

Taxonomical study on a sample of land snails from Alcobaça (Bahia, Brazil), with description of a new species

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Abstract

A sample of land snails, mainly pulmonates, was recently (August 2012) collected in a fragment of Atlantic rainforest, in the vicinity of the city of Alcobaça (south of Bahia state, Brazil); its study is urgent both from a taxonomical as well as from an environmental point of view. The geographical ranges of *Beckianum beckianum* (Subulinidae), and possibly also of *Rectartemon piquetensis* (Streptaxidae), are extended to Bahia. Specimens of *Helicina angulifera* (Helicinidae), *Gastrocopta oblonga* (Gastrocoptidae), *Bulimulus tenuissimus* and *Leiostracus vimineus* (Bulimulidae), and *Burringtonia pantagruelina* (Odontostomidae), already known to Bahia, were also found. Moreover, *Solaropsis alcobacensis* **n. sp.** (Pleurodontidae) is described herein. The finding of this new species is a stark reminder of how little the Brazilian terrestrial snail fauna is known and of how such forest fragments may serve as refuges for endemic species and should therefore be properly preserved.

Key words: Neritimorpha, Northeast Brazil, Pulmonata, *Solaropsis alcobacensis* new species, Stylomatophora.

Zusammenfassung

Landschnecken, überwiegend bestehend aus Pulmonaten, wurden im August 2012 in einem atlantischen Regenwald-Fragment in der Umgebung der Stadt Alcobaça im Süden des Bundesstaates Bahia in Brasilien gesammelt; das Studium dieser Aufsammlung war sowohl aus taxonomischen wie auch aus ökologischen Gründen wichtig. Die Verbreitungsgebiete von *Beckianum beckianum* (Subulinidae) und möglicherweise auch *Rectartemon piquetensis* (Streptaxidae) werden um Bahia erweitert. Exemplare der bereits von Bahia bekannten *Helicina angulifera* (Helicinidae), *Gastrocopta oblonga* (Gastrocoptidae), *Bulimulus tenuissimus* und *Leiostracus vimineus* (Bulimulidae) sowie *Burringtonia pantagruelina* (Odontostomidae) werden ebenfalls nachgewiesen. Außerdem wird *Solaropsis alcobacensis* **n. sp.** (Pleurodontidae) beschrieben. Der Fund dieser neuen Art ist ein deutlicher Hinweis darauf, wie wenig die brasilianische Landschneckenfauna bekannt ist und wie derartige Waldfragmente als Rückzugsraum für endemische Arten dienen können und daher eines besonderen Schutzes bedürfen.

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1 Introduction

The megadiverse Brazilian Atlantic rainforest has been much exploited and degraded throughout the few centuries of the country's history, being reduced to less than one tenth its original range (HIROTA 2011). Nevertheless, even the few remaining forest fragments still hide new discoveries, especially of the scarcely studied terrestrial molluscan fauna. A recent expedition (August 2012) by shell dealer JOSÉ COLTRO Jr. and his team to southern Bahia have brought to our attention interesting local samples of land snails. Part of this material was donated to the collection of the Museu de Zoologia da Universidade de São Paulo (MZSP, São Paulo, Brazil) and is studied here.

As a testament to the incomplete knowledge of the Brazilian fauna, among the animals recovered there is a new species. This paper presents a formal description of this

new species and reports the occurrence of other seven species, two of which have their geographical ranges extended. Descriptions of new species from this kind of environment are somewhat urgent, in order to encourage legal protection. According to the Brazilian legislation, a type-locality can more likely become a protected area. Furthermore, better known geographical distributions can further improve arguments for conservation. The present work is part of a wider ongoing project aiming to improve the knowledge on the Brazilian continental malacofauna, the first step of which was the publication of a catalogue (SIMONE 2006).

