

Predation on a White-throated Clawed Gecko (*Gonatodes albogularis fuscus*) by the Tropical House Gecko (*Hemidactylus mabouia*) in Cuba

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Edited by: S. Blair Hedges. **Date of publication:** 27 April 2023.

Citation: Bignotte-Giró I, Fong G A. 2023. Predation on a White-throated Clawed Gecko (*Gonatodes albogularis fuscus*) by the Tropical House Gecko (*Hemidactylus mabouia*) in Cuba. *Caribbean Herpetology* 87: 1–4.

DOI: <https://doi.org/10.31611/ch.87>

Substantial biodiversity declines, alterations in ecosystem functioning, and high monetary expenditures associated with the management, are among the main negative effects of biological invasions (Diagne *et al.* 2021). Invasive alien species, i.e. species that have successfully been introduced, established and spread beyond their native range, are expected to increase in number and impact worldwide as a result of international trade and climate change (Fournier *et al.* 2019; Diagne *et al.* 2021). Invasive species is the fourth most prevalent threat for world's reptiles (Cox *et al.* 2022).

Of the 21 reptiles that were brought to Cuba in the last several centuries, nine species have successfully colonized and are now considered invasive (Borroto-Páez *et al.* 2015), with three of them being house geckos of the genus *Hemidactylus*. The Tropical House Gecko (*H. mabouia*) is native to central Africa (Henderson and Powell 2009) and currently can be found in several areas around Cuba with populations appearing to increase rapidly (Díaz 2014), especially in urban areas. These large geckos (adult snout-vent length [SVL] = 61–75 mm) are mainly associated with human habitations, where they hide in cracks and other refuges. They feed mainly on insects, but other arthropods and even small vertebrates can be taken (Albuquerque *et al.* 2013; Lamb *et al.* 2021).

The White-throated Clawed Gecko, *Gonatodes albogularis fuscus* is another lizard considered as an invasive species in Cuba by some authors (Borroto-Páez *et al.* 2015) and possibly native by others (Chaves *et al.* 2022). This species can be found in several sites around the Cuban archipelago living as a human commensal in houses, gardens, parks, and plantations (Díaz 2008). This diurnal gecko can reach 40 mm SVL (Schwartz and Henderson 1991) and the only known predator in Cuba is the House Sparrow (*Passer domesticus*; Bello 2000).

Although the first introduced reptiles probably arrived to Cuba in the early 16th Century with the beginning of the slave trade (Borroto-Páez *et al.* 2015), little information has been published about the interactions among invasive reptile species and about the relations with the Cuban native reptiles (e.g. Armas and Iturriaga 2017; Borroto-Páez and Reyes 2019). In this note, we document interactions between two invasive lizard species and comment about possible negative effects of *Hemidactylus mabouia* on sympatric geckos living in human habitations.

On 2 August 2020 at 1201 h, we found an adult individual *Hemidactylus mabouia* (about 75 mm SVL) swallowing an adult male *Gonatodes albogularis fuscus* (about 20 mm SVL). The observation was in a house's courtyard in the residential neighborhood named Los Olmos in Santiago de Cuba city, Cuba. The predation event occurred on a wall, ca. 178 cm above the ground, the predator had captured the prey head-first and only the rear legs and tail were hanging from its mouth (Fig. 1).

In Cuba, arthropods are the only prey reported in the diet of *Hemidactylus mabouia* (Iturriaga and Marrero 2013; Armas *et al.* 2021), however it is known this lizard can also take vertebrate prey elsewhere, including cannibalism (see review in Borroto-Páez and Reyes 2020). To the best of our knowledge, this is the first report of Tropical House Gecko predation on *Gonatodes albogularis*. Dornburg *et al.* (2011) noted it consumes *Gonatodes antillensis*



Figure 1. An adult *Hemidactylus mabouia* ingesting a male of *Gonatodes albogularis fuscus* in Santiago de Cuba. Photos by Irellis Bignotte-Giró.

in Curaçao. Hence, our record corroborates *Hemidactylus mabouia* as a generalist and opportunistic predator and also confirms previous observations of occasional diurnal activity in this gecko (*i.e.*, Malhotra and Thorpe 1999; Borroto-Páez and Reyes 2019; Armas 2022). Competition with small reptiles associated with human construction was considered by Borroto-Páez *et al.* (2015) as the main impact of the Tropical House Gecko in Cuba. Our observation shows predation on other co-occurring reptiles as an additional impact of this invasive gecko.

