First bloom of *Ostreopsis* cf. *ovata* in the continental Portuguese coast

Fig. 1. Sampling site on Lagos beach

Blooms of *Ostreopsis* in coastal areas are a topic of increasing interest, mainly in the Mediterranean area, due to the potential hazard that species of this genus might cause to human health and the consequent negative effect on the tourism economy. In contrast to typical blooms of other planktonic dinoflagellates, *Ostreopsis*, as an epibenthic genus, proliferates to form a thin pellicle that covers the substrate. Cell aggregates are normally released into the water column after events of increasing hydrodynamism (waves, tides). These aggregates are detectable by sight as mucilaginous flocs in the water column and at surface in shallow waters.

During the last decade, records of *Ostreopsis* events have been increasing in the Mediterranean. Following outbreaks in the W Mediterranean, in the Balearic Islands in 2005 and on the Murcia coast of Spain in 2006, *Ostreopsis* spp were detected in the NE Atlantic, in macroalgae samples from Madeira and the Canary Islands [1]. The species was later identified as *O.* cf. *ovata* [2]. On the Moroccan Atlantic coast off Cape Ghir, *O.* cf. *siamensis* was observed for the first time in 2004 and blooms have been increasing in intensity and frequency since then [3]. In 2008, several fishermen from the Portuguese Selvagens Islands (located at the same latitude as Cape Ghir) became sick after eating a fish from the genus *Seriola*. The phytoplankton community present in seawater samples from those islands and provided to the IPIMAR monitoring programme revealed the presence of *Ostreopsis* spp., although the relationship with the syndrome was not established. On the Portuguese mainland, during 2008, *Ostreopsis* cf. *siamensis* was identified for the first time in the SW upwelling coast of Sines [4]. In the same year, this species was detected in the Portuguese mid-Atlantic Azores Archipelago together with *O. heptagona* and *O.* cf. *ovata* [5].

In September 2011, as part of a sampling program started in 2010 [6], a bloom of *Ostreopsis* was seen on the beach of D. Ana (Lagos coast, south Portugal, Fig. 1) due to the presence of mucilaginous filaments. This information was communicated to IPIMAR, the national phytoplankton monitoring laboratory, which intensified sampling in time and in adjacent areas. The bloom reached densities as high as 5420 cells L^{-1} although concentrations were lower (40 to 320 cells L^{-1}) in adjacent areas. A forecast of bloom transport and aggregation/dispersion was made with the MOHID operational model for the Portuguese coast (http://forecast.maretec.org/), under the framework of FP7-ASIMUTH project (IST-IPIMAR). Local authorities closed several beaches for bathing once informed about the bloom occurrence and model predictions for its transport.

Identification of *Ostreopsis* solely on morphological criteria is difficult, even when details of the thecal plates are taken into acount. As in most *Ostreopsis* blooms, there was great morphological and size variability in cells from the Lagos coast. Cell dimensions fell within the range of *O.* cf. *siamensis* and *O.* cf. *ovata* and were smaller than the other described *Ostreopsis* species (Figs. 2 and 3). Due to the difficulty of finding a conclusive morphological identification, a genetic analysis was performed to both field and cultured strains based on the ITS1-5.8S-ITS2. Genetic analyses revealed the presence of *Ostreopsis* cf. *ovata*. Our sequences, when compared

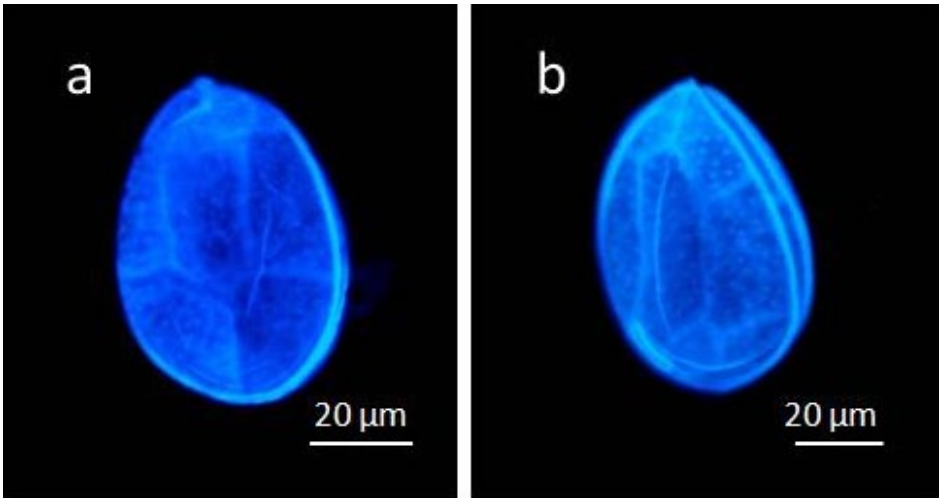

Fig. 2. Calcofluor stained field cells of Ostreopsis*. Hypotheca (a) and epitheca (b) views*