Abbreviations of shell dimensions

D	shell greatest width
d	aperture width
H	shell length
h	aperture height

Acronyms of Institutions

ANSP	Academy of Natural Sciences of Philadelphia, USA
LMD	Löbbecke Museum Düsseldorf, Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MZSP	Museu de Zoologia da Universidade de São Paulo, Brazil
NHMUK	Natural History Museum, London, United Kingdom
SMF	Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany
ZMA	Zoological Museum Amsterdam (now NCB Naturalis), The Netherlands
ZMB	Museum of Natural History, Humboldt University Berlin, Germany

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2 Material and methods

The collection locality is ca. 2 km north of the city of Alcobaca, southern Bahia [17°30'10"S 39°11'42"W (road's coordi-



Fig. 1. Map showing the municipality of Alcobaca. – Abbreviations of neighboring states: MA, Maranhão; PI, Piauí; PE, Pernambuco; AL, Alagoas; SE, Sergipe; TO, Tocantins; GO, Goiás; MG, Minas Gerais; ES, Espírito Santo.

nates; the collection area is immediately adjacent to the road), ~10 m of elevation; Fig. 1], being a small (ca. 2 ha) Atlantic Forest fragment close to the shore, to roads and to the city, and thus subject to much anthropic disturbance. The specimens were randomly collected by handpicking, as the intention of the collectors was commercial rather research-focused. The majority of the collected material is composed of empty shells, almost exclusively of stylommatophoran pulmonates, with the exception of one neritimorph species. The list of material examined follows each species description. Species identification was conducted based on their original descriptions, later revisions and comparison with material (including types whenever possible) housed at the following institutions: ANSP, LMD, MNHN, MZSP, NHMUK, SMF, ZMA, ZMB. The classification scheme used herein follows BOUCHET et al. (2005), with the following exception: Gastrocoptidae is considered a distinct family, instead of a subfamily of Vertiginidae (cf. MANGANELLI & GIUSTI 2000).

3 Systematics

Order Neritimorpha

Family Helicinidae

Genus *Helicina* Lamarck, 1799*Helicina angulifera* Wagner, 1910
(Figs. 2–4)

Helicina angulifera Wagner, 1910 in WAGNER 1907–1911: 279 (pl. 55, figs. 6–8); SALGADO & COELHO 2003: 151; SIMONE 2006: 35 (fig. 2).

Material analyzed: MZSP 107962 (10 specimens), 107963 (25 shells).

Dimensions (in mm; n=10): H=7.2 ± 0.3 (max 7.7, min 6.7), D=9.8 ± 0.4 (max 10.7, min 9.2).

Type locality: Bahia, Brazil.

Remarks: This species is known only from the state of Bahia (SIMONE 2006), although a more precise distribution is still a matter for further study. The examined specimens, as well as those figured by SIMONE (2006: fig. 2) from Ilhéus, Bahia, show more rounded basal and columellar regions of the peristome when compared to the figures from the species' original description. This feature is still under analysis and has not been found in other samples from Bahia. The remaining shell attributes are closely similar, including the angulation of the peripheral carina.

Order Pulmonata

Suborder Stylommatophora

Family Gastrocoptidae

Genus *Gastrocopta* Wollaston, 1878*Gastrocopta oblonga* (Pfeiffer, 1852)
(Fig. 5)

Pupa oblonga PFEIFFER, 1852: 69.

Gastrocopta servilis oblonga: PILSBRY 1916–1918: 90 (pl. 17, figs. 9, 14–15).

Gastrocopta oblonga: SALGADO & COELHO 2003: 153; SIMONE 2006: 116 (fig. 347).

Material analyzed: MZSP 107968 (1 shell).

Dimensions (in mm): H = 2.0, D = 1.0.

Type locality: Possibly Bahia, Brazil (PILSBRY 1916–1918).

Remarks: The present specimen agrees well with the description and figures of *G. oblonga* by PILSBRY (1916–1918). The sole exception is the apertural dentition: the present specimen shows only three teeth/lamellae, while *G. oblonga* typically has five. The anguloparietal lamella is strikingly similar, as are the columellar and lower palatal teeth, but both the upper palatal tooth and the basal tooth are lacking. PILSBRY (1916–1918) treats *G. oblonga* as a subspecies of *G. servilis* (Gould, 1843) and among his diagnostic characters he pointed out the weakness of the teeth, with the basal one either usually being very small or completely lacking. *Gastrocopta* is known for great intraspecific variability in the number and strength of apertural barriers and, thus, the present specimen seem to be an example of simple morphological variation in *G. oblonga*, with both smaller teeth lacking. This species is known from Suriname, north and northeastern Brazil, Paraguay, Uruguay and Argentina (PILSBRY 1916–1918, SIMONE 2006).

