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# New records of marine molluscs for the northeastern coast of Cuba

## Nuevos registros de moluscos marinos para la costa nororiental de Cuba

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### Abstract

Recently, several studies on Cuban marine molluscs have been developed. However, it is necessary to conduct studies on their distribution, particularly in the poorly studied eastern coasts. In the present work, we collected and identified marine molluscs from the northeastern coast of Cuba. A checklist with 88 species, which are new records to the area, is presented; 59 species are gastropods, 27 are bivalves and two are chitons. Considering previous studies, 375 species have been recorded from this region. The localities with the higher number of recorded species are Playa Esmeralda - Playa Guardalavaca (232 species, 46 new records) and Bahía de Naranjo (107 species, 17 new records). Further studies have to be conducted in other localities of the area, particularly in coral lagoons and bays, and focused on micromolluscs, sea slugs and families with a high number of local endemics (Columbellidae, Marginellidae, and Cystiscidae).

**Keywords:** Bivalvia, Gastropoda, marine biodiversity, Mollusca, Polyplacophora.

### Resumen

Recientemente, numerosos estudios sobre los moluscos marinos de Cuba se han sido desarrollados. No obstante, es necesario conducir estudios sobre su distribución, particularmente, en las poco estudiadas costas orientales. En el presente trabajo, se recolectaron e identificaron moluscos marinos de la costa nororiental de Cuba. Es presentada una lista anotada de 88 especies, que son nuevos registros para el área; 59 especies son gasterópodos, 27 son bivalvos y dos son quitones. Considerando los estudios anteriores, 375 especies han sido registradas de esta región. Las localidades con mayor número de especies registradas son Playa Esmeralda - Playa Guardalavaca (232 especies, 46 nuevos registros) y Bahía de Naranjo (107 especies, 17 nuevos registros). Estudios futuros deben ser conducidos en otras localidades del área, particularmente en lagunas coralinas y bahías, y con énfasis en micromoluscos, babosas de mar y familias con alto

número de endémicos locales (Columbellidae, Marginellidae y Cystiscidae).

**Palabras clave:** Bivalvia, Gastropoda, biodiversidad marina, Mollusca, Polyplacophora.

## Introduction

In recent years, the knowledge of Cuban marine molluscs has wrought up constantly. Dozens of species have been described or recorded from the archipelago (*e. g.* Espinosa *et al*., 2017; Espinosa & Ortea, 2018, 2020). However, most of these taxonomical studies have been carried out in restricted areas, except the studies around Península de Guanahacabibes (see Espinosa *et al*., 2005, 2007). Other inventories of molluscs fauna can be found in grey literature such as Bachelor or Master theses. The number of recorded species from Cuba reaches 1 920 (Espinosa & Ortea, 2021).

Most of the studies of the marine molluscs from the eastern coasts of Cuba have been developed in the last 10 years. A broad taxonomical work of the molluscs from the northeastern coast of Cuba (from Bahía de Puerto Padre to Bahía de Nipe) was published by Diez and Jover (2012), recording 266 species to the area. Later, Espinosa & Ortea (2014) described 16 new species from the National Park Alejandro de Humboldt, Baracoa, where previously Espinosa *et al*. (2008) described *Prunum humboldti* Espinosa, Ortea & Moro, 2008 (Marginellidae). Afterward, Espinosa *et al*. (2015) described *Volvarina holguinera* Espinosa, Ortea & Diez, 2015 from Holguín province and *Volvarina humboldtiana* Espinosa, Ortea & Diez, 2015 from Baracoa. Furthermore, ecological studies of macrofauna recorded few species of marine molluscs in northeastern Cuba (Ocaña *et al*., 2010, 2012).

It is necessary to develop studies on distribution of Cuban marine species due to the lists published in 'Biodiversidad Marina de Cuba' (Claro, 2007) are mostly limited to information collected in the central and western coasts of the archipelago. Studies on species distribution are particularly important in the conservation of marine biodiversity. Therefore, in the present work we studied material of mollusc from several localities in Holguín province, northeastern coast of Cuba, recording 88 known species to the area.

