

SCIENTIFIC NOTE

New records of the invasive marine crab *Charybdis hellerii* (Crustacea, Brachyura) in Cuba

Nuevos registros del cangrejo marino invasor *Charybdis hellerii* (Crustacea, Brachyura) en Cuba

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Abstract

The brachyuran crab *Charybdis hellerii* is originally from the Pacific; nevertheless, the species has been introduced to tropical waters globally. Its initial sighting in the Western Atlantic was documented in 1990 based on specimens collected in Cuba in 1987. In this paper, we present findings of *C. hellerii* from two localities in eastern Cuba: Santiago de Cuba and Taco bays. Up to this point, the species has solely been documented in estuaries in Cuba, and it likely exists throughout the entire archipelago. Given its feeding behaviour and extensive distribution, encompassing areas within the National Park Alejandro de Humboldt, this species can be key in the formulation of conservation plans for Cuban marine ecosystems.

Keywords: bioinvasions, Caribbean Sea, conservation, Decapoda, Portunidae.

Resumen

El cangrejo braquiuro *Charybdis hellerii* es originario del Pacífico; sin embargo, la especie ha sido introducida en aguas tropicales a nivel mundial. Su primera aparición en el Atlántico Occidental se registró en 1990 en base a especímenes recolectados en Cuba en 1987. En este artículo, presentamos los hallazgos de *C. hellerii* en dos localidades en Cuba oriental: las bahías de Santiago de Cuba y Taco. Hasta el momento, la especie solo ha sido registrada en estuarios en Cuba y es probable que esté presente en todo el archipiélago. Dada su conducta alimentaria y su amplia distribución, que incluye áreas dentro del Parque Nacional Alejandro de Humboldt, esta especie puede ser clave en la formulación de planes de conservación para los ecosistemas marinos cubanos.

Palabras clave: bioinvasiones, Mar Caribe, conservación, Decapoda, Portunidae.

Introduction

Cuban marine waters are renowned for harbouring the highest biodiversity in the Caribbean (Miloslavich *et al.*, 2010). The majority of this diversity is either native

or endemic to the archipelago (Espinosa & Ortea, 2007). Nonetheless, the region also serves as a reservoir for several invasive species. Notable among non-native species are the lionfish *Pterois volitans* (Linnaeus, 1758) and *P. miles* (Bennett, 1828), initially observed in the Western Atlantic off the coast of Florida (USA) in 1985 (Morris & Akins, 2009) and in Cuba in 2007 (Chevalier-Monteagudo *et al.*, 2008). The impacts of these species on Atlantic ecosystems have been deemed as devastating (Albins & Hixon, 2008; Ballew *et al.*, 2016). Another invasive species in Cuban waters is the green mussel *Perna viridis* (Linnaeus, 1758), documented in Cienfuegos (Fernández-Garcés & Rolán, 2005) and Mariel Bays (Lopeztegui *et al.*, 2013). Recently, two alien cnidarians, *Unomia stolonifera* (Gohar, 1938) (Espinosa *et al.*, 2023) and *Phyllorhiza punctata* von Lendenfeld, 1884 (Morejón-Arrojo *et al.*, 2023), have been recorded in the archipelago.

Crustaceans rank as the second most species-rich invertebrates in Cuba, comprising 1,320 species (Lalana & Ortiz, 2000; Lalana *et al.*, 2005, 2014; Diez, 2014), surpassed only by molluscs with nearly 2,000 species (Espinosa & Ortea, 2021). Some crustaceans have successfully become invasive in Cuban waters, such as the shrimp *Penaeus monodon* Fabricius, 1798, accidentally introduced from commercial aquaculture (Giménez *et al.*, 2013). Presumably, the extensively farmed shrimp *Penaeus vannamei* Boone, 1931, has also found its way into Cuban ecosystems (Fernández de Alaiza *et al.*, 2014). The Indo-Pacific native crab *Charybdis hellerii* (A. Milne-Edwards, 1867) has been documented in tropical waters worldwide. In Cuba, it was previously recorded in Cienfuegos and Gibara Bays (Gómez & Martínez-Iglesias, 1990) and Cojímar and Banes River (Lalana *et al.*, 1999). The introduction of *C. hellerii* to the Western Atlantic is likely attributed to the transportation of larvae via ballast water (Dineen *et al.*, 2001).

