



# South American terrestrial Gastropoda in the collection of the Auckland War Memorial Museum

Rodrigo B. Salvador<sup>1,2,3</sup>, Abraham S. H. Breure<sup>4,5,6</sup>, Severine Hannam<sup>7</sup>, Wilma M. Blom<sup>7</sup>

1 Department of Arctic and Marine Biology, Faculty of Biosciences, Fisheries and Economics, UiT – The Arctic University of Norway, Framstredet 43, 9019, Tromsø, Norway

2 The Arctic University Museum of Norway, UiT – The Arctic University of Norway, Lars Thørings veg 10, 9006, Tromsø, Norway

3 Museum of New Zealand Te Papa Tongarewa, 169 Tory Street, 6011 Wellington, New Zealand

4 Royal Belgian Institute of Natural Sciences, Rue Vautier 29, 1000 Brussels, Belgium

5 Invertebrate Division, Department of Life Sciences, Natural History Museum, Cromwell Road, South Kensington, SW7 5BD London, UK

6 Naturalis Biodiversity Center, Darwinweg 2, 2333 CR Leiden, Netherlands

7 Auckland War Memorial Museum, The Auckland Domain, Parnell, 1010 Auckland, New Zealand

Corresponding author: Rodrigo B. Salvador ([salvador.rodrigo.b@gmail.com](mailto:salvador.rodrigo.b@gmail.com))

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## Abstract

The catalogued collection of South American terrestrial gastropods, including the Caribbean ABC islands and Trinidad & Tobago, of the Auckland War Memorial Museum (AM), New Zealand, is discussed here. In total, 264 specimen lots from South America were found in the AM collection, including eight type lots. Twelve of the specimens represent new geographic distribution data, including the first known precise locality for the species *Bostryx luridus* (L. Pfeiffer, 1863) and potentially for *Drymaeus* cf. *waldoschmidti* Parodiz, 1962 as well. The specimens of *Lopesianus crenulatus* Weyrauch, 1967 allowed for the revision of the monospecific genus *Lopesianus* Weyrauch, 1958, which is herein considered valid in the family Simpulopsidae.

## Keywords

Helicinoidea, land snails, natural history collections, Neotropical fauna, Stylommatophora, type specimens

## Introduction

While several thousand species and subspecies of terrestrial gastropods have been described from South America, very little is known about their biology, evolution, geographic distribution and conservation status (Salvador 2019b; Miyahira et al. 2022; Rosa et al. 2022). With so many gaps in our knowledge, every specimen and every piece of information can improve our understanding of these animals. As a case in point, while researching the South American specimens in the collection of the Museum of New Zealand Te Papa Tongarewa (Salvador 2019a, 2021; Salvador et al. 2021), a number of important specimen lots were discovered, including type material, representatives

of poorly-known species, and new distributional records. As such, it could be expected that, given its history of specimen exchange and donations, the collection of the Auckland Museum (AM; Auckland, New Zealand) would have similarly important material.

Auckland Museum is in the middle of a multi-year project to electronically catalogue its foreign (i.e., non-New Zealand) shells. In the present study, we report on the already catalogued South American terrestrial gastropods in the AM collection, including those from the ABC islands (Aruba, Bonaire, and Curaçao) and Trinidad & Tobago. We provide a complete list of taxa, type specimens, and further discussions on taxonomy and geographic distribution when pertinent.

## Materials and methods

The catalogued South American land snails in the AM collection were analysed for the present study, including those specimens from Trinidad and Tobago, as well as the ABC islands (Aruba, Bonaire, and Curaçao) of the Kingdom of the Netherlands.

Every specimen was identified to species level using current taxonomic literature, including catalogues and illustrated check lists (Simone 2006; Massemín et al. 2009; Birckolz et al. 2016; Breure and Mogollón Avila 2016; Breure et al. 2022), local surveys and check lists (Araya and Catalán 2014; Salvador et al. 2018a, 2018b; Breure 2019); type and/or collection catalogues (Breure 2011, 2013; Breure and Ablett 2012, 2014, 2015; Breure and Araujo 2017; Salvador 2019a; Salvador et al. 2021), and more specific taxonomic studies (Bequaert 1948; Breure 1979; Breure and Mogollón Avila 2010; Ramírez et al. 2012; Cuezso et al. 2018; Breure and Borrero 2019; Miquel et al. 2019; Salvador and Cavallari 2019; Ampuero and Ramírez 2020). Furthermore, specific literature is mentioned in the Results section below where appropriate. Photographs of specimens (including types) from museum collections available in institutional online databases and in the authors' personal archives were likewise consulted, as well as comparative specimens in the collection of the MZSP and NMNZ.

The following abbreviations are used throughout the text: **Collections:** **AM**, Auckland War Memorial Museum (Auckland, New Zealand); **CMIOC**, Instituto Oswaldo Cruz (Rio de Janeiro, Brazil); **FMNH**, Field Museum of Natural History (Chicago, USA); **MZSP**, Museu de Zoologia da Universidade de São Paulo (São Paulo, Brazil); **NMNZ**, Museum of New Zealand Te Papa Tongarewa (Wellington, New Zealand); **SMF**, Senckenberg Naturmuseum (Frankfurt am Main, Germany); **ZMB**, Museum für Naturkunde Berlin (Berlin, Germany); **UMMZ**, University of Michigan Museum of Zoology (Ann Arbor, USA); **USNM**, Smithsonian National Museum of Natural History (Washington, D.C., USA). **Measurements:** **D**, maximum shell diameter (perpendicular to H, taken in apertural view); **H**, shell height (parallel to columellar axis); **W**, number of whorls. Measurements were taken with a digital calliper (0.01 mm precision, rounded to the nearest 0.1 mm). **Countries:** **ABW**, Aruba; **ARG**, Argentina; **BOL**, Bolivia; **BRA**, Brazil; **CHL**, Chile; **COL**, Colombia; **CUW**, Curaçao; **ECU**, Ecuador; **GUY**, Guyana; **PER**, Peru; **PRY**, Paraguay; **TTO**, Trinidad and Tobago; **URY**, Uruguay; **VEN**, Venezuela. The country codes used follow the ISO 3166 international standard.

## The Auckland Museum collection

Auckland Museum's first organised molluscan collections were started by T.F. (Thomas Frederic) Cheeseman

(1874–1923), who was appointed its sole curator in 1874 (Blom 2016). Although no exact date was recorded, at least one of the South American specimens dealt with here (e.g., MA114796; Suppl. material 1) dates from this early period. Other early lots (e.g., MA114794) came to AM in 1926 from the Thomas Ball Collection when his collection was donated after Ball's death (Auckland Museum Annual Reports 1926/1927: p. 26, 27). It is not known whether Ball collected his specimens or whether they came to him via other collectors.

Further early South American specimens with field collection dates prior to 1929, such as those from the Augustus Hamilton (d. 1913) and W.F. (Walter Freeman) Webb (obtained in 1927) came via the collection of A.W.B. (Arthur William Baden) Powell. In 1929, when Auckland Museum moved to its present site in Auckland Domain, more permanent curatorial positions became available and Powell became the Museum's first paid conchology and palaeontology curator until his retirement in 1968 (Cernohorsky 1988). By special arrangement with the Museum Council (Powell et al. 1967) Powell's private collection of 60,000 lots was housed at AM and was integrated into the AM collections after his death.

Cheeseman maintained an early register of acquisitions and the bulk of early molluscan specimens were recorded in this. However, after 1929 the pace of collecting stepped up and the responsibility of registering scientific specimens devolved to each of the separate departments (Blom 2019). Powell maintained separate numbering systems for his personal collection and the AM collection. As all the A. Hamilton and W.F. Webb specimens have 'Powell numbers', this indicates they came to AM via Powell's personal collection. It is not known how Hamilton or Webb obtained their shells, but as the latter was by 1930 America's largest shell dealer (Wikipedia 2022a) it is assumed that these lots were traded or bought by him.

After his appointment in 1929, as well as developing the AM malacology collection Powell continued to make exchanges for his personal collection. This is confirmed by a large amount of correspondence in the AM archives between Powell and malacologists such as W.J. Clench (Museum of Comparative Zoology, Harvard, USA) and Harald A. Rehder (Academy of Natural Sciences, Philadelphia, USA), both of whom were interested in terrestrial snails from South America. The earliest correspondence between Powell and Rehder dates from 1943 and during the 1960s Powell visited the USA several times and on occasions he stayed with Rehder and his family. The correspondence between Clench and Powell dates from 1960–1962 and indicates that some exchanges were made with Clench, who was also the source of specimens from the 1865–1866 Thayer Expedition to Brazil (e.g., MA114566).

Another 107 specimen lots were contributed to AM via members of the Conchology Section of the Auckland Institute and Museum (aka the Auckland Shell Club). The Club was started by Powell in 1930, and a number

of its members (e.g., A.E. (Albert Eugene) Brookes, J. (Joan) Coles, D. (Damaris) Hole, and E. (Edna) Hudson) posthumously donated their personal collections to AM.

Few specimen lots appear to have been collected by Club members themselves but they often illustrate the intricate webs that existed between collectors. For instance, labels with specimens of *Isomeria kolbergi* (K. Miller, 1878) (e.g., MA104983) record a series of exchanges from R.W. (Ralph Waldo) Jackson (who may or may not have been the collector) to B.R. (Blenn Rife) Bales to A.E. (Albert Eugene) Brookes, whose collection posthumously came to AM in 1955. Labels with similar specimens in the A.W.B. Powell Collection (e.g., MA104984) record they also came from B.R. Bales. They may well have come from A.E. Brookes to Powell before the former's death in 1955, and therefore by inference, ultimately from R.W. Jackson, but this cannot be confirmed from labels.