Family Orthalicidae
Subfamily Bulimulinae
Genus *Bulimulus* Leach, 1814

Bulimulus tenuissimus (d'Orbigny, 1835)
(Fig. 6)

Helix tenuissima D'ORBIGNY, 1835: 11.

Bulimulus tenuissimus: PILSBRY 1897–1898: 64 (pl. 10, figs. 91–92); MORRETES 1949: 146; BREURE 1979: 64; SALGADO & COELHO 2003: 160; SIMONE 2006: 120 (fig. 370).

Material analyzed: MZSP 107966 (10 shells).

Dimensions (in mm; n = 3): H = 19.9 ± 1.8 (max 21.7, min 18.0), D = 10.1 ± 0.6 (max 10.7, min 9.4).

Type locality: Rio de Janeiro, Brazil.

Remarks: *Bulimulus tenuissimus* is broadly distributed, occurring in Suriname, Bolivia, Brazil (north, northeast and southeast regions, including Bahia) and Uruguay (SIMONE 2006). This species is one of the few native orthalicids that has adapted well to urban areas, and has been transported and introduced by man in various localities (even as far as North Carolina, USA, see ROBINSON & SLAPCINSKY 2005). Whether the occurrence of *B. tenuissimus* in Bahia is a natural one or if the species was introduced there is currently impossible to state, but the latter seems more plausible.

Genus *Leiostracus* Albers, 1850
Leiostracus vimineus (Moricand, 1833)
(Fig. 7)

Helix (Cochlogena) viminea MORICAND, 1833: 540 (pl. 1, fig. 5).

Drymaeus (Leiostracus) vimineus: PILSBRY 1899: 95 (pl. 14, figs. 18–20).

Leiostracus vimineus: SALGADO & COELHO 2003: 163; SIMONE 2006: 124 (fig. 388).

Material analyzed: MZSP 107999 (1 shell), 107967 (8 shells).

Dimensions (in mm; n = 4): H = 20.0 ± 1.2 (max 21.2, min 18.9), D = 10.7 ± 0.4 (max 11.1, min 10.1).

Type locality: Bahia, Brazil.

Remarks: *Leiostracus vimineus* is known from the states of Bahia and Rio de Janeiro (SIMONE 2006) and is readily identifiable by the folds on the basal region of its aperture. The present specimens, however, seem to be slightly smaller, with more convex whorls and proportionately larger apertures.

Subfamily Odontostominae
Genus *Burringtonia* Parodiz, 1944

Burringtonia pantagruelina (Moricand, 1833)
(Fig. 8)

Helix (Cochlodina) pantagruelina MORICAND, 1833: 542 (pl. 1, fig. 7).

Odontostomus (Odontostomus) pantagruelinus: PILSBRY 1901–1902: 63 (pl. 8, figs. 82–85).

Cyclodontina (Burringtonia) pantagruelina: PARODIZ 1944: 4; PARODIZ 1962: 454.

Cyclodontina (Pantagruelina) labrosa: FORCART 1947: 59.

Cyclodontina pantagruelina: BAKER 1947: 106.

Cyclodontina labrosa: SALGADO & COELHO 2003: 165.

Burringtonia pantagruelina: SIMONE 2006: 171 (fig. 600).

Material analyzed: MZSP 107961 (2 shells).

Dimensions (in mm; n = 2): H = 56.6, D = 26.2.

Type locality: Brazil; restricted to Bahia by PILSBRY (1901–1902).

Remarks: The genus *Burringtonia* is endemic to the eastern portion of Brazil and the distribution of *B. pantagruelina* comprises three states: Bahia, Espírito Santo and Rio de Janeiro (SIMONE 2006). This is the most common species in the genus and is notable for some variability in the shape and number of apertural barriers (PILSBRY 1901–1902). The specimens from Alcobaca fit well in the species' variation.

