

## Potential new record of the coral-dwelling gall crab *Kroppcarcinus siderastreicola* (Cryptochiridae) from São Tomé and Príncipe

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**Abstract.**— Coral-dwelling crabs of the family Cryptochiridae have been recorded across the tropical western Atlantic but are rarely reported from the eastern Atlantic. Here, we document the presence of cryptochirid crabs in the coral *Siderastrea radians* (Pallas, 1766) from São Tomé and Príncipe, Gulf of Guinea. This coral is likely inhabited by *Kroppcarcinus siderastreicola* Badaró, Neves, Castro & Johnsson, 2012, the only known gall crab to inhabit this coral host with a recorded distribution from Florida to Brazil. Our new record highlights that this crab potentially has an amphi-Atlantic distribution, similar to its confamilial *Troglocarcinus corallicola*, and in line with the distribution of its coral host genus.

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### ■ Introduction

São Tomé and Príncipe is an island nation located in the Gulf of Guinea, off the coast of West Africa. At this latitude, the western Atlantic is linked to the eastern Atlantic by the easterly flowing equatorial currents, and the marine fauna of São Tomé and Príncipe has a strong component of amphi-Atlantic species (e.g., Wirtz, 2003; 2018). Wirtz & d'Udekem d'Acoz (2008) listed several symbiotic decapod crustaceans associated with sessile and non-sessile host organisms from São Tomé and Príncipe and highlighted the amphi-Atlantic distribution of many of them, but did not include species associated with scleractinian corals. Coral-dwelling gall crabs (Cryptochiridae) are a prime example of symbiotic coral-dwelling decapod crustaceans and are obligately associated with their scleractinian hosts. The shallow-water scleractinian corals of São Tomé and Príncipe were recorded by Wirtz (2023) and include the following possible hosts of cryptochirid crabs (based on Kropp & Man-

ning, 1987; van der Meij, 2014): *Favia gravida* Verrill, 1868, *Montastraea cavernosa* (Linnaeus, 1767), *Schizoculina africana* (Thiel, 1928), *S. fissipara* (Milne Edwards & Haime, 1850), *Siderastrea radians* (Pallas, 1766), and *S. siderea* (Ellis & Solander, 1786).

Four shallow-water cryptochirid species are known from the Atlantic Ocean, but records from the west coast of Africa are few and far between. The amphi-Atlantic generalist species *Troglocarcinus corallicola* Verrill, 1908 has been recorded from São Tomé Island inhabiting the coral *F. gravida* (Kropp & Manning, 1987). Furthermore, the eastern Atlantic gall crab species *Detocarcinus balssi* (Monod, 1956) occurs at several localities between the Canary Islands and southward to Angola, including São Tomé and Príncipe (Kropp & Manning, 1987; González, 2016). This crab has multiple coral hosts but is most commonly found in association with *Schizoculina* hosts (van der Meij & Nieman, 2016). The Agariciidae-associated cryptochirid *Opecarcinus hypostegus* (Shaw &

Hopkins, 1977) is commonly observed in the western Atlantic and reaches Ascension Island in the central Atlantic (Kropp & Manning, 1987). However, since Agariciidae corals are absent from São Tomé and Príncipe, records of this species from West Africa are highly unlikely (van der Meij, 2014; Wirtz, 2023). Lastly, *Kroppcarcinus siderastreicola* is a western Atlantic species, with records from Florida to Brazil, including the remote oceanic archipelago of Trindade and Martim Vaz, and Ascension Island in the South Atlantic Ocean (Tavares & Mendonça, 2022), and strictly associates with *Siderastrea* and *Stephanocoenia* corals (Badaró *et al.*, 2012; van der Meij, 2014; Fig. 1). No other cryptochirid crabs have been recorded in association with *Siderastrea* corals (Badaró *et al.*, 2012; van der Meij, 2014), despite extensive research in the western Atlantic by the authors between 2012 and 2023.

## Methods

Scleractinian corals in São Tomé and Príncipe

pe were opportunistically observed at shallow depths (<3 m) while snorkeling at several localities. Corals that contained crescentic galls, indicative of the presence of Cryptochiridae, were photographed with an OM Systems TG-7 waterproof camera. The photographs were used to identify the corals to species level. It should be noted that the nature of these observations was purely incidental and that no premeditated planning of dedicated surveys had occurred to search for these animals. No material was collected.

