

New findings of *Phelsuma grandis* and *P. laticauda* (Sauria: Gekkonidae) at the southern edge of the range of the endangered *Phelsuma serraticauda* in eastern Madagascar

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The gecko genus *Phelsuma* currently comprises 52 described species (Uetz, 2013), most of them occurring on south-western Indian Ocean islands. The Golden-dust Day Gecko *Phelsuma laticauda* (Boettger, 1880; Fig. 1) is a non-gluer species commonly found in humid regions of northern Madagascar. The Madagascar giant day gecko *Phelsuma grandis* (Gray, 1870; Fig. 2) is the largest known species within this genus, with a maximal total length of 30 cm (Rocha et al., 2010). Both species' ability to colonise and thrive in degraded habitats is well known, and they are commonly found in primary forests as well as anthropogenic habitats (e.g., banana and coffee plantations; Andreone et al., 2003; Glaw and Vences, 2007). *P. laticauda* and *P. grandis* are categorised as Least Concern by the International Union for the Conservation of Nature (IUCN; Gerlach, Ineich and Vences, 2011; Ratsouvina, Glaw and Rakotonirafy, 2011). The species were naturally endemic to Madagascar and colonised several locations across the world. Introduced individuals of *P. laticauda* were found in French Polynesia, Comoros and Seychelles (Ota and Ineich, 2006; Rocha et al., 2009), *P. grandis* was found in Florida (Krysko, Hooper and Sheehy, 2003), and both species were recorded in the Mascarenes and Hawaii (Allison, 2002; Cole, 2007; Rocha et al., 2007).

The two species were observed between 9–13 December 2008 during a survey (Randrianantoandro et al., 2012). The observation sites were located in

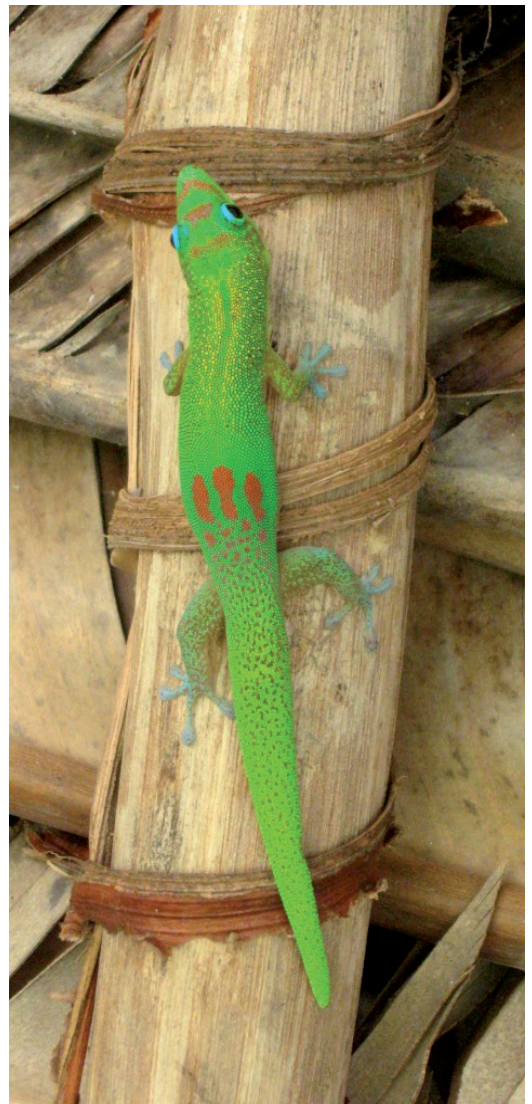


Figure 1. Dorsal view of an adult *Phelsuma laticauda* on a *Ravenala*-made shelter in Analamalotra, eastern Madagascar. Photo: C. Randrianantoandro.

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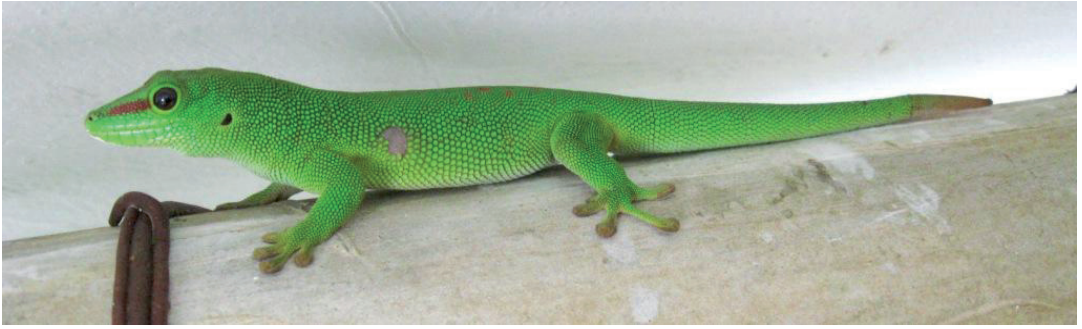


Figure 2. Lateral view of an adult *Phelsuma grandis* on artificial support in Analamalotra, eastern Madagascar. Photo: C. Randrianantoandro.

