

246. CONTRIBUTIONS TO THE BENTHIC MARINE FLORA OF CHAFARINAS ISLANDS (ALBORAN SEA, WESTERN MEDITERRANEAN)María ALTAMIRANO^{1*}, Julio DE LA ROSA², Monia FLAGELLA¹, Marianela ZANOLLA¹

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Contribuciones a la flora marina bentónica de las Islas Chafarinas (Mar de Alborán, Mediterráneo Occidental)

Key words. Chafarinas Islands, geographical distribution, Mediterranean Sea, seaweeds.

Palabras clave. Islas Chafarinas, corología, macroalgas marinas, Mediterráneo.

Chafarinas Islands is the smallest Spanish archipelago, located less than 3 km far from the Moroccan coast near to the Argelian frontier (south-eastern Alboran Sea, Western Mediterranean). It is constituted by three small volcanic islands named Isla de Isabel II, Isla del Rey and Isla del Congreso, the former the only one housing a permanent population of military staff. As a whole, they exhibit a perimeter of approximately 7 km and a maximum height of 137 m at Isla del Congreso, with a maximum depth of nearly 60 m depth less than half a kilometer from the coast.

Due to its important biodiversity, this archipelago is considered in the Spanish law National Refuge of Hunting (since 1982), Special Zone for the Protection of Birds (since 1989) and European Community Interesting Place (since 2006, 92/42/CEE Directive). Nowadays, it represents one the few pristine marine environments in the Mediterranean, due to total absence of human disturbing activities.

The first reference on the algae of these islands was provided by Conde (1984),

based on samples collected in an expedition performed in the archipelago in 1980. Later, temporal scattered contributions were added to the knowledge of the marine flora of occidental benthic African Mediterranean coast (Navarro & Gallardo 1989, González & Conde 1994), and specifically to the archipelago of Chafarinas (Flores & Conde 1998; Altamirano 1999, Altamirano *et al.* 2010). Nearly the whole information was lately included as bibliographic references in the checklists of marine seaweeds of Morocco (Benhissoune *et al.* 2001, 2002a, 2002b, 2003), which includes mainly eulittoral collections.

Continuing with the study of the marine flora of the Archipelago of Chafarinas Islands, the aim of this work is to increase the knowledge on the marine flora of the Archipelago of Chafarinas Islands, providing 17 new records, 10 Rhodophyta, 1 Phaeophyceae and 6 Chlorophyta. Six taxa (indicated with an asterisk) represent new records for the coast of Morocco, and three for the northern coast of Africa.

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Figure 1. Sampling sites location at Chafarinas Islands. 1. Playa Larga, Isla de Congreso; 2. West part of Isla de Isabel II; 3. Muelle Chico, Isla de Isabel II; 4. Las Cuevas, Isla de Congreso; 5. North-west part of Isla de Rey; 6. La Sartén, Isla de Rey; 7. La Piedra, Isla de Congreso; 8. Punta España, Isla de Isabel II.

Samples were collected from Isla del Congreso, Isla del Rey and Isla de Isabel II in August 2011 (fig. 1) by SCUBA diving and snorkeling, carried to the laboratory of the Estación Biológica Islas Chafarinas and immediately identified. Coordinates are given in UTM Datum ETRS89. Herbarium sheets of the different taxa of Rhodophyta, Phaeophyta and Chlorophyta have been included at the University of Málaga Herbarium (MGC). Herbarium acronyms follow Thiers (2013).

RHODOPHYTA

Caulacanthaceae

Caulacanthus ustulatus (Mertens ex Turner) Kützinger
 “Muelle Chico”, Isla de Isabel II. 30S 552067 3893242. 13.VIII.2011. MGC Phyc 5138. Eulittoral.

Corallinaceae

Lithophyllum stictaeforme (Areschoug) Hauck

“Playa Larga”, North-west part of Isla de Congreso. 30S 551021 3892702. 11.VIII.2011. MGC Phyc 5453. In *Posidonia oceanica* L. meadows at -6 m depth. “La Sartén”, North-east part of Isla del Rey. 30S 552622 3893347. 15.VIII.2011. MGC Phyc 5454. -15 m depth. “Punta España”, North-west part of Isla de Isabel II. 30S 551696 3893609. 13.VIII.2011. MGC Phyc 5455. -13 m depth. Fig. 2a.

