Rediscovery of Living Land Snails on Trindade Island, Brazil

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RESEARCH NOTE

Rediscovery of living land snails on Trindade Island, Brazil

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Abstract: For four decades it has been suspected that the endemic land snails of Trindade Island, Brazil, were extinct. Here we report finding live *Succinea lopesi* Lanzieri, 1966 and a species of *Happia* Bourguignat, 1889 on top of the island's highest peaks. *Happia* is a new record for the island and possibly also a new endemic species. As Trindade's environment has suffered much degradation due to introduced feral goats, such remote places might have acted as refuges for the snails. With the ongoing recovery of the native flora after the eradication of the goats, the snails' populations might re-establish themselves.

Key words: Gastropoda, *Happia* sp., Pulmonata, Stylommatophora, *Succinea lopesi*.

Trindade Island lies about 1140 km off the city of Vitória, Espírito Santo state, Brazil (Fig. 1). It was the subject of historical disputes among Portugal, the United Kingdom, and Brazil, and thus received many military and scientific expeditions since its discovery in 1501. Trindade's terrestrial molluscan fauna has recently been the target of studies: some of the native land snails were revised by Salvador *et al.* (2013), who also indicates some non-native microgastropods on the island. Previously, the single introduced snail recorded was *Bradybaena similaris* (Férussac, 1821) (Alves 1998). However, there was something very curious about the island's land snails: only empty shells have been recovered in the last three decades: not a single snail had been reported alive, native or otherwise. This suggested that the native land snails could already be extinct.

Besides the non-native gastropods, there are two other introduced species that could have played a major role in this disappearance: goats, by destroying the native flora and thus the land snails' habitat and food source, and house mice, by acting as potential predators. Hence, Salvador *et al.* (2013) predicted that if some land snails survived, it should be on the island's peaks, which would have acted as refuges, since introduced species do not usually expand their range into such places (Gargominy 2008). Therefore, we were overjoyed to confirm this prediction: recent collecting on two of the highest peaks on Trindade Island recovered living snails (Fig. 2).

The collected specimens are housed in the collections of the MNRJ (Museu Nacional; Rio de Janeiro, Brazil) and MZSP (Museu de Zoologia da Universidade de São Paulo; São Paulo, Brazil), as follows: *Happia* sp. Bourguignat, 1889: MNRJ, RJV Alves 8836b (5 specimens.), MZSP 112120 (3 specimens); *Succinea lopesi* Lanzieri, 1966: MNRJ, RJV Alves 8836a (3 specimens), MZSP 112122 (2 specimens). All were collected by R.J.V. Alves and N.G. Silva on 18 February 2013.

***Happia* sp.:** Collected on Desejado Peak (Fig. 1), under the bark of a dead, introduced, *Araucaria angustifolia* (Pinophyta, Araucariaceae). Desejado Peak is the third tallest peak on the Island. The summit's western flank is covered by a cloud forest dominated by the tree fern *Cyathea copelandii* (Pteridophyta, Cyatheaceae), mostly growing on humus in the understory, and by *Myrsine umbellata* (Magnoliophyta, Primulaceae). On the eastern side of the flat summit, there is a single dead *Araucaria angustifolia*, about 4 m high (20°30′41.61″S 29°19′26.60″W, 547 m above sea level). The *Happia* specimens were found under the decomposing bark of this tree, together with earthworms, ants and centipedes.

This is the first report of a species of *Happia* from Trindade. Judging by its shell morphology (Figs. 5–7) and the remote place it was found, it very likely is a new species, endemic to the island. However, only young specimens were recovered and thus a full taxonomic treatment must be postponed for the moment. It is interesting to note that this genus