Analamalotra (18°4'0" S - 49°23'0" E; 15 m a.s.l.) and Toamasina (18°10'03" S - 49°24'11" E; 12 m a.s.l.), at 280 km distance from the natural range of *P. laticauda* and 340 km from the one of *P. grandis* (Fig. 3). A total of 38 individuals of *P. laticauda* (34 adults and two juveniles in Analamalotra; two adults in Toamasina), and seven of *P. grandis* (three adults and one juvenile in Analamalotra; two adults and one juvenile in Toamasina), were observed on natural (i.e., *Cocos nucifera* and *Ravenala madagascariensis*) and artificial supports (i.e., on the walls of houses and containers; see Fig. 2). Several individuals of four autochthonous *Phelsuma* species were observed in proximity (i.e., one *P. lineata*, one *P. madagascariensis* and three *P. quadriocellata*).

Individuals taken from the species' natural range are known to be kept in captivity in Toamasina by international traders before exportation to other countries, an activity in which many Malagasy herps are involved (Andreone *et al.*, 2013). Individuals of both *P. grandis* and *P. laticauda* have escaped captivity and new populations have recently been observed in the north of Toamasina (Pearson and Raxworthy, 2009). Gehring, Ratsavina and Vences (2010) also reported the presence of *P. laticauda* around Lac Ampitabe, 40 km south of Toamasina. Another finding of this species was reported in Maroantsetra (Gehring, *et al.*, 2010; Fig. 3). We confirm the suspected range expansion of the two species around Toamasina. Further monitoring is therefore needed between Toamasina and the north-eastern coastal region of Madagascar.

The range of the two species already overlaps in the northern edge with the distribution of *P. serratacauda*, which is categorised as Endangered by the IUCN (Randrianantoandro *et al.*, 2011). The newly-discovered populations of *P. laticauda* and *P. grandis* reveal

sympatry in the southern edge of *P. serratacauda*. Both *P. laticauda* and *P. grandis* are known to be adaptable and aggressive competitors (Ratsavina, Glaw and Rakotondrazafy, 2011). Sympatry in *Phelsuma* species

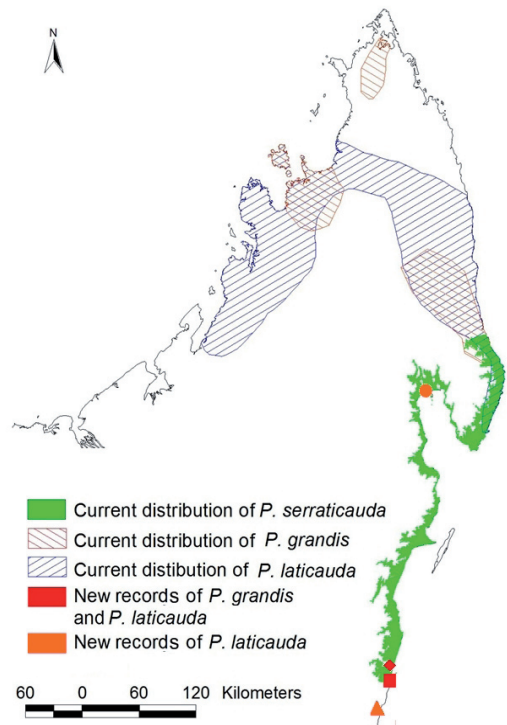


Figure 3. Distribution of *Phelsuma serratacauda*, *P. grandis* and *P. laticauda* in northern Madagascar. The red square and the red diamond are the new localities reported in this paper and by Pearson and Raxworthy (2009), respectively; the orange closed circle and the orange triangle represent localities reported by Gehring *et al.* (2010) and Gehring, Ratsavina and Vences (2010), respectively.

may cause competition and shifts in habitat use that might harm the less adaptable *P. serraticauda* (Harmon, Harmon and Jones, 2007). Moreover, the larger *P. grandis* may pose a risk of predation (Garcia and Vences, 2002) and was already cause of concern when found within the natural range of other *Phelsuma* species (e.g., Buckland, 2009; Dubos, 2013). The presence of *P. laticauda* and *P. grandis* would probably increase the existing threats to the species in the region, namely illegal collection, population fragmentation, and habitat loss (Randrianantoandro et al., 2011). Given the status of *P. serraticauda* and the lack of conservation measures, we recommend further monitoring of *P. laticauda* and *P. grandis* to be prioritised in the Toamasina District.

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