

HARMFUL ALGAE NEWS

An IOC Newsletter on toxic algae and algal blooms
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• Italy

BENTOX-NET, a Research and management initiative on *Ostreopsis* spp. and other benthic microalgal blooms on the Italian coast

Ostreopsis ovata (Fig. 1), *O. siamensis* and other congeneric species are typical components of the 'ciguatera community', i.e. the association of benthic microalgae found along with *Gambierdiscus* toxicus s.l. in tropical waters. These dinoflagellates colonise benthic macroalgae and seagrasses or attach directly to the substrate, whereas only rarely are they found in the plankton.

The presence of *Ostreopsis ovata* was reported at Villefranche sur Mer (NW Mediterranean Sea) in the 1970s (Max Taylor, pers. comm.) but massive blooms of this species have recently become a threat at several sites along the Italian coasts (Fig. 2). Two distinct species, both producing palytoxin-like toxins, have so far been identified in the northwestern Mediterranean basin: *O. ovata* and *O. cf. siamensis* [1]. Blooms of *Ostreopsis* spp. were first recorded along Tuscany coasts in 1998, when thick mucilaginous layers hosting thousands of cells covered both biotic and abiotic substrates [2, 3, 4]. During blooms, mucilage flocs and cells may detach from substrates and float in the water column [5]. In the last 3 years, bloom events have been reported from several other sites in summer and autumn (Fig. 2).

The impact of these blooms on the ecosystem may be serious, with hypoxia, anoxia and benthic invertebrate kills. In addition, skin irritations, fever,

respiratory affections and conjunctivitis have caused the hospitalisation of several hundred people. These symptoms have been explained with the presence of a palytoxin-like substance produced by *O. ovata* in both the water [6] and aerosol. In addition to *Ostreopsis* spp., at least two other potentially toxic species may abound on macrophytes, i.e. *Prorocentrum lima*, which produces okadaic acid, and *Coolia monotis*, which produces toxins whose effects on humans are unknown.

The dynamics and consequences of *Ostreopsis* blooms observed in Italian seas and recently along the Spanish coast [7] can hardly be compared to other HAB cases, and pose many questions as to their management during the high risk phases and over longer time

scales. Many scientific questions need to be answered to clarify the phenomenon and its possible expansion in coming years, ranging from the exact identification of the species involved, their geographic provenance, physiology, ecology, bloom dynamics, possible role in the trophic web, to the toxins, their production, fate in the trophic web and in the medium. These researches require a multidisciplinary approach. In addition, given the relevance of these phenomena to human health and economic activities, it is crucial that research and management are conducted in a coordinated and integrated way.

To this end, the network BenTox-net (BENThic potentially TOXic microalgae NETwork) has been

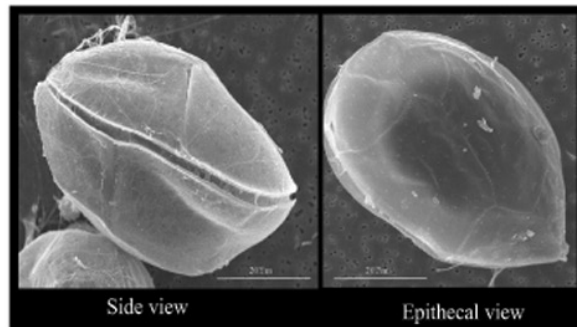


Fig. 1. *Ostreopsis ovata* SEM, left: side view; right: apical view. Pictures taken by Maria Grazia Giacobbe and Magda Vila.

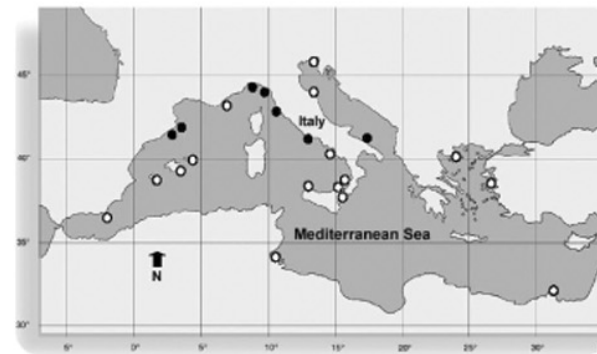


Figure 2. Map of Mediterranean localities where *Ostreopsis* spp. have been detected. Full circles mark sites where problems have been reported.

established among scientists from various Italian laboratories. Participants to the network cover a wide range of expertise including taxonomy, toxin chemistry, genetics and ecology of harmful and non-harmful microalgae. BenTox-net aims at the following:

- to establish communication among research groups working on potentially toxic benthic microalgae;
- to set up intercalibrated sampling and analytical procedures, allowing comparison of data gathered at different sites by distinct groups;
- to continue or establish monitoring activities in areas susceptible to benthic blooms;
- to create links with local agencies that are in charge of bloom management as for environmental quality, public health, seafood protection, tourism and recreational activities in coastal areas;
- to establish an alert strategy tailored on the needs and expertise available in different Italian regions;
- to refine communication strategy with the press and public, to avoid misinformation or unjustified alarms;
- to prepare and submit research projects and secure their funding by public institutions of different nature;
- to train local agencies personnel on methods for sampling and identification of potentially toxic micro-organisms;
- to produce scientific and reach-out papers to be published in national and international newsletters and scientific journals;

- to organise scientific and technical meetings with different participants and target audiences, to promote the delivery of information and research and management activities related to harmful benthic microalgal blooms.

BenTox-net is a bottom-up initiative driven by the need for integrated and effective action in response to the threat posed by this new type of harmful algal blooms. BenTox-net is established based on spontaneous and voluntary participation of the scientists and respective research groups in the list below. At present, no other funds and resources exist beyond those available at the individual Institutes. This hardly allows for basic activities to be set up as response to alert situations in case of blooms. However, the level of protection offered is very limited at this stage, considering the lack of scientific knowledge at local scale and in general. An optimised monitoring and management strategy requires preliminary investigations with extended and frequent sampling over long periods of the year, coupled with ecological, physiological, molecular and toxin chemistry studies. This can only be achieved with support and resources obtained through the search for funding, which will have high priority among the activities of the network.

The Principal Investigators of the 19 groups so far participating in the network are listed below. The network is open to further participation and will

shortly seek links with Mediterranean partners.

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