

SHORT COMMUNICATION

Museum specimens and occurrences of *Glottidia audebarti*, *Discradisca strigata* and other brachiopods (Brachiopoda) in the Pacific of Costa Rica

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ABSTRACT. Introduction: Lamp shells or brachiopods have a rich fossil record but only about 400 extant species. Their diversity on the Eastern Pacific is poorly known and only eight species are reported for the Pacific of Costa Rica. **Objective:** To list the specimens from Costa Rica and provide a distribution map along its Pacific coast. **Methods:** We checked collections at the University of Costa Rica (MZ-UCR) and Scripps Institution of Oceanography. **Results:** We found 22 records at MZ-UCR and 10 at Scripps, both include unidentified specimens, as well as *Glottidia audebarti* and *Discradisca strigata*, which are frequently collected intertidally. **Conclusion:** The study of Eastern Pacific living brachiopods is at an early stage; ecological studies could focus on the more easily accessed intertidal species.

Keywords: Lophophorates, Lingulida, intertidal, estuary, Gulf of Nicoya, Coco Island.

RESUMEN. “Especímenes de museo y distribución de *Glottidia audebarti*, *Discradisca strigata* y otros braquiópodos (Brachiopoda) en el Pacífico de Costa Rica” **Introducción:** Las “conchas lámpara” o braquiópodos tienen un rico registro fósil, pero hoy solo viven unas 400 especies. Su diversidad en el Pacífico Oriental es poco conocida y solo se conocen ocho especies del Pacífico de Costa Rica. **Objetivo:** Registrar los especímenes de Costa Rica y proporcionar un mapa de distribución en la costa del Pacífico. **Métodos:** Revisamos las colecciones de la Universidad de Costa Rica (MZ-UCR) y la Institución Scripps de Oceanografía. **Resultados:** Encontramos 22 registros en MZ-UCR y 10 en Scripps, ambos incluyen especímenes no identificados, así como *Glottidia audebarti* y *Discradisca strigata*, que frecuentemente se recolectan intermarealmente. **Conclusión:** El estudio de los braquiópodos vivos del Pacífico oriental se encuentra en una etapa temprana; los estudios ecológicos podrían centrarse en las especies intermareales, de más fácil acceso.

Palabras clave: Lofoforados, Lingulida, entre-mareas, estuario, Golfo de Nicoya, Isla del Coco.

The Phylum Brachiopoda, or lamp shells, is a group of marine lophophorate invertebrates with about 30.000 fossil species but only approximately 400 are still extant (Santagata, 2015; Ye et al., 2021). Emig (2009) listed eight species for the Pacific coast of Costa Rica of which six (*Liothyrella clarkeana*, *L. moseleyi*, *Macandrevia americana*, *M. craniella*, *M. diamantina*, *Neorhynchia strebeli*) were found in deep waters near the oceanic Coco Island (see also Cortés, 2012). Two coastal species, the lingulids *Glottidia audebarti* (Broderip, 1885) and the scarce *G. albida* (Hinds, 1844) have been collected in intertidal flats in the Gulf of Nicoya estuary (Emig & Vargas, 1990; Emig, 2009). Several



reports focused on different aspects of the biology of the former based on specimens from the estuary (Emig & Vargas, 1990; Lecuyer et al., 1996; Vargas, 1996; Kowalewski et al., 1997; Dittman & Vargas, 2001; Rodland et al., 2003; Vargas et al., 2016). The finding of a fossil *Glottidia* near the Gulf has been reported by Aguilar & Alvarado (2004). Based on the presence of the discinid, *Discradisca strigata* (Broderip, 1834), from rocky substrates in Panama (Labarbera, 1985), Emig (2009) listed its presence in Costa Rica and no collection sites were indicated. Specimens of *G. audebarti*, *G. albida*, and *D. strigata* from the Pacific of Costa Rica are deposited in the collections of the Museum of Zoology of the University of Costa Rica (MZ-UCR). The MZ-UCR and the Scripps Institution of Oceanography (University of California, San Diego) house small collections of unidentified brachiopods (shells and tissues) from Costa Rica. Thus, the objectives of this report are to list the specimens deposited at both institutions, and provide a map of the occurrences of *G. audebarti* and *D. strigata* along the Pacific coast of Costa Rica.

