Type specimens of the South American terrestrial gastropods described by Henry Suter

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Abstract

In 1900, Henry Suter, a New Zealand malacologist, described six land snail taxa from South America, mostly from Brazil. These taxa received little further attention from malacologists and the unusual depository of its type specimens (New Zealand) caused much confusion in the literature. Suter's types and taxa are thus revisited in the present work. In summary, the following species are considered valid: *Gastrocopta iheringi* (Gastrocoptidae), *Scolodonta interrupta* (Scolodontidae), *Radiodiscus compactus,* and *Radiodiscus patagonicus* (Charopidae). *Streptaxis tumescens* is a junior synonym of *Happia vitrina* (Scolodontidae) and *Pyramidula schuppi* is a junior synonym of *Rotadiscus amancaezensis* (Charopidae).

Keywords: Argentina, Brazil, Gastropoda, Patagonia, Stylommatophora

Zusammenfassung

Henry Suter, ein neuseeländischer Malakologe, beschrieb im Jahr 1900 sechs Landschneckenarten aus Südamerika, vorwiegend aus Brasilien. Sie erfuhren nur wenig Beachtung und der ungewöhnliche Aufbewahrungsort ihrer Typusexemplare (Neuseeland) verursachte in der Literatur viel Verwirrung. Suters Typen und Taxa werden daher in der vorliegenden Arbeit revidiert. Zusammenfassend werden folgende Arten als valide betrachtet: *Gastrocopta iheringi* (Gastrocoptidae), *Scolodonta interrupta* (Scolodontidae), *Radiodiscus compactus,* and *Radiodiscus patagonicus* (Charopidae). *Streptaxis tumescens* ist ein Synonym von *Happia vitrina* (Scolodontidae) und *Pyramidula schuppi* ist ein Synonym von *Rotadiscus amancaezensis* (Charopidae).

Contents

1 Introduction

In 1900, Swiss-born New Zealand malacologist Henry Suter, described six land snail taxa from South America. They belonged to a larger sample that he received from Hermann F. A. von Ihering, a German-Brazilian zoologist based in São Paulo, Brazil. The new species and subspecies, as they appear in the original (Suter 1900), are *Pupa iheringi*, *Pyramidula patagonica patagonica*, *Pyramidula patagonica compacta*, *Pyramidula schuppi*, *Streptaxis interruptus*, and *Streptaxis tumescens*. All of them were described from material collected in southern Brazil, with a single exception from Patagonia, Argentina.

Most of these species received little further attention. There have been erroneous reports in the literature that their type material would be housed in São Paulo, Philadelphia and/or London, despite the fact that Suter's land snail collection is housed in the Museum of New Zealand Te Papa Tongarewa (Wellington, New Zealand) and that all the types from his original publication (Suter 1900) are deposited there (Marshall 1996; salvador 2019). As such, Suter's types and taxa are revisited herein: the state of the art of their taxonomy is laid down, revisions are conducted when necessary, and the type material is figured.

Acknowledgements

I am very grateful to Bruce A. Marshall (MNZ) for helping with curatorial matters; to Ellen Wildner (ANSP), Simone Lira (MZSP), Enrico Schwabe (ZSM), Inga Veitenheimer-Mendes (UFRGS), and Janaína Wickert (UFRGS) for access and/or information about the material under their care; to Carlo M. Cunha (Universidade Metropolitana de Santos, Brazil) for his help in tracking down and recovering the missing types; to David Flynn (VUW) for his help with SEM imaging; to Luiz R. L. Simone (MZSP) for the images of the topotypes of *Gastrocopta iheringi*; and to bernard hausdorf (Universität Hamburg, Germany) and an anonymous reviewer for the helpful comments, which greatly improved the present work. Credit of all images used here (except for *G. iheringi*) belong to the MNZ (license CC BY-NC-ND). I acknowledge the bequest of the Bruce Fraser Hazelwood Fund and the MNZ for this project.