Family Subulinidae
Genus *Beckianum* Baker, 1961

Beckianum beckianum (Pfeiffer, 1846)
(Fig. 9)

Bulimus Beckianus PFEIFFER, 1846: 82.

Opeas beckianum: PILSBRY 1906: 189 (pl. 27, figs. 42–46, 54–55); SALGADO & COELHO 2003: 155.

Beckianum beckianum: SIMONE 2006: 187 (fig. 685).

Material analyzed: MZSP 108000 (1 shell), 107969 (21 shells).



Figs. 2–15. Land snails from Alcobaça, Bahia state, Brazil; apical (3, 10, 13), umbilical (4, 11, 14), and apertural (2, 5–9, 12, 15) views. – 2–4. *Helicina angulifera* (MZSP 107963; D=9.8 mm). 5. *Gastrocopta oblonga* (MZSP 107968; H=2.0 mm). 6. *Bulimulus tenuissimus* (MZSP 107966; H=21.7 mm). 7. *Leiostracus vimineus* (MZSP 107999; H=21.2 mm). 8. *Burringtonia pantagruelina* (MZSP 107961; H=56.6 mm). 9. *Beckianum beckianum* (MZSP 108000; H=8.0 mm). 10–12. *Rectartemon* cf. *piquetensis* (MZSP 107965; D=21.3 mm). 13–15. *Solaropsis alcobacensis* n. sp. (holotype; MZSP 107964; D=33.2 mm).

Dimensions (in mm; $n=4$): $H=7.6 \pm 0.6$ (max 8.1; min 7.0), $D=2.5 \pm 0.2$ (max 2.6; min 2.3).

Type locality: Opara Island, Polynesia (PFEIFFER 1846), but PILSBRY (1906) supposes that there was some mistake in the attribution of this locality and states that PFEIFFER's specimens are very similar to the ones found in Central America.

Remarks: This species occurs from Mexico to the southeastern Brazilian states of Rio de Janeiro and São Paulo, also including the Caribbean Islands (SIMONE 2006). Nevertheless, to our knowledge this is the first record specific to Bahia.

Family Streptaxidae

Genus *Rectartemon* Baker, 1925

Rectartemon cf. *piquetensis* (Pilsbry, 1930)
(Figs. 10–12)

Artemon piquetensis PILSBRY, 1930: 365 (pl. 32, figs. 5a–b).

Artemon intermedius piquetensis: MORRETES 1949: 166.

Streptaxis piquetensis: SALGADO & COELHO 2003: 171.

Rectartemon piquetensis: SIMONE 2006: 199 (fig. 746).

Material analyzed: MZSP 107965 (1 shell).

Dimensions (in mm): $H=13.1$, $D=21.3$.

Type locality: Piquete, São Paulo, Brazil.

Remarks: This species is known only from its type locality and from the northeast of Minas Gerais state (personal observation); it also has a record from Bahia state that likely is a misidentification (SIMONE 2006). The present record calls attention to the possible species occurrence in Bahia, from a locality very close to its occurrence in Minas Gerais. However, the present specimen has a more depressed spire and a taller body whorl, with a rounded profile. The types of *R. piquetensis* (SIMONE 2006: fig. 746) have a higher spire and a shorter body whorl with a peripheral carina in its median portion. Due to the low number of specimens in museum collections, it is currently not possible to assess whether these differences are indicative of specific differentiation or simple morphological variation.

Family Pleurodontidae

Genus *Solaropsis* Beck, 1837

Solaropsis alcobacensis n. sp.
(Figs. 13–15)

Holotype: MZSP 107964.

Type locality: Brazil, Bahia, Alcobaca, 17°30'10"S 39°11'42"W, ~10 m of elevation (COLTRO col., viii/2012).

Etymology: The specific epithet refers to the type locality.

Diagnosis: Flattened spire; proportionately large and oval aperture, with slight angle at the basal region.

Proportionately narrow and deep umbilicus. Color white, with a single strong brown spiral band immediately below carina and a series of numerous parallel thin light brown dotted spiral bands beginning below the strong band and reaching umbilicus.

