

Taxonomic study on a collection of terrestrial mollusks from the region of Santa Maria, Rio Grande do Sul state, Brazil

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Abstract. The malacological collection of the *Universidade Federal de Santa Maria*, curated by Dr. Carla B. Kotzian, has been recently donated to the *Museu de Zoologia da Universidade de São Paulo* (MZSP, Brazil). The collection is rich in well preserved specimens of terrestrial gastropods from central Rio Grande do Sul state, in southernmost Brazil. That region, centered in the municipality of Santa Maria, represents a transitional area between the Atlantic Rainforest and Pampas biomes and has been scarcely reported in the literature. Therefore, we present a taxonomical study of these specimens, complemented by historical material of the MZSP collection. Overall, we report 20 species, mostly belonging to the Stylommatophora, from which four represent new records for Rio Grande do Sul: *Adelopoma brasiliense*, *Happia vitrina*, *Macrodonates gargantua*, and *Cyclodontina corderoi*. The present report of *C. corderoi* is also the first from Brazil. Two introduced species were found in the studied material: *Bradybaena similis* and *Zonitoides* sp.

Key-Words. Diplommatinidae; Gastropoda; Helicinidae; Pulmonata; Stylommatophora.

Resumo. A coleção malacológica da Universidade Federal de Santa Matia, curada pela Dra. Carla B. Kotzian, foi recentemente doada ao Museu de Zoologia da Universidade de São Paulo (MZSP, Brasil). A coleção é rica em espécimes bem preservados de gastrópodes terrestres do estado do Rio Grande do Sul, no extremo sul do Brasil. Esta região, centrada no município de Santa Maria, representa uma área de transição entre os biomas Mata Atlântica e Pampa, e tem sido pouco relatada na literatura. Visando melhoria desse cenário, apresentamos um estudo taxonômico desses espécimes, complementado por material histórico da coleção MZSP. No total, relatamos 20 espécies, na sua maioria pertencentes a Stylommatophora, das quais quatro representam novos registros para o Rio Grande do Sul: *Adelopoma brasiliense*, *Happia vitrina*, *Macrodonates gargantua* e *Cyclodontina corderoi*. O presente relato de *C. corderoi* é também o primeiro do Brasil. Duas espécies introduzidas foram encontradas no material estudado: *Bradybaena similis* e *Zonitoides* sp.

Palavras-Chave. Diplommatinidae; Gastropoda; Helicinidae; Pulmonata; Stylommatophora.

INTRODUCTION

Recently, Dr. Carla Bender Kotzian, who worked in the *Universidade Federal de Santa Maria* (UFSM, Brazil), transferred the collection guard of Recent mollusks to the *Museu de Zoologia da Universidade de São Paulo* (MZSP, Brazil). Among the material of this collection, our attention was drawn to the specimens of terrestrial gastropods from the central region of Rio Grande do Sul state (centered in the municipality of Santa Maria), which proved to be rather abundant and in a good preservation state.

Therefore, with the intention of bringing new information on the terrestrial gastropod fauna of a scarcely sampled region, we present herein the species from the Santa Maria region found in the former UFSM collection, complemented by further historical material deposited in the collection of the MZSP. All the species are figured below, with notes on their distribution, diagnosis and taxonomy, when applicable. Overall, we report 20 species, mostly belonging to Stylommatophora, from which three represent new distribution records.

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MATERIAL AND METHODS

All the studied specimens stem from several municipalities around Santa Maria (Fig. 1) and are now deposited in the malacological collection of the MZSP (São Paulo, Brazil). The full list of analyzed material, with lot numbers and collection data, can be found under each species entry below. Identification of the species was based in specialized literature: original descriptions, further taxonomic literature, the catalogue by Simone (2006), and comparative material from the MZSP collection. Species are presented below in systematic order, following Bouchet *et al.* (2017). Coordinates given on the text are for the city center of each municipality, as the collection events here typically lack this data. Measurements were made either with a digital caliper (for larger specimens) or with the aid of the Zeiss Axiovision SE64 Rel 4.8 imaging software. The following abbreviations are used herein: L = shell length; D = shell greatest width (perpendicular to L); RS = Rio Grande do Sul state; UFSM = former Universidade Federal de Santa Maria collection; col = collector(s); sh = shell(s); spm = specimen(s).

SYSTEMATICS

Neritimorpha
Superfamily Helicinoidea
Family Helicinidae
Genus *Helicina* Lamarck, 1799
***Helicina densestriata* Wagner, 1910**
(Fig. 2A-E)

Helicina densestriata Wagner, 1910: 272, pl. 53, figs. 11-13;
Shade, 1965: 213; Salgado & Coelho, 2003: 151.
Helicina (Oxyrhombus) densestriata: Haas, 1959: 365.
Oxyrhombus densestriatus: Simone, 2006: 41, fig. 34;
Agudo-Padrón, 2008: 51.

Type locality: Brazil, Rio Grande do Sul state, Serra do Mar.

Distribution: Brazil (Santa Catarina and Rio Grande do Sul states) and Paraguay (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Agudo (29°38'S, 53°15'W): 6 sh, 21.x.1988, UFSM, L. Indrusiak



Figure 1. Map of Rio Grande do Sul state, showing the municipalities where the present specimens were collected.

col. (MZSP 137933), 4 sh, 01.x.1988, UFSM, L. Indrusiak col. (MZSP 137945); Mata (29°33'S, 54°27'W): 28 sh, 01.vi.1982, UFSM, M.L. Bier col. (MZSP 137938); Santa Maria (29°41'S, 53°48'W): 7 sh, 21.vi.1979, A. Assunção col. (MZSP 43120); 2 sh, ix.1980, L. Indrusiak col. (MZSP 43339); 2 spm, ix.1980, L. Indrusiak col. (MZSP 44147); Silveira Martins (29°38'S, 53°35'W): 2 sh, 09.xi.1989, UFSM, L. Indrusiak col. (MZSP 137942).

Remarks: This species can be identified by its relatively small size and strong spiral cords on the teleoconch (on adapical area of the whorl, above the keel). As common for other congeners (e.g., Salvador *et al.*, 2014), specimens of *H. densestriata* can vary from a rounded profile (Fig. 2D) to a strongly marked keel (Fig. 2A); furthermore, the spiral sculpture, although typically well marked, can be fainter in some specimens (Fig. 2B).

Caenogastropoda
Superfamily Cyclophoroidea
Family Diplommatinidae
Genus *Adelopoma* Doering, 1885
***Adelopoma brasiliense* Morretes, 1953**
(Fig. 2F-G)

Adelopoma brasiliense Morretes, 1953: 331; Salgado & Coelho, 2003: 153; Simone, 2006: 46, fig. 56; Agudo-Padrón, 2014: 10; Martins & Simone, 2014: 765; Salvador *et al.*, 2018a: 106, figs. 5A-C.

Type locality: Brazil, São Paulo state, Iguape municipality.

Distribution: Brazil (São Paulo state and possibly Alagoas state) (Simone, 2006; Salvador *et al.*, 2018a).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 1 sh, ix.1990, UFSM, L. Indrusiak col. (MZSP 132596); 3 sh, ii.1990, UFSM, L. Indrusiak col. (MZSP 132597); São Martinho da Serra (29°32'S, 53°51'W): 2 sh, v.1990, UFSM, L. Indrusiak col. (MZSP 132598); 4 sh, iv.1991, UFSM, L. Indrusiak col. (MZSP 132599); Silveira Martins (29°38'S, 53°35'W): 1 sh, ii.1989, UFSM, L. Indrusiak col. (MZSP 132595).