2 Material and methods

All type material from Suter's collection was analyzed, as well as topotypes from Ihering's collection (ANSP and MZSP) and further comparative material from other collections. All reports in the specialized literature regarding these taxa were also studied and the information compiled is summarized herein. The state of the art of the taxonomy of Suter's species is outlined, taxonomic revisions are conducted when necessary, and the type material is figured. SEM images were obtained in the School of Chemical and Physical Sciences of VUW.

Acronyms of depositories

ANSP	Academy of Natural Sciences of Drexel University (Philadelphia, USA)
NHMUK	Natural History Museum (London, UK)
MNZ	Museum of New Zealand Te Papa Tongarewa (Wellington, New Zealand)
MZSP	Museu de Zoologia da Universidade de São Paulo (São Paulo, Brazil)
VUW	Victoria University of Wellington (Wellington, New Zealand)
ZSM	Zoologische Staatssammlung München (Munich, Germany)

Abbreviations

colln.	collection
sh	dry shell
H	shell length (parallel to columellar axis)
D	greatest shell width (perpendicular to H)

3 Systematics

Stylommatophora
Superfamily Pupilloidea
Family Gastrocoptidae
Genus *Gastrocopta* Wollaston, 1878

Type species: *Pupa acarus* W.H. Benson, 1856.

Gastrocopta iheringi (Suter, 1900)
(Figs 1–3)

Pupa (*Bifidaria*) *iheringi:* Suter 1900: 336, pl. 3, figs. 8–8a; Marshall 1996: 43.

Gastrocopta (*Immersidens*) *iheringi*: Pilsbry 1916–1918: 101, pl. 17, fig. 16; Marshall 1996: 43.

Gastrocopta iheringi: Morretes 1949: 130; Thompson & López 1996: 51; Salgado & Coelho 2003: 153; Dornellas & Simone 2011: 18; Veitenheimer-Mendes & Oliveira 2012: 182, figs. 1–5; Salvador 2019: 83.

Type material. MNZ M.205848 (syntype, ex Suter colln. 2176), MNZ M.262658 (syntype, ex Suter colln. 2176).

Type locality: Brazil, Rio Grande do Sul state, Rio Grande municipality, Bolaxa ("Cidade de Rio Grande do Sul (Bollaxa)", in the original).

Distribution: Known only from type locality. Other reports of the species (e.g., Richards & Hummelinck 1940) were considered doubtful by later authors (Thompson & López 1996). The record from Santa Fé province, northern Argentina (Miguel & Parent 1996: fig. 7) does not represent *G. iheringi*, as clearly seen by its small and bifid anguloparietal lamella.