Cystocloniaceae

* *Hypnea valentiae* (Turner) Montagne

“Punta España”, North-west part of Isla de Isabel II. 30S 551696 3893609. 13.VIII.2011. MGC Phyc 5456. -12 m depth. This is the first record of this species for the northern coast of Africa. Identification has been achieved following Tsiamis & Verlaque (2011), who highlighted the following traits as the main taxonomical characteristics of the species: erect, rather delicate habit, cylindrical main axes, branching not divaricate, spines sparse, simple and up to 1.5 mm long, and cell visible in cross section and distinctly smaller than medullary cells. From the eleven species of *Hypnea* present in the

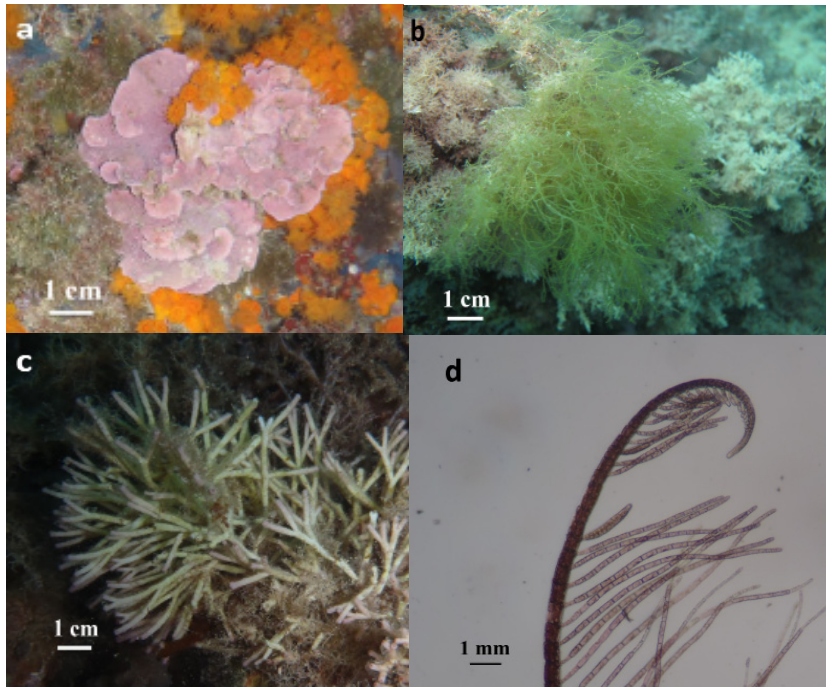


Figure 2. a) *Lithophyllum stictaeforme*; b) *Hypnea valentiae*; c) *Tricleocarpa fragilis*; d) *Cottoniella filamentosa*.

Mediterranean Sea, *H. valentiae* is one of the nine exotic ones. Fig. 2b.

Galaxauraceae

* *Tricleocarpa fragilis* (L.) Huisman & R.A. Townsend
 “Punta España”, North-west part of Isla de Isabel II. 30S 551696 3893609. 13.VIII.2011. MGC Phyc 5457. -14 m depth. This report represents the first record of the species for the Moroccan coast and the northern coast of Africa. Fig. 2c.

Gelidiaceae

* *Gelidium attenuatum* (Turner) Thuret
 “Muelle Chico”, Isla de Isabel II. 30S 552067 3893242. 13.VIII.2011. MGC Phyc 5458. On harbour slide at -2 m depth. North-west part of Isla de Rey. 30S 552452 3893715. 14.VIII.2011. MGC Phyc 5459. It represents the first record of the species for the Moroccan coast.

Liagoraceae

Liagora viscida (Forsskål) Thuret
 “Muelle Chico”, Isla de Isabel II. 30S 552067 3893242. 13.VIII.2011. MGC Phyc 5460. On harbour slide at -2 m depth.

