A new neotropical and southernmost distributional record of freshwater sponge dosilia radiospiculata (Mills, 1888) (Porifera: Demospongeia: Spongillidae) from Honduras

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ABSTRACT
We added a new record of a freshwater sponge at the family level from Honduras. The presence of the *Dosilia* genus in Central America was confirmed, extending its distribution by 890 linear miles south of Mexico. This constitutes a new southern range extension of *D. radiospiculata* from the Nearctic to Neotropical region. The specimen was collected from the Pacific slope of Honduras. Although sponges constitute an important element of a freshwater ecosystem, environmental pressures and contamination of rivers or other aquatic environments, where they exist, have not been considered under any category of protection.

RESUMEN
Se agrega un nuevo registro de una esponja de agua dulce anivel familia en Honduras. Se confirmó la presencia del género *Dosilia* en Centroamérica, extendiendo su distribución en 890 millas lineales al sur de México. Esto constituye una nueva extensión de rango desde la región Neártica al Neotrópico para *D. radiospiculata*. El especímen fue recolectado de la vertiente del Pacífico de Honduras. A pesar de que las esponjas constituyen un elemento importante de un ecosistema de agua dulce, las presiones ambientales y la contaminación de las ríos u otros ambientos acuáticos, cuando existen, no se han considerado bajo ninguna categoría de protección.

Introduction

The freshwater sponges of the Spongillidae family are widespread and most diverse, with approximately 22 genera and 155 species [1]. Twelve species from eight genera were added by Manconi and Prozanto [1] from Central American countries (Belize, Guatemala, El Salvador, Costa Rica, and Panama). In Nicaragua, Rueda and Mesquita-Joanes [2] reported the presence of one species of freshwater sponge, *Radiospongilla crateriformis*, which represented a new species report from Central America. However, there have been no records of any species or genera of freshwater sponges of the family Spongillidae from Honduras.

Manconi and Prozanto [3] considered that the genus *Dosilia* had representatives in four zoogeographic regions: Nearctic (NA), Neotropical (NT), Afrotropical (AT), and Oriental (OL). According to Manconi and Prozanto [3] and Cândido et al. [4], the genus *Dosilia* had five recognized species: *D. plumosa* (Carter, 1849) from Pakistan, India, and Southeast Philippines (OL); *D. brouni* (Kirkpatrick, 1906) from Sudan and Kenya (AT); *D. palmeri* (Potts, 1885) from the United States of America and Mexico (NA); *D. radiospiculata* (Mills, 1888) from Canada, the United States of America, and Mexico (NA); and *D. pydanieli* (Volkmer-Ribeiro, 1992) from Brazil, South America (NT). Roush [5] mentioned the presence of the genus *Dosilia* from Costa Rica; based on this reference [6], included it in Costa Rica. Subsequently, Volkmer-Ribeiro and Machado [7] reviewed the material collected by Roush [5] as *Dosilia* sp. and established that the specimens corresponded instead to *Corvoheteromeyenia heterosclera* (Ezcurra de Drago, 1974).

Of the species that were recorded from North America (Canada, United States of America, and Mexico), *D. palmeri* was proposed by Penney and Racek [8] as probably present in Central America, and this statement was followed by Frost [9] and Manconi & Prozanto [10]. Manconi and Prozanto [10] included this species as a NT species, but according to Cândido et al. [4], their statement was based on specimens from northwestern Mexico and Florida, sites that are not in Central America.

Information about freshwater sponges (Spongillidae) from Honduras was lacking. Preliminary surveys for sponges were conducted in some rivers and as a result, a specimen from the Choluteca River of Honduras was found. Our objective was to determine its taxonomic identity and contribute to the knowledge of freshwater sponges.
Methods

**Locality:** The specimen was collected on March 31st, 2019 from the Iztoca River, Iztoca, at a linear distance of 3.3 km, N-NW of Choluteca city (N 13.327362 W – 87.203846) (Figure 1 and 2A). The river belongs to the lower-middle basin of the Choluteca River. The basin has an area of approximately 7,580 km² and drains into the Pacific slope of Honduras. The river presents slow-flowing, shallow, brown-colored water, and is stony in the dry season. Approximately 15 m from where the sponge was found, a small pigsty was observed, discharging all its waste into the river, possibly affecting the quality of the water.