## Material and methods

Sampling campaigns were conducted in Holguín province: Bahía de Gibara (21°06'00"N; 76°08'09"W), Bahía de Naranjo (21°06'35"N; 75°52'33"W), Playa Guardalavaca (21°07'32"N; 75°49'39"W), El Embarcadero (21°04'11"N; 75°40'32"W), Playa Puerto Rico (20°55'46"N; 75°36'49"W), Bahía de Banes (20°54'13"N; 75°43'40"W), Bahía de Nipe (20°46'04"N, 75°39'17"W), and Bahía de Levisa (20°42'47"N; 75°33'01"W). The material was mostly collect in the intertidal or supratidal thanatocoenosis (sand samples or shells). The sand samples were washed with freshwater, dried at room temperature and sieved in 0.5 mm sieve. The material retained in the sieve was studied under a Novel NSZ-606 stereomicroscope in order to separate the shells. The shells were stored in plastic vials or bags. Samples of living specimens were taken directly under rocks, sublittoraly up to 1 m deep. We also collected on echinoderms, looking for parasitic species.

A large number of papers and books were used to identify the species and, therefore, the most important ones are listed (Warmke & Abbot, 1961; de Jong & Coomans, 1988; Espinosa *et al*., 2005, 2007, 2012; Espinosa & Ortea, 2021). The species names were updated according to the data base http://www.marinespecies.org (WoRMS, 2021).

## Results

Eighty-eight species were identified, most of which are common in the Caribbean shallow waters, and all were previously recorded in Cuba. These species include 59 gastropods, 27 bivalves, and two chitons. The gastropods belong to 39 families, the bivalves to 16, while the chitons are within Acanthochitonidae.

**Table 1.** New records and distribution of marine molluscs for northeastern Cuba. 1- Bahía de Gibara, 2- Bahía de Naranjo, 3- Playa Esmeralda – Playa Guardalavaca, 4- El Embarcadero, 5- Playa Morales, 6- Bahía de Banes, 7- Bahía de Nipe, and 8- Bahía de Levisa.

| Taxonomy | | Localities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Polyplacophora** | | | | | | | | | |
| Acanthochitonidae | *Americhiton zebra* (Lyons, 1988) | | | | x | | | | |
| | *Cryptoconchus floridanus* (Dall, 1889) | | | | | x | | | |
| **Gastropoda** | | | | | | | | | |
| Lottiidae | *Lottia cubensis* (Reeve, 1855) | | | x | x | | | | |
| Tegulidae | *Tegula gruneri* (Philippi, 1849) | | | | x | | | | |
| | *Tegula hotessieriana* (d'Orbigny, 1842) | | | x | x | x | | | |
| Liotiidae | *Liotia microgrammata* Dall, 1927 | | | x | | | | | |
| Phasianellidae | *Eulithidium thalassicola* (R. Robertson, 1958) | | | x | | | | | |
| Neritidae | *Vitta meleagris* (Lamarck, 1822) | x | | | | | | | |
| Litiopidae | *Litiopa melanostoma* Rang, 1829 | | | x | | x | | | |
| Turritellidae | *Vermicularia knorrii* (Deshayes, 1843) | | | | | | | | x |
| Potamididae | *Cerithideopsis pliculosa* (Menke, 1828) | x | | | x | x | | | |
| Scaliolidae | *Finella adamsi* (Dall, 1889) | | | x | | | | | |
| Littorinidae | *Echinolittorina jamaicensis* (C. B. Adams, 1850) | x | | x | | x | | | |
| | *Littoraria nebulosa* (Lamarck, 1822) | x | | | | | | | |
| Rissoidae | *Alvania auberiana* (d'Orbigny, 1842) | | | x | x | | | | |
| Rissoinidae | *Phosinella cancellina* (Rolán & Fernández-Gracés, 2010) | | | x | | | | | |
| | *Phosinella pulchra* (C. B. Adams, 1850) | | | x | | | | | |
| Caecidae | *Caecum insularum* Moore, 1970 | | | x | | | | | |
| Teinostomatidae | *Teinostoma cocolitoris* Pilsbry & McGinty, 1945 | | | x | | | | | |
| | *Teinostoma nesaeum* Pilsbry & T. L. McGinty, 1945 | | | x | | | | | |
| | *Teinostoma semistriatum* (d'Orbiny, 1842) | | | x | | | | | |
| Tornidae | *Paviturboides comptus* (Woodring, 1928) | | | x | | | | | |
| Naticidae | *Natica tedbayeri* Rehder, 1986 | | | x | | | | | |
| | *Polinices hepaticus* (Röding, 1798) | | | x | | | | | |
| Tonnidae | *Tonna galea* (Linnaeus, 1758) | x | | | | | x | x | |
| Cymatiidae | *Monoplex pilearis* (Linnaeus, 1758) | x | | | | | | | |
| Cerithiopsidae | *Cerithiopsis albovittata* (C.B. Adams, 1850) | | | x | | | | | |
| Triphoridae | *Marshallora modesta* (C. B. Adams, 1850) | | x | | | | | x | |
| Eulimidae | *Melanella conoidea* (Kurtz & Stimpson, 1851) | | | x | x | x | | | |
| | *Melanella hypsela* (Verrill & Bush, 1900) | | | x | x | | | | |
| | *Melanella eburnea* (Megerle von Mühlfeld, 1824) | | | | x | x | | | x |
| Epitoniidae | *Epitonium nautlae* (Mörch, 1874) | | | x | | | | | |
| Muricidae | *Tripterotyphis triangularis* (A. Adams, 1856) | | x | | | | | | |
| | *Siratus articulatus* (Reeve, 1845) | x | | | | | | | |
| | *Coralliophila caribaea* Abbott, 1958 | | | | | | | | x |
| Pisaniidae | *Bailya weberi* (Watters, 1983) | | x | x | | | | | |

