

- Italy

## Bloom of *Ostreopsis ovata* on the Conero Riviera (NW Adriatic Sea)

At the end of September 2006, an unusual bloom of the benthic dinoflagellate *Ostreopsis ovata*, occurred on the Conero Riviera, a rocky promontory along the sandy coast of the NW Adriatic Sea. The bloom was observed as a brown, velvet-like mat, covering natural and artificial rocks, seaweed thalli, and mollusc shells. Due to the weak association of microalgal cells with the substrate, the mat was easily resuspended in the water column by waves and mechanical action. The bloom persisted for 30-40 days and by mid-November, only a sporadic presence of *O. ovata* was observed.

The occurrence of *O. ovata* in microalgal communities of western Italian coasts is known since the 1980s, when it was reported in the Tyrrhenian Sea [1, 2]. In the last decade, bloom events became more frequent, and their occurrence in summer in the Tyrrhenian and Ligurian Seas was associated with death of benthic organisms and/or human health problems such as respiratory difficulties and skin irritation [3-6]. *O. ovata* has been reported also on the Sicily coast (Giacobbe pers. comm.), [13] and in the southern Adriatic Sea, where it has been observed since 2001 [7]. This is the first report for the northern Adriatic basin. Moreover, in the same period, *O. ovata* has also been observed on the rocky coast of the Gulf of Trieste, NE Adriatic Sea (Cabrini & Monti, pers. comm.).

*O. ovata* is a producer of palytoxin-like compounds [8]. Due to its appearance at the end of summer, when tourist affluence was decreasing, the bloom was apparently not associated with health problems, although unknown toxicity, not due to other common toxins of this area, such as YTX and DSP, was detected in mussels in the same period (Poletti, pers. comm.).

In the northern Adriatic Sea, microphytobenthic communities are commonly represented by diatoms and filamentous cyanobacteria, which exhibit typical seasonal behaviour.

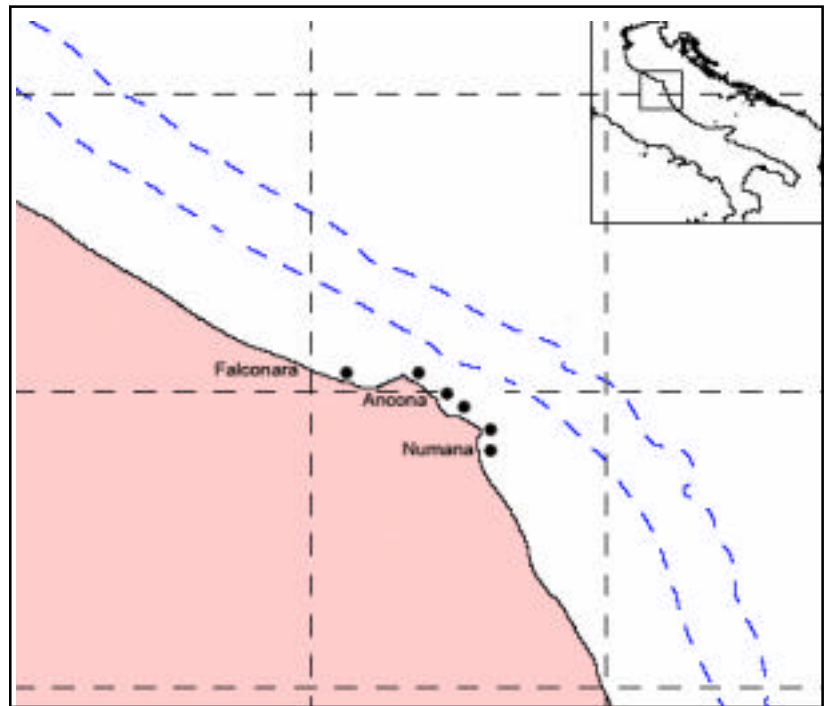


Fig. 1. Conero Riviera (Adriatic Sea) and location of sampling sites.

Benthic dinoflagellates such as *Prorocentrum lima* are rarely observed, always in summer, at low abundance, and only associated with soft sediments [9, 10].

The appearance of this bloom led to intense sampling, from the sandy coast of Palombina to Numana harbour (Fig. 1): sampling was carried out in different areas and on different substrates and in the water column, to estimate microalgal abundance. Results show that *O. ovata* cells colonized a variety of substrates, such as macroalgae, rocks, mussel shells, and also benthic invertebrates (Fig. 2). *O. ovata* was not observed in samples collected on sandy beaches. Densities reached 6500 cells cm<sup>-2</sup> on rocks and 20,000 cells g<sup>-1</sup> fresh wt (corresponding to 124,000 cells g<sup>-1</sup> dry wt) on seaweed samples. These values were lower than those observed in the Ligurian [5], Catalan [11], or Aegean Seas [12], but at the time of sampling the bloom was declining. Higher numbers were found on ramified filamentous (e.g. *Chondria*) and parenchymatic (e.g. *Dictyota*) algae than on laminar thalli (e.g. *Ulva*). The

abundances of *O. ovata* in the water column amounted to about 2000 cells L<sup>-1</sup>.

The identification and counting of *O. ovata* in the samples was carried out with an inverted microscope (Fig. 3) under epifluorescence using Calcofluor. However, due to the taxonomical uncertainties with *O. siamensis*, the diagnosis was confirmed by the molecular PCR based analysis.

*Ostreopsis* cells were isolated using a micropipette, and monospecific cultures were maintained in F/2 and F/4 media at 21 ± 1°C and a 14:10 h (light:dark) photoperiod. Illumination was provided by fluorescent tubes with a photon irradiance of 100 μmol photons m<sup>-2</sup> s<sup>-1</sup>.