However, the greatest number (83) of South American specimens were contributed by a single member of the Auckland Shell Club, L. (Laurie) Price. He joined the Club in 1955 and shortly before his death in 1997 donated his extensive collection to AM. It is not known whether he collected any South American shells himself, but for about 20 years Price collected land snails for Alan Solem of the Field Museum of Natural History (Chicago, USA), particularly around the Pacific region (Gardner and Gardner 1998).

Laurie Price Collection specimens throughout AM's collection have distinctive labels from all others, all type-written on the same type of paper-grade, with the binomial name underscored. These appear to be Price's own labels. However, many of the South American specimens from the Laurie Price Collection have a second set of labels which are type-written on thin paper in a very distinctive 'pixilated' font. It is not known whether these are Price's own labels, but a number, including one paratype specimen (MA73551), are annotated on the reverse with 'ex. A. Solem' or 'ex. A. Solem Chicago Museum', often with dates in the early 1960s. The 'ex.' is assumed to indicate the specimens were exchanged, as similar labels have been found with other specimen lots in the AM collections which are recorded as exchanges, such as with the Museum of Comparative Zoology.

Again, some of the Price specimen labels, such as those with MA114753, illustrate the complex path of exchanges. This specimen lot appears to have originated with W.F. Clapp, who was an assistant at the Museum of Comparative Zoology (1911–1923) and a researcher at the Massachusetts Institute of Technology, MIT (1924–1926) (Wikipedia 2022b). Clapp exchanged the specimens with entomologist James Zetek (Wikipedia 2022c), whose collection was left to the Field Museum. Price subsequently obtained the specimens, presumably through an exchange with A. Solem, after which they came into the collection of AM.

Several of Price's own labels are also annotated on the reverse (e.g., MA104138) and appear to indicate that

he may have exchanged shells more directly with other big collectors, such as the amateur malacologist R.W. Jackson, from Cambridge (Maryland, USA) (Shellers from the past and present 2022).

Wolfgang K. Weyrauch appears to be another potential source of specimens, including paratypes (Suppl. material 1). The labels with Weyrauch specimens are distinctive and have a two-letter, four-digit alphanumeric code in the left-hand corner. They are frequently accompanied by a second cardboard label indicating that they have come to AM via the AWB Powell collection. These may well have come directly from Weyrauch, but that is unlikely, as no correspondence has been found in the AM archives between Powell and Weyrauch. However, Weyrauch specimens also appear in the Laurie Price Collection. He in turn, acquired them in 1960 or 1961 from A. Solem. As Price first appears to have joined the Auckland Shell Club in 1955, he may have contributed specimens to AM and/or Powell throughout the period of his membership, not just toward the end of his life when he donated his personal collection. Therefore, Powell may well have acquired the Weyrauch specimens via Price.

Similarly, Auckland Shell Club members also traded amongst themselves, and although he may not have been recorded as the source, it is highly likely that other members also obtained South American shells from Laurie Price. These may have subsequently come to AM via later donations of members' collections.

## Results

In total, there are 264 catalogued specimen lots from South America in the AM collection. The species found are presented below in systematic order, following the classification scheme of Bouchet et al. (2017), with the addition of more recent revisions to neotropical Helicoidea and Sagdoidea (Sei et al. 2017; Calcutt et al. 2020). The genera and species within each family are listed in alphabetical order for ease of use. The collection registration number, as well as information on the locality data for each specimen lot are also indicated. A spreadsheet containing all available collection data for each specimen lot is provided in Suppl. material 1.

The provenance (field collectors and/or acquisition sources) of 16 of the 264 South American terrestrial gastropod lots is not recorded and so it is not known how these came to Auckland Museum (Suppl. material 1). However, the remaining 248 lots came from a diversity of sources and were collected from late Victorian times into the 2000s. As demonstrated above, they often illustrate the lengthy and complex routes by which shells come into natural history collections and the concomitant uncertainties this creates.

Some specimens represent new distributional data or are otherwise important for the taxonomy of their group. These cases are explored in more detail below;

photographs of these specimens are provided, as well as a synonymy and abbreviated chresonymy.

Type specimens are likewise illustrated and discussed in more detail below. In addition, it is worthwhile noting that six specimen lots from Weyrauch were marked as paratypes on the original labels, but they were later found not to be type specimens. Their labels contain manuscript names of subspecies that were unpublished before his sudden death in 1970 (see also Breure 2012). These include the following specimen lots: AM MA73230, MA37406, MA73222, MA73509, MA106718 and MA106719.

## List of taxa

**NERITIMORPHA. Helicinidae:** *Helicina caracola* Moricand, 1836 (AM MA103724, MA111633), *Helicina weyrauchi* F. Haas, 1948 (AM MA103707).

**STYLOMMATOPHORA. Achatinidae:** *Leptinaria unilamellata* (d'Orbigny, 1838) (AM MA113695, MA113706), *Neobeliscus calcareus* (Born, 1778) (AM MA112567, MA112568), *Obeliscus obeliscus* (S. Moricand, 1834) (AM MA113657, MA113658, MA113659), *Obeliscus riparia* (L. Pfeiffer, 1854) (AM MA113662), *Subulina octona* (Bruguière, 1789) (AM MA113580, MA113594, MA113596). **Streptaxidae:** *Streptartemon* sp. (AM MA112083), *Streptaxis contusus* (Férussac, 1821) (AM MA112969). **Succineidae:** *Succinea burmeisteri* Doering, 1873 (AM MA118014). **Cerionidae:** *Cerion uva* (Linnaeus, 1758) (AM MA73505). **Strophocheilidae:** *Austroborus lutescens* (King & Broderip, 1832) (AM MA114757, MA114758, MA114759, MA114760, MA114779), *Chiliborus chilensis* (G.B. Sowerby I, 1833) (AM MA114752, MA114753), *Chiliborus pachychilus* (L. Pfeiffer, 1843) (AM MA114868, MA114869), *Megalobulimus abbreviatus* (Bequaert, 1948) (AM MA114796), *Megalobulimus auritus* (G.B. Sowerby I, 1938) (AM MA114793), *Megalobulimus conicus* (Bequaert, 1948) (AM MA114794), *Megalobulimus crassus* (Albers, 1850) (AM MA114782, MA114795, MA114797, MA114804, MA114805, MA114867, MA181517, MA181521, MA181528, MA181537), *Megalobulimus haemastomus* (Scopoli, 1786) (AM MA116329), *Megalobulimus huascari* (Tschudi, 1852) (AM MA114755, MA114756), *Megalobulimus leonardosi* (Morretes, 1952) (AM MA114781), *Megalobulimus leucostoma* (G.B. Sowerby I, 1835) (AM MA114785), *Megalobulimus* cf. *leucostoma* (G.B. Sowerby I, 1835) (AM MA114783, MA114784), *Megalobulimus musculus* (Bequaert, 1948) (AM MA114790), *Megalobulimus oblongus* (O.F. Müller, 1774) (AM MA114788, MA114792, MA114801, MA114860), *Megalobulimus ovatus* (O.F. Müller, 1774) (AM MA114842, MA114843), *Megalobulimus* cf. *ovatus* (O.F. Müller, 1774) (AM MA114840), *Megalobulimus pergranulatus* (Pilsbry, 1901) (AM MA117638), *Megalobulimus popelarianus* (Nyst, 1845) (AM MA114802), *Mirinaba cuspidens* (Morretes, 1952) (AM MA114806), *Mirinaba planidens* (Michelin, 1831) (AM MA114870), *Strophocheilus calus* Pilsbry,

