

## Massive proliferation of a dictyotalean species (Phaeophyceae, Ochrophyta) through the Strait of Gibraltar (Research note)

Ocaña<sup>1\*</sup>, Ó., Afonso-Carrillo<sup>2</sup>, J. & Ballesteros<sup>3</sup>, E.

<sup>1</sup> Museo del Mar de Ceuta, Muelle España, s/n, 51001 Ceuta, Spain

<sup>2</sup> Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna  
38200 San Cristóbal de La Laguna, Tenerife, Canary Islands, Spain

<sup>3</sup> Centre d'Estudis Avançats de Blanes (CSIC)

Accés Cala Sant Francesc, 14, 17300 Blanes, Girona, Spain

\* Corresponding autor: Óscar Ocaña (email: lebruni@telefonica.net)

### ABSTRACT

A massive proliferation of a dictyotalean seaweed has been observed growing on shallow rocky bottoms on both sides of the Strait of Gibraltar. Since the autumn 2015, and mainly during summer 2016, a significant growths of the alga have been proven in Ceuta, La Línea and Gibraltar but surely the species should be spread out on more spots along the region. Morphological observations have resulted insufficient for a reliable identification at the species level and consequently the true identity of the dictyotalean alga responsible for this massive proliferation needs to be established by molecular phylogenetic analyses.

**Key words:** Massive proliferation, Phaeophyceae, seaweed, Strait of Gibraltar.

### RESUMEN

Proliferación masiva de una especie de alga dictiotal (Phaeophyceae, Ochrophyta) a través del Estrecho de Gibraltar (Nota de investigación).- Se ha detectado una masiva proliferación de un alga parda dictiotal colonizando los fondos rocosos someros a ambos lados del Estrecho de Gibraltar. Desde el otoño de 2015, y principalmente durante el verano de 2016, se constataron crecimientos significativos del alga en Ceuta, La Línea y Gibraltar, pero seguramente la especie se ha expandido por más puntos a lo largo de la región. Las observaciones morfológicas han resultado insuficientes para una identificación fiable a nivel de especie y, por consiguiente, la verdadera identidad del alga dictiotal responsable de esta proliferación masiva necesita establecerse mediante análisis filogenéticos moleculares.

**Palabras clave:** Alga marina, proliferación masiva, Phaeophyceae, Estrecho de Gibraltar.

## 1. REPORT

Since the autumn 2015, and mainly during summer 2016, a massive proliferation of a dictyotalean seaweed has been observed colonizing shallow rocky bottoms on both sides of the Strait of Gibraltar. Significant growths of the alga have been proven in Ceuta, La Línea and Gibraltar but surely the species should be spread out on more spots along the region.

Due to the very high proliferation of this seaweed, the benthic landscape is being profoundly transformed. The characteristic mixed meadows of seaweeds present along the littoral North of the Bay of Ceuta (see OCAÑA *et al.*, 2009) have become significantly impoverished. Populations of several seaweed species have decreased, because the available space is fully occupied. The rhodophycean *Sphaerococcus coronopifolius* as well as several *Dictyota* species, which previously covered the sea bottom, are hardly observed after the invasión (Fig. 1). Both the main shallow benthic communities and the deepest benthic habitats (coralligenous environments and hemisciaphilic assemblages) seem to be directly affected by the massive growth of this species. Gorgonians, ascidians and other marine invertebrates can be affected by potential harmful effects of algal cover. Some specimens of the gorgonians *Paramuricea clavata* and *Eunicella singularis* were observed densely surrounded by this alga (Fig. 2).



**Figure 1.-** Other seaweeds can hardly growth among the invasive alga.



**Figure 2.-** Specimens of the gorgonians *Paramuricea clavata* (red colour) and *Eunicella singularis* (white colour) densely surrounded by the brown alga.

Accumulation of algal wrack on beaches is causing dramatic effects in some areas since at least 15.5 km of coast were strongly affected by this massive proliferation at the end of summer 2016. Only in the littoral of Ceuta 5000 tonnes of seaweed wrack have been removed (Fig. 3), an emblematic beach has remained closed forth the whole bathing season, and the stacking of algae under the sand has increased the beach level. Fishermen from both shores of the Strait of Gibraltar have been also affected by the spreading of this brown alga, collapsing fishing nets or disabling bottoms of specific fishing.

*Dictyota dichotoma*, a fairly common species on Northeastern Atlantic rocky bottoms (see TRONHOLM *et al.*, 2008; 2010; RODRÍGUEZ-PRIETO *et al.*, 2013) was first estimated as the likely responsible for this unusual proliferation. However, evidences based on the morphology and vegetative structure of some voucher specimens did not confirm the first identification and it showed to be another dictyotalean species. The specimens, which lacked reproductive structures, were characterized by a dichotomously branched thallus with a medulla unilayered centrally and multilayered near the margins. This anatomical feature is only known from a few species belonging to the genera *Dictyota* and *Rugulopteryx* (see VERLAQUE *et al.*, 2009). Morphological observations have resulted insufficient for a reliable identification at the species level, although there are two probable options: *Dictyota pinnatifida* Kützing a species described from Lesser Antilles and widely



**Figure 3.-** Impressive seaweed wreck on North litoral of Ceuta along the summer 2016.

reported in the central Atlantic Ocean, from Bermuda to Brazil (WYNNE, 2011) and from Madeira to Cape Verde Islands (JOHN *et al.*, 2004), or *Rugulopteryx okamurae* (Dawson) I.K. Hwang, W.J. Lee & H.S. Kim, a species described from Japan, widely distributed in northwest Asia (HWANG *et al.*, 2009), and recently reported as introduced in the coastal lagoon of Thau (France, Mediterranean) probably along with Japanese oysters imported into Europe for mariculture purposes (VERLAQUE *et al.*, 2009). Consequently, the true identity of the dictyotalean brown alga responsible for this massive proliferation through the Strait of Gibraltar presented here, needs to be established by molecular phylogenetic analyses.

The identification as well as a first assesment of the spread and impact of dense populations of this species on local benthic communities is now under development and it will be the subject of a future article.

## 2. ACKNOWLEDGEMENTS

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