Samples *O. ovata* from scraped mats and macroalgal thalli were processed for molecular analysis using the PCR based method. Genomic DNA and genus and species specific PCR assays were carried out as described by [13,14]. Genomic DNA was promptly amplified by PCR assay using genus and species-specific primers. Designed primers for the high variable

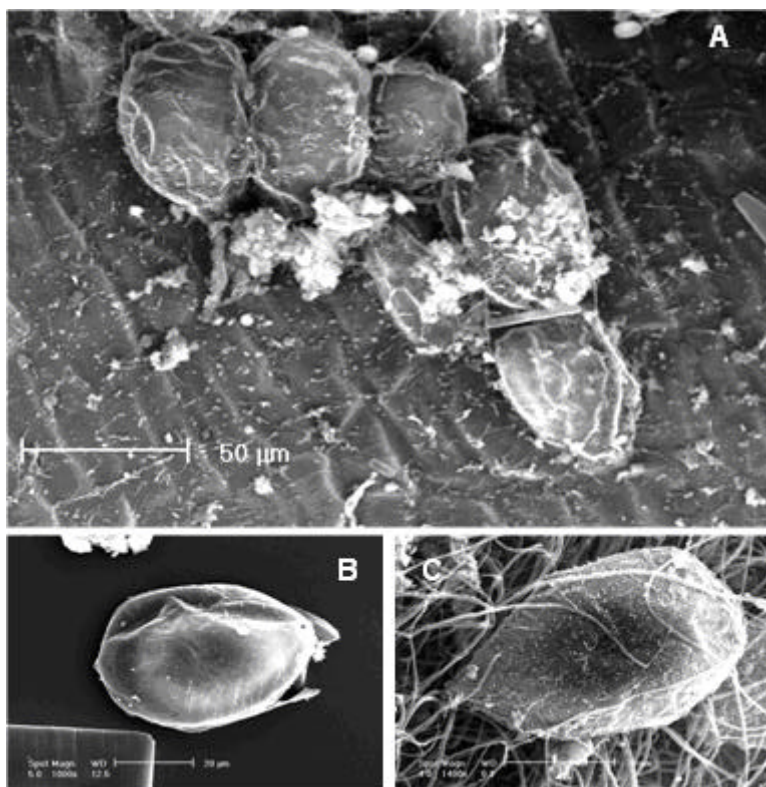


Fig. 2. SEM micrographs of *Ostreopsis ovata* on different substrates: (A) Cells of *O. ovata* on brown alga *Dictyopteris polypodioides*. (B) *O. ovata* from a rocky substrate. (C) Cell of *O. ovata* on brown alga *Cystoseira compressa*, covered by filamentous cyanobacteria.

and conserved ITS-5.8S rDNA regions for the genus *Ostreopsis* and species *O. ovata* and *O. cf. siamensis* gave PCR amplified products of appropriate size for the genus and species *O. ovata*: 92 bp and 210 bp, respectively. No amplified products specific for *O. cf. siamensis* (223 bp) were obtained. The primers showed high specificity with no other detectable bands observed, and did not amplify non-target genomic DNAs. The PCR based method applied

to different kind of environmental samples proved to be a rapid and sensitive way to confirm the taxonomic identity of *O. ovata* at the species level.

*Ostreopsis ovata* is a common species in tropical areas. Its occurrence in Mediterranean microalgal assemblages, may be a result of a recent introduction to the Mediterranean from ciguatera areas [2]; alternatively, its presence in microphytobenthic communities may have been neglected

in the past. This species seems to be expanding its range rapidly, even in colder northern areas. Its occurrence in coastal areas of the northern Adriatic Sea (Conero Riviera and Gulf of Trieste) has probably been favoured by the increased water temperatures of the last decade [15]. It clearly poses increasing risks for human health, and effects on benthic communities.

#### References

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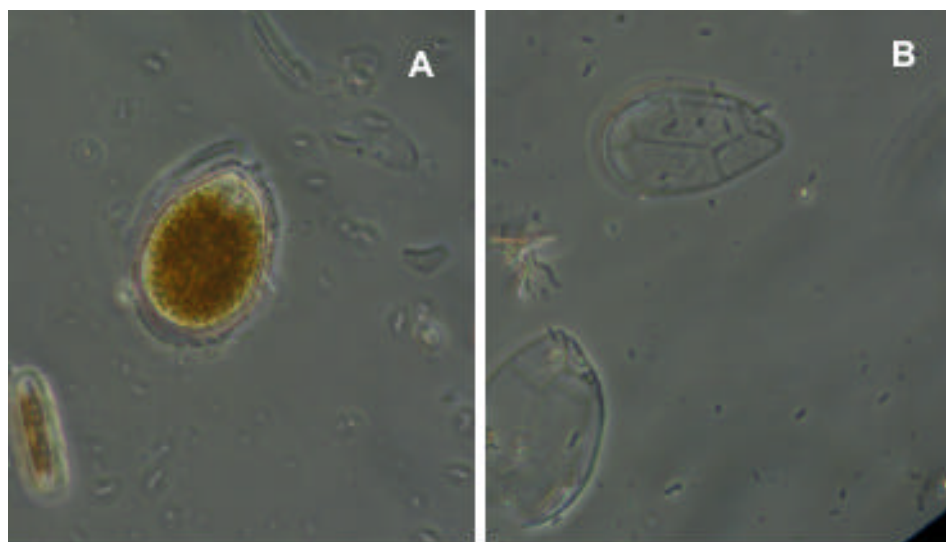


Fig. 3. Light micrographs of *Ostreopsis ovata*: (A) formaldehyde fixed cell. (B) Empty cell showing thecal plates.

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