



The Puerto Rican Racer (*Borikenophis portoricensis*) using Two Invasive Species as Resources: Australian Pines (*Casuarina equisetifolia*) as Refuge and House Geckos (*Hemidactylus* sp.) as Prey

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Introduced species are second only to habitat destruction among factors negatively affecting biodiversity (Simberloff and Rejmánek 2011; Bellard et al. 2016). A non-native species can alter the structure and function of an ecosystem, can compete with and even displace a native species, and can expose native species to exotic diseases and parasites (Vitousek et al. 1997; Kraus 2009; Simberloff and Rejmánek 2011; Bellard et al. 2016; Barnett et al. 2018).

Four species of House Geckos in the genus *Hemidactylus* have become established in Puerto Rico; the introductions of

Hemidactylus mabouia, *H. angulatus*, and *H. turcicus* probably date to colonial times (Rivero 1998), whereas the introduction of *H. frenatus* was more recent (Sanchez 2018). Of the four, the Tropical House Gecko (*H. mabouia*) is the most common and widely distributed, occurring in many urban and rural situations. Little is known about the interactions of these invasive geckos with the ensembles of native reptiles on Caribbean Islands. Owen and Perry (2005) described a Tropical House Gecko (*H. mabouia*) being eaten by a Puerto Rican Crested Anole (*A. cristatellus*) in the British Virgin Islands. Armas and Iturreaga (2017) reported predation on a Tropical House Gecko by a Spotted Brown Trope (*Tropidophis pardalis*) in Cuba. Other reports have described various competitive interactions with Caribbean lizards (e.g., Powell 2003; Powell and Henderson 1992; Stroud 2016), and Borroto-Páez and Reyes (2019) described competitive interference between *H. mabouia* and endemic Cuban anoles (*Anolis* sp.).

The Puerto Rican Racer (*Borikenophis portoricensis*) is the largest of three native dipsadid snakes of the Puerto Rican Bank (SVL to 923 mm; Schwartz and Henderson 1991) and has an extensive distribution in Puerto Rico and the Virgin Islands (Rivero 1998; Henderson and Powell 2009; Mayer 2012). It is a largely ground-dwelling, diurnally active snake that uses mainly visual cues to locate prey consisting of small vertebrates, including introduced species like *Hemidactylus mabouia* (Henderson and Sajdak 1996; Rodríguez-Robles 2005). Because few studies have documented interactions among non-native and native species (e.g., Chiba 2010), we herein describe native Puerto Rican Racers exploiting two non-native species, Australian Pines (*Casuarina equisetifolia*) as habitat and a Tropical House Gecko as prey.

The predation event occurred between 1000 and 1030 h on 10 July 2003 while establishing an experimental plot

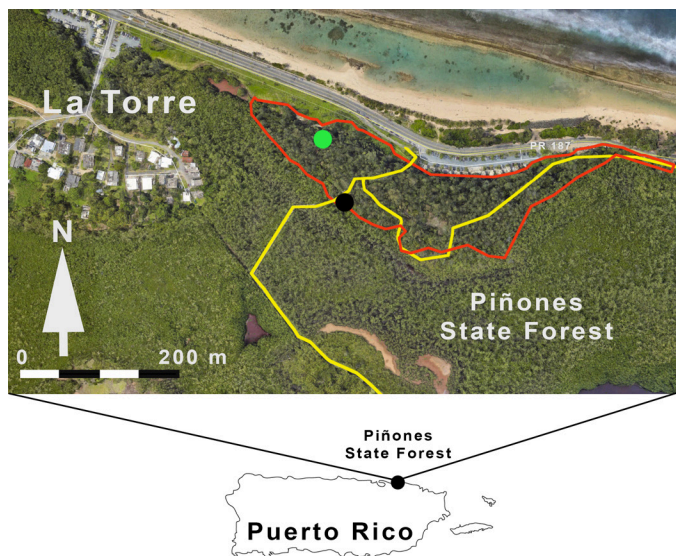


Fig. 1. Aerial view of the sites of observations in the Piñones State Forest (1,270.18 ha) on the northern coast of Puerto Rico. The yellow line marks the boardwalk; the red outline denotes the 3.53-ha stand of Australian Pines (*Casuarina equisetifolia*); the green dot marks the locality where a Puerto Rican Racer (*Borikenophis portoricensis*) preyed on a House Gecko (*Hemidactylus* sp.); and the black dot indicates the place where another Puerto Rican Racer was observed in Australian Pine forest border.



Fig. 2. A sequence of images showing the predation of a House Gecko (*Hemidactylus* sp.) by a Puerto Rican Racer (*Borikenophis portoricensis*) in an Australian Pine (*Casuarina equisetifolia*) forest in the Piñones State Forest, Puerto Rico. The eight still images were extracted from a four-minute video: A. 1'30", B. 1'48", C. 1'51", D. 2'18", E. 2'20", F. 3'24", G. 3'49", H. 3'50". Note the typical digital morphology of geckos in the genus *Hemidactylus* evident in Fig. 2F. Video recorded by the senior author.

in a stand of Australian Pines on the southern side of Route PR-187 in the western sector of the Piñones State Forest (18°27'10.74"N, 65°58'08.81"W; Fig. 1). The predation images were recorded with a Sony CCD-TRV68 Hi8 video camera, a portion of which is available at <https://youtu.be/VWhX1GfGdzc> and extracted images are presented in Fig. 2.

Omar Monzón initially noticed movement in a cluster of dry twigs in the crotch of an Australian Pine at a height of 1.8 m. Closer examination revealed a Puerto Rican Racer with a House Gecko (presumably *H. mabouia*) in its mouth (Fig. 2). Initially holding the gecko by the pelvic region, the snake manipulated its prey until the mandible was on the back of the gecko and the upper jaw was on its venter. The gecko continued to move during the swallowing process, suggesting that the snake was unable to inject its venom. The 4-min sequence (Fig. 2) ended with the snake climbing higher and out of view, at which time it had swallowed the tail and most of the posterior third of the gecko's body.

This event and a second snake observed in another Australian Pine illustrate adaptations by a native species in order to exploit a new trophic resource and structural habitat available as a consequence of introducing non-native species (e.g., Gangoso et al. 2006).

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