

MARINE RECORD

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First record of the irregular sea urchin *Lovenia cordiformis* (Echinodermata: Spatangoida: Loveniidae) in Colombia

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Abstract

Background: A first record of occurrence of the irregular sea urchin *Lovenia cordiformis* in the Colombian Pacific is herein reported.

Results: We collected one specimen of *Lovenia cordiformis* at Gorgona Island (Colombia) in a shallow sandy bottom next to a coral reef. Basic morphological data and images of the collected specimen are presented. The specimen now lies at the Echinoderm Collection of the Marine Biology Section at Universidad del Valle (Cali, Colombia; Tag Code UNIVALLE: CRBMeq-UV: 2014-001).

Conclusions: This report fills a gap in and completes the distribution of the species along the entire coast of the Panamic Province in the Tropical Eastern Pacific, updating the echinoderm richness for Colombia to 384 species.

Keywords: *Lovenia cordiformis*, Loveniidae, Sea porcupine, Heart urchin, Gorgona Island

Background

Heart shape-bodied sea urchins also known as sea porcupines (family Loveniidae), are irregular echinoids characterized by its secondary bilateral symmetry. Unlike most sea urchins, features of the Loveniidae provide different anterior-posterior ends, with mouth and anus located ventrally and distally on an oval-shaped horizontal plane. Sea porcupines are infaunal burrowers, small to medium-sized and detritus feeders usually restricted to dwell within sand and coarse rubble (Kanazawa 1992), therefore, can be considered rare and hard to find alive. *Lovenia cordiformis* Agassiz 1872, belongs to a genus comprising less than 20 living species, which along with other five living genera (e.g. *Echinocardium*), engross the family Loveniidae. The species, belonging to the Order Spatangoida, is a phylogenetic member of the most diverse extant group of echinoids as exposed by Stockley et al. (2005). Since its description by Agassiz in 1872, *L. cordiformis* has been considered native to the Eastern Pacific, and with this paper we report the occurrence of *L. cordiformis* in a coral reef of an island on the

continental shelf of the Pacific coast of Colombia, filling in a gap of its coastal distribution in the Tropical Eastern Pacific (TEP).

Materials and methods

One *Lovenia cordiformis* specimen was collected on October 19, 2012 by snorkeling during low tide at approximately 2.5 m deep, close to a *Malacanthus brevis* burrow in the outer border of La Azufrada (2°57'22.4"N – 78°10'28"W), a 9.4 ha protected coral reef in Gorgona Island (TEP) (see Zapata and Vargas-Angel 2003; for detailed description). This specimen is the first to be collected in the Colombian Pacific, and was identified using Brusca (1980), Hickman (1998), Kerstitch and Bertsch (2007), and the online database of Kroh and Hansson (2013). Dr. Gordon Hendler (curator of echinoderms at the Natural History Museum of Los Angeles County, CA.) confirmed the identification with photographs of the collected specimen taken when still alive.

We trapped the specimen unintentionally while digging the substrate for the collection of sand samples. At first and due to its appearance and color, the specimen remained unnoticed until it began to move. The specimen was fixed in ethanol (95 %), identified at the laboratory

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and deposited in the Echinoderm Collection of Universidad del Valle (in Cali, Colombia; Tag code *UNIVALLE: CRBMeq-UV: 2014-001*).

Results and discussion

Systematics

Class ECHINOIDEA Leske, 1778.

Order SPATANGOIDA Claus, 1876.

Suborder MICRASTERINA Fischer, 1966.

Family LOVENIIDAE Lambert, 1905.

Genus *Lovenia* Desor, 1847.

Lovenia cordiformis Agassiz, 1872.

The specimen had the typical shape of heart urchins, with a larger length (46.50 mm) than width (35.83 mm), and a height of 20.72 mm with a flat oral surface. The convex dorsal surface was covered by small brown hair-like spines, which gives the animal the appearance of a coconut shell. There were evident scattered long serrated spines with a clear banded coloration pattern of brown-reddish and pale-yellowish bands. These scattered spines run backward along the longer axis, as if they were combed (Fig. 1).