Remarks

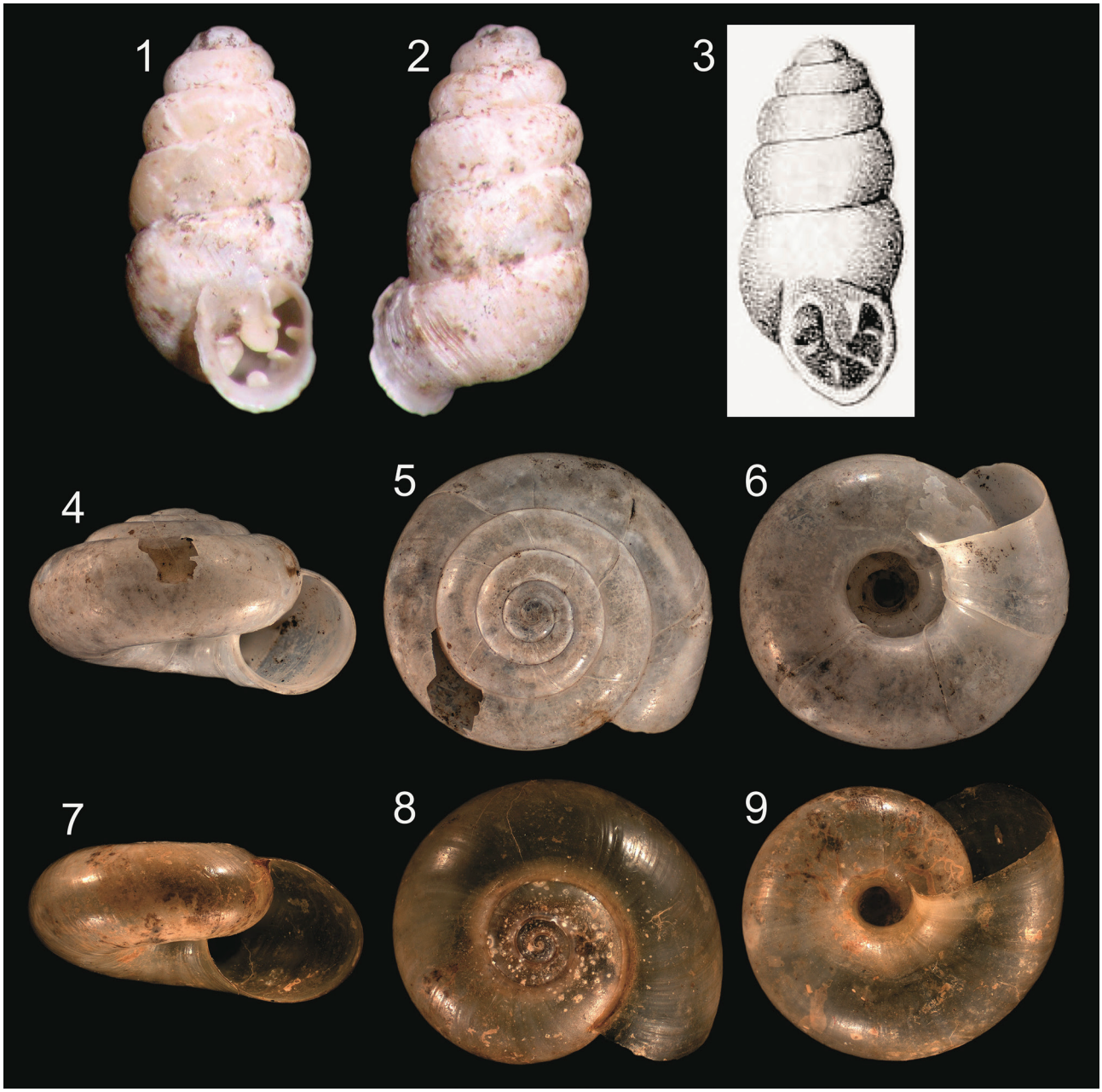
The material Suter (1900) used to describe his new species was sent to him from Brazil by Hermann F. A. von Ihering, then director of the "Museu Paulista" (now MZSP) (Nomura 2012). Suter (1900), as stated in his publication, deposited this material in his own collection, which today can be found at the MNZ (Salvador 2019). However, Ihering kept duplicate specimens of some taxa (all topotypes), which were housed at the Museu Paulista (now MZSP). This led Simone (2006) and later Dornellas & Simone (2011) to consider the MZSP specimens (MZSP 3187, 9 spm, MZSP 7519, 4 spm, MZSP 32872, 2 spm) as the type material of Suter's species. However, the material housed at the MZSP are not types, since, as explained above, Suter's (1900) originals are housed at the MNZ in New Zealand. The same is valid for *Pyramidula patagonica compacta* and *Streptaxis interruptus* below.

Likewise, the paratypes reported by Pilsbry (1916–1918), ANSP 22940 (4 sh), are not actual type material. Pilsbry assumed Suter had these specimens on hand for his description (since they were donated to the ANSP by Ihering), but there is no evidence thathe actually did.

Marshall (1996) reported two syntypes from the MNZ collection, but Veitenheimer-Mendes & Oliveira (2012) disregarded one of those, a fragmentary specimen, claiming it was not a type, since Suter (1900) used the word in the singular in his publication. Suter (1900) always used the word "type" in the singular ("typo" in the original), although it is clear from his collection at the MNZ that he possessed more than one specimen in many cases, as can be seen by the dual type locality of *Streptaxis tumescens* (see below). Furthermore, there is no evidence that Suter could write in Portuguese (Hyde 2017), the language of his 1900 article; his manuscript (probably in German) would in all likelihood have been translated for publication by Ihering (it was published in the MZSP journal).