The collection at the MZ-UCR includes 22 records of brachiopods mainly of intertidal *G. audebarti* and *D. strigata*. *G. audebarti* was found mainly in the upper Gulf of Nicoya plus one record from the southern coast of Costa Rica (Sierpe-Térraba, Table 1, Fig. 1). The records of *G. albida* (Table 1, Fig. 1) need further evaluation since this species has been previously reported from Mexico (Type locality: Magdalena Bay, Gulf of California) North to Canada (Emig & Vargas, 1990; Emig, 2009). *D. strigata* (Maximum shell diameter found: 17 mm) has been collected along the Pacific coast of Costa Rica (Table 1, Fig. 1). Three MZ-UCR records are for unidentified specimens collected by submersibles in waters around 250m depth at Coco Island (Table 1). The Scripps collection includes 10 records of unidentified species also collected by submersibles in water depths from 380 to 1 782m offshore and near Coco Island (Table 2).

There are few taxonomists working on living brachiopods (Santagata, 2015) and hopefully this report may encourage the identification of species, the finding of new specimens, and more ecological research on the more easily collectable lingulids.

TABLE 1

Brachiopods deposited in the collection of the Museum of Zoology, University of Costa Rica (MZ-UCR)

MZ-UCR	Species	Collector	Date	Locality	Substrate	Depth
01	<i>Glottidia audebarti</i>	José A. Vargas	Oct. 1995	Punta Morales, Gulf of Nicoya	Mud flat	Intertidal
02	<i>Glottidia audebarti</i>	no data	Nov. 24, 1990	Costa de Pájaros, Gulf of Nicoya	Sandy mud	Intertidal
03	<i>Glottidia audebarti</i>	José A. Vargas	Feb. 15, 1995	Cocorocas sand flat, Gulf of Nicoya	Sand	Intertidal
04	<i>Glottidia audebarti</i>	Manuel Lobo	Jun. 15, 1995	Mouth of Bocón estuary, Sierpe-Térraba	No data	Intertidal
05	<i>Discradisca strigata</i>	Rita Vargas & Davis Morera	Jul. 31, 2015	Thomas Bay, Santa Elena Peninsula, Guanacaste	Net on muddy bottom	No data
06	<i>Discradisca strigata</i>	Student group	May 8, 2013	Los Pargos rocks, upper Golfo Dulce	Coral rock	1-2m
07	<i>Discradisca strigata</i>	Eleazar Ruiz	Nov. 11, 2011	Murcielago Islands, Santa Elena Peninsula, Guanacaste	Coral rock	No data
08	<i>Discradisca strigata</i>	Rita Vargas	Jun. 11, 2011	Ostional Wildlife Refuge, Guanacaste	Rocks	Intertidal
09	<i>Discradisca strigata</i>	Rita Vargas	Dec. 11, 2012	Cuajiniquil Beach, Guanacaste	<i>Pocillopora</i> -coral debris	Intertidal
10	<i>Discradisca strigata</i>	Rita Vargas	Dec. 8, 2012	Matapalo Beach, Guanacaste	no data	Intertidal
11	<i>Discradisca strigata</i>	Rita Vargas	Nov. 8, 2014	Punta Morales Playa Blanca, Gulf of Nicoya	Under rocks	Intertidal
12-01	Brachiopoda sp.1	Odalisca Breedy	Sep. 18, 2012	Kili drop, Coco Island (Isla del Coco). Deep See dive 1692	Black coral	224m
12-02	Brachiopoda sp.2	Odalisca Breedy	Sep. 18, 2012	Kili drop, Coco Island (Isla del Coco). Deep See dive 1692	Black coral	224m
13	<i>Glottidia audebarti</i>	José A. Vargas	May 15, 2004	Punta Morales, Playa Blanca, Gulf of Nicoya	Muddy sand	Intertidal
14	Brachiopoda sp.	Edi Widden & Bruce Robinson	Sep. 22, 2009	Kili Rock, Coco Island (Isla del Coco). Deep See dive 931	Black coral	250m
15	<i>Glottidia audebarti</i>	José A. Vargas	Dec.15, 2015	Cocorocas sand flat, Gulf of Nicoya	Sand	Intertidal
16-1	<i>Glottidia audebarti</i>	José A. Vargas	Oct. 2, 2015	Cocorocas sand flat, Gulf of Nicoya	Sand	Intertidal
16-2	<i>Glottidia cf albida</i>	José A. Vargas	Oct. 2, 2015	Cocorocas sand flat, Gulf of Nicoya	Sand	Intertidal
17	<i>Glottidia audebarti</i>	José A. Vargas	Jun. 25, 1997	Cocorocas sand flat, Gulf of Nicoya	Sand	Intertidal
18	<i>Discradisca strigata</i>	Rita Vargas	Feb. 17, 2014	Punta Morales, Playa Blanca, Gulf of Nicoya	Under rocks	Intertidal
19	<i>Discradisca strigata</i>	Jeffrey A. Sibaja, Yolanda Camacho, Rita Vargas & Carlos Garita	Feb.7, 2012	Culebra Bay, Hermosa Beach, Guanacaste	Under rocks	Intertidal
20	<i>Glottidia audebarti</i>	Carolina Salas, Juan C. Azofeifa	Apr.3, 2019	Mouth of Saprissa estuary, Lepanto, Gulf of Nicoya	Core sediments	Intertidal
21	<i>Discradisca strigata</i>	Carolina Salas	Feb.16, 2020	Burbujas Gas Seep, in front of Platanares Beach, Golfo Dulce	Coraline rocks	7-10m
22-01	<i>Glottidia cf albida</i>	José A. Vargas, Arturo Angulo & Rita Vargas	Mar.24, 2023	Punta Morales estuary, Gulf of Nicoya	Sandy mud	Intertidal
22-02	<i>Discradisca strigata</i>	José A. Vargas, Arturo Angulo & Rita Vargas	Mar.24, 2023	Punta Morales estuary, Gulf of Nicoya	Under rocks	Intertidal