This paper documents the expanded distribution of *C. hellerii* in two additional localities in eastern Cuba.

Material and methods

Two specimens were collected in Bahía de Taco (20°30'38"N; 74°40'14"W), Baracoa, Guantánamo (February 22, 2019), and Ciudadamar (19°58'13"N; 75°52'08"W), Bahía de Santiago de Cuba (March 24, 2019) (Fig. 1). They were found during snorkeling explorations at 0.5 m deep. The specimen from Bahía de Taco was collected on a sandy bottom with *Thalassia testudinum* K. D. Koenig and the specimen from Ciudadamar under rocks. Other specimens were observed in Ciudadamar on March 5, 2022 but they were not collected.

The species identification was done following Padate *et al.* (2010). We recorded the length (over the midline; CL) and maximum wide of the carapace (CW) using a digital ABS Digimatic Vernier calliper (Mitutoyo, Japan+; Instrumental error ± 0.02 mm). Specimens were preserved in 70% ethanol and stored at Museum Charles Ramsden, Universidad de Oriente, Cuba.

Results and Discussion

The specimen collected in Ciudadamar is a male (CL = 4.57 cm, CW = 7.00 cm; voucher number IC89) and the specimen from Bahía de Taco is a female (CL = 2.90 cm, CW = 4.34 cm; voucher number IC90) (Fig. 2). They both exhibit the distinctive morphological traits of *C. hellerii*. This species is characterised by a smooth carapace, with six anterolateral and six frontal teeth. The palms are armed with five dorsal, black-tipped spines, the same morphology of the spines of posterior margin of merus and carpus of swimming legs. The propodus of swimming legs is armed on its posterior margin with a spiny row. In males, the abdominal sixth segment is as broad as long, with rounded posterodistal margins (Lemaitre, 1995). The colouration of the species is predominantly dark green with some silver tone; however, in the Atlantic specimens, the tone is reddish or purple (Lemaitre, 1995; Lalana *et al.*, 1999). Our specimen

