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## New and rare sponges from the deep shelf of the Alboran Island (Alboran Sea, Western Mediterranean)

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## Abstract

The sponge fauna from the deep shelf (70 to 200 m) of the Alboran Island (Alboran Sea, Western Mediterranean) was investigated using a combination of ROV surveys and collecting devices in the frame of the EC LIFE+ INDEMARES Grant aimed to designate marine areas of the Nature 2000 Network within Spanish territorial waters. From ROV surveys and 351 examined specimens, a total of 87 sponge species were identified, most belonging in the Class Demospongiae, and one belonging in the Class Hexactinellida. Twenty six (29%) species can be regarded as either taxonomically or faunistically relevant. Three of them were new to science (*Axinella alborana* **nov. sp.**; *Axinella spatula* **nov. sp.**; *Endectyon filiformis* **nov. sp.**) and 4 others were Atlantic species recorded for the first time in the Mediterranean Sea (*Jaspis eudermis* Lévi & Vacelet, 1958; *Hemiasterella elongata* Topsent, 1928; *Axinella vellerea* Topsent, 1904; *Gelliodes fayalensis* Topsent, 1892). Another outstanding finding was a complete specimen of *Rhabdobaris implicata* Pulitzer-Finali, 1983, a species only known from its holotype, which had entirely been dissolved for its description. Our second record of the species has allowed a neotype designation and a restitution of the recently abolished genus *Rhabdobaris* Pulitzer-Finali, 1983, also forcing a slight modification of the diagnosis of the family Bubaridae. Additionally, 12 species were recorded for the first time from the shelf of the Alboran Island, including a few individuals of the large hexactinellid *Asconema setubalense* Kent, 1877 that provided the second Mediterranean record of this "North Atlantic" hexactinellid. ROV explorations also revealed that sponges are an important component of the deep-shelf benthos, particularly on rocky bottoms, where they make peculiar sponge gardens characterized by a wide diversity of small, erect species forming a dense "undergrowth" among a scatter of large sponges and gorgonians. The great abundance and the taxonomic singularities of the sponge fauna occurring in these deep-shelf bottoms strongly suggest these habitats to be considered within the environmental protection of the Nature 2000 Network.

**Key words:** Atlantic immigrants, benthic communities, biodiversity, deep benthos, environmental protection, Mediterranean invasions, sponge gardens, Porifera

## Introduction

The Alboran Sea occupies the westernmost basin of the Mediterranean. It is known to be a transitional region between the North Atlantic Ocean and the Mediterranean *sensu stricto*, in terms of both hydrography and organismal distributions. The influx of North Atlantic surface water during most of the Quaternary and in Recent times favors the penetration of many "Atlantic species" in this western Mediterranean zone (Péres & Picard 1964). Consequently, the sublittoral communities in this area often present high biodiversity relative to equivalent communities in nearby Lusitanian and Mauritanian areas (Templado *et al.* 2006; Coll *et al.* 2010).

At the heart of the Alboran basin, the Island of Alboran (Fig. 1), a tiny (642 m long and 265 m wide) islet made of volcanic rocks, emerges from a large (45 km long and 10 km wide) submerged shelf, remnant of an ancient (7–16 my old) volcanic cone. This cone is in turn part of an ancient submerged volcanic chain that crosses the Alboran basin with Northeast-Southwest direction. The bottom of the basin in this area reaches a maximum depth of 1500 m and consists of a thinned crustal microplate formed during the Lower Miocene (about 18 my ago) at an important seismic area where the Euroasian and African plates collided (Comas *et al.* 1992; Martínez-García *et al.* 2010).

Although the hydrography of the Alboran Sea is quite complex, it has been well documented that in the central area where the Alboran Island is located, the incoming Atlantic seawater forms a low-salinity (~36.5 ‰), 150–200 m thick, upper layer above the underlying Mediterranean water (~38.2‰), influencing to a varying extent all the communities on the shelf of the island. The singularity and ecological relevance of the benthic communities on the upper shelf (above 70 m) of the Alboran Island has long been recognized (reviewed in Templado *et al.* 2006), and the upper shelf is currently protected under both Spanish and European legislation by declaration of a Marine Reserve, a Fish Reserve, a Special Area of Mediterranean Importance (SPAMI), and a Site of Community Importance (SCI). Additionally, the shelf of the Alboran Island, due to its strategic location at the Mediterranean entry, may provide a unique reference site for early detection of migration and invasion processes into the Mediterranean by Atlantic organisms.

Previously available information on the sponge fauna of the Alboran Sea (Templado *et al.* 1986; Pansini *et al.* 1987; Maldonado & Benito 1991; Maldonado 1992; Boury-Esnault *et al.* 1994; Maldonado & Uriz 1996, 1999; Rosell & Uriz 2002; Templado *et al.* 2006) strongly suggests that sponges may be an important component of the benthos at the still ill-known deep shelf of the Alboran Island. Interestingly, the deep-shelf sponge fauna of the Alboran Island bears some similarities with that reported from the easternmost areas of the western Mediterranean,

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