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Stephacharopa miqueli sp. nov., a new terrestrial microsnail (Gastropoda: Charopidae) from the central Chilean coast

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Abstract. In Chile, punctoidean microsnails of the family Charopidae, Cystopeltidae, and Punctidae, characterised by having shells only a few millimetres in diameter, are one of the most species-rich groups of land snails. However, few studies exist on this fauna, mainly due to the small size of punctoid snails and the specialised techniques used for their characterisation. In this work, we describe a new species of Charopidae, *Stephacharopa miqueli* sp. nov., from Santo Domingo, Región de Valparaíso, in central coastal Chile. The new species is characterised by its minute discoid shell (to 1.98 mm in width); a comparatively large protoconch with about 52–66 weak, low radial ribs; and a teleoconch with about 112–124 weak ribs, with a distinct protoconch–teleoconch transition. The new species is the first *Stephacharopa* recognised from central Chile, and it can be distinguished from the five other extant species of the genus by differences in shell morphology, including teleoconch and protoconch sculpture. The discovery of a previously unknown microsnail in a densely populated, human-modified landscape highlights the importance of microhabitat refuges in central Chile, such as native vegetation patches and rocky outcrops, which support the survival of native species.

Key words. Punctoidea, South America, *Stephadiscus*, *Stephanoda*, Stylommatophora

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Introduction

Land snails are an important part of the terrestrial ecosystems, where they function as decomposers, calcium recyclers, and as bioindicators of ecosystem health (Gerlach *et al.* 2013). Among them, microsnails are a remarkable diverse but largely overlooked terrestrial fauna; these are land snails that typically measure less than 5 mm in their maximum shell dimensions. Due to their minute size, microsnails require specialised sampling and equipment for their morphological study, and thus these taxa remain relatively poorly studied (Sidhe *et al.* 2024). Consequently, like many native land snails with limited dispersal capacity, they face significant threats mainly from habitat fragmentation (Schilthuizen *et al.* 2002) and climate change (Nicolai & Ansart 2017). In Chile, microsnails of the families Charopidae, Cystopeltidae, and Punctidae are among the terrestrial molluscs with the greatest species richness, comprising around 45 species distributed mainly in the southern part of the country and in the Juan Fernández Archipelago; almost all of them are endemic to Chile (Stuardo & Vega 1985). In general, as most South American microsnails are known almost exclusively from shell material, their taxonomy heavily relies on morphological characters of the teleoconch and protoconch, including microsculpture. In charopid snails from southern South America, species exhibiting axial ribs on both the protoconch and teleoconch are currently classified in either *Stephadiscus* Hylton-Scott 1981 (southern Argentina and Chile) or *Stephacharopa* Miquel & Araya, 2013 (northern Chile to Southern Argentina) (Miquel & Araya 2022).

The genus *Stephacharopa* currently comprises five extant species. The type species, *Stephacharopa calderaensis* Miquel & Araya, 2013, is restricted to a few hyperarid localities along

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the Chilean Coastal Range from Antofagasta (20°S) to Caldera (27°S), at the margins of the Atacama Desert (Araya *et al.* 2017). The four other species are *Stephacharopa distincta* (Hylton Scott, 1970), described from Río Negro, southern Argentina; *Stephacharopa testalba* (Hylton Scott, 1970), from the same locality as *S. distincta* and from Hualpén, Concepción, and Cajón del Maipo, in Chile (Miquel & Araya 2022); *Stephacharopa perversa* (Hylton Scott, 1969) from Río Negro and Nahuel Huapi National Park, Puerto Blest, southern Argentina and from Vidal Gormáz Island, Tierra del Fuego, southern Chile (Miquel & Araya 2013); and *Stephacharopa paposensis* Araya & Miquel, 2018, known only from its type locality in Paposo, northern Chile (Araya & Miquel 2018).

In this study, as part of an ongoing effort to document Chilean land snails, we surveyed an approximately 8 km stretch of the coast extending south from the Port of San Antonio toward Santo Domingo (for a full list of sites, see Supplementary Material), including the shore at Llolleo and the estuary of the Maipo River. This region consists primarily of a low-relief, sandy coastal plain with some sparse vegetation on modified Holocene dunes (Paskoff *et al.* 2000). However, most of the area from approximately 50–100 m inland from the high-tide line has been heavily modified and is highly urbanised, forming part of a nearly continuous conurbation in central Chile that ends in the municipality of Santo Domingo. Some remnants of undisturbed native vegetation exist in the area, mainly confined around a few rocky outcrops on the Santo Domingo coast, and it was within these restricted microhabitats that we discovered shells of an undescribed land snail. The examination of this material allows us to describe *Stephacharopa miqueli* sp. nov. in this work, which is the first species of *Stephacharopa* recognised from coastal central Chile.