**Specimen:** The specimen was found attached to a rock, and was hand-picked and collected during the dry season (Figure 2). In the laboratory, sponge fragments were prepared according to Manconi and Pronzato [1] and Volkmer and Pauls [11] for light microscopy and scanning electron microscope (SEM) observations of sponge gemmules and spicules. SEM analysis was performed on a Hitachi model 2700 scanning electron microscope, with an acceleration voltage of 11 and 20, installed in the Metallurgy Laboratory of the School of Physics at the Faculty of Sciences of the Universidad Nacional Autónoma de Honduras – Ciudad Universitaria (UNAH-CU). The sample was deposited in the scientific collection of the Natural History Museum of UNAH-CU. The sample was identified using descriptive terminology based on scientific literature [4,10,12,13]. Measurements were made using Fiji: a platform for biological-image analysis [14]. A zoogeographic realms map of North and Central America [15] with previous localities was prepared following the taxonomic arrangement developed by Cándido et al. [4]. The records in the map were made using descriptive references (Figure 1) from several resources [16–22].

Results

**Specimen description:** Dried brownish yellow sponge. Growth form bulbous, consistency very brittle, and charge with whitish gemmules, forming a shallow and fragile crust attached. Oscula inconspicuous. Gemmules scattered mainly towards the sponge basal portion, subspherical range from to 548–600 µm. Figure 3A. Gemmuloscleres of two types, pseudobirotules and birutules of distinctly different size classes. Figure 3B and 3D. Pseudobirotules long with short spines fusiform shafts and apical pseudorotules of few, long, strongly recurved hooks. Figure 3C; birutules short range from to 45–80 µm, with spiny shaft bearing umbonate rotules with irregularly indented margins. Figure 3E. Microscleres aster-like, extremely variable, bearing 7–10 microspined rays of irregular size projecting radially from a centrum. Presence of rare oxeas with long straight rays from the centrum Aster.

![Figure 1. Previous records (PR) of *D. radiospiculata* from North America and Mexico (Green circle), taking from different sources following the taxonomic arrangement by Cándido et al. [4], and the new recorded (NR), which is a Pacific distribution in Honduras (red triangle).](image-url)
Discussion

Freshwater sponges represent a benthic invertebrate group that has not been studied in Honduras. Other Central American countries have already reported species of Spongillidae as part of their freshwater invertebrate fauna. According to Volkmer-Ribeiro and Machado [7], the genus Dosilia was not found in Central America, as reported by Roush [5] and Manconi and Prozanto [6,10], making the first report of the genus from Honduras and Central America. We agree with Cândido et al. [4] that D. palmeri at present does not have a specimen sample from Central America, and it does not belong to the NT zoogeographic region. Instead, our results showed that D. radiospiculata is present in Central America, and will be considered as part of the fauna of NT invertebrates (Figure 1). We also propose that D. radiospiculata should no longer be considered endemic to the NA invertebrate fauna, as mentioned by Manconi and Prozanto [13].

Freshwater sponges are invertebrates that constitute an important element in freshwater habitats. They are also considered as suitable habitats for other organisms. For instance, in the collected specimen, we found two larvae of the order Odonata (Figure 2C), both identified to the genus level as Argia sp., using the descriptive terminology based on Westfall and Tennesen [23]. Despite this, as well as considering the few number of reports, no freshwater sponges are under international protection, although in some cases are being indirectly protected [24].

Conclusion

This report represents the southernmost record of D. radiospiculata, and extends the distributional record to approximately 890 miles linearly south of Mexico (Figure 1). Until now, Honduras was the only country in
Central America that did not have any report of species of the Spongillidae family, although it constitutes one of the largest Central American countries in territorial expanse, and contains several basins and three of the biggest rivers in Central America. This report of *D. radiospiculata* (Spongillidae) confirms the presence of the genus *Dosilia* in Central America. Further, this study also represents the first report of the Family Spongillidae and a new recorded genus and species of a freshwater sponge to Honduras.

Furthermore, Cándido et al. [4] established that *D. radiospiculata* is distributed in the NA region, but its distributional range now extended to the NT region. Additional surveys and fieldwork in different areas and basins of Honduras will be necessary to discover more species of freshwater sponges and to know their actual distribution.

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Disclosure statement
No potential conflict of interest was reported by the author(s).

Geolocation
Iztoca River, Iztoca, Choluteca basin, Choluteca (N 13.327362 W −87.203846); Honduras Central America

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