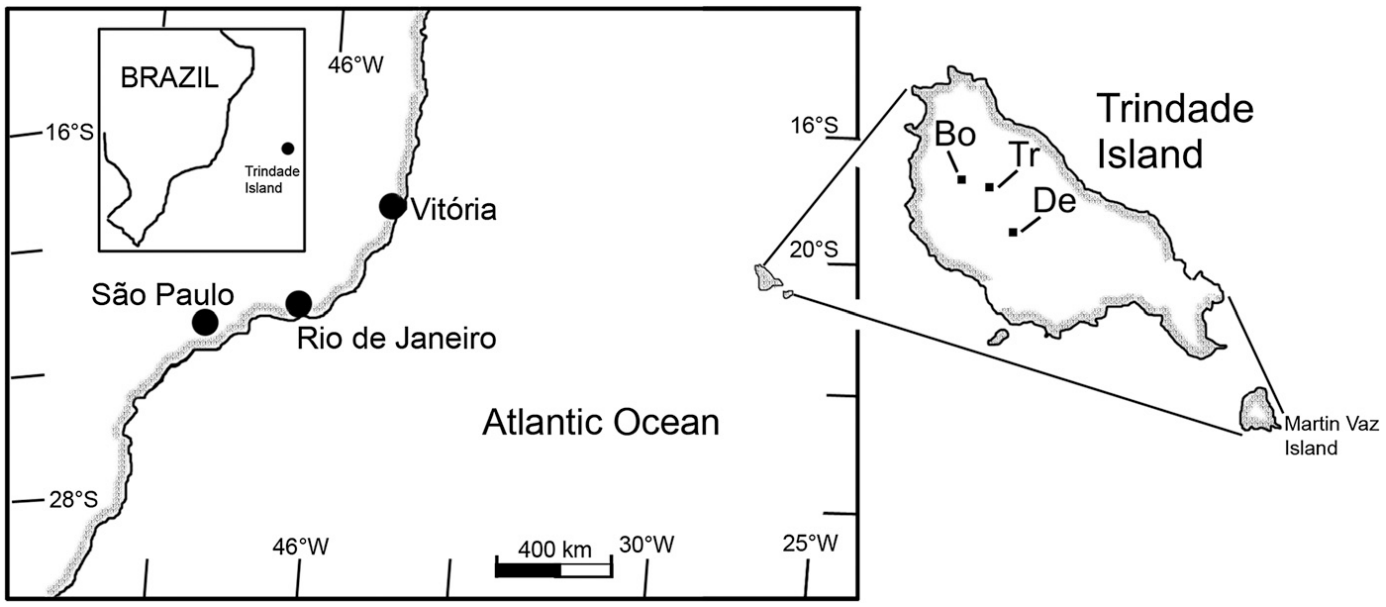

Figure 1. Map showing the location of Trindade Island, off Vitória (20°30′S 29°20′W). Abbreviations: ***Bo,*** São Bonifácio Peak; ***De,*** Desejado Peak; ***Tr,*** Trindade Peak.

(as well as most species in the family Scolodontidae) is a known carnivorous snail, feeding on earthworms but having a "preference" for molluscan prey (Barker and Efford 2004). As noted above, the specimens were found alongside a number of earthworms. Still, plausibly there are other microgastropod species, which would be the prey of this *Happia*, waiting to be discovered on Trindade. Future expeditions will try to shed some light on this issue.

***Succinea lopesi*:** Collected on Trindade Peak (Fig. 1), on *Cyathea copelandii*. Trindade Peak is the second tallest peak on the island and most of its summit is covered by the same tree fern forest as Desejado Peak. The *Succinea* Draparnaud, 1801 specimens were found exclusively on the petioles of live tree fern fronds (ca. 150 cm above the soil; 20°30′29.93″S 29°19′45.42″W, 532 m above sea level), resting among the scales.

The two native Succineidae from Trindade, *Succinea lopesi* and *Oxyloma beckeri* Lanzieri, 1966, were not revised by Salvador *et al*. (2013) since they were thoroughly described by Lanzieri (1966). Both shell morphology and internal anatomy of the recently found specimens (Figs. 2–4) are more akin to *S. lopesi* (in comparison with the type material housed at the MNRJ), but it should be noted that the two species might well be synonyms and further work is warranted. Their type localities and distributions are restricted to two peaks on the island (Desejado Peak for *S. lopesi* and São Bonifácio Peak for *O. beckeri*; Fig. 1), and such isolation was originally treated as a sign that they were distinct species (Lanzieri 1966). However, the new occurrence of *S. lopesi* from a different locality (namely, Trindade Peak) casts some doubt on this idea. A proper taxonomic revision, with further anatomical study on specimens from the three peaks, is, thus, desirable.

The introduced goats were responsible for a drastic deforestation on Trindade, which led to the extinction (or nearly so) of many endemic plant species (Alves 1998, Serafini *et al*. 2010). A great campaign was then conducted to eradicate the goats and, after its completion in 2005, the flora seems to be recovering with the aid and constant monitoring of a research team (Martins and Alves 2007, Silva and Alves 2011). Hopefully, the recovery of the native flora might allow the snail populations to re-establish themselves. However, the mice still thrive on the island, their population estimated at tens of thousands (Silva and Alves 2011). Moreover, it should be noted that no living snails of the other endemic species of Trindade, namely *Bulimulus brunoi* (Ihering, 1917), *Naesiotus arnaldoi* (Lanzieri and Rezende, 1971) and *Vegrandinia trindadensis* (Breure and Coelho, 1976), which lived near the shore, have been found, so the question whether they still survive remains open.