Both syntypes were sent on loan during the late 1990's to Veitenheimer-Mendes & Oliveira (2012) and remained in the malacological collection of the UFRGS. The types have been recovered in 2018 for this publication and are back in the MNZ collection. However, the reported intact shell (MNZ M.205848) was broken, likely during transport. Therefore, here one of Ihering's topotypes from the MZSP collection is illustrated instead (Figs 1–2), which compares extremely well to the illustrations in the original description (Suter 1900: fig. 8, reproduced here as Fig. 3) and to the syntype (Veitenheimer-Mendes & Oliveira 2012: figs 1–3).

Both Suter (1900) and the labels of Ihering's specimens at the MZSP indicate that the material is sub-fossil. However, this may not be necessarily so. Several shells in



Figures 1–9. Families Gastrocoptidae and Scolodontidae. **1–2.** *Gastrocopta iheringi* (Suter, 1900), topotype, MZSP 7519; H = 2.5 mm. **3.** *Gastrocopta iheringi* (Suter, 1900), illustration reproduced from Suter (1900: fig. 8). **4–6.** *Scolodonta interrupta* Suter, 1900, syntype, MNZ M.205851; H = 3.9 mm, D = 6.5 mm. **7–9.** *Happia vitrina* (Wagner, 1827), syntype of *Streptaxis tumescens* Suter, 1900, MNZ M.205839; H = 5.4 mm, D = 9.6 mm.

Suter's collection at the MNZ bear the indication "subfossil", but do not actually seem to be (personal observation). The small and thin shells of gastrocoptids can erode very quickly, especially in the typically acidic environments of Brazil, and may acquire a bleached look in a short time (e.g., Pearce 2008).

The present species clearly belong to the genus *Gastrocopta* and, more specifically to a group that presents the parietal and angular lamellae fused in a gutter-like or channel-like anguloparietal lamella. Species with this type of lamella have been historically grouped in the subgenus *Immersidens* Pilsbry & Vanatta 1900, but the validity of the many subgenera of *Gastrocopta* is still poorly resolved (Manganelli & Giusti 2000).

Gastrocopta iheringi is clearly distinguishable from all other Brazilian gastrocoptids by its larger size and shape

of the anguloparietal lamella (see Salvador et al. 2017 for a comparison), being more similar to other Central American and northern South American forms of *Immersidens* (Thompson & López 1996).

Superfamily Scolodontoidea
Family Scolodontidae
Genus *Scolodonta* Doering, 1875

Type species: *Scolodonta semperi* (Doering, 1875)

Scolodonta interrupta Suter, 1900
(Figs 4–6)

Streptaxis (Happia) interruptus: Suter 1900: 331, pl. 3, figs 5–5b.
Scolodonta interrupta: Pilsbry 1900: 385, pl. 12, figs 6–8; Gude 1902: 240; Kobelt 1906: 69, pl. 51, figs 21–23; Morretes 1949: 166; Salgado & Coelho 2003: 170; Simone 2006: 225, fig. 856; Dornellas & Simone 2011: 20.
Streptaxis interruptus: Marshall 1996: 42; Salvador 2019: 32.

Type material. MNZ M.205833 (5 syntypes; ex Suter colln. 4020), MNZ M.205851 (syntype, ex Suter colln. 4014), MNZ M.262656 (syntype; ex Suter coll. 4014).
Type locality. Brazil, São Paulo state, São Paulo municipality, Perus ("Os Perus, S. Paulo", in original).
Distribution: Known only from type locality; a second record was cited from Paraguay (Bertoni 1925), but was considered dubious by later authors (Quintana 1982; Simone 2006).

Remarks

The probable syntypes (2 spm) listed by Dornellas & Simone (2011), MZSP 7591 (erroneously as MZSP 7597 in Simone 2006), are not types, as explained above for *Gastrocopta iheringi*.