Material and Methods

The material used in the description was found by visual observation and by sorting leaf-litter and soil samples collected at five stations along the coast of the city of Santo Domingo, Commune of Santo Domingo, Provincia de San Antonio, Región de Valparaíso, central Chile (Fig. 1; see also Supplementary Material). Samples of leaf litter and soil, each about 500 g, were collected from each station, and shell specimens were sorted and measured in laboratory by hand under magnification. All of them, except the holotype, were empty shells with no soft parts. Specimens were measured under light microscopy at Estación Costera de Investigación Marina (ECIM, Las Cruces Chile), while SEM imaging was done in a ZEISS GeminiSEM 360 microscope at the Universidad Tecnológica Metropolitana (Santiago, Chile). Type specimens were sputtered coated with gold previous for scanning electron microscopy, and they are deposited in the collections of the Museo Nacional de Historia Natural in Santiago, Chile (MNHNCL). Abbreviations are: aperture height (AH), aperture width (AW), height (H), number of whorls (NW), protoconch ribs (PR), teleoconch ribs (TR), umbilicus width (UW), and width (W).

Systematics

Family Charopidae F.W. Hutton, 1884

Subfamily Trachycystinae Schileyko, 1986

Genus *Stephacharopa* Miquel & Araya, 2013

Type species. *Stephacharopa calderaensis* Miquel & Araya, 2013 (by original designation).

***Stephacharopa miqueli* sp. nov.**
Figure 2A–E

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Type locality. CHILE, Region of Valparaíso, Province of San Antonio, Commune of Santo Domingo, north of Rocas de Santo Domingo, Sector Roca Intihuatana (33° 37′ 47.1″ S 071° 38′ 07.2″ W, 5 m a.s.l.).

Type material. Holotype, MNHNCL MOL 205500: coll. by J.F. Araya, 6 February 2026. Paratypes: MNHNCL MOL 205501, same data as holotype except 33° 37′ 49.3″ S 071° 38′ 02.8″ W, 3 specimens; MNHNCL MOL 205502, same data as holotype, except south of Rocas de Santo Domingo (33° 37′ 53.0″ S 071° 38′ 05.6″ W), 2 specimens; MNHNCL MOL 205503, same data as holotype, except south of Rocas de Santo Domingo (33° 38′ 00.7″ S 071° 38′ 04.1″ W), 1 specimen. All paratypes collected by J.F. Araya and N. Zambrano, 6 February 2026.

Diagnosis. Shell discoid, W to 1.98 mm, with *c.* 3½ whorls, dextral. Protoconch of *c.* 1.7 whorls, with *c.* 52–66 thin, weak, and very low ribs separated by almost smooth interspaces. Teleoconch sculpture of *c.* 115–124 thick ribs, separated by interspaces filled with *c.* 6–8 finer riblets. Aperture almost circular, slightly descendent. Umbilicus well developed, deep, and perspective.

Description. Shell orbicular (H/W *c.* 0.59–0.62), very thin (42–50 μm shell thickness), fragile, medium-sized for the family (W to 1.98 mm), dextral, with *c.* 3½ convex whorls,