Remarks: The species can be distinguished from local congeners by its conical shell profile, with an acuminate and somewhat truncated apex, and the widely spaced axial ribs. The present record extends the species distribution to southern Brazil.

Stylommatophora
Superfamily Achatinoidea
Family Achatinidae
Genus *Lamelaxis* Strebel & Pfeffer, 1882
***Lamelaxis gracile* (Hutton, 1834)**
(Fig. 2H-I)

Bulimus gracilis Hutton, 1834: 93; Martens, 1973: 183.

Opeas gracile: Baker, 1913: 644; Vernhout, 1914: 18; Pilsbry, 1930a: 342; Haas, 1935: 111, 1939: 268; Morretes, 1949: 132; Jaeckel, 1952: 6.

Opeas (Synopeas) gracile: Baker, 1927: 7.

Opeas (Opeas) gracile: Haas, 1953: 205.

Lamelaxis gracilis: Richards & Hummelinck, 1940: 9; Pilsbry, 1946: 177, figs. 85f-g; Morretes, 1953: 62; Tillier, 1980: 60, pl. 3, fig. 14; Cuzzo & Drahg, 1995: 191; Oliveira & Almeida, 1999: 23; Bruschi-Figueiró & Veitenheimer-Mendes, 2002: 32; Salgado & Coelho, 2003: 155; Silva & Castro, 2003: 67; Simone, 2006: 184, fig. 669; Agudo-Padrón, 2008: 157; Rumi *et al.*, 2010: 2988.

Lamelaxis (Allopeas) gracilis: Baker, 1945: 88; Figueiras, 1963: 88; Shade, 1965: 215; Fernandez & Castellanos, 1973: 271, pl. 4, fig. 3; Quintana, 1982: 81.

Lamelaxis gracile: Delannoye *et al.*, 2015: 258, pl. 51.

Allopeas gracilis: Thompson, 2011: 159.

Allopeas gracile: Capinera, 2017: 116.

Type locality: India, Mirzapur.

Distribution: W. Indies, Central America, tropical and subtropical South America (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 11 sh, 1987, UFSM, C.M. Ferreira col. (MZSP 132622); 1 sh, ix.1980, UFSM, L. Indrusiak col. (MZSP 132623).

Remarks: This species has been introduced in several tropical and subtropical localities worldwide (Capinera, 2017), but it likely originates from South America, despite its type locality (Delannoye *et al.*, 2015). It is known throughout Brazil, including Rio Grande do Sul state (Simone, 2006).

Genus *Leptinaria* Beck, 1837
***Leptinaria lamellata* (Potiez & Michaud, 1838)**
(Fig. 2J-K)

Helix unilamellata d'Orbigny 1835: 9 [*nomen nudum*].

Achatina lamellate Potiez & Michaud, 1838: 128, pl. 11, figs. 7-8; Reeve, 1849a: pl. 18, fig. 97.

Leptinaria (Leptinaria) lamellata: Haas, 1953, 205.

Leptinaria lamellata: Pilsbry, 1906: 288; Baker, 1913: 645, 1927: 22; Haas, 1939: 268; Richards & Hummelinck, 1940: 10; Jaeckel, 1952: 6; Götting, 1978: 105, fig. 7; Tillier, 1980: 62, pl. 3, fig. 12; Ramírez *et al.*, 2003: 276; Salgado & Coelho, 2003: 155; Simone, 2006: 186, fig. 678; Delannoye *et al.*, 2015: 264, pl. 54; Salvador *et al.*, 2018a: 116, figs. 10E-F; Salvador, 2019a: 91.

Leptinaria lamellata lamellata: Thompson, 2011: 164.

Leptinaria (Leptinaria) unilamellata: Arias, 1953: 250, fig. 4.

Leptinaria unilamellata: Baker, 1945: 91; Pilsbry, 1906: 288; Altena, 1960: 50; Dutra, 1988: 581; Araujo & Keller, 1993: 502; Oliveira & Almeida, 1999: 23; Silva & Castro, 2003: 67; Simone, 2006: 186, fig. 684; Agudo-Padrón, 2008: 157; Massemin *et al.*, 2009: 415, pl. 9, fig. D; Breure & Araujo, 2017: 90, fig. 34B.