This species was originally classified in *Streptaxis* Gray, 1837, but later transferred to *Scolodonta* by Pilsbry (1900), who analyzed a topotype provided by H. von Ihering. This classification is maintained herein, although the shell indeed bears some resemblance to Streptaxidae, such as the seemingly periodical interruptions in shell growth (seen as varix-like structures in all available specimens). A proper classification will only be possible when fresh specimens become available for molecular and/or anatomical studies.

Genus *Happia* Bourguignat, 1889

Type species: *Helix vitrina* Wagner, 1827.

Happia vitrina (Wagner, 1827)
(Figs 7–9)

Synonymy see Gude (1902: 234). Complement:
Streptaxis (Happia) tumescens: Suter 1900: 330, pl. 3, fig. 4–4b.
Scolodonta (*Happia*) *vitrina*: Kobelt 1906: 49, pl. 48, figs 13–14.
Happia vitrina: Thiele 1927: 318; Morretes 1949: 138; Salgado & Coelho 2003: 169; Agudo-Padrón 2008: 165; Birckolz et al. 2016: table 1; Salvador et al. 2018: 116, figs 11A–C; Salvador 2019: 93.
Happia vitrina var. *mülleri*: Thiele 1927: 318.
Happia (*Happia*) *vitrina*: Zilch 1960: 545, fig. 1904.
Streptaxis tumescens: Marshall 1996: 42; Simone 2006: 194, fig. 722.
Happia vitrina muelleri: Agudo-Padrón 2008: 165.

Material: MNZ M.205839 (syntype of *Streptaxis tumescens* Suter, 1900; ex Suter colln. 4013), M.262655 (syntype of *Streptaxis tumescens* Suter, 1900; ex Suter colln. 4013); both from Brazil, São Paulo state, Alto da Serra region and Cubatão municipality.
Distribution: Brazil (Alagoas, Bahia, Rio de Janeiro, São Paulo, Paraná, and Santa Catarina states) (Salvador et al. 2018).

Remarks

Suter (1900) gave two type localities for his new species *Streptaxis tumescens*: "Alto da Serra" and "Cubatão"; both are relatively close to each other, given the country's size. The original lot (M.205839), containing two syntypes, has been divided into two lots (M.205839 and M.262655), which was done after the list of types of the MNZ was published by Marshall (1996); it is now impossible to tell which specimen came from each locality. Furthermore, a third lot from Suter's collection (M.205840, 9 sh) only indicates "Brazil" as provenance, so it is uncertain if these shells are also syntypes.

After its original description, the species was soon placed into synonymy of *Happia vitrina* by Pilsbry (1900), who had specimens from Suter's type locality. This synonymization has been ignored by a good portion of later authors. It is supported here, as Suter's syntypes are indistinguishable from *H. vitrina* (syntype ZSM 20020666, possible syntype of *Helix nana* Wagner in Spix 1827, ZSM 20020657).

Superfamily Punctoidea
Family Charopidae
Genus *Radiodiscus* Pilsbry & Ferris, 1906

Type species: *Radiodiscus millecostatus* Pilsbry & Ferriss, 1906.

Radiodiscus compactus (Suter, 1900)
(Figs 10–12, 19)

Synonymy see Miquel et al. (2007: 212). Complement:
Pyramidula compacta var. *compacta*: Marshall 1996: 36.
Pyramidula compacta: Dornellas & Simone 2011: 11.
Radiodiscus compactus: Salvador 2019: 94.

Type material: MNZ M.205772 (lectotype, herein designated; ex Suter colln. 2175), MNZ M.262657 (paralectotype; ex Suter colln. 2175; from type locality).
Type locality: Brazil, Rio Grande do Sul state.

Distribution: Brazil (Rio Grande do Sul state), Paraguay (Guairá department), Argentina (Jujuy, Tucumán, and Córdoba provinces) (Miquel et al. 2007).