Phylloporaceae

Phyllophora crispa (Hudson) P.S. Dixon
 “Playa Larga”, South-west part of Isla de Congreso. 30S 551021 3892702 11.VIII.2011. MGC Phyc 5461. -8 m depth.

Rhodomelaceae

Laurencia obtusa (Hudson) J.V. Lamouroux
 North-west part of Isla de Rey. 30S 552452 3893715. 14.VIII.2011. MGC Phyc 5462. “Punta España”, North-west part of Isla de Isabel II. 30S 551696 3893609. 15.VIII.2011. MGC Phyc 5463. “La Piedra”, South-east part of Isla de Congreso. 30S

551197 3893016. 16.VIII.2011. MGC Phyc 5464. Always infralittoral, from -6 m depth.

Sarcmeniaceae

Cottoniella filamentosa (M.A. Howe) Børgesen

“Punta España”, North-west part of Isla de Isabel II. 30S 551696 3893609. 13.VIII.2011. MGC Phyc 5465. -14 m depth. North-west part of Isla de Rey. 30S 552452 3893715. 14.VIII.2011. MGC Phyc 5466. -20 m depth. “La Sarten”, North-east part of the North-east part of Isla del Rey. 30S 552622 3893347. 15.VIII.2011. MGC Phyc 5467. -15 m depth. North-east part of Isla de Isabel II. 30S 552040 3893555. 15.VIII.2011. MGC Phyc 5468. -10 m depth. Some samples were reproductive exhibiting spermatangial branches. Fig. 2d.

SCINAIACEAE

Sciniaia furcellata (Turner) J. Agardh

“Punta España”, North-west part of Isla de Isabel II. 30S 551696 3893609. 13.VIII.2011. MGC Phyc 5469. -14 m depth.

PHAEOPHYCEAE

Arthrocladiaceae

Arthrocladia villosa (Hudson) Duby

North-west part of Isla de Rey. 30S 552452 3893715. 14.VIII.2011. MGC Phyc 5470. -20 m depth. It represents the first record for the Mediterranean coast of Morocco.

CHLOROPHYTA

Anadyomenaceae

* *Microdictyon tenuius* J.E. Gray

“Las Cuevas”, South-west part of Isla de Congreso. 30S 550639 3892927. 12.VIII.2011. MGC Phyc 5471. -17 m depth. “La Piedra”, South-east part of Isla de Congreso. 30S 551197 3893016. 16.VIII.2011. MGC Phyc 5472. -10 m depth. This is the first report of the species for the Moroccan coast.

Cladophoraceae

* *Cladophora retroflexa* (Bonnemaison ex P.L. Crouan & H.M. Crouan) G. Hamel
West part of Isla Isabel II. 30S 551726

3893315. 12.VIII.2011. MGC Phyc 5473. In eulittoral rockpools. This is the first record for the Moroccan coast and the northern coast of Africa.

* *Cladophora battersii* Hoek

West part of Isla Isabel II. 30S 551726 3893315. 12.VIII.2011. MGC Phyc 5474. In eulittoral rockpools. “Muelle Chico”, Isla de Isabel II. 30S 552067 3893242. 13.VIII.2011. MGC Phyc 5475. On harbour slide at -2 m depth. This is the first record for the Moroccan coast.

Codiaceae

Codium adhaerens C. Agardh

“La Sarten”, North-east part of Isla del Rey. 30S 552622 3893347. 15.VIII.2011. MGC Phyc 5476. -15 m depth.

Codium decorticatum (Woodward) M.A. Howe

“Muelle Chico”, Isla de Isabel II. 30S 552067 3893242. 13.VIII.2011. MGC Phyc 5477. On harbour slide at -2 m depth. “La Piedra”, South-east part of Isla de Congreso. 30S 55197 3893016. 16.VIII.2011. MGC Phyc 5478. -9 m depth.

Derbesiaceae

Derbesia tenuissima (Moris & De Notaris) P.L.

Crouan & H.M. Crouan

“La Sarten”, North-east part of Isla del Rey. 30S 552622 3893347. 15.VIII.2011. MGC Phyc 5479. -15 m depth.

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