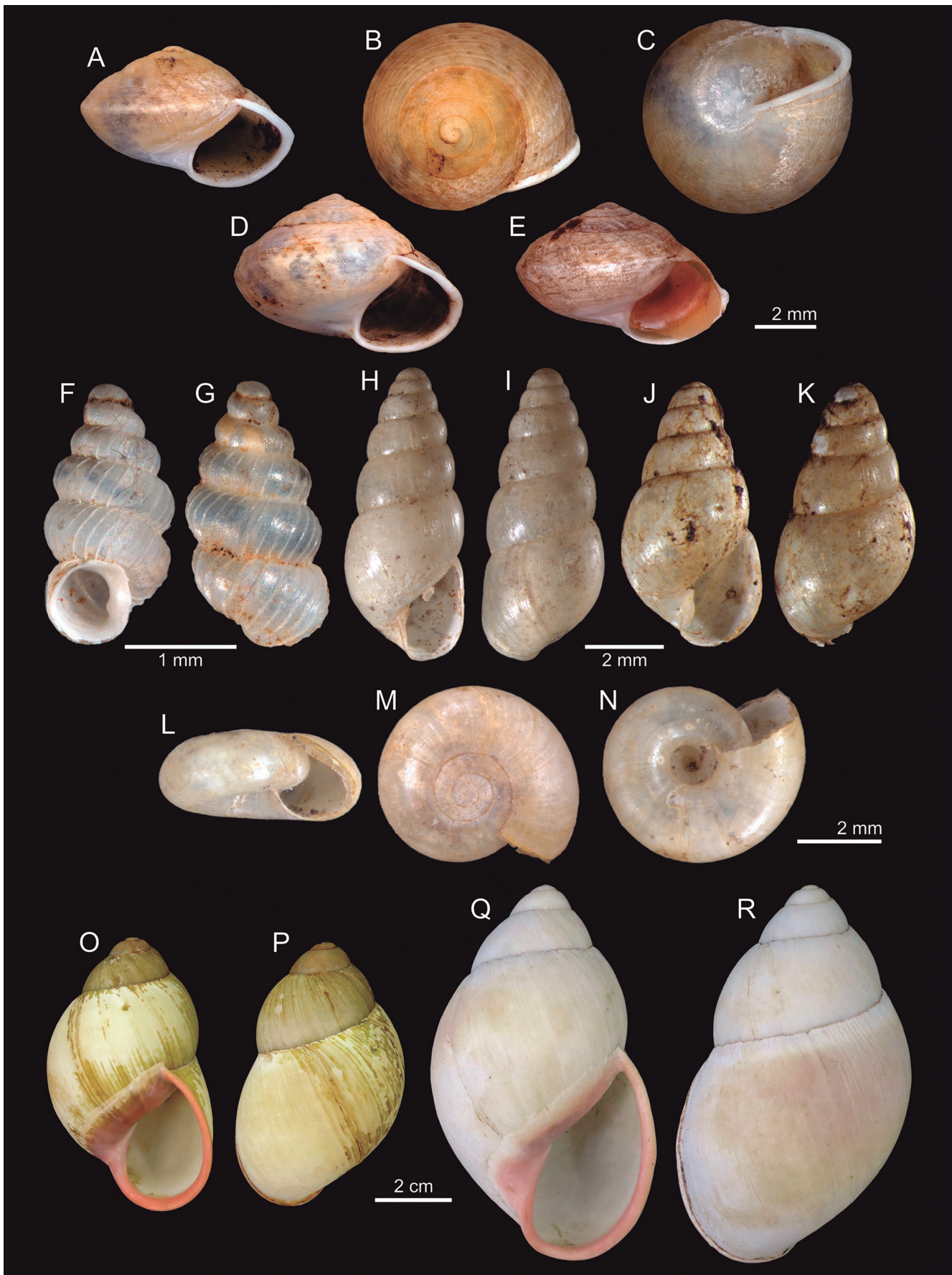


Figure 2. (A-R) = Shells from Santa Maria region, Rio Grande do Sul state. (A-E) = *Helicina densestriata*, (A-C) = MZSP 137933 (L = 4.6 mm, D = 7.1 mm). (D) = MZSP 43339 (L = 5.2 mm, D = 7.6 mm). (E) = MZSP 44147 (L = 4.6 mm, D = 6.9 mm). (F-G) = *Adelopoma brasiliense* MZSP 132597 (L = 2.3 mm). (H-I) = *Lamellaxis gracile* MZSP 132622 (L = 7.2 mm). (J-K) = *Leptinaria lamellata* MZSP 132621 (L = 6.8 mm). (L-N) = *Happia vitrina* MZSP 132658 (L = 2.3 mm, D = 4.8 mm). (O-P) = *Megalobulimus abbreviatus* MZSP 132550 (L = 72 mm). (Q-R) = *Megalobulimus haemastomus* MZSP 132553 (L = 101 mm).

Type locality: Undefined, but Delannoye *et al.* (2015) indicated Santa Cruz department, in Bolivia, as a possibility.

Distribution: From Nicaragua to Brazil (Simone, 2006; Delannoye *et al.*, 2015).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 3 sh, ix.1993, UFSM, L. Indrusiak col. (MZSP 132621).

Remarks: This species is very widespread in South America, including southern Brazil (Simone, 2006). It has been introduced to some Caribbean Islands and French Polynesia (Massemin *et al.*, 2009).

Superfamily Scolodontoidea
Family Scolodontidae
Genus *Happia* Bourguignat, 1889
***Happia vitrina* (Wagner, 1827)**
(Fig. 2L-N)

Helix vitrina Wagner in Spix, 1827: 25, pl. 17, fig. 6.

Solarium imperforatum Spix, 1827: 25, pl. 17, fig. 6.

Streptaxis (Happia) tumescens Suter, 1900: 330, pl. 3, fig. 4-4b.

Happia vitrina: Gude, 1902: 234; Thiele, 1927: 318; Haas, 1935: 111; Morretes, 1949: 138; Salgado & Coelho, 2003: 169; Agudo-Padrón, 2008: 165; Birckolz *et al.*, 2016: table 1; Salvador *et al.*, 2018a: 116, figs. 11A-C; Salvador, 2019a: 93.

Scolodonta (Happia) vitrina: Kobelt, 1906: 49, pl. 48, figs. 13-14.

Happiavitrina var. *mülleri*: Thiele, 1927: 318.

Happia (Happia) vitrina: Haas, 1953, 205; Zilch, 1960: 545, fig. 1904.

Streptaxis tumescens: Marshall, 1996: 42; Simone, 2006: 194, fig. 722.

Happia vitrina muelleri: Agudo-Padrón, 2008: 165.

Type locality: Brazil, "southern provinces" (Wagner in Spix, 1827).

Distribution: Brazil, from Alagoas state to Santa Catarina state (Salvador *et al.*, 2018a).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 1 spm, ix.1980, L. Indrusiak col. (MZSP 44145); 1 sh, ii.1992, UFSM, L. Indrusiak col. (MZSP 132659); Silveira Martins (29°38'S, 53°35'W): 5 sh, i.1993, UFSM, L. Indrusiak col. (MZSP 132658).

Remarks: Even though shell characters are of limited use for diagnosis within the genus *Happia*, the present specimen confer with *H. vitrina*, a widespread species in Brazil, due to its depressed spire, relatively shallow umbilicus and abapically bent aperture. The present record extends the species distribution a little further to the south.

Superfamily Rhytidoidea
Family Strophocheilidae
Genus *Megalobulimus* Miller, 187
***Megalobulimus abbreviatus* (Bequaert, 1948)**
(Fig. 2O-P)

Stropocheilus granulosis abbreviates Bequaert, 1948: 164, pl. 27, fig. 4.

Stropocheilus (Megalobulimus) granulosis abbreviatus: Sawaya & Petersen, 1962: 37.

Megalobulimus abbreviatus: Bruschi-Figueiró & Veitenheimer-Mendes, 2002: 33; Salgado & Coelho, 2003: 157; Achaval *et al.*, 2005: 74; Horn *et al.*, 2005: 459; Agudo-Padrón & Lenhard, 2011: 167; Borda & Ramírez, 2013: 681; Agudo-Padrón, 2015: 4.

Type locality: Brazil.

Distribution: Brazil: Mato Grosso, São Paulo and Rio Grande do Sul states (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Salto do Jacuí (29°05'S, 53°12'W): 6 sh, ii.1989, UFSM, G. Deprá col. (MZSP 132550); Santa Maria (29°41'S, 53°48'W): potentially lost; 1 sh, 1990, L. Indrusiak col. (MZSP 48216); 1 sh, v. 82, L. Indrusiak col. (MZSP 48241) 5 sh, 01.xii.1976, L. Indrusiak col. (MZSP 48244); Silveira Martins (29°38'S, 53°35'W): 1 sh, ii.1989, UFSM, L. Indrusiak col. (MZSP 132569).

Remarks: *Megalobulimus abbreviatus* was originally described as a subspecies. However, Leme (1973) elevated all subspecies in Megalobuliminae to species level in an unpublished thesis that largely followed the faunal lists of Morretes (1949, 1953) (Fontenelle *et al.*, 2019). Leme (1973) did not provide a clear rationale for his decision, but was nevertheless followed by later authors (e.g., Salgado & Coelho, 2003; Simone, 2006). As a result, most Brazilian *Megalobulimus* spp. are in dire need of reassessment.

***Megalobulimus haemastomus* (Scopoli, 1786)**
(Fig. 2Q-R)

Bulimus haemastomus Scopoli, 1786: 67, pl. 25, figs. B1-2; Lamarck, 1822: 117; Swainson, 1840: 180; Gray, 1847: 174; Troschel, 1849: 227.

Bulimus hämastomus: Küster, 1850: 5, pl. 1, figs. 3-4.

Strophocheilus oblongus haemastomus: Bequaert, 1948: 60, pl. 6, fig. 2, pl. 21, fig. 4, pl. 24, fig. 5; Barattini & Ledón, 1949: 2; Buckup & Buckup, 1957: 34; Klappenbach, 1967: 42.

Psiloicus haemastomus: Morretes, 1952: 113.

Strophocheilus (Megalobulimus) oblongus haemastomus: Figueiras, 1963: 83; Parodiz, 1957a: 132; Sawaya & Petersen, 1962: 37; Figueiras, 1963: 83; Fernandez & Castellanos, 1973: 276.

Megalobulimus oblongus haemastomus: Quintana, 1982: 84; Miquel & Aguirre, 2011: 112, fig. 12.

Megalobulimus haemastomus: Salgado & Coelho, 2003: 158; Simone, 2006: 211. Agudo-Padrón, 2008: 161, 2014: 16, 2015: 4; Fontenelle *et al.*, 2014: 34; Salvador, 2019a: 92.

Type locality: Undefined.