Description: Shell large, discoid, with flattened spire; shell length $\sim \frac{1}{2}$ its width. Color white, with single strong light brown spiral band immediately below carina and series of numerous parallel thin light brown dotted spiral bands; 9–10 equidistant bands between carina and umbilicus; space between bands ~ 3 times their width (Fig. 14). Spire angle $\sim 135^\circ$. Protoconch of $1\frac{3}{4}$ whorl, blunt, smooth; transition to teleoconch clear. Teleoconch sculptured by fine, raised, well-marked and regularly distributed sinuous ribs, increasing below carina. Whorls profile weakly convex; strong peripheral carina, profile angle $\sim 105^\circ$, located in superior third of body whorl. Suture shallow but well-marked. Body whorl $\sim \frac{7}{8}$ shell height. Aperture large, oval, with slight angle at the basal region; slightly prosocline ($\sim 20^\circ$ in relation to shell axis); $\sim \frac{3}{4}$ shell height, $\sim \frac{1}{2}$ shell width. Peristome reflected, especially on basal and columellar regions. Umbilicus wide, deep, occupying $\sim 10\%$ of inferior surface.

Holotype dimensions (in mm): 4.5 whorls; $H=16.3$; $D=33.2$; $h=12.0$; $d=17.3$.

Distribution: Known only from type locality.

Remarks: The genus *Solaropsis* occurs from Costa Rica to northern Argentina, being especially diverse in Guyana and Brazil (CUEZZO 2003, SIMONE 2006). Despite the single shell found being slightly worn out, we believe it bears enough diagnostic characters to be considered a distinct species.

Differential diagnosis: *Solaropsis alcobacensis* n. sp. belongs to the group within the genus that possesses a pronounced peripheral keel or carina. As such, comparisons are here restricted to this group: *Solaropsis alcobacensis* bears some resemblance to *S. amazonicus* (Pfeiffer, 1854) from the north of Brazil, *S. planior* (Pilsbry, 1899) from the states of Espírito Santo and São Paulo, and *S. punctatus* (Wagner, 1827) from the states of Piauí, Pernambuco and Bahia (SIMONE 2006). – *Solaropsis alcobacensis* can be distinguished from *S. amazonicus* by its white color, smaller size, more flattened spire, a proportionately larger and more oval aperture, a narrower umbilicus and the regularity of the parallel brown bands. Moreover, the peristome of *S. amazonicus* partially covers the umbilicus and its holotype (SIMONE 2006: fig. 918) has a more median peripheral carina (profile angle $\sim 90^\circ$). *Solaropsis alcobacensis* differs from *S. planior* by its taller and less laterally elongated aperture, a narrower and more cylindrical umbilicus, a more flattened shell (lower height/width) and a greater number of spiral brown bands. The holotype of *S. planior* (SIMONE 2006: fig. 931) also has a higher carina (profile angle $\sim 115^\circ$). Finally, *S.*

alcobacensis can be distinguished from *S. punctatus* by its much smaller size (~33 mm, against ~50 mm in *S. punctatus*), a proportionately larger and more oval aperture (with a slight angle at the basal region), a narrower and more cylindrical umbilicus, and a greater number of spiral brown bands. Moreover, *S. alcobacensis* also lacks the sinuous axial brown bands found in *S. punctatus*.

4 Discussion

The geographical ranges of *Beckianum beckianum* and, possibly, also of *Rechartemon piquetensis* are here extended to Bahia. *Helicina angulifera*, *Gastrocopta oblonga*, *Bulimulus tenuissimus*, *Leiostracus vimineus* and *Burringtonia pantagruelina*, though already known to Bahia, are recorded here for the region of Alcobça. Finally, by the new species presented here, *Solaropsis alcobacensis*, this paper is also a reminder that the remnants of Atlantic rainforest might act as refuge for many species (sometimes endemic) and therefore require protection and appropriate legislation. This in turn leaves us with the question of how many species are being extinct before even being known to us. The knowledge of the local fauna of each place is the first step towards environmental protection, and it is our hope that this paper is a step towards this goal.

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