## Results

### *Kroppcarcinus siderastreicola* (Badaró, Neves, Castro & Johnsson, 2012)

#### New potential record

SÃO TOMÉ AND PRÍNCIPE — **Lembá** • Ponta Figo, Praia das Furnas; 0°21'0"N, 6°32'22"E; 1.7 m depth; 27–28.XI.2023; A. Schleimer and A. J. R. Cruz obs.; galls in *Siderastrea radians* hosts; Fig. 2A, B.

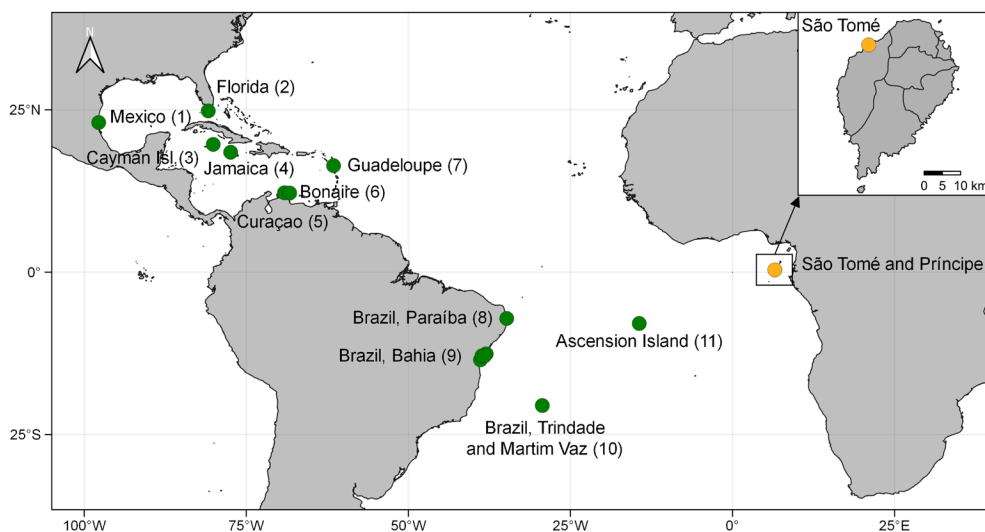


Fig. 1. Distribution of *Kroppcarcinus siderastreicola*. The current species records across the Caribbean and Brazil are given in green. The new potential record from São Tomé island (inset) is provided in orange. Species record references: (1) Kropp & Manning, 1987, (2) Klompmaker *et al.*, 2016, (3) H. Bravo, pers. obs, (4) Scott, 1987, (5) van der Meij, 2014, (6) van der Meij pers. obs, (7) Bravo *et al.*, 2024, (8) Tavares & Mendonça, 2022, (9) Badaró *et al.*, 2012; Nogueira *et al.*, 2014, (10) Tavares & Mendonça, 2022, (11) Zibrowius *et al.*, 2017.

### Identification

Dwellings made by shallow-water Atlantic Cryptochiridae are always crescentic in shape and no other taxa are known to create similar pits in scleractinian corals (Zibrowius & Gili, 1990; van der Meij, 2014; Nogueira *et al.*, 2014; Fig. 2). These dwellings are so charac-

teristic that in corals, they can be used, through their *domichnia* (dwelling traces), as evidence of their presence in the fossil record (Klomp-maker *et al.*, 2016). There are four shallow-water cryptochirid species in the Atlantic Ocean, but only one of these four is known to inhabit *Siderastrea* corals (Badaró *et al.*, 2012; van der