Distribution: Brazil (central to south), Paraguay, Uruguay, and Argentina (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Agudo (29°38'S, 53°15'W): 10 sh, vi.1988, UFSM, Equipe Piscicultura col. (MZSP 132553); 2 sh, v.1987, UFSM, H. Schumacher col. (MZSP 132566); Faxinal do Soturno (29°34'S, 53°26'W): 1 sh, 1987, UFSM (MZSP 132568); Ivorá (29°31'S, 53°34'W): 1 sh, x.1989, UFSM, E. Peripolli col. (MZSP 132565).

Superfamily Succineoidea

Family Succineidae

Genus *Succinea* Draparnaud, 1801

Succinea meridionalis d'Orbigny, 1837

(Fig. 3A-B)

Succinea oblonga: d'Orbigny, 1837: 231 [non Draparnaud, 1835].

Succinea meridionalis d'Orbigny, 1837: 711; Fernandez & Castellanos, 1973: 269; Doering, 1874: 52; Strobel, 1874: 29; Pilsbry, 1911: 520; Pfeiffer, 1876: 47; Morretes, 1949: 130; Parodiz, 1957a: 129; Figueiras, 1963: 84; Shade, 1965: 214; Lanzieri, 1966: 170; Fernandez & Castellanos, 1973: 269, pl. 1 fig. 3; Quintana, 1982: 75; Bruschi-Figueiró & Veitenheimer-Mendes, 2002: 33; Salgado & Coelho, 2003: 153; Scarabino, 2004: 269; Simone, 2006: 236, fig. 906; Agudo-Padrón, 2008: 156, 2014: 13; Santos *et al.*, 2010: 512; Miquel & Aguirre, 2011: 106, fig. 3; Miquel *et al.*, 2015: 90.

Succinea (Hydrophyga?) meridionalis: Haas, 1953: 205.

Type locality: South America ("l'Amérique méridionale"; d'Orbigny, 1837: 231).

Distribution: From Rio de Janeiro state, Brazil, to Patagonia (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 1 sh, 1 spm, 24.vii.1994, T. Breyer col. (MZSP 57504).

Superfamily Orthalicoidea

Family Bulimulidae

Genus *Bulimulus* Leach, 1814

Bulimulus angustus Weyrauch, 1966

(Fig. 3C-D)

Bulimulus (Bulimulus) versicalis angustus Weyrauch, 1966: 45; Breure, 1979: 61; Bruschi-Figueiró & Veitenheimer-Mendes, 2002: 32.

Bulimulus versicalis: Richardson, 1995: 88.

Bulimulus angustus: Miquel, 1991: 94; Salgado & Coelho, 2003: 160; Simone, 2006: 117, fig. 354; Agudo-Padrón, 2008: 158, 2014: 15; Agudo-Padrón & Lenhard, 2011: 167; Birckolz *et al.*, 2016: table 1.

Type locality: Brazil, Rio Grande do Sul state, São Leopoldo municipality.

Distribution: Brazil: Santa Catarina and Rio Grande do Sul states (Birckolz *et al.*, 2016).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 1 spm, ix.1980, L. Indrusiak col. (MZSP 44144); 18 sh, iv.1984, UFSM, L. Indrusiak col. (MZSP 132650); 2 sh, iii.1996, UFSM, L. Indrusiak col. (MZSP 132653).

Bulimulus marcidus (Pfeiffer, 1853)

(Fig. 3E-F)

Bulimulus marcidus Pfeiffer, 1853: 435, 1854: 67; Pfeiffer, 1854 *in* Küster & Pfeiffer, 1840-1865: 188, pl. 49 figs. 11-12; Hupé, 1857: 54.

Bulimulus marcidus: Pilsbry, 1901-1902: 146, pl. 25, figs. 23-24; Morretes, 1949: 147; Breure, 1979: 63; Richardson, 1995: 79; Salgado & Coelho, 2003: 160; Simone, 2006: 118, fig. 364; Breure & Ablett, 2014: 117, figs. 63I-J, L36v, 2015: 64.

Type locality: Brazil.

Distribution: Brazil (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 7 sh, ix.1980, L. Indrusiak col. (MZSP 43336).

Remarks: This species can be identified by its medium size, convex whorls, and widely spaced prosocline axial ribs. The precise distribution of *B. marcidus* in Brazil is uncertain.

Genus *Drymaeus* Albers, 1850

Drymaeus muelleggeri Jaekel, 1927

(Fig. 3G-H)

Drymaeus muelleggeri Jaekel, 1927: 136; Breure, 1979: 111; Richardson, 1995: 152; Salgado & Coelho, 2003: 162; Simone, 2006: 140, fig. 463; Agudo-Padrón, 2014: 15.

Type locality: Brazil, Rio Grande do Sul state, Santa Rosa municipality.

Distribution: Brazil: Santa Catarina and Rio Grande do Sul states (Simone, 2006; Agudo-Padrón, 2014).

Material studied: Brazil, Rio Grande do Sul: Dilermando de Aguiar (29°42'S, 54°12'W): 6 sh, xii.1993, UFSM, L.