1901 (AM MA127335), *Strophocheilus pudicus* (O.F. Müller, 1774) (AM MA114871, MA114949). **Orthalicidae:** *Kara thompsonii* (L. Pfeiffer, 1845) (AM MA112987), *Porphyrobaphe iostoma* (G.B. Sowerby I, 1824) (AM MA114093, MA114094, MA114100), *Porphyrobaphe iris* (L. Pfeiffer, 1853) (AM MA114098), *Porphyrobaphe irrorata* (Reeve, 1849) (AM MA114095, MA114096, MA114097), *Porphyrobaphe saturnus* (L. Pfeiffer, 1860) (AM MA114099), *Scholvienia alutacea* (Reeve, 1850) (AM MA114955), *Scholvienia bambamarcaensis* (Breure, 1978) (AM MA37406), *Scholvienia bifasciata* (Philippi, 1845) (AM MA112981, MA114956, MA114957), *Scholvienia porphyria* (L. Pfeiffer, 1847) (AM MA114958). **Amphibulimidae:** *Dryptus funckii* (Nyst, 1843) (AM MA114754), *Dryptus moritzianus* (L. Pfeiffer, 1847) (AM MA114780), *Dryptus venezuelensis* (Nyst, 1845) (AM MA114872), *Plekocheilus alticola* (F. Haas, 1955) (AM MA114947), *Plekocheilus aurissciuri* Guppy, 1866 (AM MA112974, MA112975, MA112976, MA112980), *Plekocheilus* cf. *cardinalis* (L. Pfeiffer, 1853) (AM MA114873), *Plekocheilus castaneus* (L. Pfeiffer, 1845) (AM MA114841), *Plekocheilus coloratus* (Nyst, 1845) (AM MA114862), *Plekocheilus floccosus* (Spix, 1827) (AM MA114945), *Plekocheilus linterae* (Sowerby III, 1890) (AM MA114946), *Plekocheilus loveni* (L. Pfeiffer, 1848) (AM MA114944), *Plekocheilus oligostylus* Pilsbry, 1939 (AM MA114863, MA114948), *Plekocheilus taylorianus* (Reeve, 1849) (AM MA114864, MA114950, MA114951, MA114952, MA117652), *Plekocheilus tricolor* (L. Pfeiffer, 1853) (AM MA114865), *Plekocheilus veranyi* (L. Pfeiffer, 1848) (AM MA114953). **Bulimulidae:** *Auris bilabiata* (Broderip & G.B. Sowerby I, 1830) (AM MA112977, MA112978, MA112979), *Auris brachyplax* Pilsbry, 1896 (AM MA127237), *Auris illheocola* (Moricand, 1836) (AM MA11298, MA112983, MA112984), *Auris melastoma* (Swainson, 1820) (AM MA112985, MA112986), *Bocourtia aequatoria* (L. Pfeiffer, 1853) (AM MA114657), *Bocourtia bicolor* (G.B. Sowerby I, 1835) (AM MA114628), *Bocourtia culminea* (d'Orbigny, 1835) (AM MA114557), *Bocourtia revincta* (Hupé, 1857) (AM MA114645), *Bostryx acalles* (L. Pfeiffer, 1853) (AM MA127234), *Bostryx albicans* (Broderip, 1832) (AM MA106724, MA114750), *Bostryx andoicus* (Morelet, 1863) (AM MA114627), *Bostryx depstus* (Reeve, 1849) (AM MA73509), *Bostryx elatus* (Philippi, 1869) (AM MA114636), *Bostryx hamiltoni* (Reeve, 1849) (AM MA114626), *Bostryx ignobilis* (Philippi, 1867) (AM MA127338), *Bostryx infundibulum* (L. Pfeiffer, 1853) (AM MA114641, MA114656), *Bostryx limensis* (Reeve, 1849) (AM MA127332), *Bostryx longinquus* (Morelet, 1863) (AM MA106689, MA127337, MA127342), *Bostryx luridus* (L. Pfeiffer, 1863) (AM MA127334), *Bostryx modestus* (Broderip, 1832) (AM MA114633), *Bostryx nigropileatus* (Reeve, 1849) (AM MA114639, MA114649, MA127341), *Bostryx perforatus* (Haas, 1951) (AM MA114643), *Bostryx scalariformis* (Broderip, 1832) (AM MA114653), *Bostryx serotinus* (Morelet, 1860) (AM MA106723), *Bostryx* sp. (AM MA127339), *Bostryx torallii* (d'Orbigny, 1835) (AM

MA106733), *Bostryx* aff. *tricinctus* (Reeve, 1848 (AM MA106715), *Bostryx tumidulus* (L. Pfeiffer, 1842) (AM MA127340), *Bulimulidae* indet. (AM MA127331), *Bulimulus bonariensis* (Rafinesque, 1833) (AM MA114621), *Bulimulus corumbaensis* Pilsbry, 1897 (AM MA114642), *Bulimulus tenuissimus* (Férussac, 1832) (AM MA114603, MA114604, MA114605, MA114624, MA114647, MA114652), *Cochlorina aurisleporis* (Bruguière, 1792) (AM MA112988, MA112989, MA113015, MA113016, MA113017, MA113019), *Cochlorina intensior* (Pilsbry, 1898) (AM MA113014), *Cochlorina lateralis* (Menke, 1828) (AM MA113020), *Drymaeus glaucostomus* (Albers, 1852) (AM MA114679), *Drymaeus hidalgoi* (S.I. da Costa, 1898) (AM MA114665), *Drymaeus morbidus* (Philippi, 1867) (AM MA106704, MA106718), *Drymaeus papyraceus* (Mawe, 1823) (AM MA106705, MA106706), *Drymaeus poecilus* (d'Orbigny, 1835) (AM MA106707), *Drymaeus rawsoni* (Guppy, 1871) (AM MA114625), *Drymaeus rubrovariegatus* Higgins, 1868 (AM MA106720), *Drymaeus serratus* (L. Pfeiffer, 1855) (AM MA114683), *Drymaeus* sp. (AM MA114682), *Drymaeus strigatus* (G.B. Sowerby I, 1833) (AM MA106729), *Drymaeus sykesi* da Costa, 1906 (AM MA106693), *Drymaeus vexillum* (Wood, 1828) (AM MA73222, MA106719), *Drymaeus virgulatus* (Férussac, 1821) (AM MA106739, MA114567), *Drymaeus* cf. *waldoschmidti* Parodiz, 1962 (AM MA127336), *Naesiotus durus* (Spix, 1827) (AM MA114566), *Naesiotus orbignyi* (L. Pfeiffer, 1846) (AM MA114592), *Naesiotus quitensis* (L. Pfeiffer, 1848) (AM MA73506, MA73507, MA73508, MA114578, MA114596, MA114606, MA114644, MA114655), *Naesiotus* sp. (AM MA114717, MA127333), *Neopetraeus altoperuvianus* (Reeve, 1849) (AM MA113021, MA113022, MA113024), *Neopetraeus camachoi* Weyrauch, 1967 (AM MA73552), *Neopetraeus decussatus* (Reeve, 1849) (AM MA113025, MA114634), *Neopetraeus lobbii* (Reeve, 1849) (AM MA113026, MA113027, MA113028), *Neopetraeus vadum* Pilsbry, 1898 (AM MA113029), *Otostomus signatus* (Spix in J. A. Wagner, 1827) (AM MA113030), *Oxychona bifasciata* (Burrow, 1815) (AM MA113031), *Oxychona maculata* Salvador & Cavallari, 2013 (AM MA113032), *Oxychona pyramidella* (Spix, 1827) (AM MA127238), *Scholvienia bambamarcaensis* (Breure, 1978) (AM MA106737, MA106738), *Scutalus baroni* (Fulton, 1896) (AM MA112971), *Scutalus cretaceus* (L. Pfeiffer, 1855) (AM MA114630), *Scutalus latecolumellaris* Preston, 1909 (AM MA114654), *Scutalus versicolor* (Broderip, 1832) (AM MA114716). **Megaspiridae:** *Thaumastus buckleyi* (Higgins, 1872) (AM MA114676), *Thaumastus taunaisii* (Férussac, 1822) (AM MA114954, MA114960, MA114961, MA114962, MA114963). **Odontostomidae:** *Anostoma depressum* Lamarck, 1822 (AM MA112078, MA112079), *Anostoma ringens* (Linnaeus, 1758) (AM MA112972), *Burringtonia pantagruelina* (S. Moricand, 1833) (AM MA112067), *Clessinia martensii* (Doering, 1875) (AM MA112074), *Clessinia philippii* (Doering, 1875) (AM MA112068), *Clessinia pyriformis* (Pilsbry, 1901) (AM MA112069), *Clessinia striata* (Spix, 1827) (AM

MA112075), *Cyclodontina chaseae* Marshall, 1926 (AM MA112071), *Cyclodontina fusiformis* (Menke, 1828) (AM MA112066), *Cyclodontina inflata* (J.A. Wagner, 1827) (AM MA112063, MA112065), *Cyclodontina kuhnholtziana* (Crosse, 1870) (AM MA112080, MA112970), *Hyperaulax ramagei* (E.A. Smith, 1890) (AM MA112070), *Hyperaulax ridleyi* (E.A. Smith, 1890) (AM MA112077), *Odontostomus paulista* Pilsbry & Ihering, 1898 (AM MA112064), *Plagiodontes daedaleus* (Deshayes, 1851) (AM MA112072, MA112133, MA112134, MA134160), *Plagiodontes dentatus* (W. Wood, 1828) (AM MA112073, MA112076, MA112135), *Tomigerus esamianus* Salgado & Coelho, 1990 (AM MA112081), *Tomigerus gibberulus* (Burrow, 1815) (AM MA112082). **Simpulopsidae:** *Lopesianus crenulatus* Weyrauch, 1957 (AM MA114587, MA114635, MA114588, MA114589). **Clausiliidae:** *Parabalea pilsbryi* (Weyrauch, 1956) (AM MA73229), *Steeriana cajamarcana solutilabrum* H. Nordsieck, 2005 (AM MA73230), *Zilchiella grandiportus* Weyrauch, 1957 (AM MA72774). **Solaropsidae:** *Solaropsis brasiliiana* (Deshayes, 1832) (AM MA105026), *Solaropsis gibboni* (L. Pfeiffer, 1846) (AM MA105027), *Solaropsis planior* (Pilsbry, 1889) (AM MA105030). **Labyrinthidae:** *Isomeria aequatoriana* (Hidalgo, 1867) (AM MA104136), *Isomeria bourcierii* (L. Pfeiffer, 1853) (AM MA104146, MA104980), *Isomeria cymatodes* (L. Pfeiffer, 1852) (AM MA104139, MA104981, MA104982), *Isomeria globosa* (Broderip, 1832) (AM MA104145), *Isomeria jacksoni* Solem, 1966 (AM MA104144), *Isomeria junco* (L. Pfeiffer, 1850) (AM MA104143), *Isomeria kolbergi* (K. Miller, 1878) (AM MA104138, MA104983, MA104984), *Labyrinthus manueli* Higgins, 1872 (AM MA104141), *Labyrinthus raimondii* (Philippi, 1867) (AM MA104142, MA104988). **Epiphragmophoridae:** *Epiphragmophora lentiformis* (F. Haas, 1955) (AM MA73551).

