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First record of *Grapsus grapsus* (Linnaeus, 1758) (Brachyura: Decapoda: Grapsidae) in freshwater habitat

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ABSTRACT

The sally lightfoot crab, *Grapsus grapsus* (Linnaeus, 1758), has been recorded from the oceanic islands off Brazil, as well as from the Caribbean, in coastal rocky shores in the Eastern Pacific, and in Galapagos. We report the first observation of *G. grapsus* in freshwater habitat, registered in a stream at Trindade Island, Brazil.

KEY WORDS

Trindade Island, Grapsoidea, salinity, inland, South Atlantic Ocean.

The family Grapsidae MacLeay, 1838 is comprised by 10 genera and 41 extant species (De Grave *et al.*, 2009), represented by coastal, oceanic and estuarine crabs. Species of the family Grapsidae are known to inhabit especially rocky shores and mangroves, tolerating a wide range of salinities, such as the mangrove root crab *Goniopsis cruentata* (Latreille, 1803) (Martelo and Zanders, 1986) and the mottled shore crab *Pachygrapsus transversus* (Gibbes, 1850) (Warburg *et al.*, 1987), found in Brazilian mangroves and rocky shores.

The genus *Grapsus* Lamarck, 1801 currently comprises eight valid species (Davie and Türkay, 2011), widespread around the world (Schubart, 2011). The only species recorded in American waters is the sally lightfoot crab *Grapsus grapsus* (Linnaeus, 1758). In Brazil, *G. grapsus* is restricted to rocky shores of the oceanic islands of Fernando de Noronha, Rocas' Atoll, St. Paul's Rocks and Trindade (Freire *et al.*, 2011; Teschima *et al.*, 2016).

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SUBMITTED 27 February 2017
ACCEPTED 9 September 2017
PUBLISHED 4 December 2017

DOI 10.1590/2358-2936e2017032

It is also found in the Caribbean, along the tropical Pacific coasts of Central and South America and Galapagos Islands (Teschima *et al.*, 2016).

The island of Trindade is located at the eastern limit of the Vitória-Trindade submarine Ridge ($20^{\circ}30'S$ $29^{\circ}20'W$), in southeastern Brazil. It forms the easternmost group of islands off Brazil, together with the Martin Vaz Archipelago, which lies 48 km east of Trindade (Fig. 1A). Trindade Island hosts one unique

population of *G. grapsus* that is genetically distinct from the population of the other three equatorial islands (Teschima *et al.*, 2016). The species has been recorded from the rocky shores of 'Praia das Tartarugas' and 'Pão de Açúcar' since the first scientific expedition to the island (Oliveira, 1951). In this study we report for the first time the occurrence of *G. grapsus* in freshwater habitat.