| Taxonomy | | Localities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Nassariidae | *Antillophos adelus* (Schwengel, 1942) | | x | | | | | | |
| Columbellidae | *Rhombinella laevigata* (Linnaeus, 1758) | x | | | | | | | |
| | *Falsuszafrona idalina* (Duclos, 1940) | x | | | | | | | |
| Olividae | *Oliva sayana* Ravenel, 1834 | | | | | | | | x |
| | *Olivella acteocina* Olsson, 1956 | | | x | | | | | |
| Cistiscidae | *Persicula pulcherrima* (Gaskoin, 1849) | | | x | | | | | |
| Costellariidae | *Atlantilux gemmata* (G. B. Sowerby II, 1871) | x | | | | | | | |
| | *Atlantilux puella* (Reeve, 1845) | | | | x | | | | |
| Drilliidae | *Clathrodrillia solida* (C. B. Adams, 1830) | | | x | | | | | |
| Mangeliidae | *Ithycythara parkeri* Abbott, 1958 | | | x | | | | | |
| | *Pyrgocythara cinctella* (L. Pfeiffer, 1840) | | | x | | | | | |
| Pyramidellidae | *Sayella fusca* (C. B. Adams, 1839) | | | x | | | | | |
| | *Odostomia laevigata* (d'Orbigny, 1842) | | | x | | | | | |
| | *Odostomia solidula* C. B. Adams, 1850 | | | x | | | | | |
| | *Trabecula krumpermani* (De Jong & Coomans, 1988) | | | x | | | | | |
| | *Mumiola gradatula* (Mörch, 1876) | | | x | | | | | |
| | *Triptychus niveus* Mörch, 1875 | | | x | | | | | |
| Aglajidae | *Navanax gemmatus* (Mörch, 1863) | | x | | | | | | |
| Pleurobranchidae | *Berthella stellata* (Risso, 1826) | | x | | | | | | |
| Chromodorididae | *Felimida binza* (Ev. Marcus & Er. Marcus, 1963) | | x | | | | | | |
| | *Felimare ruthae* ( Ev. Marcus & Hughes, 1974) | | x | | | | | | |
| Discodorididae | *Discodoris branneri* MacFarland, 1909 | | x | | | | | | |
| Dendrodorididae | *Dendrodoris krebsii* (Mörch, 1863) | | x | | x | | | | |
| Facelinidae | *Phidiana lynceus* Bergh, 1867 | | x | | | | | | |
| Ellobiidae | *Melampus bidentatus* Say, 1822 | x | | x | x | | | | |
| **Bivalvia** | | | | | | | | | |
| Nuculidae | *Nucula proxima* Say, 1822 | | | x | | | | | |
| Mytilidae | *Botula fusca* (Gmelin, 1791) | | | x | | | | | |
| | *Crenella decussata* (Montagu, 1808) | | | x | | | | | |
| Anomiidae | *Pododesmus rudis* (Broderip, 1834) | | | | | | x | | |
| Ungulinidae | *Diplodonta punctata* (Say, 1822) | | | | | | | | x |
| | *Phlyctiderma semiasperum* (Philippi, 1836) | | x | | | | | | |
| Dreissenidae | *Mytilopsis leucophaeata* (Conrad, 1831) | | x | | | | | | |
| Chamidae | *Arcinella arcinella* Linnaeus, 1767 | | | | | | x | | |
| Crassatellidae | *Kalolophus speciosus* (A. Adams, 1852) | x | | | | | | x | |
| Mactridae | *Mulinia cleryana* (d'Orbigny, 1846) | x | | | | | | | x |
| Tellinidae | *Tampaella mera* (Say, 1834) | | | x | | | | | |
| | *Laciolina laevigata* (Linnaeus, 1758) | | | x | | | | | |
| | *Oudardia sandix* (Boss, 1968) | x | | | | | | | |
| | *Strigilla carnaria* (Linnaeus, 1758) | | | x | | | | | |
| | *Macoploma tenta* (Say, 1834) | | x | | | | | | x |

