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HOW MANY SPONGES LIVE IN ANCHIALINE CAVES?

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To contribute to the assessment of global biodiversity, this paper reviews available information on the cave-dwelling anchialine sponge fauna worldwide.

Key words: biodiversity assessment, Porifera, cave-dwellers, karst caves, lava tunnels, subterranean estuaries.

INTRODUCTION

Faunal diversity in anchialine cave systems is often restricted, by the ecotonal and extreme nature of these biotopes, to a few marine lineages that might represent the first step in the colonization processes of continental aquatic habitats by marine invasions (RIEDL, 1966; SKET, 1996). Anchialine caves are centres of endemicity for taxa of marine origin (RIEDL, 1966; SKET, 1996; ILIFFE, 2000; HUMPHREYS, 2006; HUMPHREYS *et al.*, 2009) although knowledge on the biodiversity of several taxa is extremely poor worldwide.

To contribute to the assessment of global biodiversity, this paper reviews available information on the cave-dwelling anchialine sponge fauna worldwide.

MATERIAL & METHODS

Detailed investigations are in progress to ascertain the existence of published data (including grey literature) on anchialine sponges, and the presence of preserved samples scattered across scientific institutions, or in private collections.

In addition, cooperation is in progress with speleo-teams in Italy, Austria, Croatia, Texas, and Thailand, and new contacts are planned to engage with divers, scientists, and amateurs in the field of biospeleology to acquire more samples and information.

New samples of sponges were analysed that were recently collected from two sites:

– Canary Islands, Lanzarote, Corona lava tube, Tunel de la Atlantida at 722 m from the entrance of the submerged tunnel Montaña de Arena, depth 18 m (courtesy of A. Martinez);

– Sardinia, oriental karst, shallow water in estuarine caves.

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Sponges were dissected under a stereo microscope to observe macro-traits. Representative fragments of the skeleton were analysed by light and SEM microscopy to determine the taxonomic status following standard methods (MANCONI & PRONZATO, 2000).

RESULTS & DISCUSSION

The bibliographic search indicates that the sponge fauna, and sessile benthic taxa in general, from anchialine caves have been sparsely investigated (VAN SOEST & SASS, 1981; CHEVALDONNÉ *et al.*, 2005; OERTEL & PATZNER, 2007; MANCONI, 2009; MARTINEZ *et al.*, 2009; MANCONI *et al.*, 2010). A few synopses (VANDEL, 1964; VAN SOEST & VELIKONJA, 1986; VACELET, 1994; CADEDDU, 2012) highlighted the extreme rarity, the high values of endemicity, and the relictual status of cave-dwelling sponges in totally dark caves.

The few records of sponges refer to species endemic to a single cave or a single cave system. *Higginsia ciccaresei* Pansini & Pesce, for example, is endemic to the Mediterranean Zinzulusa Cave (PANSINI & PESCE, 1998), and *Protosuberites geracei* (van Soest & Sass) together with *Oceanapia penicilliformis* (van Soest & Sass) are endemic to the Bahamian Dixon Hill Lighthouse Cave on San Salvador (VAN SOEST & SASS, 1981). Another species, *Cinachira subterranea* van Soest & Sass, previously considered endemic to the latter cave, is currently considered to be a junior synonym of the much more widespread species *Cinachyrella alloclada* (Uliczka, 1929).

The recent records of *Protosuberites* cf. *epiphytum* (Lamarck, 1815) and a haplosclerid species (MANCONI & LEDDA, in prep.) in the Bue Marino Cave (Sardinian karst) are also remarkable. The latter investigation was focused on cryptobiosis by resting bodies as an adaptive strategy exhibited by cave-dwelling sponge fauna. Life history traits of sponges are, in general, largely unknown not only in anchialine and freshwater biotopes but also in well known marine caves.

A rich taxocenosis of sponges was reported by ILIFFE (2000) and GARCÍA-VALDECASAS (1985), including the presence of abundant sessile filter-feeders, from the Corona lava tube system on Lanzarote. Taxonomic investigations are currently in progress on sponges from the Corona lava tube and the Sardinian karst.

Historical investigations show that very few published data exist. Although samples of sponges are registered in some collections, no taxonomic investigations have been undertaken on these material (T. Iliffe, *in litteris*). Investigations are in progress on new samples and new sampling campaigns are planned for the near future in the Bahamas, Canary Islands and Sardinia.

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