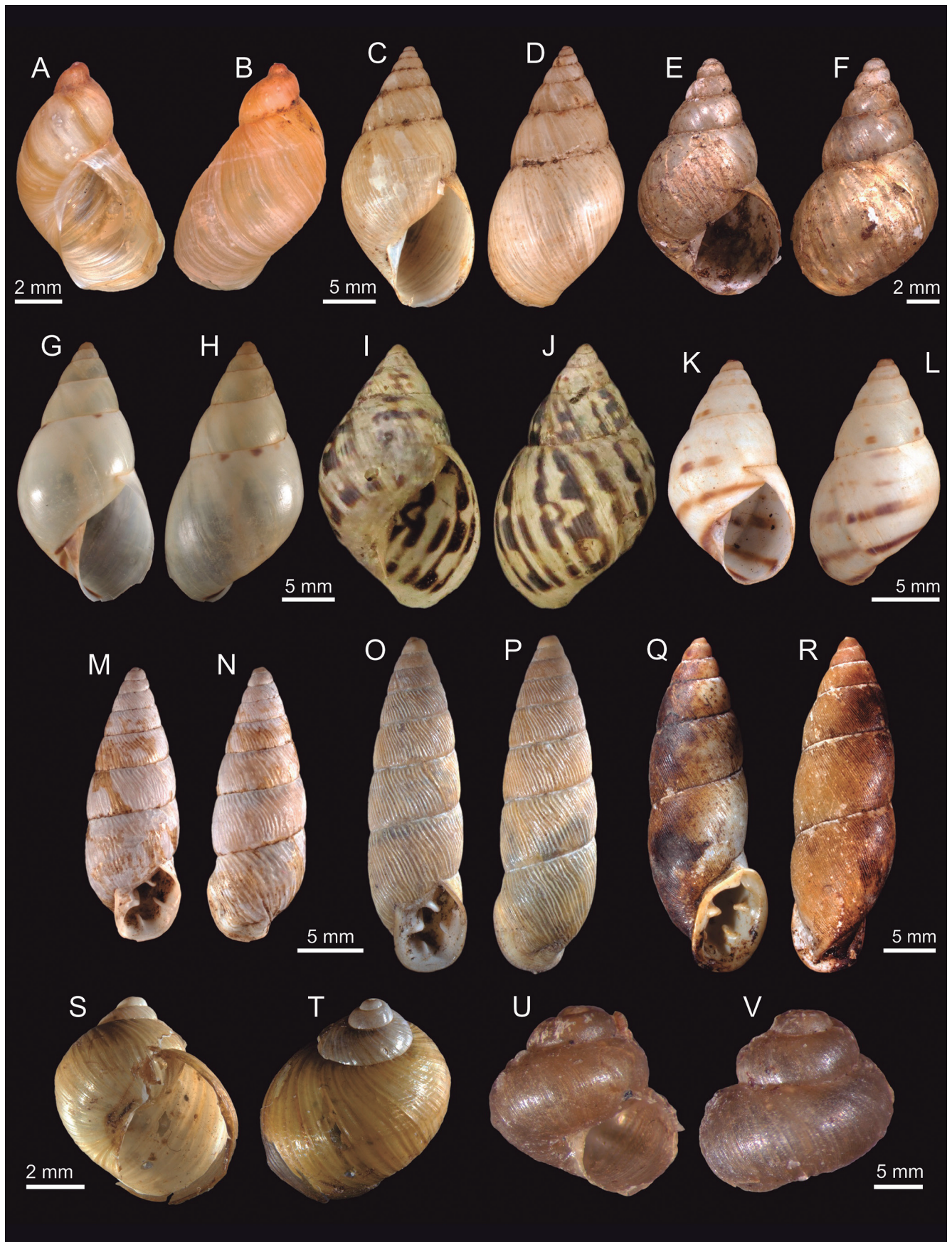


Figure 3. (A-V) = Shells from Santa Maria region, Rio Grande do Sul state. (A-B) = *Succinea meridionalis* MZSP 57504 (L = 9.7 mm). (C-D) = *Bulimulus angustus* MZSP 132650 (L = 25.3 mm). (E-F) = *Bulimulus marcidus* MZSP 43336 (L = 14.6 mm). (G-H) = *Drymaeus muelleggeri* MZSP 132577 (L = 24.8 mm). (I-J) = *Drymaeus papyraceus* MZSP 132558 (L = 25.0 mm). (K-L) = *Drymaeus poecilus* MZSP 132588 (L = 16.9 mm). (M-N) = *Cyclodontina corderoi* MZSP 132605 (L = 21.1 mm). (O-P) = *Cyclodontina corderoi* MZSP 132609 (L = 25.7 mm). (Q-R) = *Macrodonates gargantua* MZSP 43332 (L = 32.7 mm). (S-T) = *Simpulopsis sulculosa* MZSP 132663 (L = 7.3 mm, D = 6.1 mm). (U-V) = *Pupisoma dioscoricola* MZSP 132671 (L = 2.0 mm, D = 2.1 mm).

Indrusiak col. (MZSP 132577); Mata (29°33'S, 54°27'W): 1 sh, ii.1982, H.O. Lippold col. (MZSP 43122); Santa Maria (29°41'S, 53°48'W): 3 sh, (MZSP 43105).

***Drymaeus papyraceus* (Mawe, 1823)
(Fig. 3I-J)**

Helix papyracea Mawe, 1823: 168, fig. 7; Breure, 1979: 112.

Bulimus litus Férussac, 1819: 89, pl. 139, figs. 6, 7.

Bulimus lita: d'Orbigny, 1838: 268.

Bulimus papyraceus: Gray, 1825: 414; Beck, 1837: 65; Hupé, 1857: 52; Albers, 1860: 216; Heynemann, 1868: 110; Martens, 1868: 179; Hidalgo, 1869: 108, 1870: 57; Pfeiffer, 1848: 102; Reeve, 1849b: pl. 39, fig. 236; Ihering, 1884: 271.

Bulimulus papyraceus: Ancey, 1897: 5.

Bulimulus (Mormus) papyraceus: Clessin, 1888: 166.

Drymaeus (Drymaeus) papyraceus: Breure & Eskens, 1981: 32, figs. 100-101; Breure & Araujo, 2017: 78, fig. 30D.

Drymaeus (Leiostracus) papyraceus: Haas, 1935: 110.

Drymaeus papyraceus: Pilsbry, 1897-1898: 249; Parodiz, 1946b: 358, 1957b: 24, 1962: 444; Lopes, 1957: 44; Figueiras, 1962: 47, 1963: 90; Shade, 1965: 217; Duarte, 1971: 84; Fernandez & Castellanos, 1973: 280; Quintana, 1982: 97; Dutra-Clarke & Souza, 1991: 293, pl. 2, figs. 1a-1b; Richardson, 1995: 159; Salgado & Coelho, 2003: 162; Simone, 2006: 140, fig. 465; Cuezco et al., 2013: 156; Salvador et al., 2018a: 112, figs. 7D-F; Salvador, 2019a: 86.

Drymaeus (Mormus) papyraceus papyraceus: Morretes, 1949: 149.

Drymaeus papyraceus papyraceus: Figueiras, 1963: 90; Oliveira et al., 1972: 16; Oliveira & Almeida, 1999: 36; Silva & Castro, 2003: 67; Agudo-Padrón, 2008: 159, 2014: 15, fig. 10.

Type locality: Brazil, Rio de Janeiro.

Distribution: Widespread in Brazil, Paraguay, Argentina and Uruguay (Simone, 2006; Cuezco et al., 2013).

Material studied: Brazil, Rio Grande do Sul: Itaara (29°36'S, 53°45'W): 1 sh, iv.1982, UFSM, L. Indrusiak col. (MZSP 132587); Santa Maria (29°41'S, 53°48'W): 1 sh, ix.1980, L. Indrusiak col. (MZSP 43338); 20 sh, iii.1990, UFSM, L. Indrusiak col. (MZSP 132558); 7 sh, xi.1990, UFSM, L. Indrusiak col. (MZSP 132559); 2 sh, x.1992, UFSM, S. Cechin col. (MZSP 132560); 5 sh, ix.1980, UFSM, L. Indrusiak col. (MZSP 132561); 1 sh, xi.1991, UFSM, S. Cechin col. (MZSP 132562); 1 sh, ii.1992, UFSM, L. Indrusiak col. (MZSP 132579).

***Drymaeus poecilus* (d'Orbigny, 1835)
(Fig. 3K-L)**

Helix (Cochlogena) poecila d'Orbigny, 1835: 11; Breure, 1979: 113.

Bulimus poecilus: d'Orbigny, 1837: 268, pl. 31, fig. 1-10; Gray, 1854: 15; Pfeiffer, 1848: 200; Reeve, 1849b: pl. 16, fig. 91.

Bulimus poecilus var. *major* d'Orbigny, 1837: 269.

Bulimus poecilus var. *minor* d'Orbigny, 1837: 269.

Bulimulus poecilus: Beck, 1837: 65; Martens, 1881-1885: 13, fig. 1-5; Ancey, 1897: 5.

Bulimulus poecitus: Martens, 1895: 33.

Bulimus pictus Bonnet, 1864: pl. 5, figs. 4-6, pl. 6, fig. 1.

Bulimus poecilus var. *icterica* Ancey, 1892: 92.

Drymaeus poecilus: Pilsbry, 1897-1898: 285, pl. 49, figs. 49-57; Smith, 1903: 71; Morretes, 1943: 117; Parodiz, 1946b: 358, 1957b: 25, 1962: 440; Lopes, 1957: 44; Shade, 1965: 217; Breure, 1975b: 1152; Oliveira et al., 1992: 99; Richardson, 1995: 163; Oliveira & Almeida, 1999: 37; Salgado & Coelho, 2003: 162; Silva & Castro, 2003: 67; Simone, 2006: 141, fig. 468; Cuezco, et al., 2013: 156; Agudo-Padrón, 2014: 15; Salvador et al., 2015: 73, figs. 22-23, 2018b: 76, figs. 24-42; Birckolz et al., 2016, table 1; Salvador, 2019a: 86.