## Systematics

### Order Stylommatophora

#### Superfamily Streptaxoidea

#### Family Streptaxidae

#### Genus *Streptartemon* Kobelt, 1905

#### *Streptartemon* sp.

Fig. 1A–D

**Remarks.** *Streptartemon* spp. are differentiated among Neotropical Streptaxidae by the “bent” body whorl that “moves” away from the typical coiling axis of the shell. Their shells are typically globose, with convex whorls (e.g., Simone 2006). Nevertheless, the present specimen (AM MA112083) is unlike any other *Streptartemon* spp. in Brazil, being clearly distinguished by its conical-flattened spire with a marked keel on the median portion of the whorl, that then transitions to a tall and rounded (keel-less) body whorl; furthermore, it has a light keel on the periphery of the umbilicus. We consider that the

unusual shell shape is natural, as there is no evidence of breakage and regrowth on the shell, or any other scars indicating an anomalous shell growth. As such, this specimen could represent a yet unrecognized species in Brazil.

Unfortunately, no further information is given on the specimen's original label. The majority of other material from Brazil that is present in the AM was collected in the Atlantic Forest areas of Bahia, Espírito Santo and Rio de Janeiro states. Thus, those areas could be the source of the present specimen, especially considering that both Bahia and Rio de Janeiro are known hotspots of Streptaxidae diversity in Brazil (Salvador 2018).

Remarkably, a convergent shell shape can be seen in Asian Streptaxidae, namely in some species of *Perrottetia* Kobelt, 1905 from India, such as *P. canarica* (W.T. Blanford, 1869) and *P. subacutus* (W.T. Blanford, 1899), and *Carinartemis* Siriboon & Panha, 2014, such as *C. exacutus* (Gould, 1856) and *C. sankeyi* (Benson, 1859) (Raheem et al. 2014; Sian Man et al. 2022).

### Superfamily Urocoptoidea

#### Family Cerionidae

##### Genus *Cerion* Röding, 1798

##### *Cerion uva arubanum* H.B. Baker, 1924

Fig. 1E, F

*Cerion uva arubanum* H.B. Baker, 1924: 104, pl. 20.

**Type locality.** Aruba, Barranca Alto.

**Current systematic position.** Junior synonym of *Cerion uva uva* (Linnaeus, 1758) (Harasewych 2015).

**Geographic distribution.** ABC Islands (Hovestadt and van Leeuwen 2017).

**Remarks.** Baker (1924: 104) lists 322 adult specimens as types that have three origins: (1) the type locality, (2) a locality “just north of Perkietenboseh [sic, Parkietenbosch]”, and (3) undetermined limestone facies (i.e., specimens were subfossils) throughout the island. The present two specimens (AM MA73505) have no specific locality data, but the label states they are paratypes and collected by Baker. Given their origin and date, we consider the present AM specimens as probable syntypes. The UMMZ collection lists one specimen in their collection as holotype (UMMZ 31752), although the basis for that determination instead of lectotype is uncertain.

### Superfamily Rhytidoidea

#### Family Strophocheilidae

##### Genus *Strophocheilus* Spix in J.A. Wagner, 1827

##### *Strophocheilus pudicus* (O.F. Müller, 1774)

Fig. 1G, H

*Helix pudica* O.F. Müller, 1774: 97.

*Strophocheilus* (*Strophocheilus*) *pudicus*: Bequaert, 1948: 29, pl. 4, fig. 4, pl. 8, fig. 5, pl. 9, fig. 4, pl. 16, fig. 3, pl. 19, fig. 1 [see here for full synonymy].

*Strophocheilus pudicus*: Schileyko 1999b: fig. 600; Simone 2006: 201, fig. 756; Birckolz et al. 2016: table 1.

**Type locality.** Unknown.

**Geographic distribution.** Brazil, Paraíba and Bahia states and, possibly, Santa Catarina state (Birckolz et al. 2016).

**Remarks.** The present record (AM MA114949) from São Paulo state fills a gap in the species' known distribution.

### Superfamily Orthalicoidea

#### Family Amphibulimidae

##### Genus *Dryptus* E. von Martens, 1860

##### *Dryptus moritzianus* (L. Pfeiffer, 1847)

Fig. 1I, J

*Bulimus moritzianus* Pfeiffer, 1847: 66.

*Dryptus moritzianus* Borrero & Breure, 2011: 9, fig. 2C.

**Type locality.** Venezuela, Caracas.

**Geographic distribution.** Venezuela and northern Colombia.

**Remarks.** The present specimen (AM MA114780) is labelled as being from Brazil, without any further information. It is not possible to ascertain if the locality data is correct but if so, this could represent the first record of this species in the country.

##### Genus *Plekocheilus* Guilding, 1827

##### *Plekocheilus alticola* (F. Haas, 1955)

Fig. 1K, L

*Plekocheilus* (*Plekocheilus*) *fulminans alticola* Haas, 1955a: 381, fig. 81.

*Plekocheilus* (*Plekocheilus*) *fulminans alticola*: Breure 2009: 27, figs 4E–G, 9B.

*Plekocheilus* (*Plekocheilus*) *alticola*: Breure 2019: 251, fig. 11.2A.

**Type locality.** Venezuela, Bolívar state, Chimantá massif, Toronó tepuí, on slopes bordering Caño Mojado, 2250 m alt.

**Geographic distribution.** Known only from Toronó tepuí (Breure 2019).

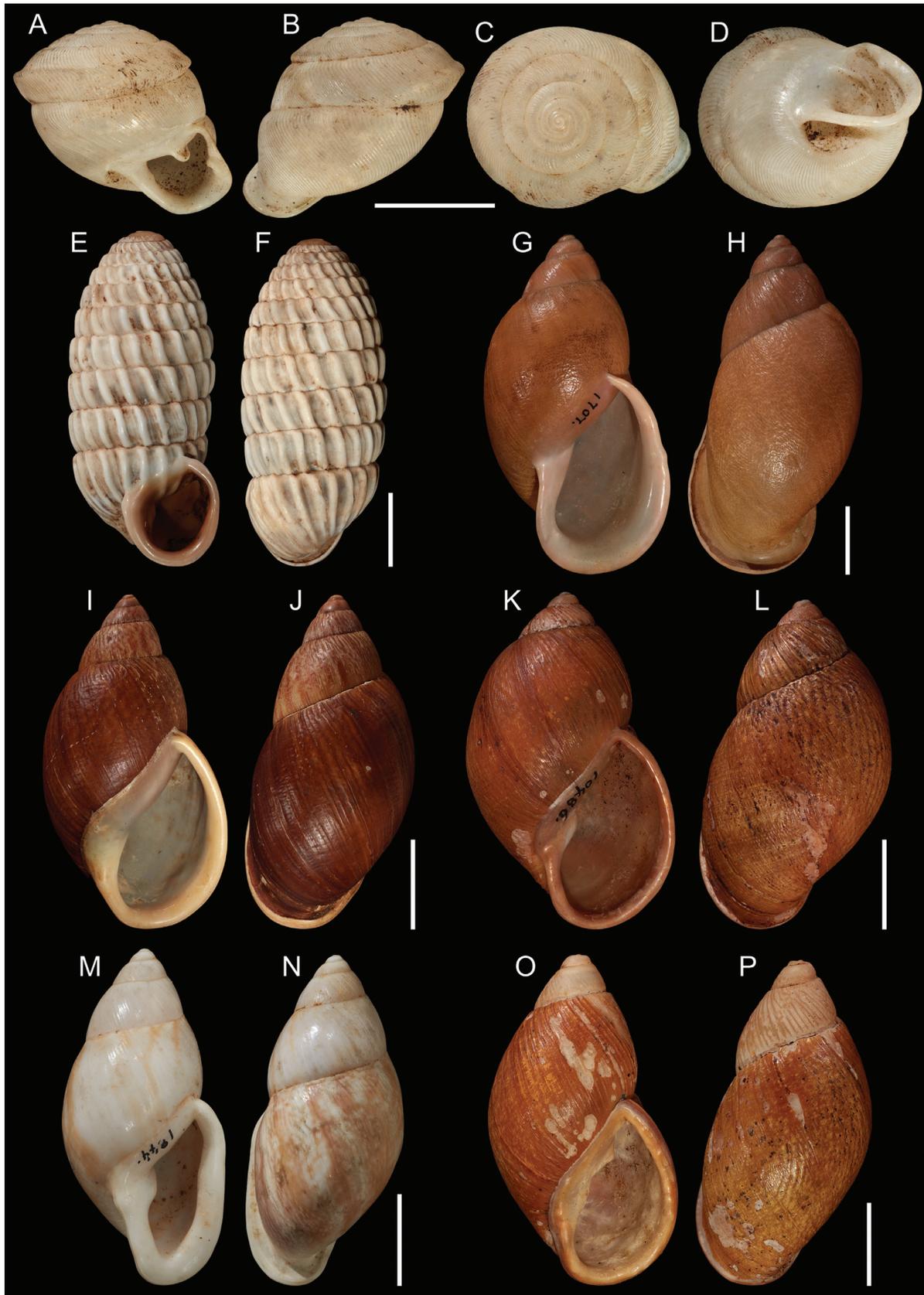
**Remarks.** The present specimen (AM MA114947) has Mount Roraima in Guyana as its locality. If that locality is precise, it would mean an extension of this species' known distribution; however, the “Mt Roraima” on the specimen label could refer to the general area, including the tepuis in the vicinity.