Remarks

Miquel et al. (2007) revised Suter's variety and elevated it to species level, also putting several other names into its synonymy. Nevertheless, Miquel et al. (2007) did not fully diagnose *R. compactus* from nominate *R. patagonicus* and so this must be addressed here. As Suter (1900) already remarked, *R. compactus* is smaller (for the same number of whorls), with finer and more closely packed axial ribs, and with a wider umbilicus. Furthermore, *R. compactus* has a shallower suture and a less pronounced and less bulbous protoconch.

The probable syntypes (3 spm) listed by Dornellas & Simone (2011), MZSP 7630 (as "probable type" in Simone 2006), are not types, as explained above for *Gastrocopta iheringi*. Miquel et al. (2007) refers to specimen MNZ M.205772 as lectotype of *R. compactus*, but without actually designating it as such. This is deemed not to be sufficient according to ICZN art. 74.7.3 (International Commission on Zoological Nomenclature, 1999). Thus, the specimen MNZ M.205772 (the larger and better-preserved shell among Suter's specimens; Figs 10–12) is herein designated as lectotype.

Radiodiscus patagonicus (Suter, 1900)
(Figs 13–15, 20)

Pyramidula (*Gonyodiscus*) *patagonica* Suter, 1900: 334, pl. 3, figs 6–6b.

Stephanoda patagonica: Pilsbry 1900: 387; Crawford 1939: 115; Hylton Scott 1970: 282; Fonseca & Thomé 1993: 71.

Radiodiscus patagonicus: Pilsbry 1911: 517; Miquel et al. 2007: 226; Salvador 2019: 94.

Zilchogyra patagonica: Weyrauch 1965: 122.

Pyramidula patagonica: Marshall 1996: 38.

Type material: MNZ M.205771 (syntype; ex Suter colln. 4012).

Type locality: Argentina, Patagonia, Santa Cruz province.

Distribution: Argentina (Santa Cruz province). The records from Brazil (e.g., Fonseca & Thomé 1994a; Salgado & Coelho 2003; Simone 2006), as argued by Miquel et al. (2007), belong to *Radiodiscus compactus*.

Remarks

Suter (1900) described the species from sub-fossil material (although this might not be necessarily so, as explained above for *Gastrocopta iheringi*), and Pilsbry (1900, 1911) reported living individuals from the same Argentinian province. The alternative placement in the genera *Radiodiscus* and *Stephanoda* Martens, 1860 seen in the literature is related to the protoconch sculpture, and the dispute regarding to the presence of axial and/or spiral striae (Pilsbry 1911; Crawford 1935; Hylton Scott 1970). *Radiodiscus* presents only spiral striae and *Stephanoda* axial and (fainter) spiral striae (Zilch 1959–1960; Schileyko 2001). In any event, *Stephanoda* has a more distinct shell morphology than *Radiodiscus* and the whole confusion arose from misidentified specimens in the NHMUK by Crawford (1939), who thought they were Suter's originals (Simone 2006 likewise mentioned the holotype from the NHMUK collection). Examination of Suter's actual types in the MNZ makes clear that the conchological features, including the protoconch sculptured by multiple fine spiral striae, are in line with *Radiodiscus*.

Genus *Rotadiscus* Pilsbry, 1926

Type species: *Helix hermanni* Pfeiffer, 1866.

Rotadiscus amancaezensis (Hidalgo, 1869)
(Figs 16–18)

Synonymy see Miquel et al. (2007: 211). Complement:

Pyramidula (*Gonyodiscus*) *schuppi*: Suter 1900: 335, pl. 3, figs 7–7b.

Endodonta janeirensis: Thiele 1927: 322, figs 21a–b.

Endodonta janeirensis: Haas 1953: 205.

Radiodiscus (*Radiodiscus*) *janeirensis*: Haas 1959: 365.

Zilchogyra janeirensis: Hylton Scott 1978: 48.

Austrodiscus (*Zilchogyra*) *janeirensis*: Hylton Scott 1973: table 1; Vaz 1987a: 12; Vaz 1991: 281.

Ptychodon amancaezensis: Vaz 1987b: 3.

