



INTRODUCED SPECIES

Cuban Treefrogs, *Osteopilus septentrionalis* (Duméril & Bibron 1841) (Anura: Hylidae), and other Nonindigenous Herpetofauna Interdicted in Grenada, Lesser Antilles

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The number of introduced nonindigenous species of amphibians and reptiles within the greater Caribbean, including Grenada, is escalating and has become an ever-increasing critical conservation concern (Daudin and de Silva 2011; Powell et al. 2011; Powell and Henderson 2012). The amount of development, tourism, and consequent import commerce is increasing, requiring careful regulation of the pet trade and fauna introduced for biological control as well as diligence in cargo inspection. Herein we document the first records of nonindigenous Cuban Treefrogs, *Osteopilus septentrionalis* (Duméril and Bibron 1841), interdicted from cargo, along with recent interceptions of two species of nonindigenous lizards already established on Grenada in the Lesser Antilles.

Osteopilus septentrionalis is indigenous to Cuba and portions of The Bahamas, with nonindigenous populations established in Florida, USA, Costa Rica, and a number of islands throughout the Caribbean (Meshaka 2001, 2011; Kraus 2009; Rödder and Weinsheimer 2009; Krysko et al. 2011a, 2011b; Powell et al. 2011; Powell and Henderson 2012; Somma 2012; Rivalta González 2014). This highly invasive and potentially ecologically injurious hylid is established on several islands in the Lesser Antilles. Within the Grenada Bank, it is known only on Mustique (Kraus 2009; Powell et al. 2011; Henderson and Breuil 2012; Somma 2012; Yokoyama 2012). On 9 November 2013, an adult *O. septentrionalis* (UF-Herpetology 174214) was collected from ornamental horticultural cargo by PRG at the main shipping port in Saint George's Harbour, Grenada Island, Grenada (12.047808°N, 61.748347°W, datum WGS84). Kenneth L. Krysko confirmed the identity of this specimen and those described below. On 9 December 2013, a second adult *O. septentrionalis* (UF-Herpetology 174216; Fig. 1) was collected by Stephen Cox at the same locality from similar imported

horticulture. In both instances the plants originated from a horticultural business in Miami, Miami-Dade County, Florida, USA, and were destined for a resort complex under construction on Grenada Island. These are the first interdicted *O. septentrionalis* vouchered from Grenada, but do not represent an established population.

Both the Woodslave, *Hemidactylus mabouia* (Moreau de Jonnès 1818), and Brown Anole, *Anolis sagrei* Duméril and Bibron 1837, are established on Grenada. *Hemidactylus*



Fig. 1. Cuban Treefrog, *Osteopilus septentrionalis* (UF-Herpetology 174216), collected on 9 December 2013 at a shipping port in Saint George's Harbour, Grenada Island, Grenada. Photograph by Stephen Cox.

mabouia is indigenous to Africa south of the Sahara, with invasive nonindigenous populations established throughout much of Central and South America, Mexico, Cape Verde, extralimital regions of southern Africa, perhaps Madagascar, much of Florida, USA, and numerous localities throughout the Caribbean (Powell et al. 1998, 2011; Rivas Fuenmayer et al. 2005; Carranza and Arnold 2006; Alexander and Marais 2007; Anjos and da Rocha 2008; Baldo et al. 2008; Rödder et al. 2008; Kraus 2009; Daudin and de Silva 2011; Krysko et al. 2011a, 2011b; Meshaka 2011; Rocha et al. 2011; Powell and Henderson 2012; Yokoyama 2012), including Grenada (Germano et al. 2003; Henderson and Berg 2011; Henderson and Breuil 2012). Additionally, a *H. mabouia* was interdicted in Maryland, USA, from a moving truck transporting household goods and furniture originating in Florida (Somma et al. 2013).

Anolis sagrei is a highly invasive dactyloid indigenous to Cuba, The Bahamas, and perhaps Little Cayman, that has numerous nonindigenous populations throughout the southern continental United States, Hawaii, Mexico, Belize, Taiwan, and portions of the Caribbean (Kolbe et al. 2008; Kraus 2009; Meshaka 2011; Powell et al. 2011; Powell and Henderson 2012; Yokoyama 2012), including Grenada (Greene et al. 2002; Henderson and Berg 2011; Henderson and Breuil 2012).

On 19 November 2013, one adult male (UF-Herpetology 174220) and three subadult *A. sagrei* (UF-Herpetology 174218, 174221–222), in addition to one juvenile *H. mabouia* (UF-Herpetology 174219) were collected by Stephen Cox from cargo shipments of ornamental horticulture at the same locality as the aforementioned *O. septentrionalis* vouchers. These plants originated from the same plant nursery in Miami, Florida, and were destined for the same resort complex as those harboring the Cuban Treefrogs. Although both *H. mabouia* and *A. sagrei* are already established on Grenada, the transportation of additional propagules on shipping imports is a cause for concern as they may provide genetic admixture to populations already established on Grenada. This enhanced genotypic diversity may in turn enhance the adaptability of these invasive lizards (Kolbe et al. 2008).

Nonindigenous herpetofaunal introductions through cargo stowaways have become increasingly important in the greater Caribbean in recent years (Kraus 2009; Powell et al. 2011; Powell and Henderson 2012). The interceptions we describe highlight the need for increased inspector vigilance to prevent increased genotypic diversity and adaptability in already established nonindigenous herpetofauna, or to prevent new introductions of other invasive, nonindigenous species. This need is crucial in the age of mobility, increased tourism, rapid development, and trade liberalization.

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