##### *Plekocheilus aurissciuri* Guppy, 1866

Fig. 1M, N

*Plekocheilus auris-sciuri* Guppy, 1866: 51.

*Plekocheilus* (*Eudolichotis*) *aurissciuri*: Breure, 1979: 33. *Eudolichotis aurissciuri*: Simone, 2006: 150, fig. 507.



**Figure 1.** South American shells in the AM collection. All figure pairs show the shell in apertural and dorsal views, unless otherwise noted. **A–D.** *Streptartemon* sp., AM MA112083, in apertural, dorsal, apical, and umbilical views, respectively; H = 9.9 mm; **E, F.** *Cerion uva arubanum*, probable syntype, AM MA73505; H = 23.2 mm; **G, H.** *Strophocheilus pudicus*, AM MA114949; H = 52.4 mm; **I, J.** *Dryptus moritzianus*, AM MA114780; H = 73.5 mm; **K, L.** *Plekocheilus alticola*, AM MA114947; H = 39.5 mm; **M, N.** *Plekocheilus aurissciuri*, AM MA112980; H = 31.5 mm; **O, P.** *Plekocheilus linterae*, AM MA114946; H = 42.0 mm. Scale bars: 5 mm (A–F); 2 cm (I, J); 1 cm (G, H, K, L, M, N, O, P).

*Eudolichotis glabra* [non Gmelin, 1791]: Simone 2006: 151, fig. 511B.

*Plekocheilus aurissciuri*: Massemin et al. 2009: 405, pl. 5, fig. F; Breure and Ablett 2011: 16, figs 27A–C, 27ii.

**Type locality.** Trinidad and Tobago, Trinidad.

**Geographic distribution.** Trinidad, Venezuela, Guyana, Suriname, French Guiana (Massemin et al. 2009). The record from the state of Acre in Brazil (Oliveira and Almeida 1999: 43, text fig.) appears to be a misidentification, given the larger size of the shell, taller spire, deeper suture, more convex whorls, and elongated aperture.

**Remarks.** The present specimen (AM MA112980) unfortunately has no locality data beyond “Brazil” and represents the second record of this species for the country. The first record remained obscure, because the specimen (MZSP 7959) was identified by Simone (2006: fig. 511B) as *P. glaber* (Gmelin, 1791); instead, it represents *P. aurissciuri*. The locality given by the latter author (Bahia state) is erroneous, being a misreading of the German word “Brasilien” on the specimen’s original label.

Thus, the present specimen offers further support that *P. aurissciuri* occurs (or occurred) in Brazil, although the precise locations within the country remain unknown. A locality within the Guiana Shield, however, would be the most obvious.

***Plekocheilus linterae* (G.B. Sowerby III, 1890)**

Fig. 1O, P

*Bulimus fulminans linterae* Sowerby, 1890: 582, pl. 56, fig. 12.

*Plekocheilus (Plekocheilus) fulminans linterae*: Breure 2009: 27, figs 4A–D, 9A.

*Plekocheilus (Plekocheilus) linterae*: Breure 2019: 251, fig. 11.2B.

**Type locality.** Guyana, Mount Roraima.

**Geographic distribution.** Known only from Roraima tepui (Breure 2019).

**Remarks.** The present specimen (AM MA114946) can be identified as *P. linterae*, but it shows an unusual morphology: it has a dent-like protrusion on the parietal wall and rather strong axial “folds” as teleoconch sculpture (Fig. 1O, P).

***Plekocheilus taylorianus* (Reeve, 1849)**

Fig. 2A, B

*Bulimus taylorianus* Reeve, 1849: pl. 81, fig. 602.

*Plekocheilus (Eurytus) taylorianus*: Borrero and Breure 2011: 42, figs 15C–D.

**Type locality.** Ecuador, near Quito.

**Geographic distribution.** Ecuador and possibly northern Peru (Borrero and Breure 2011).

**Remarks.** The label of the present specimen (AM MA11495) has Brazil as locality (without further

information). *Plekocheilus taylorianus* is unlikely to occur in Brazil, so we consider the locality data as doubtful.

***Plekocheilus tricolor* (L. Pfeiffer, 1853)**

Fig. 2C, D

*Bulimus tricolor* Pfeiffer, 1853: 325.

*Bulimus semipictus* Hidalgo 1869: 188.

*Plekocheilus (Eurytus) tricolor*: Borrero and Breure 2011: 43, fig. 17A, B.

**Type locality.** New Granada, Gualea [presently Ecuador, Pichincha province, Gualea].

**Geographic distribution.** Central Ecuador, in the following provinces: Bolívar, Cotopaxi, Imbabura, Los Ríos, Napo, Pichincha, Tungurahua (Borrero and Breure 2011).

**Remarks.** The present specimens (AM MA114865) are the first record of this species from Pastaza province, from Mera, a locality bordering the Tungurahua and Napo provinces.

**Family Bulimulidae**

**Genus *Bostryx* Troschel, 1847**

***Bostryx luridus* (L. Pfeiffer, 1863)**

Fig. 2E, F

*Bulimus luridus* Pfeiffer, 1863: 274.

*Bostryx luridus*: Breure and Ablett 2014: 115, fig. 9E.

**Type locality.** New Caledonia (in error; see Breure and Ablett 2014).

**Geographic distribution.** No further distribution data on this species is known.

**Remarks.** Breure and Ablett (2014) argued that this species would probably come from northern Peru or Ecuador. The present specimens (AM MA127334) are thus the first precise locality recorded for this species; they were collected in Huanta, Ayacucho department, in central Peru.

**Genus *Drymaeus* Albers, 1850**

***Drymaeus cf. waldoschmidti* Parodiz, 1962**

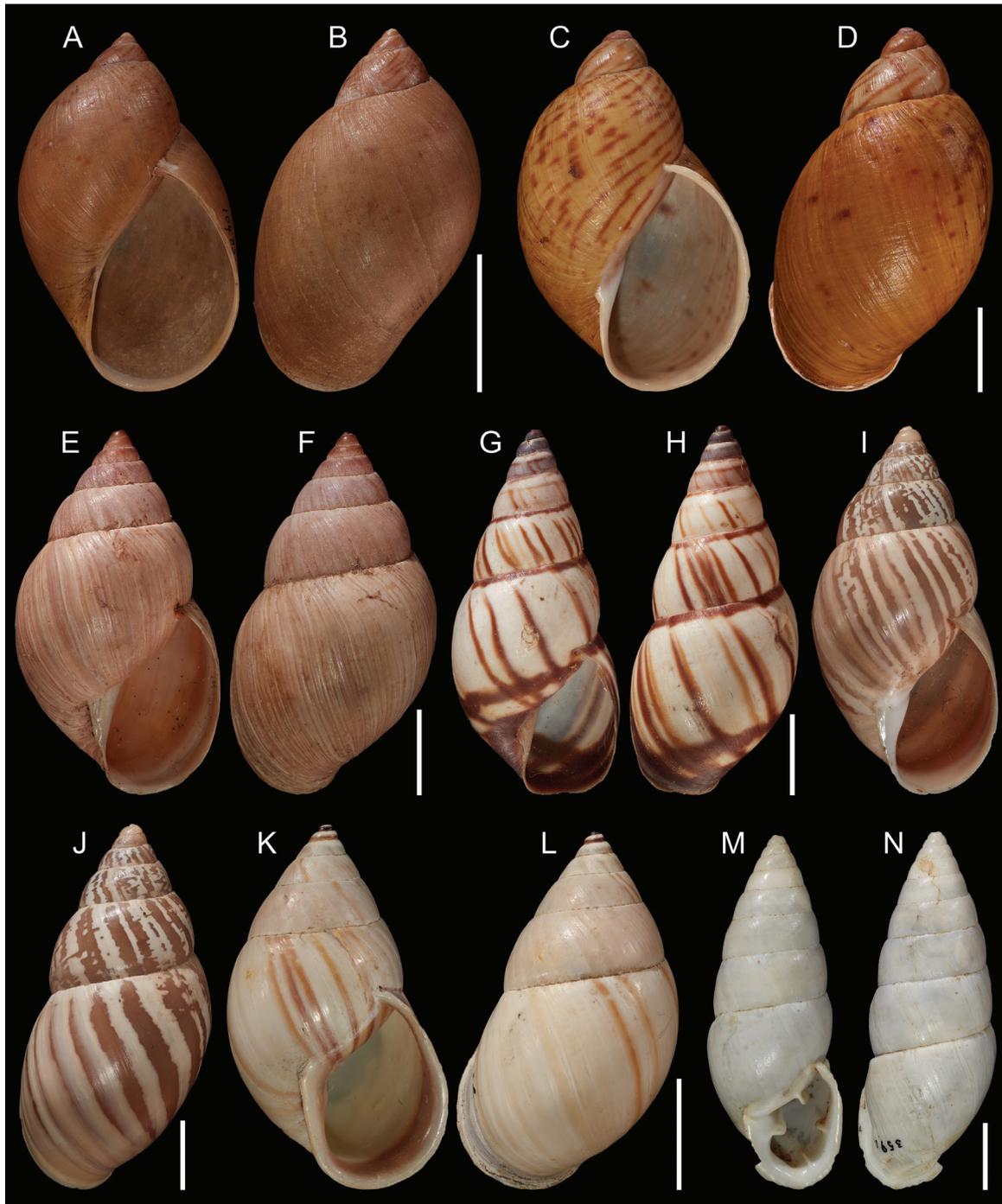
Fig. 2G, H

*Drymaeus waldoschmidti* Parodiz, 1962: 436, pl. 2, fig. 16.