Drymaeus lynchi Parodiz, 1946a: 1, pl. 1, figs. 1-3.

Drymaeus (Drymaeus) poecilus: Breure & Eskens, 1981: 32, fig. 102-108; Cuezco & Drahg, 1995: 193.

Drymaeus poecilus poecilus: Fernandez & Castellanos, 1973: 280; Quintana, 1982: 95.

Drymaeus (Leiostracus) poecilus: Oliveira & Oliveira, 1984: 12; Morretes, 1949: 151.

Drymaeus poecila: Breure & Ablett, 2014: 154, figs. 45M-N.

Type locality: Bolivia, Chiquitos province (see also Breure & Ablett, 2014).

Distribution: Bolivia, Brazil (central to south), Paraguay, and Argentina (Salvador et al., 2018b).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 3 spm, 01.v.1984, D. Junges & L. Indrusiak col. (MZSP 27662); 3 sh, ix.1979, D. Link col. (MZSP 43119); 2 sh, 04.vi.1990, UFSM, L. Indrusiak col. (MZSP 132482); 6 sh, ix.1993, UFSM, L. Indrusiak col. (MZSP 132580); 1 sh, vii.1990, UFSM, L. Indrusiak col. (MZSP 132591); 2 sh, ix.1980, UFSM, L. Indrusiak col. (MZSP 132582); 1 sh, xii.1994, UFSM. (MZSP 132583); 4 sh, ix.1980, UFSM, L. Indrusiak col. (MZSP 132584); 2 sh, viii.1980, UFSM, E. Loreto col. (MZSP 132585); 3 sh, ii.1992, UFSM, L. Indrusiak col. (MZSP 132586); (2 sh, ix.1979, UFSM, A. Alvarez col. (MZSP 132588); 2 sh, x.1993, UFSM, L. Indrusiak col. (MZSP 132592); 2 sh, iv.1994, UFSM, L. Indrusiak col. (MZSP 132593); 1 sh, v.1996, UFSM, S. Cechin col. (MZSP 132651); São Martinho da Serra (29°32'S, 53°51'W): 1 sh, iv.1988, UFSM, L. Indrusiak col. (MZSP 132590).

Remarks: The conchological features of this species are widely variable, regarding both shell shape and color pattern; the full range of variation was recently explored by Salvador et al. (2018b).

Family Odontostomidae
Genus *Cyclodontina* Beck, 1837
***Cyclodontina corderoi* Klappenbach, 1958**
(Fig. 3M-P)

Cyclodontina (Spixia) corderoi Klappenbach, 1958: 2, pls. 1-2; Olazarri et al., 1972: 7; Breure, 1974: 114; Heydrich, 2016: 29.
Cyclodontina corderoi: Figueiras, 1963: 91; Breure & Ablett, 2012: 11, figs. 21J-K, 21iii.
Spixia corderoi: Scarabino, 2003: 209.

Type locality: Uruguay, Tacuarembó department, Tambores municipality, "Pozo Hondo".

Distribution: Uruguay.

Material studied: Brazil, Rio Grande do Sul: Itaara (29°36'S, 53°45'W), 37 sh, iv.1982, UFSM, L. Indrusiak col. (MZSP 132604); 4 sh, xi.1988, UFSM, L. Indrusiak col. (MZSP 132610); Mata (29°33'S, 54°27'W): 2 sh, vi.1982, UFSM, M. Bier col. (MZSP 132619); Santa Maria (29°41'S, 53°48'W): 5 sh (MZSP 43133); 3 sh (MZSP 43136); 2 sh, ix.1980, L. Indrusiak col. (MZSP 43337); 5 sh, ix.1980, L. Indrusiak col. (MZSP 44146); 80 sh, ix.1980, UFSM, L. Indrusiak col. (MZSP 132603); 19 sh, vi.1979, UFSM, A. Fagundes col. (MZSP 132605); 20 sh, ii.1989, UFSM, L. Indrusiak col. (MZSP 132607); 1 sh, ii.1992, UFSM, L. Indrusiak col. (MZSP 132611); 1 sh, ix.1985, UFSM, P. Veiga col. (MZSP 132612); 1 sh, iii.1992, UFSM, L. Indrusiak col. (MZSP 132613); 1 sh, ix.1982, UFSM, L. Indrusiak col. (MZSP 132618); 2 sh, ix.1990, UFSM, L. Indrusiak col. (MZSP 132657); São Martinho da Serra (29°32'S, 53°51'W): 6 sh, iv.1988, UFSM, L. Indrusiak col. (MZSP 132608); 2 sh, v.1990, UFSM, L. Indrusiak col. (MZSP 132615); Silveira Martins (29°38'S, 53°35'W): 3 sh, ii.1989, UFSM, L. Indrusiak col. (MZSP 132609); 2 sh, xi.1978, UFSM, A. Fagundes col. (MZSP 132614).

Remarks: *Cyclodontina corderoi* can be identified by its shell shape, ochre coloration, the well-marked sinuous (sometimes anastomosed) axial sculpture of the teleoconch, and its aperture with four prominent teeth: a median parietal tooth, a median palatal tooth, a basal tooth, and a strong columellar lamella. A faint upper palatal tooth might also be present (Fig. 3O). Furthermore, the overall shell shape can deviate a little from the typically conical spire (Fig. 3M) to very slender forms (Fig. 3O), which are somewhat reminiscent of the genus *Spixia* Pilsbry & Vanatta, 1898. The present record is the first report of this species from Brazil and increases its range circa 250 km to the north.

Genus *Macrodonates* Swainson, 1840
***Macrodonates gargantua* (Férussac, 1821)**
(Fig. 3Q-R)

Helix (Cochlogena) gargantua Férussac, 1821: 62; Breure, 1974: 110.

Bulimus odontostoma Sowerby, 1824: 59, pl. 5, fig. 3; Reeve, 1849b: pl. 38, fig. 228; Breure & Ablett, 2012: 29, figs. 24A-D, 24i.

Odontostomus gargantula: Beck, 1837: 54.

Macrodonates sowerbeyii: Swainson, 1840: 334.

Macrodonates odontostomus: Pilsbry, 1901-1902: 31, pl. 13, figs. 85-87; Pfeiffer, 1855: 149.

Macrodonates jöergensenianus Holmberg, 1912: 153, figs. 11-13.

Odontostomus bertonii Ihering in litt.: Bertoni, 1926: 72 [nomem nudum].

Macrodonates thielei Pilsbry, 1930b: 360, pl. 31, fig. 1.

Macrodonates odontostoma: Morretes, 1949: 157.

Odontostomus gargantua: Breure & Schouten, 1985: 22; Breure & Ablett, 2012: 30, figs. 24A-D, 24i; Cuezco et al., 2013: 165.

Odontostomus (Odontostomus) gargantua: Quintana, 1982: 98.

Odontostomus (Euodontostomus) joergensenianus: Breure, 1974: 117.

Odontostomus odontostomus joergensenianus: Parodiz, 1957b: 29; Fernandez & Castellanos, 1973: 280.

Macrodonates gargantua: Pfeiffer, 1842: 136; Simone, 2006: 162, fig. 155; Agudo-Padrón, 2008: 163, 2014: 18; Gregoric et al., 2013: 1763; Breure & Araujo, 2017: 51, fig. 22G.

Type locality: Undefined.

Distribution: Brazil (Santa Catarina state) and Argentina (Misiones province) (Simone, 2006).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 8 sh, A. Assunção col. (MZSP 43332); Silveira Martins (29°38'S, 53°35'W): 1 sh, vi.1982, UFSM, L. Indrusiak col. (MZSP 132652).

