

First record of *Acrothamnion preissii* (Rhodophyta: Ceramiaceae) from the Maltese Islands (central Mediterranean Sea)

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The ceramiacean red alga Acrothamnion preissii is an Indo-Pacific species that was first recorded in the Mediterranean Sea (Italy) in 1969, and which subsequently spread within the north-western basin, reaching the Balearic Islands to the west and Sicily to the south. Here we record A. preissii from the Maltese Islands, which represents a further southwards expansion of its known distribution range in the Mediterranean Sea. Although this species can be invasive, becoming the dominant epiphyte by forming dense turfs that smother native species, so far there is no evidence for such an invasion phase in the Maltese Islands.

Keywords: Ceramiales, Malta, invasive species, alien species, range expansion

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INTRODUCTION

Acrothamnion preissii (Sonder) E.M. Wollaston, 1968 is a filamentous red alga native to the Indo-Pacific region. In 1969, this species was discovered off the coast of Livorno, Italy (Cinelli & Sartoni, 1969) and subsequently spread westwards, having been recorded from the Tuscan Archipelago (Papi *et al.*, 1992; Pardi *et al.*, 1993) and the Ligurian coast of Italy (Bianchi & Morri, 1994), southern France (Boillot *et al.*, 1982; Thélén, 1984), Monaco (Di Martino & Giaccone, 1996) and the Balearic Islands (Ferrer *et al.*, 1994). *Acrothamnion preissii* also extended its range in a southerly direction, with records from Naples (Guala *et al.*, 2004), Ustica (Piazzi & Cinelli, 2000) and Sicily (Giaccone & Di Martino, 1996), and has more recently invaded the Adriatic Sea where it was found for the first time in Dubrovnik, Croatia (Despalatović *et al.*, 2008).

In the Mediterranean Sea, *A. preissii* occurs mainly on living or dead rhizomes of *Posidonia oceanica* (Linnaeus) Delile, 1813 and amongst sciaphilic algae on vertical walls or overhangs, but it can also grow epiphytically on *P. oceanica* leaves or on macroalgae and on coralligenous or maerl bottoms down to a depth of 40 m (Ferrer *et al.*, 1994; Piazzi & Cinelli, 2003; Weitzmann *et al.*, 2009; Klein & Verlaque, 2011). This species can sometimes form dense turfs that trap sediment and smother underlying native species, thus reducing the species richness and functional algal diversity of the epiphytic macroalgal community where it occurs (Piazzi & Cinelli, 2000, 2003; Piazzi *et al.*, 2002). *Acrothamnion preissii* may have an economic impact since it can clog up fishing nets (Cinelli *et al.*, 1984). It is therefore considered to be an invasive species (Boudouresque &

Verlaque, 2002) and it has been included in the list of the 100 'Worst Invasives' in the Mediterranean Sea by Streftaris & Zenetos (2006) and in the 'Black List of [Mediterranean] Marine Invasive Species' by Otero *et al.* (2013). At present, invasive populations of *A. preissii* are known from France, Italy, Monaco and Spain (Otero *et al.*, 2013).

Here we present the first record of *A. preissii* from the Maltese Islands. This represents a southwards expansion of its known distribution range in the Mediterranean Sea by some 100 km, which now extends to the central Sicilian Channel.

RESULTS

Tufts of algae containing filamentous rhodophytes were collected during a dive at Cirkewwa, on the northern coast of the island of Malta, in April 2014. Microscopic examination of this material revealed the presence of *Acrothamnion preissii* (Figure 1). In the field, this alga was preferentially growing as an epiphyte on the rhodophyte *Phyllophora crispa* (Hudson) P.S. Dixon, 1964 on a shaded vertical rock face beneath an overhang at depths of 20 to 25 m. Although moderately common, *A. preissii* did not dominate the *P. crispa* epiphytic assemblage, which also included *Chaetomorpha* sp. Kützting, 1845, *Feldmannia lebelii* (Areschoug ex P.L. Crouan & H.M. Crouan) G. Hamel, 1939, *Halopteris filicina* (Grateloup) Kützting, 1843, *Heterosiphonia* spp. Montagne, 1842 and another invasive red alga, *Womersleyella setacea* (Hollenberg) R.E. Norris, 1992. *Acrothamnion preissii* was also found growing on *Cystoseira spinosa* Sauvageau, 1912 on a horizontal rock platform at depths of 20 to 25 m, but here it occurred at a much lower abundance than on *P. crispa*.

To assess whether *A. preissii* has a more widespread distribution in the Maltese Islands, surveys were made at two additional sites, one located a few kilometres away from

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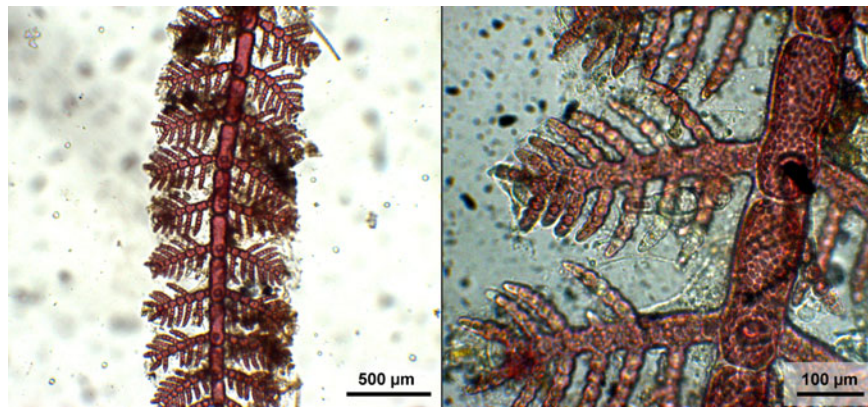


Fig. 1. Photomicrographs of *Acrothamnion preissii* collected from Cirkewwa, Malta (see Figure 2).