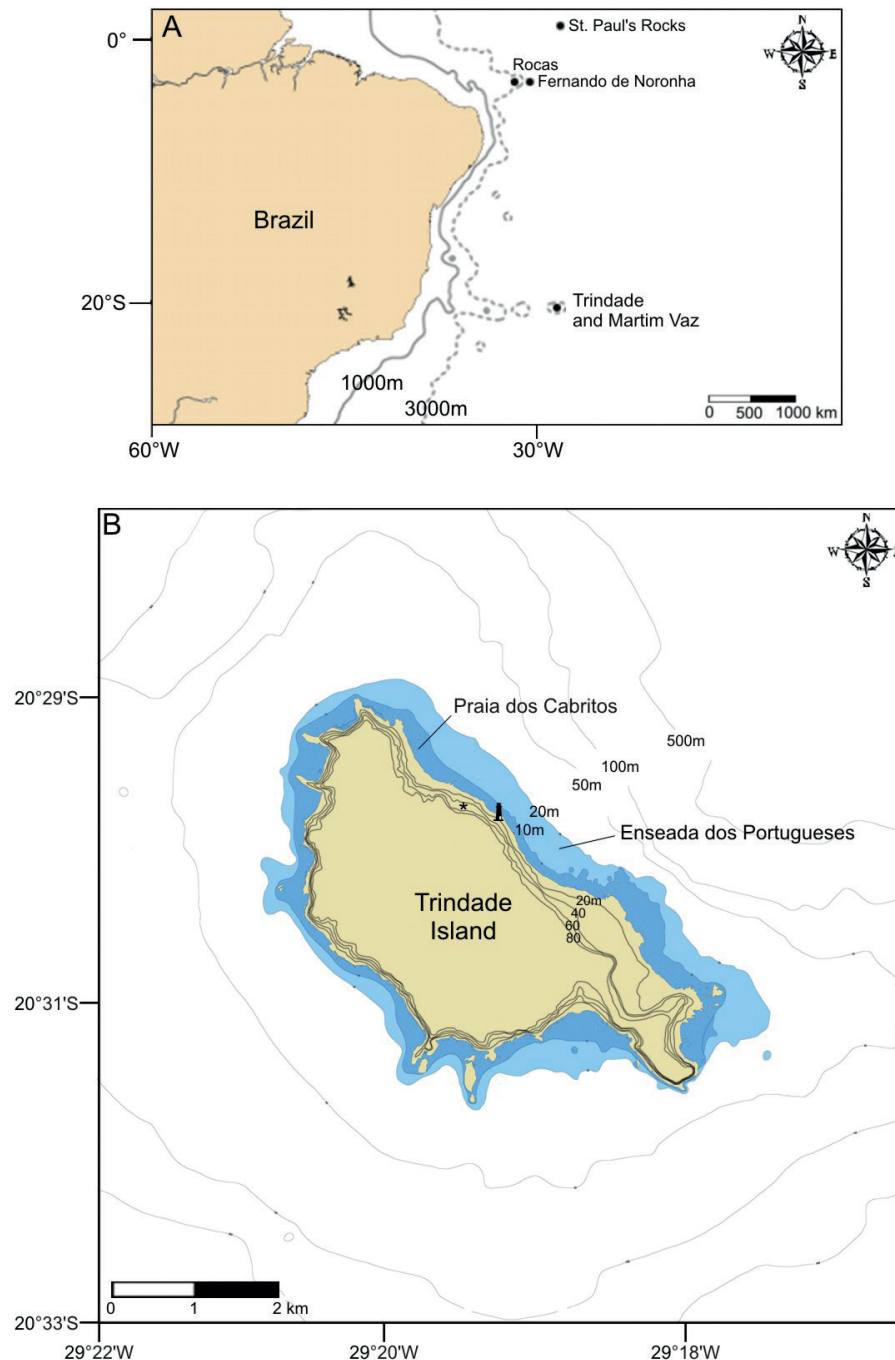


Figure 1. A, Location of the Brazilian oceanic islands, including Trindade Island; B, map of Trindade Island. Asterisk shows the location of the freshwater stream where *Grapsus grapsus* were found. Lighthouse corresponds to Ponta do Valado.

Approximately 15 specimens of *G. grapsus* were observed in a shallow stream 50 m above the sea level between the 'Enseada dos Portugueses' and 'Praia dos Cabritos', 750 m further from the northeast coast (in a straight line) of Trindade Island ($20^{\circ}29'41''\text{S}$ $29^{\circ}19'32''\text{W}$) on May 27th 2015 (Figs. 1B, 2A, B). The stream was about 30 cm deep in a small bank (one meter wide) on the top of the hill and the water flowed in sweeping meanders (10 cm deep) between and on the top of the rocks, towards a steady but also winding waterfall over the steep slope. According to local rangers, the crabs always inhabit this permanent stream. The crabs were mostly crossing the stream over the rocks, eventually walking into the water, hidden below the rocks, with part of their bodies underwater. One crab was totally submerged with a thin water layer covering its body, and it stood practically immobile inside the water for approximately 10 minutes during our presence. Otherwise, the crabs were not seen submerged, which is reasonable since also in the marine environment they are rarely observed under water, but close to shallow tide pools (ASF, pers. observ.). There

was no evidence of a downward movement towards the splash zone. The *G. grapsus* observed in the stream had different colour patterns, ranging from the small green ones to partially red (Fig. 2C–E). Partially red males are functionally mature and green males have not yet gone through the puberty molt, while it is possible to encounter green females that are sexually mature (Freire *et al.*, 2011). Therefore the population includes sexually matured specimens, especially females. Fully red larger crabs were not registered in the freshwater stream. A thin and irregular water flow was observed upon the rocky coast at sea level. The crabs were randomly occupying the rocks at the sea level up to the steep slope. The specimens found in fresh water were morphologically identical to the specimens from the rocky shore, suggesting that the rocky shore crabs moved progressively upwards trespassing the vegetation and rough soil to establish in the main freshwater stream. In the freshwater stream, *G. grapsus* were seen sharing the habitat with the gecarcinid crab *Johngarthia lagostoma* (H. Milne Edwards, 1837). These species usually shared the rocky flat area during the