Remarks: The slender profile of the body whorl, the oval aperture, the raised ridge on the abapical portion of the body whorl close to the aperture, and the number and position of the teeth (in particular the shape of the upper columellar lamella), are all consistent with *M. gargantua*. The present record extends the species distribution to the southeast.

Family Simpulopsidae
Genus *Simpulopsis* Beck, 1837
***Simpulopsis sulculosa* (Férussac, 1821)**
(Fig. 3S-T)

Helix (Cochlohydra) sulculosa Férussac, 1821: 31, pl. 11A, fig. 6; Moricard, 1836: 415; Breure, 1979: 134.

Vitrina sulculosa: Hupé, 1857: 4.

Simpulopsis (Simpulopsis) sulculosa: Morretes, 1949: 161; Haas, 1953: 205; Breure, 1973: 52, 1975a: 97, 1975b: 1157.

Simpulopsis sulculosa: Gray, 1825: 415; Pfeiffer, 1841: 74; Reeve, 1862: pl. 2, fig. 13; Heynemann, 1868: 110; Martens, 1868: 183; Hidalgo, 1869: 5, 1870: 30;

Clessin, 1888: 168; Pilsbry, 1899: 214, pl. 64, fig. 81-83; Richardson, 1995: 367; Oliveira & Almeida, 1999: 41; Salgado & Coelho, 2003: 164; Silva & Castro, 2003: 67; Simone, 2006: 180, fig. 648; Agudo-Padrón, 2008: 160; Santos *et al.*, 2010: 513; Birckolz *et al.*, 2016: table 1; Breure & Araujo, 2017: 90, fig. 33H; Salvador *et al.*, 2018a: 114, figs. 9F-G; Salvador, 2019a: 89.

Type locality: Brazil.

Distribution: Brazil, from Alagoas state to Rio Grande do Sul state (Salvador *et al.*, 2018a).

Material studied: Brazil, Rio Grande do Sul: Agudo (29°38'S, 53°15'W): 1 sh, x.1988, UFSM, L. Indrusiak col. (MZSP 132663); Santa Maria (29°41'S, 53°48'W): 2 sh, 07.vi.1996, S. Cechin col. (MZSP 132522); 1 sh, xii.1990, UFSM, L. Indrusiak col. (MZSP 132660); 7 sh, x.1992, UFSM, S. Cechin col. (MZSP 132661); 1 sh, vi.1990, UFSM, L. Indrusiak col. (MZSP 132662).

Superfamily Pupilloidea
Family Valloniidae
Genus *Pupisoma* Stoliczka, 1873
***Pupisoma dioscoricola* (Adams, 1845)**
(Fig. 3U-V)

Helix discoricola Adams, 1845: 16.

Pupisoma dioscoricola: Pilsbry, 1920-1921: 36, pl. 4, figs. 1-5; Fernandez & Castellanos, 1973: 270; Quintana, 1982: 73; Cuzzo & Drahg, 1995: 188; Salgado & Coelho 2003: 153; Rumi *et al.*, 2010: 2988; Agudo-Padrón, 2014: 18; Salvador *et al.*, 2017: 139, fig. 12, 2018a: 109, fig. 6F.

Pupisoma discoricola [sic]: Simone, 2006: 308, fig. 9.

Pupisoma (Ptychopatala) dioscoricola: Hausdorf, 2007: 1483, figs. 1-2.

Type locality: USA, Texas, Brownsville.

Distribution: From Florida, USA, to northern Argentina and southern Brazil, including the Caribbean islands (Hausdorf, 2007).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 3 sh, ii.1992, UFSM, L. Indrusiak col. (MZSP 132669); 15 sh, vi.1990, UFSM, L. Indrusiak col. (MZSP 132671); 5 sh, iv.1991, UFSM, L. Indrusiak col. (MZSP 132672); São Martinho da Serra (29°32'S, 53°51'W): 1 sh, v.1990, UFSM, L. Indrusiak col. (MZSP 132670).

Remarks: Despite the species being known throughout the Americas, the present record is on the southernmost edge of the species distribution (see Hausdorf, 2007: fig. 6). Santa Maria is just 10 km south of the southernmost record reported by Hausdorf (2007): Taquara municipality, also in Rio Grande do Sul state.

Superfamily Trochomorpoidea
Family Euconulidae
Genus *Pseudoguppya* Baker, 1925
***Pseudoguppya semenlini* (Moricand, 1846)**
(Fig. 4A-C)

Helix Semen-lini Moricand, 1846: 149, pl. 5, fig. 17; Pfeiffer, 1846: 457, 1848: 31, 1853: 32; Reeve, 1854: pl. 112, fig. 637; Hupé, 1857: 14.

Helix (Hyalina) semen lini: Albers, 1860: 73.

Hyalina semen lini: Heynemann, 1868: 106; Clessin, 1888: 166.

Hyalina (Conulus) semen lini: Martens, 1868: 175.

Conulus semen lini: Ihering, 1894: 38.

Guppya semen-lini: Ancey, 1897: 9.

Guppya seminlini: Pilsbry, 1900: 386.

Vitrea semen lini: Suter, 1900: 331.

Habroconus (Pseudoguppya) semen-lini: Haas, 1953: 205, 1959: 365.

Habroconus (Pseudoguppya) semenlini: Baker, 1928: 12; Morretes, 1949: 137; Figueiras, 1963: 87; Fernandez & Castellanos, 1973: 274; Quintana, 1982: 79.

Habroconus semenline: Salgado & Coelho, 2003: 154.

Habraconus semenlini: Klappenbach, 1967: 42; Agudo-Padrón, 2008: 166, 2014: 18; Santos *et al.*, 2010: 516.

Pseudoguppya semenlini: Salvador *et al.*, 2016: 65, 2018b: 124, figs. 14A-C; Salvador, 2019a: 95.

Type locality: Brazil, Bahia state.

Distribution: Brazil (Alagoas, Bahia, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul states), Paraguay, Uruguay, Argentina (Salvador *et al.*, 2018b).

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 5 spm, 04.ii.1992, UFSM, L. Indrusiak col. (MZSP 132541); 1 spm, 06.vii.1990, UFSM, L. Indrusiak col. (MZSP 132542); 3 spm, 16.i.1992, UFSM, S. Cechin col. (MZSP 132543).

Superfamily Gastrodontoidea
Family Gastrodontidae
Genus *Zonitoides* Lehmann, 1862
***Zonitoides* sp.**
(Fig. 4D-F)

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 1 sh, v.1982, L. Indrusiak col. (MZSP 43137).

Remarks: *Zonitoides* species are distributed through North America and Eurasia, but some have been introduced elsewhere. In Brazil, there are reports of two species: *Z. nitidus* (Müller, 1774) and *Z. arboreus* (Say, 1817) (Simone, 2006). The present specimen is an empty shell and conchological characters alone are not sufficient for a confident identification at species-level.