| Taxonomy | | Localities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Semelidae | *Semelina nuculoides* (Conrad, 1841) | | | x | | | | | |
| Solecurtidae | *Tagelus plebeius* (Lightfoot, 1786) | x | | | | | | | |
| Veneridae | *Chione elevata* (Say, 1822) | x | | x | | | | x | x |
| | *Petricola lapicida* (Gmelin, 1791) | | | | | | | | x |
| | *Transennella cubaniana* (d'Orbigny, 1842) | | | x | | | | | |
| | *Transennella stimpsoni* Dall, 1902 | | | x | | | | | |
| | *Gouldia cerina* (C. B. Adams, 1845) | | x | x | | | | | |
| | *Pitar arestus* (Dall & Simpson, 1901) | | x | | | | x | | x |
| Teredinidae | *Teredo navalis* Linnaeus, 1758 | | | | x | | | | |
| Myidae | *Sphenia fragilis* (H. Adams & A. Adams, 1854) | x | | | | | | | |
| Gastrochaenidae | *Lamychaena hians* (Gmelin, 1791) | | | | | | | x | |
| Pholadidae | *Martesia striata* (Linnaeus, 1758) | x | | | | | | | |

The families with the higher species richness are the gastropods Pyramidellidae with six, and the bivalves Veneridae and Tellenidae with six and five species, respectively. The species list and the distribution are shown in Table 1.

## Discussion

Long term biomonitoring and biodiversity quantification studies need and updated an reliable register of species (checklists) (Jürgens *et al*., 2021). In marine environments, checklists play a crucial role in the development of species distribution models (see Davies *et al*., 2017; Virgili *et al*., 2018). However, for several marine taxa distributed in Cuba there are no reliable distribution records because most of the studies have been conducted in central and western areas (see Diez & Lira, 2017). Therefore, it is priority to complete or develop the inventories of taxa such as molluscs.

Prior to this study, 287 species of marine molluscs were recorded to the northeastern coast of Cuba (Diez & Jover, 2012; Ocaña *et al*., 2010, 2012). With the present contribution the species number reaches 375, which represent an increase of 30%. In this area the localities with the higher species richness are Playa Esmeralda - Playa Guardalavaca (232 species, including 46 new records) and Bahía de Naranjo (107 species, 17 new records). The species of molluscs of this area merely represent 19.5% of the species recorded to Cuba. This richness can be considered low respect to other areas of the archipelago with a well-studied malacofauna such as Santiago de Cuba (500 species; Diez, 2016; Espinosa *et al*., 2017) and Península de Guanahacabibes (more than 1 000 species; Espinosa *et al*., 2012).

It is necessary to increase the sampling of marine molluscs in eastern Cuba, mainly focused in the poorly known groups (*e.g.* sea slugs and micromolluscs) and the families with high number of endemic species (Columbellidae, Marginellidae, and Cystiscidae). Representatives of the last three families present direct development without pelagic larva, and therefore, they have restricted distribution (Espinosa *et al*., 2015).

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## Conflict of interest

The authors have no financial or non-financial conflicts of interest to declare that are relevant to the content of the manuscript.

## Ethical behaviour

The authors have followed all applicable international, national, and institutional recommendations related to the use and handling of animals for research.

## Permits for sampling and other permits

No permits were required for the conduct of this research.

## Statement of authors' contributions

Author Contribution: "Conceptualization and Methodology, YLD; Field collecting and Formal Analysis, YLD, OGM and CDBZ; Resources and Funding Acquisition, YLD; Writing – Original "Draft Preparation, YLD, OGM and CDBZ; Writing - Review and Editing, YLD".

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