TABLE 2

Unidentified brachiopods deposited in the Scripps Institution of Oceanography - Benthic Invertebrate Collection (SIO-BIC)

SIO-BIC Catalog #	Count	Field Code	Locality	Latitude North	Longitude West	Depth (m)	Year-month-day	Submarine
B211	11	No data	Quepos Landslide	8°,85356	84°,21805	380	2009-03-06	HOV Alvin 4512
B251	1	CR17-0546	Seamount 1	8°,85433	85°,13035	1782	2017-06-08	HOV Alvin 4925
B253	1	CR18-0565	Quepos Plateau Hills	8°,53123	84°,79136	1460	2018-10-27	HOV Alvin 4981
B254	1	CR18-0566	Quepos Plateau Hills	8°,53123	84°,79136	1460	2018-10-27	HOV Alvin 4981
B255	1	CR18-0567	Quepos Plateau Hills	8°,53101	84°,79146	1470	2018-10-27	HOV Alvin 4981
M16876	1	CR18-0464	Quepos Slide	8°,85310	84°,21817	380	2018-10-25	HOV Alvin 4979
B256	3	CR19-0196	Seamount 7	6°,91577	85°,88456	901	2019-01-16	ROV SuBastian 222
B257	1	CR19-0260	Cocos Canyon	5°,58135	87°,06287	585	2019-01-18	ROV SuBastian 223
B258	1	CR19-0270	Cocos Canyon	5°,58259	87°,06681	876	2019-01-18	ROV SuBastian 223
B259	1	CR19-0308	Cocos Canyon	5°,58462	87°,06356	689	2019-01-18	ROV SuBastian 223