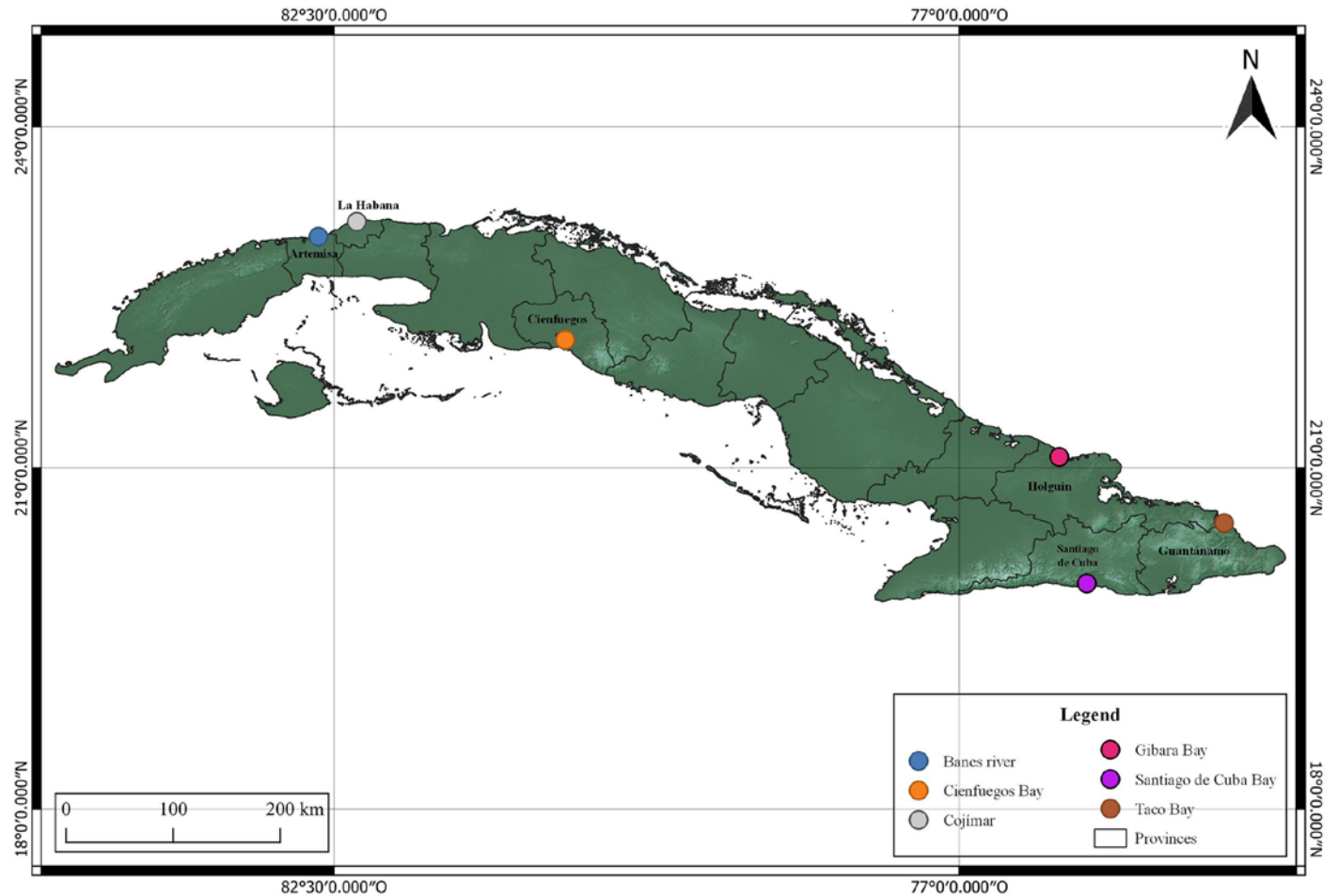


Fig. 1. Map of the known distribution of *Charybdis hellerii* in Cuba, including the two new localities.

Fig. 1. Mapa de la distribución conocida de *Charybdis hellerii* en Cuba, incluyendo las dos nuevas localidades.

collected in Bahía de Taco exhibited the mentioned reddish tone, while the specimen from Ciudadamar was dark green when alive.

As of now, there have been no studies conducted on the precise impact of the introduction of *C. hellerii* in Cuba. However, it is conceivable that this non-native species is at least engaging in competition for resources with native Cuban species, including other portunids. Based on available data, four portunids are known to inhabit Bahía de Santiago de Cuba (Gómez *et al.*, 2009; Diez *et al.*, 2015), while two are found in Bahía de Taco (Diez & Espinosa, 2018). Some of these species, such as *Callinectes* spp., hold significance in local, familial

fisheries (Gómez *et al.*, 2009). Additionally, portunids play crucial roles in food webs and maintaining the balance of marine ecosystems. It has been documented that the diet of *C. hellerii* in Atlantic populations consists of crustaceans, molluscs, and algae, which overlaps with the diet of native crabs (Sant'Anna *et al.*, 2015). This context underscores the need for targeted investigations into the distribution and impact of this invasive species in Cuba, as well as other alien crustaceans.

The introduction of alien species poses a significant threat to marine biodiversity worldwide (Tsiamis *et al.*, 2020). Invasive species can outcompete with native ones for resources, disrupt food webs, alter habitat