**Type locality.** Peru.

**Geographic distribution.** No specific distribution data on this species is known.

**Remarks.** The present specimen (AM MA127336) could represent *D. waldoschmidti*, a species that has been described from “Peru”, but without any further specification of localities. As such, the place where the present specimen was collected (Tingo María, Huánuco department) could represent the first precise locality recorded for this species.



**Figure 2.** South American shells in the AM collection. All figure pairs show the shell in apertural and dorsal views. **A, B.** *Plekocheilus taylorianus*, AM MA114951; H = 54.9 mm; **C, D.** *Plekocheilus tricolor*, AM MA114865; H = 45.3 mm; **E, F.** *Bostryx luridus*, AM MA127334; H = 22.0 mm; **G, H.** *Drymaeus* cf. *waldoschmidti*, AM MA127336; H = 23.4 mm; **I, J.** *Naesiotus* sp., AM MA114717; H = 27.5 mm; **K, L.** *Neopetraeus camachoi*, paratype, AM MA73552; H = 33.6 mm; **M, N.** *Cyclodontina inflata*, AM MA112065; H = 27.3 mm. Scale bars: 5 mm (E–J, M, N); 2 cm (A, B); 1 cm (C, D, K, L).

**Genus *Naesiotus* Albers, 1850**

***Naesiotus quitensis* (L. Pfeiffer, 1848)**

Fig. 3A–F

- Bulimus quitensis* Pfeiffer, 1848: 230.
- Bulimus irregularis* Pfeiffer, 1848: 231.
- Bulimus caliginosus* Reeve, 1849: pl. 82, fig. 609.
- Bulimus catlowiae* Pfeiffer, 1853: 427.

- Naesiotus quitensis ambatensis* Rehder, 1940: 117, pl. 13, figs 12, 14.
- Naesiotus quitensis jacksoni* Rehder, 1940: 116, pl. 13, figs 1, 5.
- Naesiotus quitensis orinus* Rehder, 1940: 116, pl. 13, figs 6, 10.
- Naesiotus quitensis vermiculatus* Rehder, 1940: 117, pl. 13, figs 17, 19.
- Naesiotus quitensis antisana* Rehder, 1942: 103.

**Type locality.** Ecuador, “Quito”.

**Geographic distribution.** Ecuador, in the following provinces: Carchi, Chimborazo, Imbabura, Napo, Pastaza, Pichincha, Tungurahua (Breure et al. 2022).

**Remarks.** Three specimens in the AM collection come from H.A. Rehder (AM MA73506, MA73507, and MA73508) and their labels note them as paratypes of, respectively, *Naesiotus quitensis jacksoni* (Fig. 3A, B), *N. q. orinus* (Fig. 3C, D), and *N. q. antisana* (Fig. 3E, F). Their locality data matches the type localities provided in Rehder (1940, 1942), but that author only designated a holotype (from the USNM collection) for each subspecies in those publications. Nevertheless, Rehder mentioned further specimens in the same publications and the notation of paratypes on the present specimens’ labels are evidence that they belonged to the author’s type series. Thus, according to ICZN Art. 72.4.1, the present AM specimens from Rehder’s material can be considered paratypes of *Naesiotus quitensis jacksoni*, *N. q. orinus*, and *N. q. antisana*. All those subspecies are currently considered synonymous with nominate *N. quitensis*, although Breure et al. (2022) suggested that the species’ populations in Ecuador are in need of revision.

*Naesiotus* sp.

Fig. 2I, J

**Remarks.** The specimens from lot AM MA114717 have unique shells. The protoconch sculpture consisting of strong prosocline axial riblets is consistent with the genus *Naesiotus*, but the shell is distinct from other species in the region of Ayacucho. These specimens could thus represent either an obscure species or a new one. For now, we provide photographs of one shell (Fig. 2I, J) to aid in future studies.

**Genus *Neopetraeus* E. von Martens, 1885**

*Neopetraeus camachoi* Weyrauch, 1967

Fig. 2K, L

*Neopetraeus camachoi* Weyrauch, 1967: 418, figs 68–70; Breure 1979: 100, fig. 6; Breure 2012: 6, pl. 3, figs 29–31; Salvador et al. 2021: 73, fig. 2G, H.

**Type locality.** Peru, Cajamarca department, between Chota and Cutervo, on the eastern slope of western Andes, on the left side of Río Chotano, Cuesta de Chuguid.

**Geographic distribution.** Andes of northern Peru, Cajamarca department (Weyrauch 1967; Breure and Ablett 2014; Salvador et al. 2021).

**Remarks.** Weyrauch (1967: 419) designated specimens in his private collection (registration number WW1451) as paratypes. The present specimen (AM MA73552) originated from Weyrauch and its original label has the WW1451 number on it; the locality given matches that of the type locality and the specimen is labelled as “paratype”. As such, this specimen is a paratype.

**Family Odontostomidae**

**Genus *Cyclodontina* H. Beck, 1837**

*Cyclodontina inflata* (J.A. Wagner, 1827)

Fig. 2M, N

*Pupa inflata* Wagner, 1827: 27.

*Clausilia pupoides* Spix, 1827: pl. 14, fig. 4.

*Cyclodontina inflata*: Simone 2006: 166, fig. 576; Agudo-Padrón 2008: 171.

**Type locality.** Brazil, “in Provinciis mediis orientalibus”.

**Geographic distribution.** Brazil (Piauí, Ceará, Bahia, Minas Gerais and Santa Catarina states), Paraguay, Uruguay (Simone 2006; Agudo-Padrón 2008).

**Remarks.** The present specimen (AM 112065) is labelled as being from “Rio Grande” in Brazil, which is interpreted as the municipality of Rio Grande, in Rio Grande do Sul state. This represents a new record for the species, filling a gap in its distribution. Nevertheless, *Cyclodontina inflata* is a poorly understood species and has a distribution covering much of Brazil, as well as occurrences in Paraguay and Uruguay. In all likelihood, the “Provinciis mediis orientalibus” of Wagner (1827) would refer to the region of Brazil encompassing Bahia and Minas Gerais states, while the other reported occurrences to the north and south could represent other species. A revision of this (and similar) species is necessary.

**Genus *Tomigerus* Spix, 1827**

*Tomigerus esamianus* Salgado & Coelho, 1990

Fig. 3G–I

*Tomigerus (Tomigerus) esamianus* Salgado & Coelho, 1990: 2, figs 1–7.

*Tomigerus esamianus*: Simone 2006: 176, fig. 627.

**Type locality.** Brazil, Rio Grande do Norte state, Mossoró municipality, Passagem do Rio (RN76 Highway).

**Geographic distribution.** Known only from type locality.

**Remarks.** The present specimen (AM MA112081) stems from Bahia state (no specific locality), which greatly extends the distribution of the species to the south. The species can be identified by the short spire and strongly dorsoventrally compressed shell, as well as the banded colour pattern of the body whorl (thick central band, thin basal band, and vestigial periumbilical band).

