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Biodiversity of freshwater sponges (Porifera: Spongillina) from northeast Brazil: new species and notes on systematics

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Abstract

Systematics and distribution of freshwater sponges is still poorly understood worldwide. This may be due to the scarcity of records, and the limited information about morphological traits used for taxonomy. Brazil has reportedly high species richness in the Neotropical Region; however, this diversity is likely to be significantly underestimated given that there are still many unexplored and poorly sampled areas, mainly in the north and northeast regions. We present here new locality records and taxonomic notes on three families and ten species of freshwater Porifera from northeast Brazil: Metaniidae (1), Potamolepidae (2) and Spongillidae (7). A new species of freshwater sponge is described here (*Ephydatia caatingae* sp.nov.). Additional notes on the systematics and biogeography of most of these species are also presented.

Key words: Porifera, Continental sponges, Haplosclerida, Neotropical Region, Brazil, Spongillidae

Introduction

Although a vast majority of the sponge species can be found in marine environments (8500+ valid species; Van Soest *et al.* 2015), there are also about 260 species living in freshwaters worldwide. These ancient invertebrates are found in many different continental aquatic environments such as streams, rivers, lakes, ponds and caves. Freshwater sponges are spread in all biogeographic regions, except Antarctica (Manconi & Pronzato 2008; van Soest *et al.* 2012). They are able to live in many adverse environmental conditions and colonize a wide variety of habitats with hard substrata such as rocks, shells of mollusks, wood debris, roots, branches in riparian zone and macrophytes (Manconi & Pronzato 2002, 2007).

Many freshwater sponge species produce gemmules, structures that contain totipotent cells protected by gemmular theca, which are important in survival and dispersal of species. These gemmules allow freshwater sponges to tolerate and survive in adverse environments such as thermal waters, drought, cold, anoxic, eutrophic and polluted waters (Harrison 1974; Ricciardi & Reisinger 1993; Pronzato & Manconi 1994; Lauer *et al.* 2001). In addition, the gemmules work as propagules and are responsible for long distance dispersal of sponge species. The main widespread families of freshwater sponges are known to produce gemmules (e.g. Metaniidae, Potamolepidae and Spongillidae). The taxonomy of these cosmopolitan families is based on the presence and features of the gemmules and gemmuloscleres (Manconi & Pronzato 2001, 2002).

Currently, all freshwater sponges are classified under the order Spongillida Manconi & Pronzato, 2002, which includes six extant families and a fossil family, Palaeospongillidae Volkmer-Ribeiro & Reitner, 1991 (Itskovich *et al.* 2007; Redmond *et al.* 2007). Spongillidae Gray, 1867 is the most species rich family and is cosmopolitan in distribution. Families like Metaniidae Volkmer-Ribeiro, 1986 and Potamolepidae Brien, 1967 are also reasonably widespread. The other families, Lubomirskiidae Rezvoi, 1936, Malawispongiidae Manconi & Pronzato, 2002 and Metschnikowiidae Czerniavsky, 1880, are restricted to ancient lakes (e.g. Baikal, Caspian Sea, Tanganyika, Malawi, Tiberias, Poso) and have low species richness. These families differ from the former by absence of microscleres and these do not produce gemmules, which are not needed in the stable conditions of their deep-water habitats (Manconi & Pronzato 2007).