 3651 ind $g^{-1}$ DW at the st. 3 (Fig. 1).

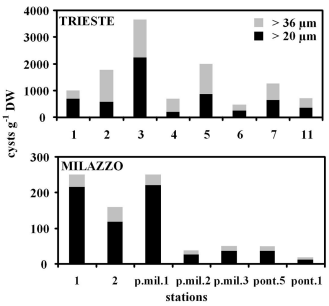


Fig. 1. Cyst abundance (number of cyst $g^{-1}$ of dry weight) at different sampling stations in the ports of Trieste and Milazzo.

A total of 32 different cyst morphotypes belonging to dinoflagellate group were identified at least at genus level. *Alexandrium*, *Protoperidinium* and *Scrippsiella* were the genera more represented. *Calciodinellum operosum* (up to 54 cysts $g^{-1}$ DW), *Lingulodinium polyedrum* (up to 957 cysts $g^{-1}$ DW), *Scrippsiella lachrymosa* (up to 212 cysts $g^{-1}$ DW), *S. trochoidea* (up to 165 cysts $g^{-1}$ DW) and cf. *Woloszynskia* sp. (up to 696 cysts $g^{-1}$ DW) were the most abundant species (Fig. 2). In the port of Milazzo, cyst abundance was lower than those in the port of Trieste, ranging from 19 cysts $g^{-1}$ DW at the st. pont.1 to 250 cysts $g^{-1}$ DW at st. 1 and p.mil. 1. Differently from Trieste, in the port of Milazzo the number of identified morphotypes was lower, although the most abundant types were the same (*Alexandrium* spp., *Lingulodinium polyedrum*, *Scrippsiella* spp.).

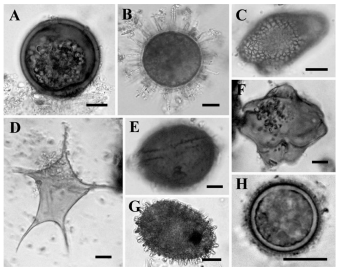


Fig. 2. Some examples of cyst morphotypes identified in this study. **A**: *Diplopsalis* group; **B**: *Lingulodinium polyedrum*; **C**: *Scrippsiella lachrymosa*; **D**: P*rotoperidinium compressum*; **E**: cf. *Zigabikodinium lenticularis*; **F**: *Protoperidinium subinerme*; **G**: *Scrippsiella trochoidea*; **H**: cf. *Woloszynskia* sp. Scale bar = 10 µm.

The analyses of phytoplankton communities and cyst assemblages of the two sampled ports revealed a rather high species diversity. The occurrence of *Warnowia* and *Woloszynskia* cysts (previously observed as cysts in another site in the Gulf of Trieste [3], but never in the water column) suggests that these species may be common members of the phytoplankton community in this area. However, these taxa are very difficult to identify live in plankton samples, and almost impossible in fixed samples. So, this survey of resting forms allow us to deepen our knowledge on phytoplankton biodiversity. Moreover, the identification of species potentially harmful in both water column and sediments highlights the importance of these studies and the necessity to couple the two different kind of sampling, especially in areas at risk such as ports.

## References
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