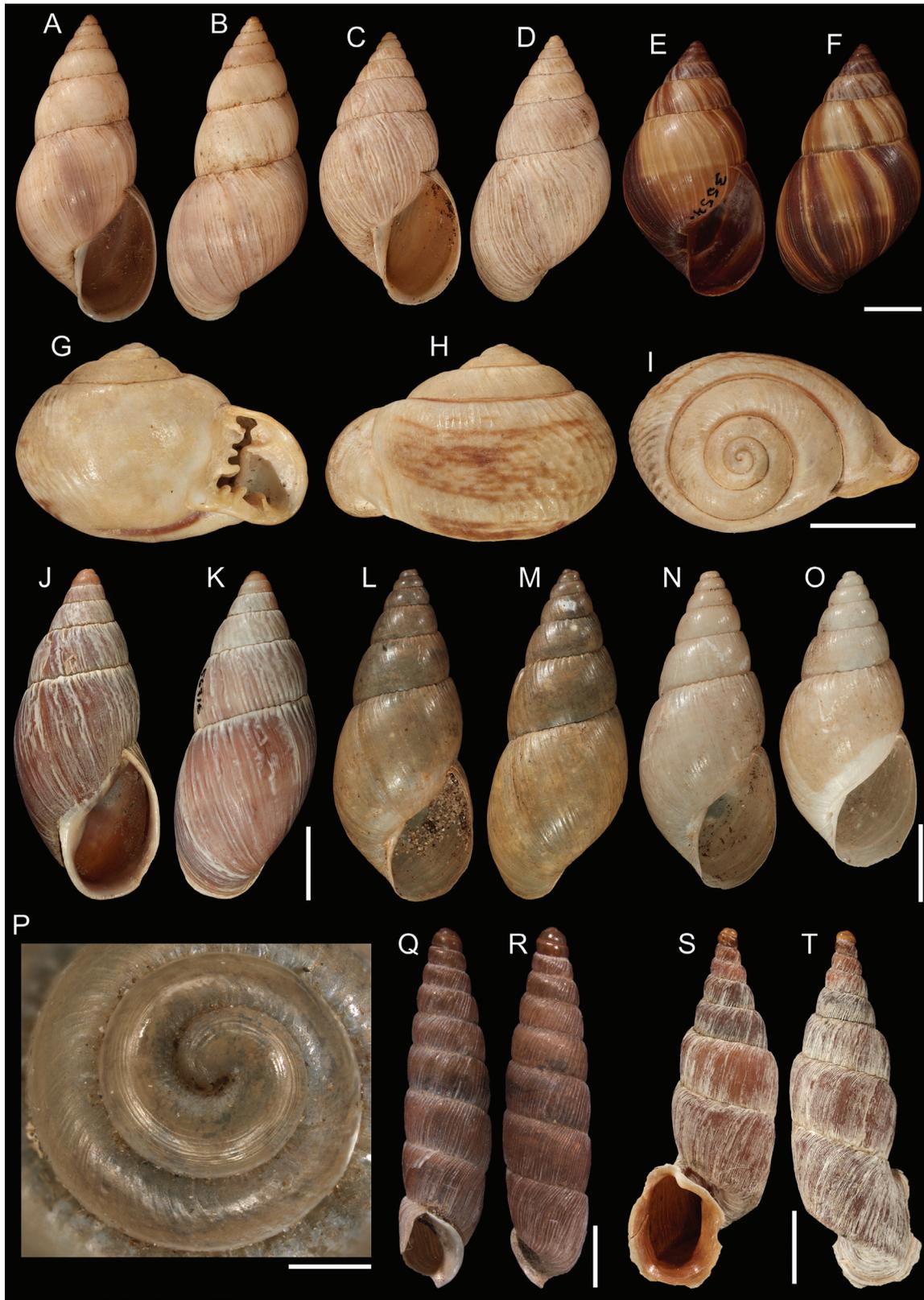
**Family Orthalicidae**

**Genus *Scholviencia* Strebel, 1910**

*Scholviencia bambamarcaensis* (Breure, 1978)

Fig. 3J, K

*Thaumastus (Scholviencia) bambamarcaensis* Breure, 1978: 41, pl. 6, fig. 8; Neubert and Janssen 2004: 200, pl. 2, fig. 20.



**Figure 3.** South American shells in the AM collection. All figure pairs show the shell in apertural and dorsal views unless otherwise noted. **A–F.** *Naesiotus quitensis*; **A, B.** *Naesiotus quitensis jacksoni*, paratype, AM MA73506; H = 27.9 mm. **C, D.** *Naesiotus quitensis orinus*, paratype, AM MA73507; H = 24.9 mm. **E, F.** *Naesiotus quitensis antisana* paratype, AM MA73508; H = 23.2 mm. **G–I.** *Tomigerus esamianus*, AM MA112081; H = 10 mm, D = 14.2 mm; **J, K.** *Scholvienia bambamarcaensis*, AM MA106737; H = 19.9 mm; **L–P.** *Lopesianus crenulatus*; **L, M.** AM MA114588; H = 20.6 mm; **N.** AM MA114588, apertural view; H = 21.5 mm; **O.** AM MA114588, apertural view; H = 20.0 mm; **P.** Detail of the protoconch of AM MA114588; **Q, R.** *Parabalea pilsbryi*, paratype, AM MA73229; H = 12.0 mm; **S, T.** *Zilchiella grandiportus*, paratype, AM MA72774; H = 25.1 mm. Scale bars: 5 mm (A–F, H–I, L–P, S, T); 2 mm (Q, R); 1 cm (J, K); 0.5 mm (G).

**Type locality.** Peru, Cajamarca department, 7 km SW of Bambamarca, 2920 m alt.

**Geographic distribution.** Known only from the vicinities of Bambamarca (Breure 1978).

**Remarks.** The present records (AM MA106737 and MA106738), from Jaén in Cajamarca department, extend the geographic distribution of the species ca. 100 km to the north.

## Family Simpulopsidae

### Genus *Lopesianus* Weyrauch, 1958

#### *Lopesianus crenulatus* Weyrauch, 1967

Fig. 3L–P

*Lopesianus crenulatus* Weyrauch, 1958: 121, pl. 6, figs 7, 8; Breure 1979: 46; Schileyko 1999a: 284, fig. 344; Neubert and Janssen 2004: 207, pl. 17, fig. 218; Simone 2006: 147, fig. 494B; Breure 2013: 17; Rangel et al. 2021: table 1, fig. 6c.

**Type locality.** Brazil, Rio de Janeiro state, Cabo Frio, Arraial do Cabo, Prainha.

**Geographic distribution.** This species was known only from shells collected (potentially all at the same time and by the same person) at the type locality. It had not been found and collected again in that locality since (Breure 1979, 2013), but it has been recently recorded (shells only; CMIOC 11159) from Pedra Branca State Park in Rio de Janeiro (Rangel et al. 2021). That shows that this species is more widespread than previously thought.

The occurrence reported from Cuba (Coupland and Barker 2004) is a mistaken identification of *Liguus crenatus* (misspelled as *Lignus crenulatus* in de Souza Lopes 1940), an uncertain taxon currently accepted as *Liguus fasciatus* (O.F. Müller, 1774).

**Description.** Shell bulimoid, narrow, with a high spire; shell wall thin, delicate. Colour dark ochre, translucent. Protoconch of c. 1½ whorl, sculptured by sinuous subsutural axial riblets on the apical portion of the whorl and, on the remainder of the whorl, by 8 to 10 parallel spiral cordlets; sculpture fades towards the last final quarter whorl of the protoconch; spiral sculpture is easily eroded and not visible in less well-preserved specimens. Teleoconch with strongly marked growth lines and subsutural crenulations. Suture well-marked. Whorl profile lightly convex. Body whorl tall, making up to circa half the shell height. Aperture oval, apically elongated. Peristome simple, thin. Umbilicus rimate.

**Measurements.** (n = 12); W = 6 (up to 6½); H = 21.3 ± 1.27 mm (min 19.6, max 23.6); D = 9.2 ± 0.49 mm (min 8.7, max 10.3).

**Remarks.** The specimens analysed herein (AM MA114587, MA114588, and MA1145879) are similar to those discussed by Breure (2013) from the ZMB collection: they were collected by the entomologist Hugo de Souza Lopes and were incorrectly identified as *Bulimulus gorrietiensis* Pilsbry, 1896. According to Breure (2013), Weyrauch (1958) made use of material from the

same collector to describe his new genus and species. The specimens from AM (like the ones from ZMB) are only topotypes; the type material is housed in the SMF collection (SMF 156356 holotype and SMF 155708/1 paratype; Neubert and Janssen 2004). Likewise, the supposed paratype figured by Simone (2006) from the FMNH is not a type specimen. In the AM collection, there is further material collected by the same person, belonging to other species and from other places in Brazil (Suppl. material 1).

The genus *Lopesianus* is monospecific and has been considered a *nomen inquirendum* by Breure (1979). Despite being classified in the Bulimulidae (at that time *sensu lato*), the protoconch sculpture of *L. crenulatus* (Fig. 3P) is very similar to that seen in species of *Leiostracus* Albers, 1850 (Simpulopsidae), a fact that had already been pointed out by Breure (1979). Both genera have sinuous subsutural axial riblets on the protoconch that give way to spiral cordlets (Breure 1979; Salvador and Cavallari 2013); however, *Leiostracus* spp. have numerous delicate cordlets, while *Lopesianus* has fewer more strongly marked cordlets. Otherwise, both genera display similar bulimoid shell shapes, albeit *Leiostracus* spp. typically have broader and sturdier shells.

A similar protoconch sculpture can be found in species belonging to the genus *Eudioptus* E. von Martens, 1860 (sometimes considered a subgenus or even a synonym of *Simpulopsis* H. Beck, 1837). However, the axial markings in *Eudioptus* are much lighter and the spiral cordlets are even fewer in number. The shell shape is also quite different; *Eudioptus* spp. typically display a more globular shell, more similar to *Simpulopsis* spp., although *E. pseudosuccinea* (Moricand, 1836) from Bahia state in Brazil has a translucent bulimoid shell similar to *L. crenulatus*.

Considering the embryonic characters of the protoconch, we propose here the reallocation of *Lopesianus* to the family Simpulopsidae. Given the lack of a phylogenetic framework of Simpulopsidae, it is impossible to tell whether *Lopesianus* should be considered a valid genus or a synonym of either *Leiostracus* or *Eudioptus*. Conchologically, at least, *Lopesianus* displays characters that are intermediate between those two genera. Therefore, we prefer to take a more conservative approach here and retain *Lopesianus* as a valid genus.

## Superfamily Clausilioidea

### Family Clausiliidae

#### Genus *Parabalea* Ancey, 1882

#### *Parabalea pilsbryi* (Weyrauch, 1956)

Fig. 3Q, R

*Temesa pilsbryi* Weyrauch, 1956: 146, pl. 11, figs 1–4; Breure 2012: 11.

**Type locality.** Peru, Lima department, El Infiernillo, right margin of Río Rimac, 90 km NE of Lima, on State Highway 22 from Lima to Oroya, on the Western slope of the Andes, 3360–3370 m altitude.

**Geographic distribution.** This species is known from the Rio Rimac and Rio Cañete valleys in Lima department.

**Remarks.** Weyrauch (1955: 147) designated specimens from his private collection (registration numbers WW3058) as paratypes. The present specimen (AM MA73229) originated from Weyrauch and its original label has the WW3058 number on it; the locality given matches that of the type locality and the specimen is labelled as “paratype”. As such, this specimen is a paratype.