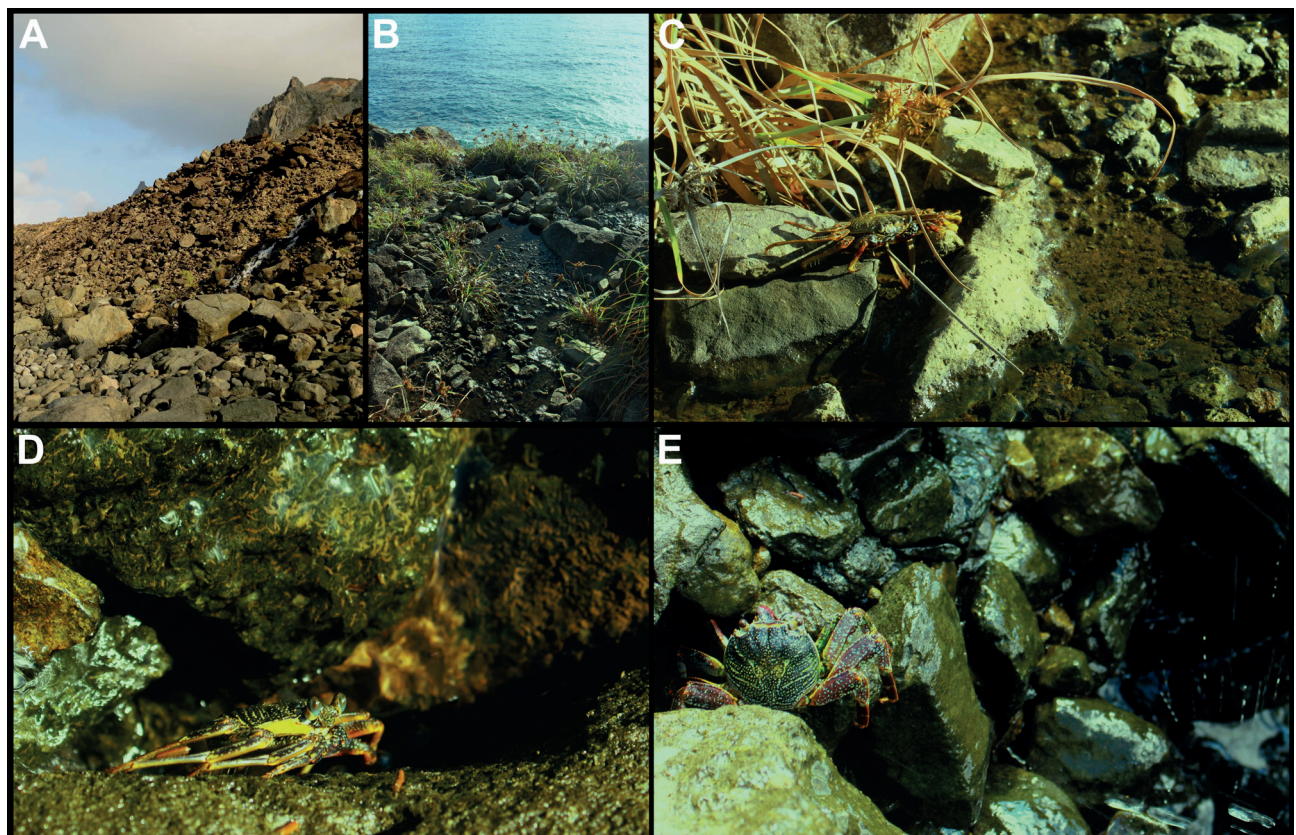


Figure 2. Freshwater stream inhabited by *Grapsus grapsus*. A, Downward flow to the rocky coast (photo credit: Hilton Entringer); B, main freshwater stream uphill; C–E, *G. grapsus* in the freshwater stream at Trindade Island.

night in Trindade Island, when *J. lagostoma* moved to the sea level. Considering the four Brazilian oceanic islands, there is no fresh water in Rocas' Atol and Saint Paul's rocks. There are no records of *G. grapsus* frequenting freshwater sites in Fernando de Noronha, probably because there are few freshwater streams in Fernando de Noronha, which remains dry during most of the year (Eston et al., 1986). This is the first record of *G. grapsus* in a freshwater habitat despite its wide neotropical distribution. Although all other species of the genus were only recorded in marine environments, this record corroborates the salinity tolerance already observed in other Grapsoidea (Gittenberger et al., 2010; Seeley et al., 2015).

ACKNOWLEDGEMENTS

We are thankful to Hilton Entringer (Tamar) and Daniel Margotti (INPE), for their help during the fieldwork, Hilton Entringer also provided the picture of the stream. PROTRINDADE/SECIRM and the N.Ap.Oc. Ary Rongel crew for the logistical support. This work was supported by the CNPq research grant 484875/2012-4. ASF also benefited from a CNPq grant (312644/2013-2). TIA was supported by a MSc scholarship from CNPq, and MCB by a PhD scholarship from CAPES.

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