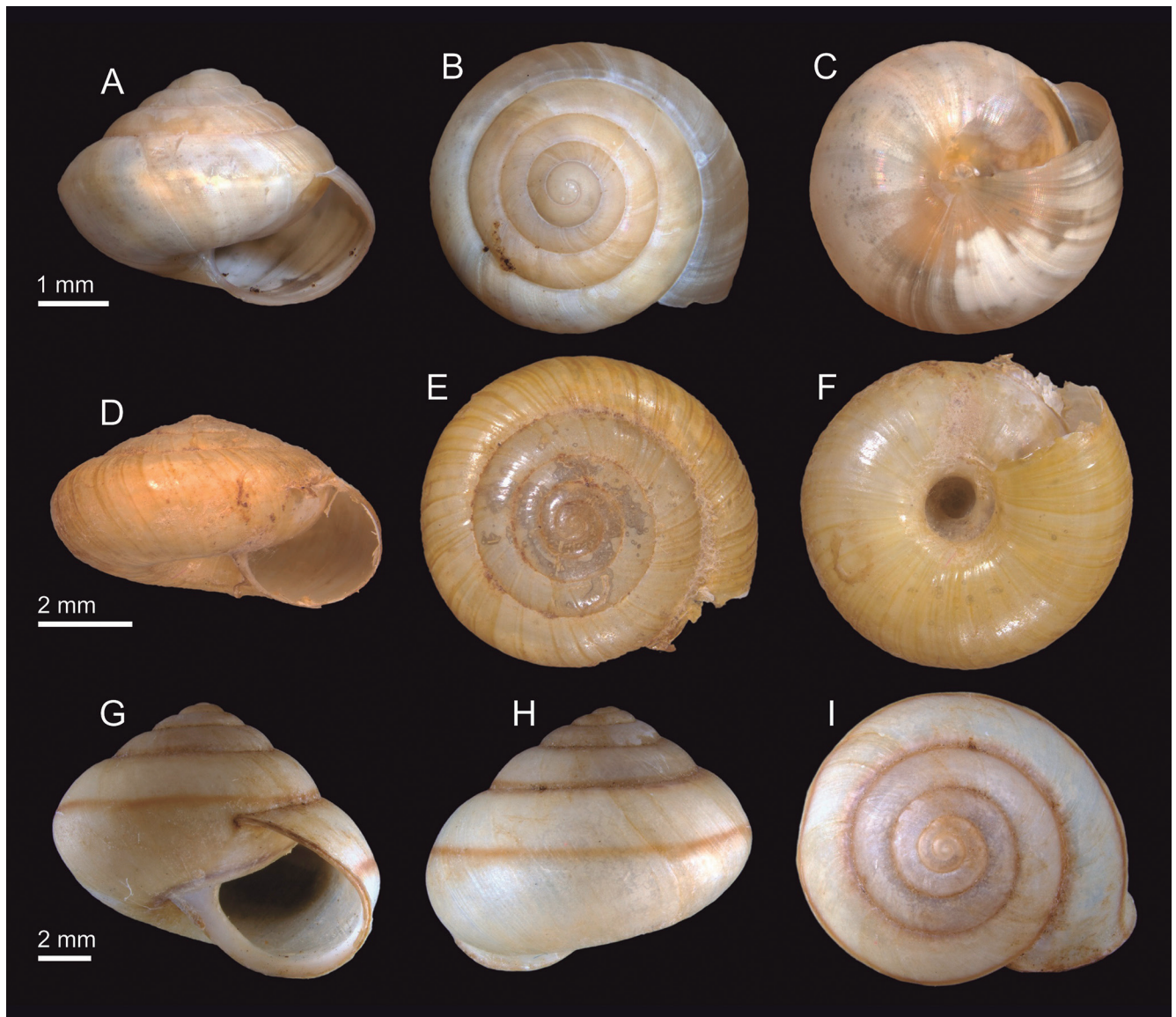


Figure 4. (A-I) = Shells from Santa Maria region, Rio Grande do Sul state. (A-C) = *Pseudoguppya semenlini* MZSP 132543 (L = 3.4 mm, D = 4.5 mm). (D-F) = *Zonitoides* sp. MZSP 43137 (L = 4.9 mm, D = 8.2 mm). (G-I) = *Bradybaena similaris* MZSP 132575 (L = 10.6 mm, D = 12.5 mm).

Superfamily Helicoidea
Family Camaenidae
Genus *Bradybaena* Beck, 1837
***Bradybaena similaris* (Férussac, 1821)**
(Fig. 4G-I)

Helix similaris Férussac, 1821: 43; Férussac & Deshayes, 1819-1851: 171, pl. 25, 27; d'Orbigny, 1835: 7; Gray, 1854: 11; Reeve, 1854: pl. 34; Martens, 1868: 175.

Helix (Fruticicola) similaris: Clessin, 1888: 166.

Bradybaena similaris: Morretes, 1949: 165; Haas, 1955: 373; Pitoni et al., 1976: 27, fig. 2; Quintana, 1982: 106; Araujo, 1989: 586, figs. 1-10; Boffi, 1989: 39, fig. 99; Picoral & Thomé, 1989: 435, figs. 1-6; Santos, 1994: 376, fig. 1; Oliveira & Almeida, 1999: 49; Simone, 1999: 5, 2006: 312, fig. 29; Bruschi-Figueiró & Veitenheimer-Mendes, 2002: 32; Salgado & Coelho, 2003: 174; Miquel et al., 2007: 114; Agudo-Padrón, 2008: 163, 2014: 18; Rumi et al., 2010: 2987; Agudo-Padrón & Lenhard, 2011: 169.

Type locality: Timor.

Material studied: Brazil, Rio Grande do Sul: Santa Maria (29°41'S, 53°48'W): 5 sh, iv.1992, UFSM, D. Linck col. (MZSP 132575); 1 sh, UFSM, M. Krügel col. (MZSP 132576).

Remarks: This species is native of Southeast Asia and has been introduced in many parts of the world. In Brazil, it is known to occur throughout most of the country's states, from the Equatorial region to the southernmost states (Araujo, 1989; Junqueira et al., 2003).

DISCUSSION

Of the 20 species reported herein, four represent significant extensions of geographic distribution, namely *Adelopoma brasiliense*, *Happia vitrina*, *Macrodontes gargantua*, and *Cyclodontina corderoi*, the latter being the first record of the species in Brazil.

This is not surprising, as the terrestrial molluscan fauna of Brazil has been scarcely studied in some regions (Salvador, 2019b). Only now, little by little, we are starting to get a better view of species diversity and distribution. Still, given the size of the country, it is expected that several localities remain un- or undersampled. In this regard, local collections, such as UFSM's studied here, are of utmost importance, as they can bring to light specimens that otherwise would have been overlooked.

The specimens give a reasonable idea of the land snail fauna that can be found in the region. However, they were collected two or three decades ago, so some might not be present there anymore; much has inevitably changed as the cities grow larger and more areas open way to agriculture, so the current status of these species in the region must be further studied. It is also worthwhile to mention that older collections inevitably focus on larger and more aesthetically pleasing specimens, which largely ignores the diversity of microsnails (Salvador, 2019b), as can be seen here by the lack of typically small but abundant groups such as the Punctoidea.

The region of Santa Maria represents the transition between two main Brazilian biomes: the Atlantic Forest and the Pampas (Löbner *et al.*, 2015). Such transitional areas often comprehend a very diverse molluscan fauna, with representatives of both biomes. This can be seen in the present assembly of species, with species known from the Atlantic Forest areas of Brazil and others known from the Pampas of Uruguay and Argentina.

Two introduced species were found in the studied material: *Bradybaena similaris* and *Zonitoides* sp. Despite being commonly found in Brazil, the presence of these exotic species hints about the state of conservation efforts in the region. There are conservation areas and reserves on the region (e.g., *Quarta Colônia State Park* in Agudo and Ibarama municipalities), but their actual state can be troubling. In Santa Maria, for instance, there are several protected areas delimited on paper, but most are occupied, and the law is not enforced (Nascimento & Foletto, 2011).

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