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Deep-sea ophiuroids (Echinodermata: Ophiuroidea: Ophiurida) from the Gulf of Cadiz (NE Atlantic)

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Abstract

The Ophiuroidea collected from mud volcanoes and adjacent bathyal environments from the Gulf of Cadiz are reviewed. Thirteen species from six families—Ophiacanthidae, Ophiactidae, Amphiuridae, Amphilepididae, Ophiuridae and Ophiolepididae—were identified. A direct relationship to the chemosynthetic assemblages has not been established as the ophiuroids found in the mud volcanoes do not appear to have novel morphological adaptations and also occur in non-reducing environments. The ophiuroid fauna from the Gulf of Cadiz differs from other cold seep regions not only by the high species richness but also because members of Amphiuridae are dominant both in number of species and abundance. One species previously unknown, *Ophiopristis gadensis* **sp. nov.**, (Ophiacanthidae) was collected from a dead cold-water coral thicket at the flank of a mud volcano and differs from its congeners in the type of disk spines which are more rugose and not smooth as in most of the other species, the presence of the thickened integument in larger specimens and the distinct separation between the oral papillae and the second oral tentacle scales.

Key words: mud volcanoes, reducing environments, macrofauna, biodiversity

Introduction

The first deep-water ophiuroid was discovered more than 150 years ago in the North Atlantic at a depth of 1460 m during the sounding of Baffin Bay (Müller & Troschel 1842 in Menzies *et al*. 1973). During late 19th and early 20th centuries, ophiuroid records have significantly increased due to the collection of many specimens by several deep-water expeditions (Martynov & Litvinova 2008). However, the most important studies on ophiuroids of the Atlantic have been carried out during the past 40 years (e.g. Cherbonnier & Sibuet 1972; Gage *et al.* 1983; Paterson 1985; Bartsch 1987, 1991; Smith et al. 1995; Stöhr & Segonzac 2005) and a taxonomic and biogeographical review has been carried out recently by Martynov and Litvinova (2008). These studies have expanded the global knowledge on this group but, despite these efforts, the deep-sea ophiuroid fauna remains poorly known as many species are only reported from a single or a few individuals. Because morphological identification of ophiuroids is based almost exclusively on skeletal characters, which change greatly in number and shape during growth (Stöhr 2004, 2005), this lack of specimens is of great importance.

Ophiuroids, which have the highest abundance of all deep-sea megafauna taxa in non-reducing environments (Gage & Tyler 1991), have also been reported from several cold seeps and vents (Hecker 1985; Tyler *et al*. 1995; Sibuet & Olu 1998; Gebruk *et al*. 2003; Sahling *et al.* 2003; Van Dover *et al*. 2003; Stöhr & Segonzac 2006; Levin & Mendoza 2007). The unidentified status of several ophiuroid records suggests that the overall diversity of ophiuroids in these reducing environments remains underestimated. Seven species were reported from Blake Ridge, Gulf of Mexico and Barbados cold seeps in the Western Atlantic (Stöhr & Segonzac 2005), two from the Haakon Mosby mud volcano in the Eastern Atlantic (Gebruk *et al*. 2003) and two from the North Pacific Aleutian margin (Levin & Mendoza 2007). Presently, eight species have been reported from hydrothermal communities in the East Pacific and Mid-Atlantic Ridge (MAR) (Stöhr & Segonzac 2005, 2006). From these, only one, *Ophienigma spinil-*

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