

[Short Communication]

First predation report of *Gecarcinus quadratus* (Brachyura: Gecarcinidae) by *Ancylometes bogotensis* (Arachnida: Ctenidae) in Coiba Island, Panama

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Abstract — Spiders are nearly omnipresent in tropical regions, throughout a vast range of habitats, where they act as top predators of other invertebrates. On islands, spiders may assume the role of larger mainland predators in regulating invertebrate populations. This study documents a novel predator-prey interaction between the wandering spider *Ancylometes bogotensis* and the land crab *Gecarcinus quadratus* on Coiba Island Panama Pacific. We briefly discuss the ecological implications of this predator-prey relationship and the potential influence of marine subsidies on the island's terrestrial ecosystem.

Keywords — fishing spider, land crab, leaf litter, nutritional subsidies, sit-and-wait predator

Ancylometes bogotensis (Keyserling 1877) is a spider species within the Ctenidae family, and it is distributed across Central America and much of South America, through altitudes up to 2,000 meters (Höfer & Brescovit 2000; World Spider Catalog 2023). Males measure around

18–21 mm, while females reach 24–26 mm (Merrett 1988; Höfer & Brescovit 2000). Recent studies by Salgado-Roa et al. (2021) and unpublished data by Murcia-Moreno suggest that *A. bogotensis* is widely distributed throughout Panama, including Coiba Island, Panama Pacific. Similarly, *Gecarcinus quadratus* De Saussure 1853 is a common gecarcinid crab species that can also be found in Coiba Island (Abele, Robinson & Robinson 1973). These crabs are semiterrestrial, and occupy the supralittoral level of beaches, up to 600 m into inland vegetated areas (Sherman 2002, 2006; Perger, Cortés & Pacheco 2013). *Gecarcinus quadratus* is mainly nocturnal, emerging from their burrows to forage in the leaf litter (Lindquist et al. 2009), a pattern matching that of nocturnal wandering spiders (Höfer & Brescovit 2000).

Such extended range inland and nocturnal activity pattern in *G. quadratus* might increase mortality risk due to higher encounter rates with predators. This pattern may be particularly perilous especially for male (44.9 mm) and female (38.7 mm) crabs with smaller carapace widths (Toledano-Carrasco et al. 2021). Although large predators such as raccoons and coatis play a significant role as predators of *G. quadratus* on the mainland, they are absent in Coiba Island (Ibañez et al. 1997, D. Gálvez, unp. data.). Alternatively, large terrestrial sit-and-wait hunter spiders like the wandering spider *A. bogotensis* (Lapinski & Tschapka 2013) are a priori assumed to behave as important predator in island contexts. Semi-terrestrial crabs, like *G. quadratus*, are ecosystem engineers, influencing tree recruitment and organic carbon distribution (Sherman 2002; Griffiths, Mohammad & Vega 2007; Lindquist et al. 2009; Perger et al. 2013). Therefore, studying the predator-prey relationship between *A. bogotensis* and *G. quadratus* is crucial for understanding their role as predators in island ecosystems; thus, the objective of this report was to document the predator-prey relationship between them.

Coiba National Park separated from continental Panama around 12,000–18,000 years ago, and is the largest marine protected area on the Pacific coast of Central America, (Fairbanks 1989; Ibañez et al. 1997). Dry season starts from December to April with precipitation < 200 mm, while maximum precipitation occurs in October ~ 600 mm (Balaguera-Reina et al. 2018). The observation occurred on October 19th, 2022 at 8:30 PM as part of an ongoing Coiba arachnid survey project. A female of the spider *A. bogotensis* was observed feeding on *G. quadratus* near the Coiba AIP research station (-7° -36' -1.406" S, 81° 43' 28.523" W), about 10–15 m from the beach. The spider was perched on the trunk of an oil palm, *Elaeis oleifera* (Kunth) Cortés 1897, at 1.2 m high, holding a fresh specimen of *G. quadratus* and in the process of consuming it; a previously unknown interaction between the two species (Fig. 1A–B). The spider held a small male crab by the ventral side with its pedipalps (Fig. 1C). The claws of the crab were missing alongside most of the walking appendages and the crab was already immobile at the moment of the observation.