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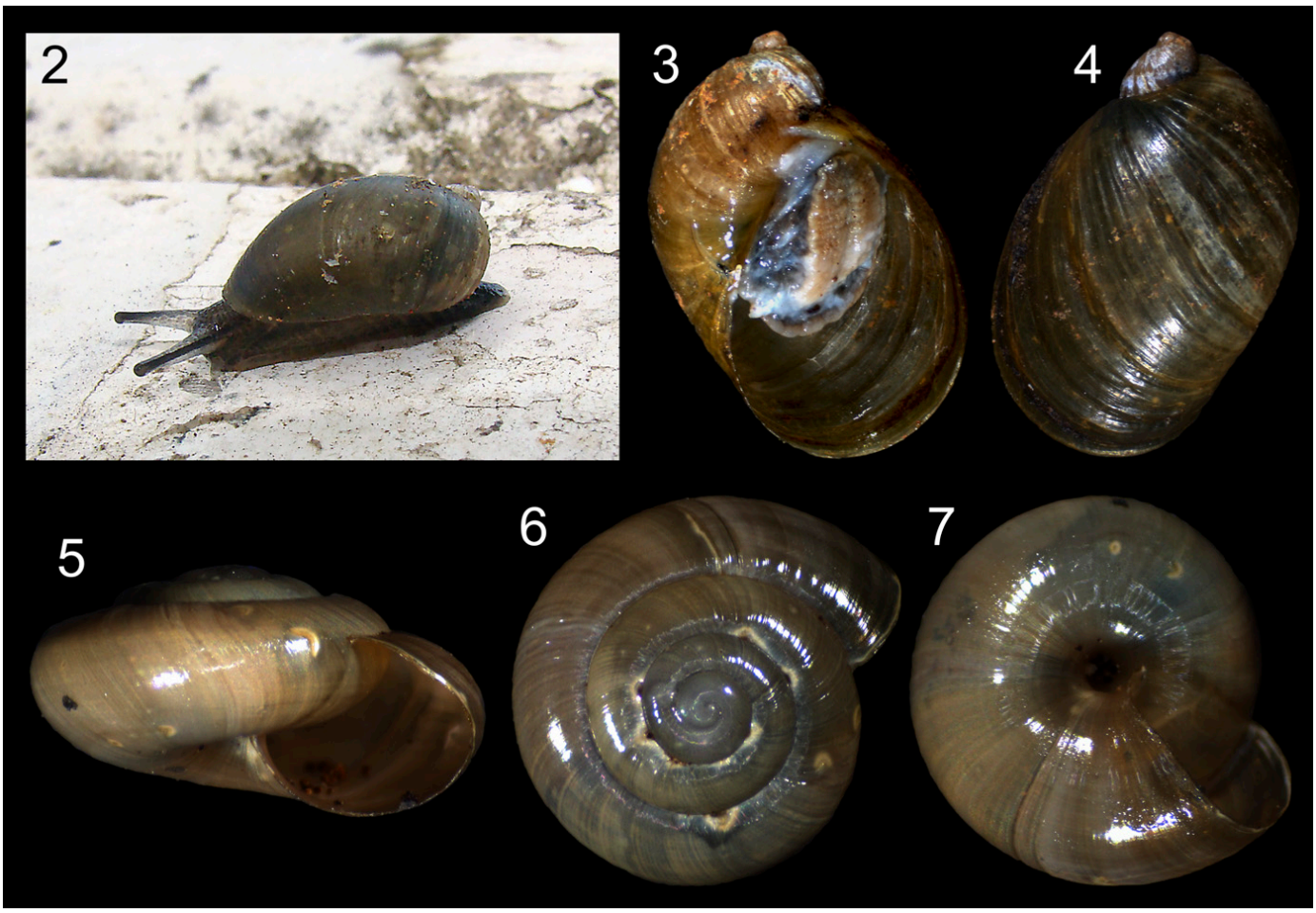

Figure 2. Live specimen of *Succinea lopesi* in artificial environment. **Figures 3–4.** *S. lopesi*, MZSP 112122 (shell length 12.5 mm). **Figures 5–7.** *Happia* sp., MZSP 112120 (shell width 3.5 mm). [Note: Figs. 2–7 appear in color in the electronic version only].

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