We have noted a declination in the population of other geckos living in Santiago de Cuba city following apparition and establishment of *Hemidactylus mabouia*, and our observations in this house document it. The first records of the Tropical House Gecko in this city date to Barbour and Ramsden (1919), however, its abundance began to increase after 2015 (authors' personal observation). In the house where we made this observation, populations of the Tropical House Gecko have increased since 2018, and populations of the West African House Gecko (*Hemidactylus angulatus*) have decreased abruptly. At present, the Tropical House Gecko is the only *Hemidactylus* species established at this location and its typical clutches of two eggs (Bock 1996; Velazco Pérez and Sanz Ochotorena 2016) are found under and behind different objects in the house.

Krisko and Daniels (2005) and Díaz (2014) mentioned declines of *Gonatodes albogularis* in Florida and Havana, respectively. We noted a diminution in the population of *Gonatodes albogularis fuscus* living in this house and in many other sites in this city, which occurred after 2018. Before that date, this gecko was the most abundant reptile in the courtyard, as it was in many other houses of Santiago de Cuba. In about an hour of observation, several adults and juveniles of different ages were observed climbing on the walls of the courtyard and several cohorts were born each year. Currently, only a pair survives in this courtyard and only one specimen per year was born in 2021 and 2022 (Fig. 2).

The endemic Cuban Broad-banded Geckolet (*Sphaerodactylus torrei torrei*) also seems to have declined in Santiago de Cuba. Some years ago, this was a common species in the courtyard and in some interior rooms of this and other buildings of the city. In surveys made between January 2007 and December 2008 in this house, we detected 27 specimens: 12 females, five males, and 10 juveniles, with an average of 0.04 specimens detected per person-day of observation. In an equivalent time interval after the introduction of *Hemidactylus mabouia*, between January 2021 and December 2022, we observed only 10 specimens: seven females, one male, and two juveniles, averaging 0.01 specimens per person-day of survey. These results seem to confirm the suggestions of Díaz (2014) about the affect on native Cuban *Sphaerodactylus* species by the introduced house geckos.

Competitive exclusion may have contributed to the disappearance of *Hemidactylus angulatus* in the study site, but the synergistic effect of competition and depredation could have caused the decline of populations of the other two geckos. Moreover, interactions among urban sympatric geckos are probably more complex than



Figure 2. Specimens of *Gonatodes albogularis fuscus* detected last year in a house in Santiago de Cuba city. An adult male, March 2022 (left); a juvenile, June 2022 (right). Photos by Ansel Fong and Irelis Bignotte-Giró.

we know at present, as shown by our observations of a *Sphaerodactylus torrei torrei* male (ca. 35 mm SVL) preying upon a *Gonatodes albogularis fuscus* newborn in the backyard of the house. The *Sphaerodactylus* was observed holding its prey by the mid-body region at 1650 h of May 7, 2010.

We are aware that our observations are mostly restricted to one house, even though *Hemidactylus mabouia* populations have increased throughout the city, which may limit conclusions. However, Short and Petren (2012) showed the importance of within-patches (buildings) surveys to document the displacement of invasive geckos in a broader scale urban landscape. We encourage monitoring species abundance changes in replicate locations and studies on the dietary and structural niche overlap among geckos of Cuban cities, which could help establish a causal relationship between invasion and decline of resident (alien or native) species.

Acknowledgements

We thank L. M. Díaz for discussions about the possible effects of the introduction of *Hemidactylus* species in Cuba, and L. F. de Armas and R. Powell for providing useful literature.

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