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First record of the Greenhouse frog, *Eleutherodactylus planirostris* (Anura: Eleutherodactylidae), in Costa Rica

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Introduction of non-native species is a worldwide phenomenon that has received great attention in the past two decades. Introduced species can become established in new locations if they find suitable habitats where they can thrive (Sax et al., 2005). In other cases, adaptable species can use a wide variety of habitats and thus successfully increase their numbers in places outside of the species range (Sax et al., 2005). Therefore, geographically separated locations with similar climate and environmental conditions are prone to invasions by ecological generalists of different habitat types. This seems to be the case of the Greenhouse frog, *Eleutherodactylus planirostris* (Cope, 1862), a species native to Cuba, the Bahamas and Cayman Islands (Olson et al., 2012). This species has been introduced elsewhere through the potted plant trade and breeding populations have been reported in Mexico (Cedeño-Vázquez et al., 2014), Honduras (McCranie and Valdés-Orellana, 2014), Jamaica (Pough et al., 1977), Turks and Caicos Islands (Reynolds and Niemiller, 2010) and several locations from both mainland and islands of the USA (Kraus et al., 1999; Christy et al., 2007; Heinicke et al., 2011). All the places where *E. planirostris* has been documented are tropical or subtropical areas and the species can be found in both natural and urbanized habitats (Olson et al., 2012). It is considered an invasive species in the Pacific Islands, attaining extremely high densities (over 12,000 per ha) and potentially having a negative impact on the native invertebrate fauna (Olson et al., 2012).

On 3rd December 2014, we captured an individual of *E. planirostris* at Limón city, Limón province, Costa Rica (9.981667, -83.051389; 32 m a.s.l.; Fig. 1). Limón is a port city on the Caribbean coast that is surrounded by rainforests, with average annual maximum temperature and average annual precipitation of 30 °C and 300 mm respectively (Gómez and Herrera, 1986). The individual was found within a house and other individuals of the same species were previously observed in the same place. No individuals were heard calling. The captured frog was deposited at the herpetological collection of the Zoology Museum, University of Costa Rica (voucher number: UCR-22190). The individual had a snout-vent length of 23.5 mm, a head length of 7.9 mm and a head width of 7.8 mm (Fig. 2). It was identified as a female, as two eggs were found within the animal. Individuals observed previously were always near moist places within the house and one individual seemed to be feeding upon insect larvae in one occasion.

E. planirostris is a direct-development frog that lays eggs in a wide variety of moist sites and can also tolerate high temperatures and dry conditions (Pough et al., 1977). These features make *E. planirostris* a species with a high potential to invade tropical areas. In addition, males produce a weak call (Díaz and Cádiz, 2007) making them inconspicuous until the population attains a high density. Therefore, it is impossible to determine an exact date of the arrival of this species to Costa Rica or assume that a breeding population is already established. However, the fact that we saw more than one individual in an urban area and that the collected frog was a female with eggs could be an indication that this species might be more common in the country than expected. In addition, females of *E. planirostris* are reported to lay 3-26 eggs (Goin, 1947),

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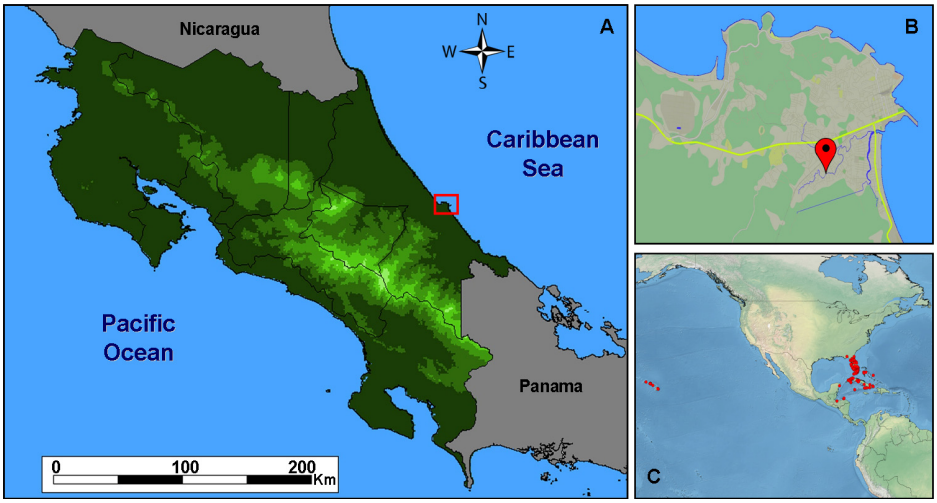