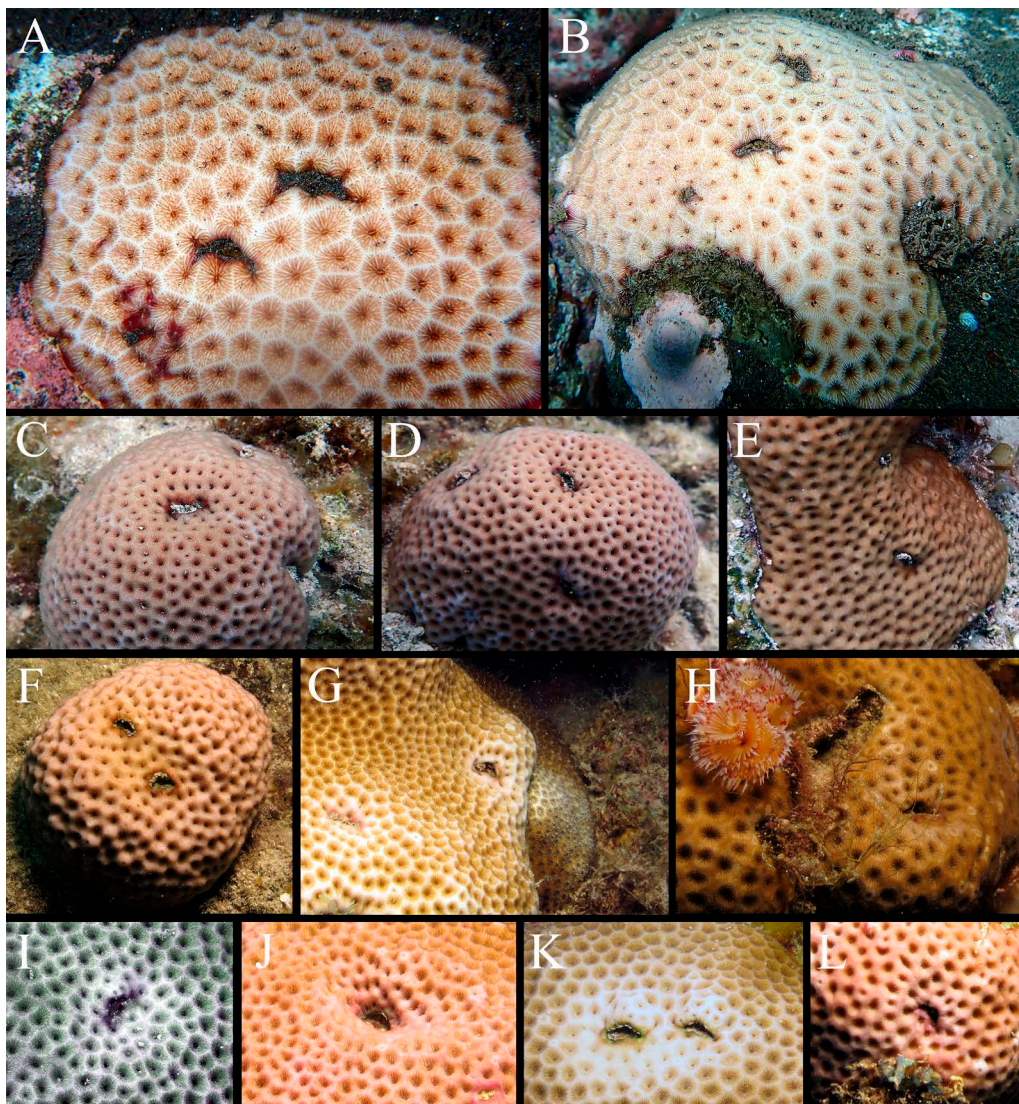


Fig. 2. Cryptochirid dwellings in *Siderastrea* colonies. A. *Siderastrea radians* colonies with multiple cryptochirid dwellings at 1.7 m depth, at Ponta Figo, Praia das Furnas, São Tomé and Príncipe (0°21'0.11"N, 6°32'22.02"E), observation on 27 November 2023. B. Observation at the same site on 28 November 2023. *Siderastrea siderea* colonies with gall crabs in the Caribbean: Curaçao (C, D, F–H, J–L), Little Cayman (E), and Guadeloupe (I). Photos by Anna Schleimer (A, B), Henrique Bravo (C–E, I), Sancia van der Meij (F–H, J–L).



Meij, 2014). Almost all gall crabs are highly host-specific, either at the genus or species level, likely linked to the specific settlement cues needed to find their coral hosts (Fize & Serène, 1957). *Kroppcarcinus siderastreicola*, as can be derived from the species epithet, was described from *Siderastrea* corals in Brazil (Badaró *et al.*, 2012) and has since also been found in *Stephanocoenia* corals (van der Meij, 2014).