Cirkewwa, on the western side of the island of Malta, and the other on the west coast of the island of Gozo (Figure 2). No specimens of *A. preissii* were recorded from Gnejna, Malta. In the case of Dwejra, Gozo, a few tufts of this species were recovered from *Cystoseira foeniculacea* (Linnaeus) Greville, 1830 at a depth of 25 m, indicating that *A. preissii* is present in the area but at a very low abundance. Filamentous rhodophytes did not form extensive turfs at any of the three sites surveyed.

DISCUSSION

Acrothamnion preissii is distributed in the north-western and central Mediterranean Sea. It is frequent along the Ligurian and adjacent southern French coasts and in the northern Tyrrhenian, and less common around the Balearic Islands, the central Tyrrhenian coast of Italy (Campania) and around Sicily (e.g. Klein & Verlaque, 2011), but was not known to occur further south prior to the present record, despite detailed surveys for this species undertaken in other

central Mediterranean sites (e.g. in Cape Bon [Tunisia], in Pantelleria and in Lampedusa; see Piazzì & Cinelli, 2000; Piazzì *et al.*, 2002; Furnari *et al.*, 2010). Thus, the present report of *A. preissii* from the Maltese Islands represents the first record of this species from the central Sicilian Channel and indicates a southwards expansion of its distribution range by some 100 km. Given that *A. preissii* is a small and inconspicuous alga that is not identifiable in the field, it can easily be overlooked and remain unnoticed in the absence of regular meticulous collection and examination of epiphytic assemblages (Piazzì & Cinelli, 2000; Meinesz, 2007). Therefore, although there is an 18-year gap between the present Maltese record and that from Sicily in 1996 by Giaccone & Di Martino (1996), this does not necessarily imply that *A. preissii* has extended its range recently. On the other hand, this species was not present around the islands in 1994–1995 when Cormaci *et al.* (1997) carried out detailed sampling of marine algae in Malta.

According to Sartoni & Sarti (1976), the original introduction of *A. preissii* into the Mediterranean region was likely due to transportation via shipping activities. Its subsequent westwards expansion from Livorno along the northern coasts of the western Mediterranean basin may have occurred naturally due to the dominant currents in the area (Boillot *et al.*, 1982), enabling *A. preissii* to spread via vegetative multiplication (Boudouresque & Verlaque, 2002). On the other hand, its westernmost limit of distribution along the southern coasts of France is Marseille (Klein & Verlaque, 2011), so the spread of *A. preissii* to the Balearic Islands and Malta may have involved human-mediated vectors of dispersal. No information on how this species spread southwards to Sicily and Malta exists, but this could include both natural range expansion and mechanisms based on anthropogenic activities; multiple introductions of species via different vectors are not uncommon (Verlaque *et al.*, 2007).

The reported habitats of *A. preissii* from the Maltese Islands (as an epiphyte on macroalgae at depths of 20 to 25 m, in low quantities on *Cystoseira* spp. and moderately common on the sciaphilic *Phyllophora crispa*) are similar to those elsewhere in the north-western Mediterranean Sea (e.g. Klein & Verlaque, 2011). No examination of the epiphytes on *Posidonia oceanica* rhizomes was carried out, so it is not known if *A. preissii* also occurs in this habitat in the Maltese Islands. However, no extensive dense turfs were observed at any of the locations surveyed, including

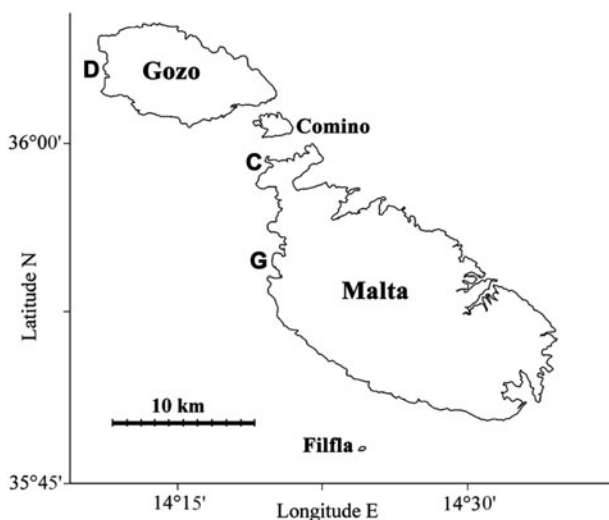


Fig. 2. Map of the Maltese Islands showing the location of the three sampling sites: Cirkewwa (C), Dwejra (D) and Gnejna (G). *Acrothamnion preissii* was present at Cirkewwa and with low abundance at Dwejra; it was not recorded from Gnejna.

amongst *P. oceanica* beds. This indicates that thus far neither *A. preissii* nor *Womersleyella setacea* (from which *A. preissii* cannot be distinguished in the field) can be considered to be acting invasively in the infralittoral waters of the Maltese Islands, although *W. setacea* may be invasive on some maerl beds in the upper circalittoral (Sciberras *et al.*, 2009). Whether these algae will persist without attaining a high biomass or eventually enter an invasion phase can only be ascertained by regular surveys of their reported habitats. Such monitoring is essential given that control of these species can only be carried out effectively early in the invasive process; once they become invasive, even containment may be impossible (Otero *et al.*, 2013).

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