Considering the size of the specimen and the holes dug in the substrate where it was found, the specimen

should had been dwelling within the first 15 cm deep in the sandy substrate. The substrate consisted on runoff land-sediments with calcareous sands and coral rubble mixture, where some scattered living coral *Pocillopora* spp. colonies are found unattached along with massive colonies like *Pavona* spp. and *Gardineroseris planulata*.

Despite Mortensen's monography (1951), who reported the continental distribution of *L. cordiformis* including Ecuador, the distribution of the species as depicted in different available online resources (e.g. World Echinoidea Database) only places the species in southern California, around the Peninsula of Baja and along the coast of Panama. With this report and according to our review of available data, the updated geographical distribution of the species includes the coasts of Southern California, Mexico, Panama and Colombia, and the oceanic islands Coco and the Galapagos (Maluf 1988; Lessios 2005; Honey-Escandón et al. 2008; Cortés 2012), while no records are reported for Malpelo Island, where the geomorphology (mostly rocky walls and the lack of shallow sandy bottoms), may hinder its occurrence.

Following the recent review by Benavides-Serrato et al. (2013) and this new record, the echinoderm richness in Colombia now totals 384 species, of which 32.6 % (125 spp.) inhabits the Pacific coast, with Gorgona Island reaching 42 species. It seems that these echinoids are fairly rare, or at least, this is the case for the Colombian Pacific. For example, there is only one related genus listed for Colombia (see *Homolampas hastata* -now accepted as *Aerolampas hastata*- in Cohen-Rengifo et al. 2009); hence, this report constitutes the first national record for the genus *Lovenia* and the second for Loveniidae.

Conclusions

This is the first record of the species *L. cordiformis* in Colombia, filling a gap of its distribution in the Eastern Pacific region. It is clear that despite the efforts, knowledge and basic ecological information about echinoderms and infaunal communities in the Colombian Pacific and the region is still incomplete.

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Authors' contributions

CGM collected the specimen and drafted the manuscript. ELC identified the specimen and improved the manuscript. Both authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

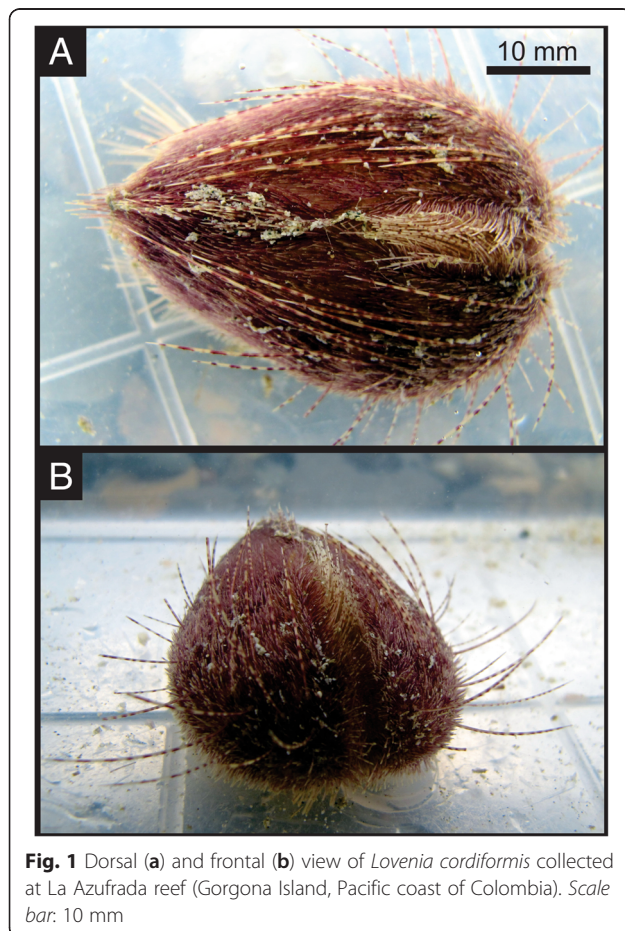


Fig. 1 Dorsal (a) and frontal (b) view of *Lovenia cordiformis* collected at La Azufrada reef (Gorgona Island, Pacific coast of Colombia). Scale bar: 10 mm

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