Rotadiscus hermanni: Climo 1989: 619 [in part, non Pfeiffer 1886].

Rotadiscus janierensis [sic]: Climo 1989: 619, fig. 18.

Ptychodon (Unilamellatus) janeirensis: Fonseca & Thomé 1993: 73; Fonseca & Thomé 1994b: 85.

Ptychodon (Unilamellatus) schuppi: Fonseca & Thomé 1993: 73; Fonseca & Thomé 1994b: 85.

Ptychodon (Ptychodon) amancaezensis: Fonseca & Thomé 1994b: 91.

Pyramidula schuppi: Marshall 1996: 39.

Ptychodon (Unilamellatus) schuppi schuppi: Fonseca & Thomé 1994b: 91.

Ptychodon (Unilamellatus) schuppi solemi: Fonseca & Thomé 1994b: 91.

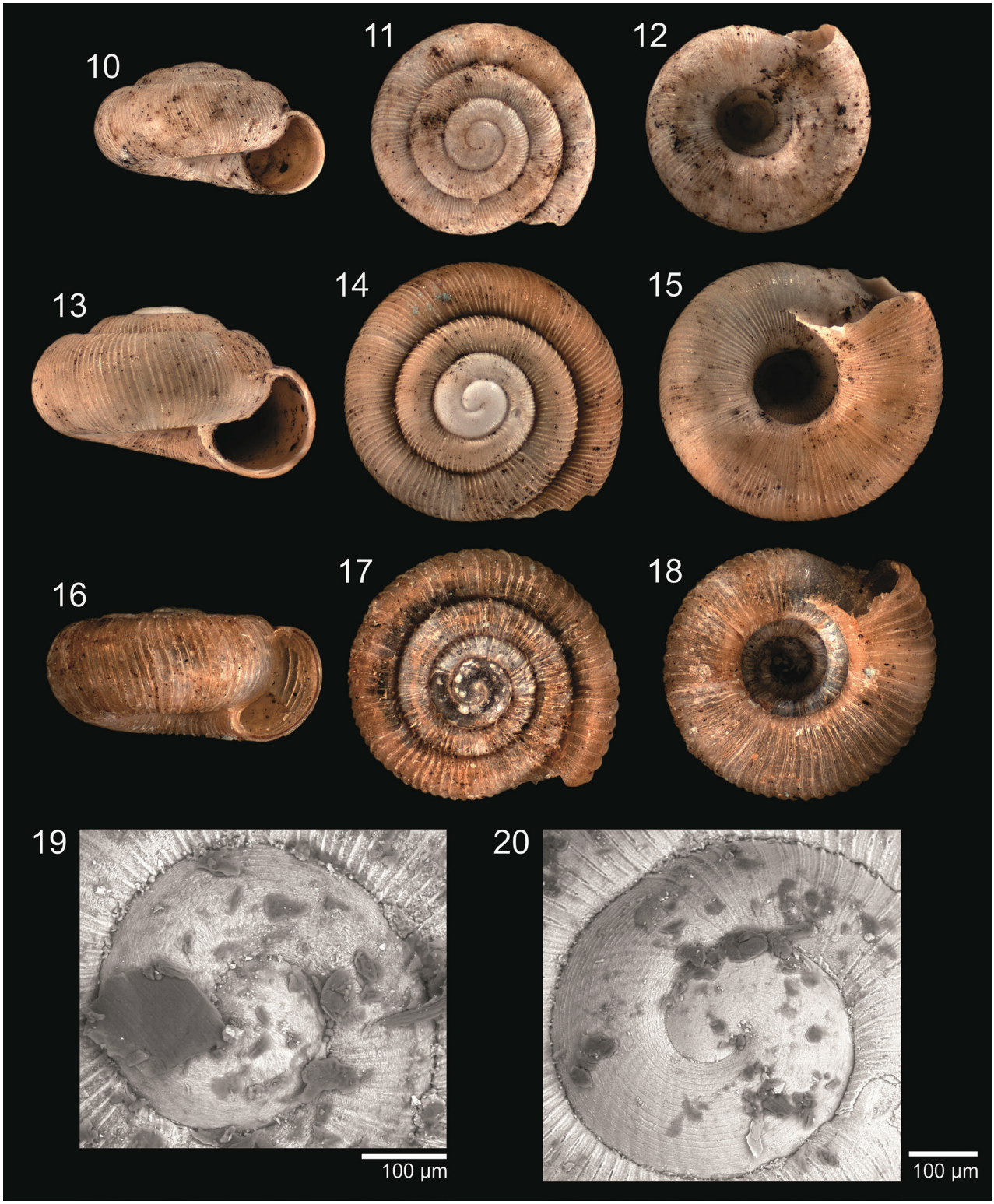
Ptychodon schuppi: Salgado & Coelho 2003: 154.

