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Alien bryozoans in the eastern Mediterranean Sea—new records from the coast of Lebanon

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Abstract

The Levant Basin (SE Mediterranean) is the most exposed to the introduction of non-indigenous species. The current assessment of exotic bryozoans present along the coast of Lebanon has been completed by the recording of fourteen cheilostome species (one cryptogenic) collected by diving in 17 localities (2–42 m). This set of exotic bryozoans comprises ten genera, including four (*Akatopora* Davis, 1934, *Drepanophora* Harmer, 1957, *Mucropetraliella* Stach, 1936 and *Predanophora* Tilbrook, 2006) not previously reported in the Mediterranean, while *Celleporaria* is the most successful extra-Mediterranean genus with four species in the survey collection. A new *Celleporina* species, *C. bitari* n. sp., also collected in the Red Sea, is described. Although lessepsian migration through the Suez Canal is the main pathway for exotic bryozoans in this region, the geographic origin of some species suggests that shipping through Gibraltar Strait is also responsible to a large extent.

Key words: SE Mediterranean, Levant Sea xenodiversity, non-indigenous species, Bryozoa, Cheilostomata, new species

Introduction

The Mediterranean Sea, despite being small (0.8 % of the World Ocean) and semi-enclosed, is a hotspot for both indigenous biodiversity (Boudouresque 2004; Coll *et al.* 2010; Bianchi *et al.* 2012) and xenodiversity (e.g. Streftaris *et al.* 2005; Zenetos *et al.* 2012; Galil *et al.* 2014; Galil & Goren 2014). As in other marine basins, import pathways for alien species are various (e.g. Minchin *et al.* 2009); among them, three have a substantial impact in the Mediterranean—aquaculture, shipping (since the first voyages overseas: Bianchi & Morri 2000), and above all the Suez Canal, through which connectivity between the Mediterranean and the Red Sea-IndoPacific realm was re-established in 1869 (e.g. Por 1978, 1989; Zibrowius 1991). Colonization of the Mediterranean by 'lessepsian' species involves most groups of flora and fauna, and the kinetics of this process increases dramatically over time (e.g. Pérès 1967; Por 1990; Zenetos *et al.* 2012). The Levant basin, in the Eastern Mediterranean, is an exceptional host area for alien species because of the immediate vicinity of the Suez Canal, the intense maritime traffic related or not to the Canal (Dobler 2002; Abdulla & Linden 2008), and the climatic context of this region. The Levant Basin is the warmest region of the Mediterranean (Abboud-Abi Saad *et al.* 2004), a condition compounded by the general rise of temperature observed in the Mediterranean (Nykjaer 2009). This thermal status increases the invasibility of the coastal zone by thermophilic alien species (Occhipinti-Ambrogi 2007; Lejeusne *et al.* 2009; Bitar 2010).

Bryozoans are among the main fouling components of artificial substrata (Ryland 1965; Gordon & Mawatari 1992; Liu *et al.* 2001). Because of their particular traits (e.g. environmental tolerance, well-adapted growth-forms, rapid growth and early reproduction), bryozoan foulers are particularly prone to dispersal outside their native geographic range by anthropogenic vectors and founding new populations (Watts *et al.* 1998; Campbell *et al.* 2003). The actual magnitude of Mediterranean bryozoan xenodiversity is still imperfectly known and is most likely underestimated (Zenetos *et al.* 2012), as demonstrated by recent investigations in the Levant basin (see below). On the other hand, some old, poorly documented records need to be critically re-examined. Bryozoans transiting through the Suez Canal were first recorded by Hastings (1927). The occurrence of exotic bryozoans in the Levant Basin was subsequently recorded from Israel (Powell 1969a,b; Eitan 1972; Goren 1980; d'Hondt 1988; Sokolover pers. comm.) and Turkey (Ünsal & d'Hondt 1979; Koçak 2007).

Additionally, a rich collection of benthic samples from coastal habitats in Lebanon has provided a basis for focusing in particular on alien bryozoans (Bitar & Kouli-Bitar 2001; Harmelin *et al.* 2007, 2009, 2011, 2012), leading to the identification of 10 non-indigenous and one cryptogenic species. The present study deals with 13 non-indigenous and one cryptogenic cheilostome species, in eight families, not already recorded from the same collection. Among them, a species of Celleporidae also collected in the Red Sea is described as a new species (*Celleporina bitari* n. sp.) and four genera (*Akatopora* Davis, 1934, *Drepanophora* Harmer, 1957, *Mucropetraliella* Stach, 1936, *Predanophora* Tilbrook, 2006) are new additions to the Mediterranean fauna.

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