While snorkeling at Ponta Figo, Praia das Furnas, the first author observed the characteristic dwellings of cryptochirid crabs in several *S. radians* colonies (Fig. 2, compare Klomp-maker *et al.*, 2016: Fig. 3). Based on the strict host specificity of gall crabs, together with their known wide distribution ranges in the Atlantic, we provisionally attribute these dwellings to *K. siderastreicola*.

## Discussion

Our species identification is based on the typical crescentic shape of dwellings of Atlantic cryptochirids that have even been used to track Cryptochiridae presence in the fossil record (Klomp-maker *et al.*, 2016). Several records of cryptochirids are available from West Africa, including a dwelling in *Siderastrea radians* illustrated by Gravier (1909: Pl. V, Fig. 16). Given the high host specificity of gall crabs, as evident from the species epithet, the inhabitant species of these *Siderastrea* colonies can, with reasonable certainty, be identified as *Kroppcarcinus siderastreicola* although specimens would need to be collected to unequivocally confirm the identity of these crabs.

This would imply that *K. siderastreicola*, like *Troglocarcinus corallicola*, has an amphiatlantic distribution, with the closest previous record reported by Zibrowius *et al.* (2017) in the 2,500 km distant Ascension Island (Fig. 1). It should be noted that the species record in Ascension Island was also based on the observation of the characteristic lunuliform crypt ap-

ertures in *S. radians* (Zibrowius *et al.*, 2017). The marine fauna in the Gulf of Guinea is strongly influenced by the easterly flowing Equatorial currents, which likely facilitated colonisation from the western Atlantic, as observed in some scleractinian corals (Nunes *et al.*, 2011). Coral-dwelling crabs are excellent dispersers and can potentially occur across the range of their preferred coral hosts (e.g., Van der Meij *et al.*, 2018). The three western Atlantic species all have wide distribution ranges (Kropp & Manning, 1987). However, an amphiatlantic distribution may not necessarily imply contemporary connectivity because the large distances could act as an effective barrier, promoting genetic differentiation and, in extreme cases, allopatric speciation (Nunes *et al.*, 2011). The collection of specimens will thus be necessary to evaluate patterns of genetic connectivity across the known range of *K. siderastreicola* to fully understand the relationship between dispersal and oceanic currents.

The composition of the scleractinian fauna in a given area presumably dictates the composition of their gall crab inhabitants. Based on the list of corals recorded from São Tomé and Príncipe (see Wirtz, 2023), it is, therefore, highly unlikely that future surveys will yield records of the agariciid-associated gall crab *Opecarcinus hypostegus*. The corals *Montastraea cavernosa* and *Schizoculina fissipara*, hosts to *T. corallicola* and *D. balssi*, respectively, were also observed at the snorkeling sites, but no cryptochirid dwellings were observed in those corals. The lack of any observations was possibly related to the deeper depth of these corals, compared to the *S. radians* colonies, as this prevented a closer examination of the corals for gall crab dwellings while snorkeling.

*Troglocarcinus corallicola* and *D. balssi* have already been recorded from São Tomé and Príncipe (Kropp & Manning, 1987). This possible new species record for *K. siderastreicola* represents an incremental yet valuable ad-

dition to ongoing efforts to increase the understanding of the marine invertebrate fauna in the Gulf of Guinea. It is anticipated that this finding will stimulate further research on the presence of cryptochirid crabs and other coral-dwelling taxa in the region. The invertebrate fauna associated with coral reefs remains largely unexplored in São Tomé and Príncipe, with most records relating to ornamental or commercial species (Bento *et al.*, 2023). With coral reefs facing numerous threats, it is timely also to record and monitor the fauna that depend on corals for their survival, especially since the conservation status of coral-associated fauna has been largely ignored thus far (Bravo *et al.*, 2021).

## ■ Ethical statement

Given the incidental nature of this observation during the vacation of authors A. Schleimer and A. J. R. Cruz, no dedicated surveys had been planned in coordination with local researchers or authorities. No biological samples were collected. Any future investigations that may arise from this initial observation will be conducted in coordination with local research institutes and with the necessary permits to collect samples, in accordance with the Nagoya Protocol.

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