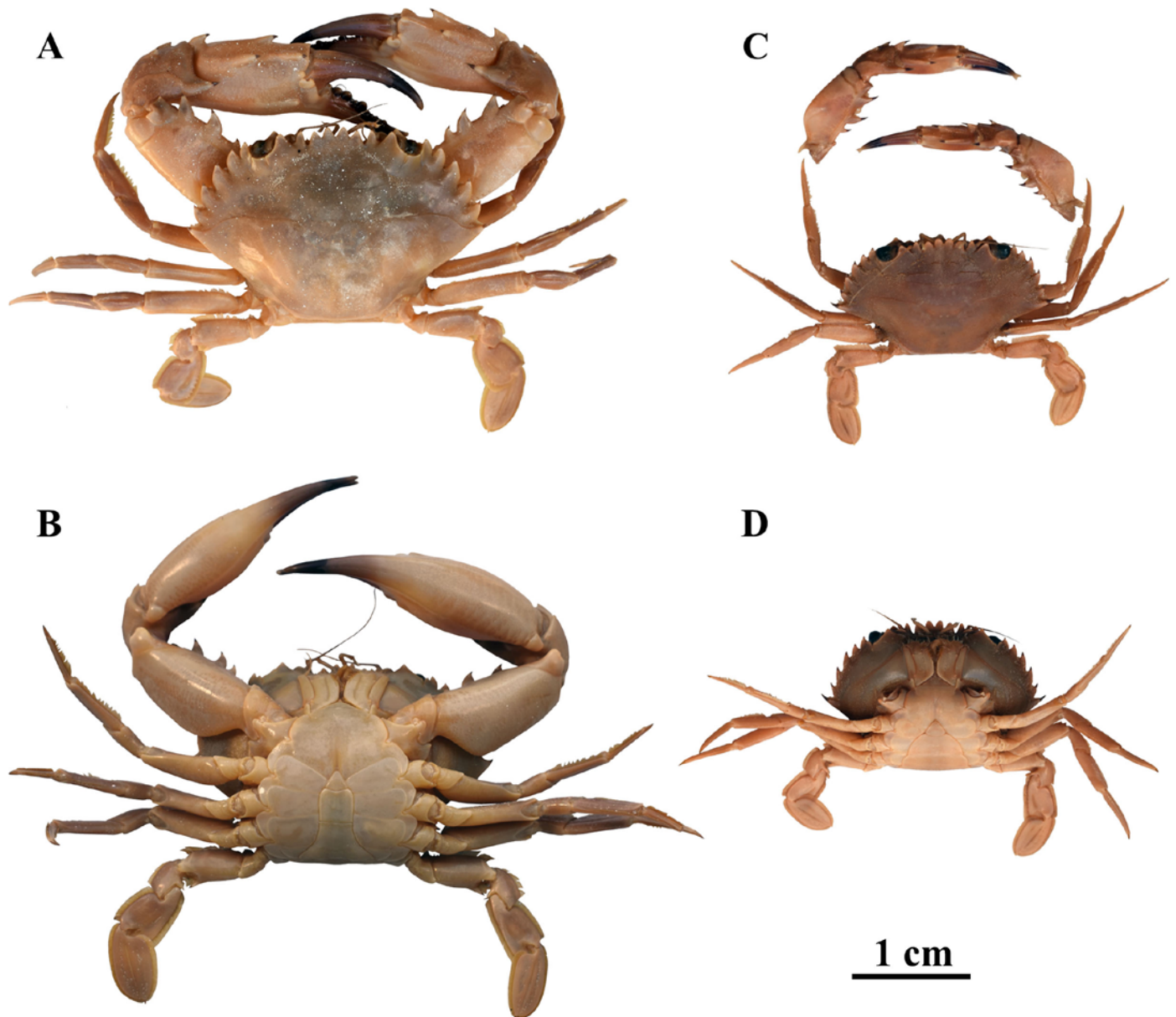


Fig. 2. General morphology of the two recently collected specimens of *Charybdis hellerii* in eastern Cuba.
 Fig. 2. Morfología general de los dos ejemplares recientemente recolectados de *Charybdis hellerii* en Cuba oriental.

structure, and even cause the extinction of local populations (Mayfield *et al.*, 2021; Hald-Mortensen, 2023). *Charybdis hellerii* is known for its rapid reproductive rate, high dispersal capabilities, and voracious predatory behaviour, which contribute to its successful establishment in new habitats (Dineen *et*

al., 2001; Bolaños *et al.*, 2012). Once introduced, *C. hellerii* can outcompete native crab species for food and habitat, leading to declines in native populations (Izar *et al.*, 2023). Therefore, effective management and control measures are crucial to mitigate the impacts of non-native species such as *C. hellerii* and

protect marine biodiversity. Addressing the threat of invasive species it is necessary to safeguard biodiversity and preserve the integrity of marine ecosystems for future generations.

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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.

Authors' contributions

Both YLD and AC equally contributed with all steps in the performance of the paper. An early version of the manuscript was written by YLD.

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