Figure 1. Map of Costa Rica (A) with an inset map of Limón port city (B) showing the location where an individual of *Eleutherodactylus planirostris* was captured. A map of the world's distribution of the species (C) is also shown (data obtained from HerpNet, 2014).

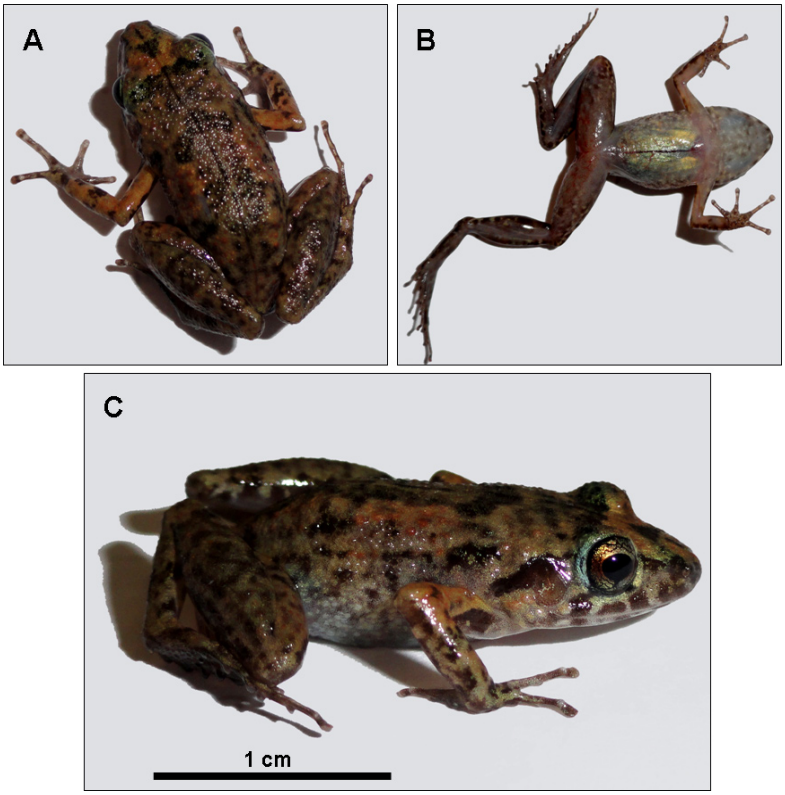

Figure 2. Dorsal (A), ventral (B) and lateral (C) views of the individual of *Eleutherodactylus planirostris* captured in Costa Rica.

so that the female we found might have already laid some eggs.

The Greenhouse frog could be a new addition to the list of herpetofauna that has been introduced into Costa Rica. Populations of 6 species of lizards (Gekkonidae: *Hemidactylus frenatus*, *H. garnotii*, *H. mabouia* and *Lepidodactylus lugubris*; Polychrotidae: *Anolis* [= *Ctenonotus*] *cristatellus* and *Anolis* [= *Norops*] *sagrei*) and 3 species of frogs (Eleutherodactylidae: *Eleutherodactylus coqui* and *E. johnstonei*; Hylidae: *Osteopilus septentrionalis*) have been reported in the country (Bolaños et al., 2011). Most of these species (5) can be found in the Caribbean coast of Costa Rica and have arrived there most probably as stowaways from merchant ships or cruises. The impact of these introductions has yet to be quantified in Costa Rica, especially to determine whether these species can be competitors, predators or food source for native species (Barquero and Hilje, 2005) or even vectors of diseases.

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