#### Genus *Zilchiella* Weyrauch, 1957

##### *Zilchiella grandiportus* Weyrauch, 1957

Fig. 3S, T

*Zilchiella grandiportus* Weyrauch, 1957: 10, pl. 1, figs 5–10; Breure 2012: 8.

**Type locality.** Peru, Cajamarca department, 8 km NE of Bambamarca, Peña Rota [La Carcel], left side of Rio Llaucan, 2550–2750 m altitude.

**Geographic distribution.** Known only from the region of the type locality (Weyrauch 1957).

**Remarks.** Weyrauch (1957: 11) designated specimens from his private collection (registration numbers WW2005) as paratypes. The present two specimens (AM MA72774) originated from Weyrauch and its original label has the WW2005 number on it; the locality given matches that of the type locality and the specimen is labelled as “paratype”. As such, these specimens are paratypes.

#### Superfamily Helicoidea

##### Family Labyrinthidae

##### Genus *Isomeria* Albers, 1850

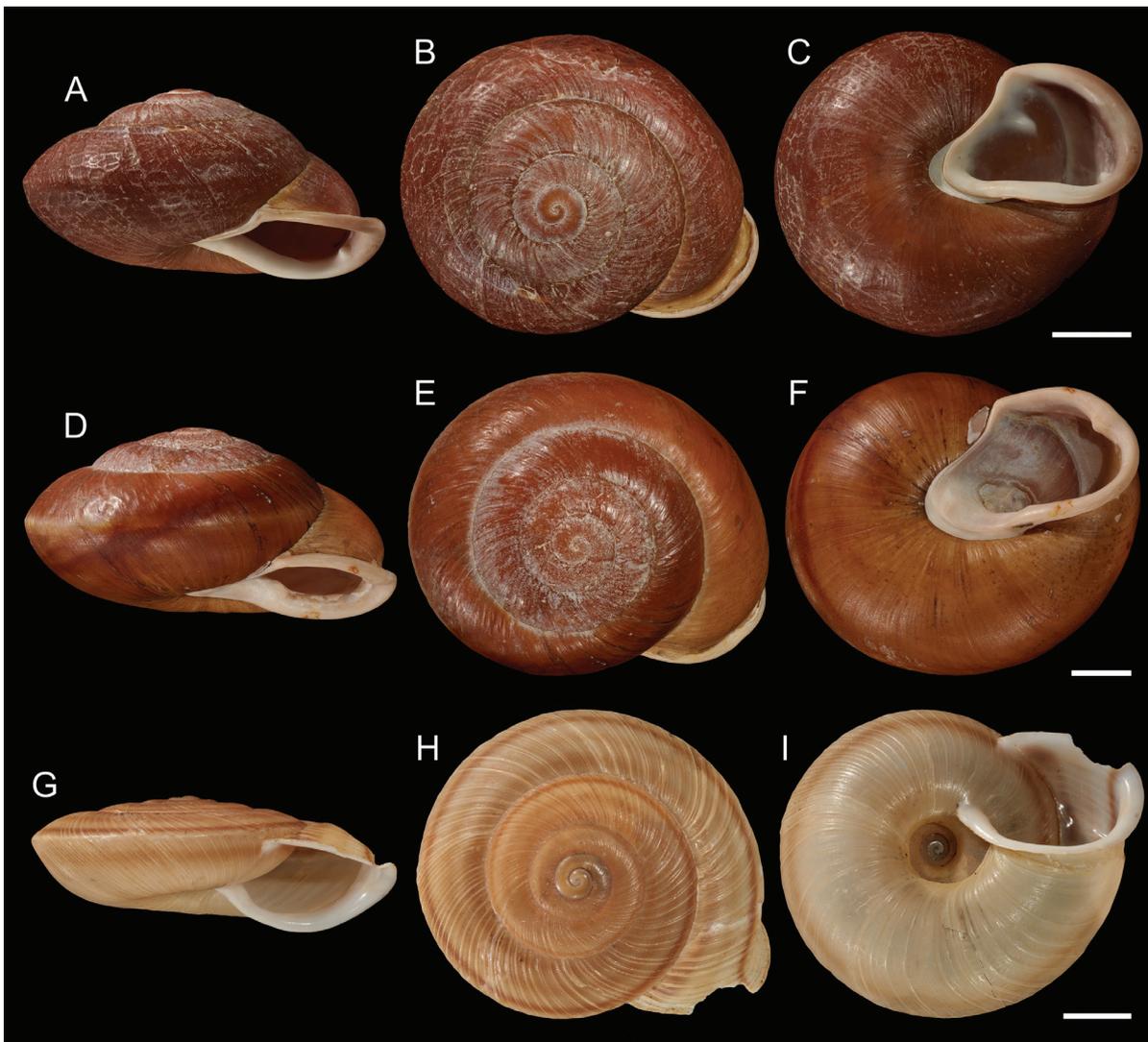
##### *Isomeria cymatodes* (L. Pfeiffer, 1852)

Fig. 4A–C

*Helix cymatodes* Pfeiffer, 1852: 92.

*Helix (Isomeria) parietidentata* K. Miller, 1878: 169.

*Isomeria cymatodes*: Breure and Araujo 2017: 119, fig. 45G–I; Breure et al. 2022: 214, figs 287.



**Figure 4.** South American shells in the AM collection. All figure trios show the shell in apertural, apical and umbilical views. A–C. *Isomeria cymatodes*, AM MA104139; H = 28.2 mm, D = 49.2 mm; E–F. *Isomeria junco*, AM MA104143; H = 18.9, D = 33.3 mm; G–I. *Epiphragmophora lentiformis*, paratype, AM MA73551; H = 11.2 mm, D = 26.5 mm. Scale bars: 5 mm (E–I); 1 cm (A–C).

**Type locality.** Unknown.

**Geographic distribution.** Ecuador, Napo and Pichincha provinces (Breure et al. 2022).

**Remarks.** These records (MA104981, MA104982) are the first from Pastaza province, extending the species' known distribution slightly to the south.

***Isomeria juno* (L. Pfeiffer, 1850)**

Fig. 4D–F

*Helix juno* Pfeiffer, 1850: 66.

*Isomeria juno*: Breure and Araujo 2017: 121, fig. 46G–I; Breure et al. 2022: 218, figs 292.

**Type locality.** “Colombian Andes”.

**Geographic distribution.** Ecuador, Napo province (Baeza) and “Quito” (Breure et al. 2022).

**Remarks.** This record (MA104143) is the first from Pastaza province, slightly extending the species' known distribution to the south.

**Family Epiphragmophoridae**

**Genus *Epiphragmophora* Doering, 1875**

***Epiphragmophora lentiformis* (F. Haas, 1955)**

Fig. 4G–I

*Karlschmidtia lentiformis* Haas, 1955b: 328, fig. 69; Schileyko 2004: 1713, fig. 2210.

*Epiphragmophora* (*Karlschmidtia*) *lentiformis*: Ramírez et al. 2003: 284.

**Type locality.** Peru, Apurímac department, Andahuaylas, Hacienda Mozobamba.

**Geographic distribution.** Known specifically only from the type locality (Haas 1955b).

**Remarks.** Haas (1955b: 328) mentions “numerous paratypes” of this species in the FMNH collection (registration number FMNH 51272). The present two specimens (AM MA73551) were part of an exchange with A. Solem from the FMNH conducted in 1961, as stated on the original labels. Considering that they are from the type locality, collected on October 1953 (as mentioned by Haas 1955b), and bear the word “paratypes” on the original label, we are confident that these two specimens were once part of specimen lot FMNH 51272 and are thus paratypes.

## Conclusions

The historical Auckland Museum collection of South American land snails was built mostly through a complex series of exchanges, especially through the activities of A.W.B Powell and L. Price. Many of the collector names (e.g., H. de S. Lopes and W.K. Weyrauch) and acquisition sources (e.g., A. Solem and R.W. Jackson) are also common to malacology collections of other institutions (e.g., Museum

of Comparative Zoology and the Field Museum) and were in some cases part of the web of exchanges with AM.

AM's South American collection is strongly biased towards large and eye-catching shells, which belong to groups such as Strophocheilidae, Orthalicoidea and Helicoidea. The taxa with less conspicuous shells are either rare in the present material (e.g., Helicinidae, Succineidae) or entirely absent (e.g., Cyclophoroidea, Scolodontidae, Punctoidea, Pupilloidea). However, as only a portion of AM's foreign (i.e., non-New Zealand) shells has been digitised to date, this may change in the future.

The examined specimens provided us with a wealth of new data on shell morphology and geographic distribution. For instance, several species listed here had their known historical distributions expanded. Such historical records are important to understand biodiversity patterns and trends through time, particularly if they are no longer found in those regions. The value of such specimens in natural history collections can therefore not be overstated (Allmon 1994; Lane 1996; Norris 2017; Meineke et al. 2018; Salvador and Cunha 2020).

## Author contributions

Conceptualization: RBS. Investigation: RBS, ASHB. Data curation: RBS, SH, WMB. Writing (original draft): RBS. Writing (review and editing): RBS, SH, ASHB, WMB.

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## Supplementary material 1

### Spreadsheet with collection data of the AM specimens studied

Authors: Rodrigo B. Salvador, Abraham S. H. Breure, Severine Hannam, Wilma M. Blom

Data type: Specimen data

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