The prey-predator relationship between crabs and spiders has been reported between other crab-spider species as well

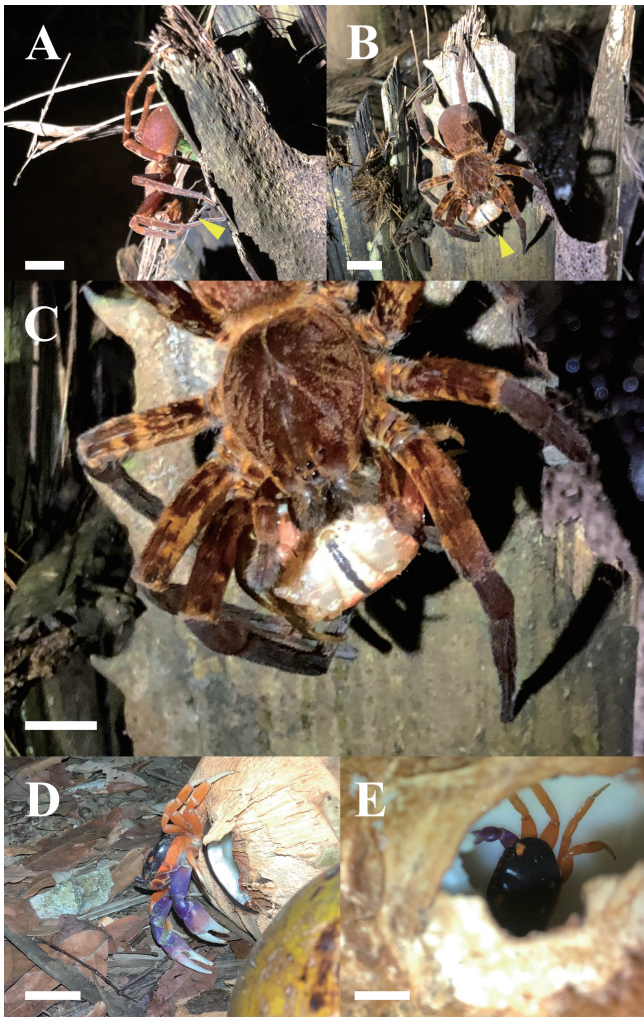


Fig. 1: Predation of *Gecarcinus quadratus* by *Ancylometes bogotensis* in Coiba Island, Panama. Female *A. bogotensis* consuming a small *G. quadratus* male (A-C). D, adult *G. quadratus*; E, juvenile crab feeding inside a coconut. Scales = 10 mm (A, B); 5 mm (C); 40 mm (D); 20 mm (E). The spider measured approximately 24 mm in length and the crab 9.5 mm in carapace width.

(see Baba et al. 2019). For example, the spider *Dolomedes raptor* and *Dolomedes orion* both prey on freshwater crabs *Geothelphusa dehaani* and a Potamid crab, respectively (Suzuki 2018; Baba et al. 2019). In estuarine systems, the wolf spider (*Lycos* sp.) preys on the fiddler crab *Austruca annulipes* (Pandya, Trivedi & Vachhrajani 2013). Interestingly, the authors report that the larger brown land crab *Cardisoma carnifex* preys on the spider during night-time activity. *Ancylometes bogotensis* diet includes small invertebrates; however, it is also capable of actively capturing larger prey (fish and frogs, Lapinski & Tschapka 2013; Bhukal, Rutherford & Mohammed 2015) and it has been observed preying on other crustacean species, such as the freshwater crab *Dilocarcinus dentatus* (Randall 1839) from Trinidad Island (Bhukal et al. 2015); these reports hint at the potential value crabs represent for spiders as prey. The average larger size of female *A. bogotensis* as compared to males (total length: 24.8 and 18.8 mm, respectively (Merrett 1988)) suggests that females pose

the highest risk of predation for *G. quadratus* juveniles. We have observed this spider species during every field trip to the island, as part of our species inventory, evidencing its large abundance. The also common *G. quadratus* in the island may provide spiders with high nutritional value (Premarathna et al. 2015), and their abundance and behavior also suggest prey-predator interactions might be frequent.

Nevertheless, it remains to be determined if this interaction is commonplace in Coiba and what the ecological implications are. Spiders are predominant predators among the arthropod species found on shores, and they utilize marine nutritional subsidies extensively (Mellbrand & Hambäck 2010; Mellbrand et al. 2011). Interestingly, we have observed *A. bogotensis* with high frequency during the dry season, a period in which most spider densities decline (Lubin 1978). In this matter, further inquiry is required to determine if *G. quadratus* is in fact linked to said sustained spider densities in Coiba island across seasons.

We present, for the first time, evidence of *A. bogotensis* preying on *G. quadratus* in Coiba Island. This discovery highlights the need for further research to compare island and mainland settings and elucidate the role of spiders as predators in the absence of larger mainland predators. Such investigations can also provide insights into the influence of marine subsidies on terrestrial ecosystems in Coiba Island.

Acknowledgements

Our gratitude goes to Alfredo de León for support in the field, as well as Coiba AIP and the Sistema Nacional de Investigación for financial support (RL, DG).

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Received June 17, 2023 / Accepted July 3, 2023