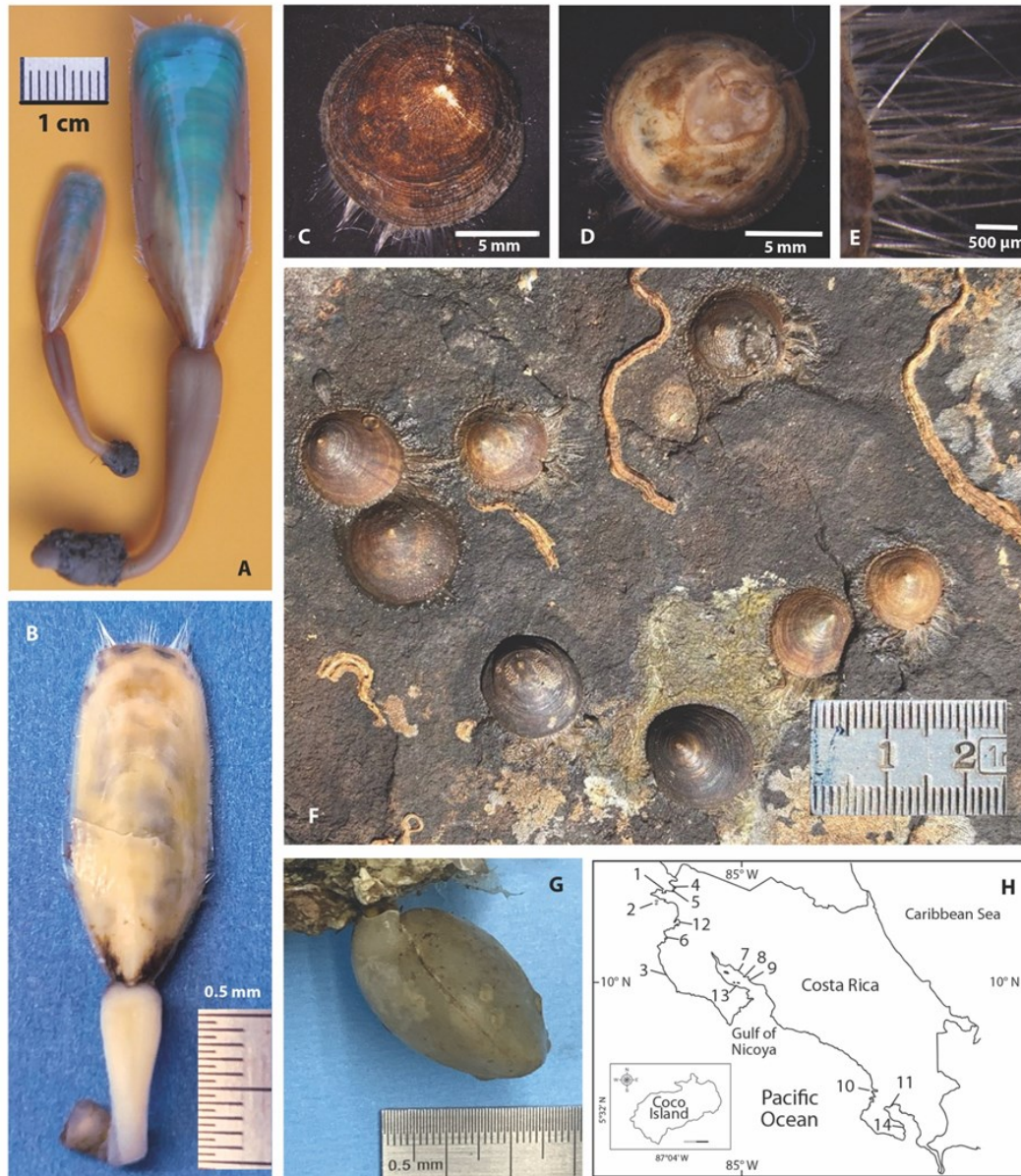


Fig.1. **A.** *Glottidia audebarti*, Cocorocas sand flat, Gulf of Nicoya. **B.** *Glottidia cf. albida*, Punta Morales mangrove estuary, Gulf of Nicoya. **C.** *Discradisca strigata*, dorsal view of shell, Punta Morales. **D.** *D. strigata*, ventral view. **E.** *D. strigata* close-up of setae. **F.** Eight *D. strigata* in situ (overturned rock), Punta Morales mangrove estuary. Scale in mm. **G.** Lateral view of an unidentified terebratulid? brachiopod attached to a dead black coral fragment from Kili Rock, Coco Island (Isla del Coco). **H.** Coco Island (see geographical coordinates) and occurrences of *G. audebarti* and *D. strigata* along the Pacific coast of Costa Rica: **1.** Santa Elena Bay. **2.** Murciélago Islands. **3.** Ostional Wildlife Refuge. **4.** Cuajiniquil beach. **5.** Thomas Bay, Santa Elena Peninsula. **6.** Matapalo Beach. **7.** Costa de Pájaros, Gulf of Nicoya. **8.** Punta Morales, Gulf of Nicoya. **9.** Cocorocas sand flat, Gulf of Nicoya **10.** Bocón estuary, Sierpe-Térraba mangrove forest. **11.** Los Pargos rocks, upper Golfo Dulce. **12.** Culebra Bay. **13.** Lepanto estuary, Gulf of Nicoya. **14.** Platanares Beach, Lower Golfo Dulce.

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ETHICAL, CONFLICT OF INTEREST AND FINANCIAL STATEMENTS

The authors declare that they have complied with all ethical and legal requirements, both during the study and in the production of the manuscript; that there are no conflicts of interest of any kind, and agree with the final edited version. A signed document has been filed in the journal archives. The contribution of each author was: J.V. Original idea, writing and editing, specimen collection. R. V. Sample collection, museum collection curator, writing, photographs.

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