Rotadiscus schuppi: Simone 2006: 235, fig. 899; Agudo-Padrón 2011: 62.

Rotadiscus amancaezensis: Salvador 2019: 94.

Material: MNZ M.205856 (holotype of *Pyramidula schuppi* Suter, 1900; ex Suter coll. 4011; from Brazil, Rio Grande do Sul state, São Leopoldo municipality).

Distribution: Bolivia (Santa Cruz department), Brazil (Rio de Janeiro, Santa Catarina, and Rio Grande do Sul states), Argentina (Jujuy, Salta, Missiones, Tucumán, Catamarca, and Córdoba provinces), Uruguay (Maldonado and Montevideo departments) (Simone 2006; Miquel et al. 2007). Records from Peru (Lima and Cuzco) and Chile (Biobío and Los Lagos regions) have not been confirmed in the main revisions of the species (Miquel et al. 2004, 2007).



Figures 10–20. Family Charopidae. **10–12.** *Radiodiscus compactus* (Suter, 1900), lectotype, MNZ M.205772; H = 0.8 mm, D = 1.4 mm. **13–15.** *Radiodiscus patagonicus* (Suter, 1900), syntype MNZ M.205771; H = 1.0 mm, D = 1.7 mm. **16–18.** *Rotadiscus amancaezensis* (Hidalgo, 1869), holotype of *Pyramidula schuppi* Suter, 1900, MNZ M.205856; H = 0.8 mm, D = 1.7 mm. **19.** Protoconch of *Radiodiscus compactus* (Suter, 1900), lectotype, MNZ M.205772. **20.** Protoconch of *Radiodiscus patagonicus* (Suter, 1900), syntype MNZ M.205771.

Remarks

There is evidence that only a single specimen was available to Suter (1900): he used the verb "to collect" in the singular ("colligido" in the original). Therefore, the present specimen is considered a holotype.

Despite the fact that the holotype of *Pyramidula schuppi* does not have its protoconch sculpture preserved (an important feature for Charopidae taxonomy), its shell shape, low spire, teleoconch sculpture and narrow aperture make it indistinguishable from the type material of *R. amancaezensis* (Simone 2006; Miquel et al. 2007). As such, the former is here considered a junior synonym of the latter. Furthermore, the distribution of *Pyramidula schuppi* (southern Brazil and Uruguay; Simone 2006) is largely contained within the distribution of *R. amancaezensis*.

"*Pyramidula schuppi*" (as *Ptychodon*) was classified as "endangered" in the IUCN Red List due to population reduction (Mansur 1996). The current recognition of synonymy, however, would make it (as R. *amancaezensis*) a much widely distributed species and thus, likely not endangered.

4 Summary

Access to Suter's type material has allowed a more in-depth study of his new species and resulted in the present work. In summary, the following of Suter's species are considered valid: *Gastrocopta iheringi, Scolodonta interrupta*, *Radiodiscus compactus*, and *Radiodiscus patagonicus*. Two of Suter's species are junior synonyms: *Streptaxis tumescens* is a junior synonym of *Happia vitrina* (Scolodontidae), and *Pyramidula schuppi* is a junior synonym of *Rotadiscus amancaezensis* (Charopidae).

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