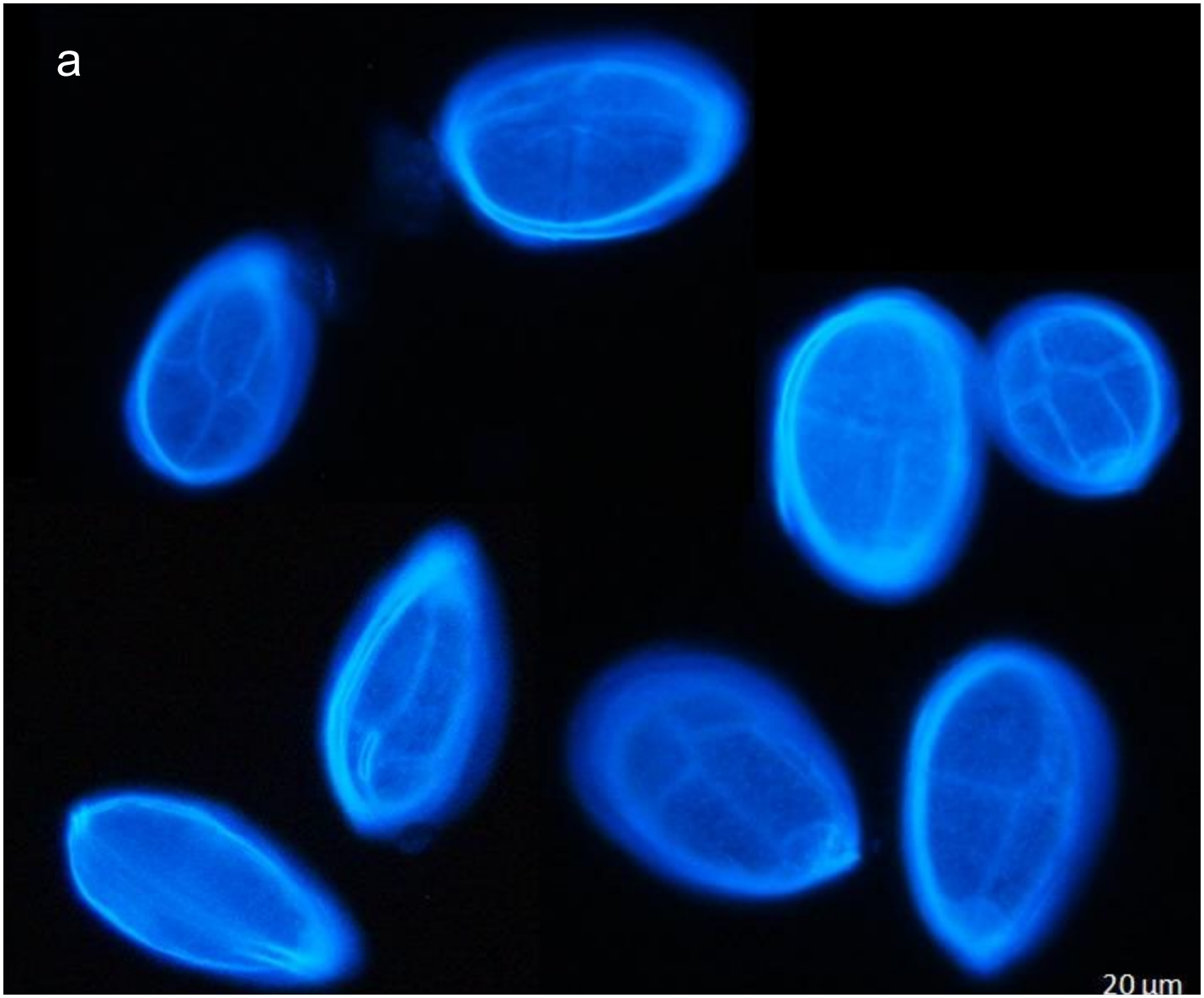

Fig. 3. Field sample of Ostreopsis*: (a) Light microscopy; (b) Calcofluor stained specimens showing morphological variability.*

to the ones of GenBank showed high similarity (99%) with strains from the Mediterranean Sea (e. g. Aegean Sea, Catalan Coast, and Tyrrhenian Sea) [2].

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References

1. *Fraga S et al 2005. Poster, ASLO Summer 2005 (Santiago Compostela, Spain)*
2. *Penna et al 2010. J Biogeography 37: 830-841*
3. *Bennouna et al 2010. HAN 42:1 & 3*
4. *Amorim et al 2010. HAN 42: 6-7*
5. *Silva et al 2010. HAN 42: 1-2*
6. *David H et al., 2011. ICOD proceedings, 4-8 April (Villefranche-sur-mer)*

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