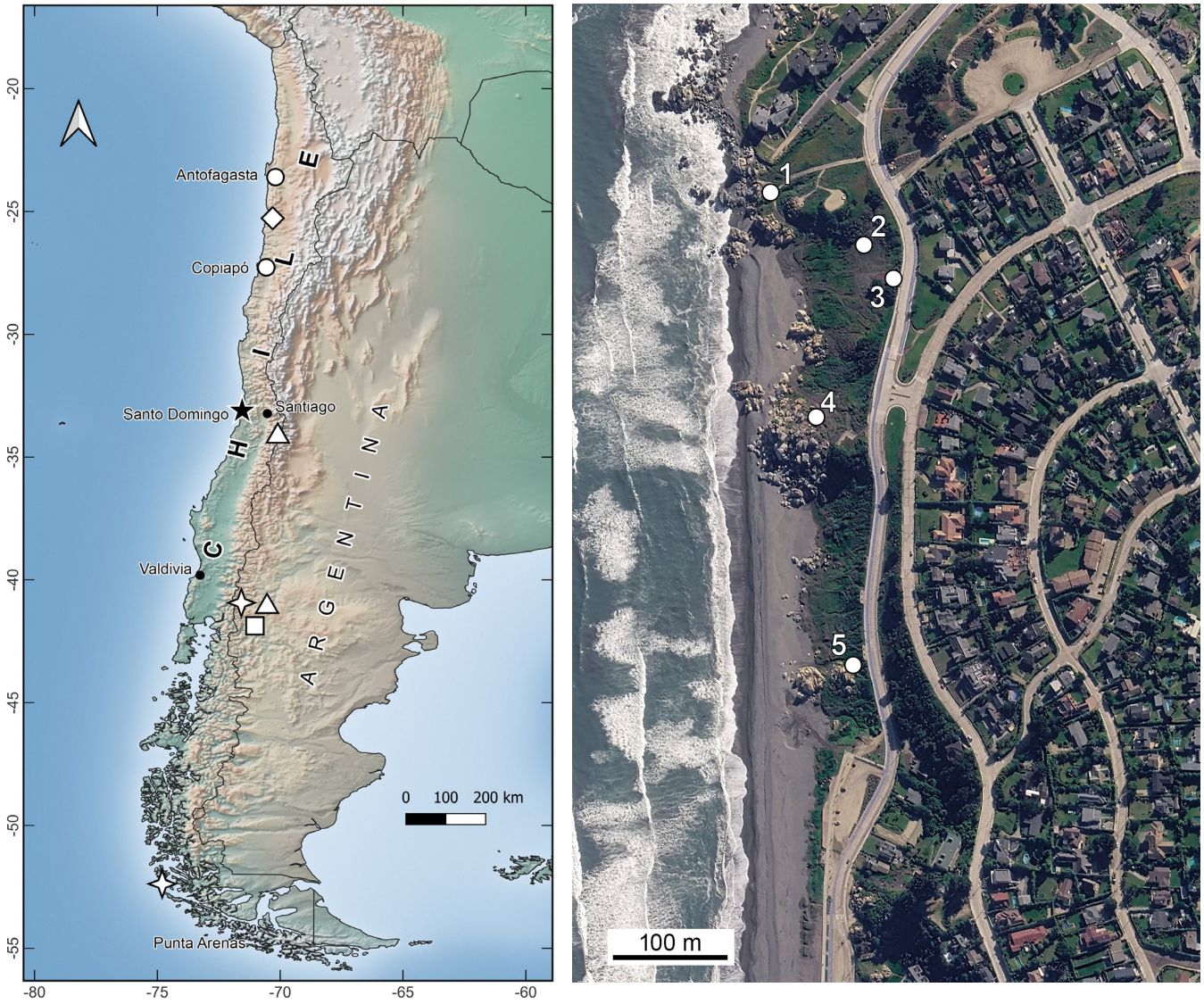


Figure 1. Distribution of *Stephacharopa miqueli* sp. nov. and congeners. **A,** type locality (☆) of *S. miqueli* sp. nov. at Santo Domingo, central Chile, and distribution of other *Stephacharopa* species in Chile and Argentina: ○ = *S. calderaensis*; ◇ = *S. paposensis*; △ = *S. testalba*; ✧ = *S. perversa*; □ = *S. distincta* (records from the literature and authors' own data). **B**, collection sites of *S. miqueli* sp. nov. at Santo Domingo; site 1 is the type locality. (Maps by R. Forsyth using QGIS v. 3.38.1 and public domain data from Natural Earth, https://www.naturalearthdata.com/, and Google Earth Pro v. 7.3.7.1327and satellite imagery © 2026 Airbus).

and widely umbilicate. Spire rather low, only slightly raised (*c.* 9% of H), convex. Protoconch of *c.* 1.7 whorls, proportionately large (*c.* 0.37 of W), sculptured with *c.* 52–66 weak, very low radial ribs, separated by interspaces which appear smooth except for very fine riblets near suture. Transition between protoconch and teleoconch well-marked by a small constriction. Teleoconch of *c.* 1.6 whorls, sculptured with about 115–124 wide, prosocline radial ribs, separated by interspaces filled with *c.* 6–8 fine riblets; riblets sharper on base of shell, near umbilicus. Suture deep, sunken, minutely crenulated by axial ribs. Aperture almost circular, about 0.74 of H, slightly descendent. Lip thin, simple, slightly reflected in its columellar part over umbilicus; parietal callus indistinct. Umbilicus well developed, deep, *c.* 0.34 of W. Shell corneous, pale amber coloured when alive, but whitish when dead.

Distribution and habitat. *Stephacharopa miqueli* sp. nov. is only known from the type locality, in an area about 512 m × 120 m in five sites about 10–50 m from the high-tide line (Fig. 3). The shells of the new species were found only in humus and leaf litter in patches of low vegetation composed almost exclusively of *Carpobrotus chilensis* (Molina)

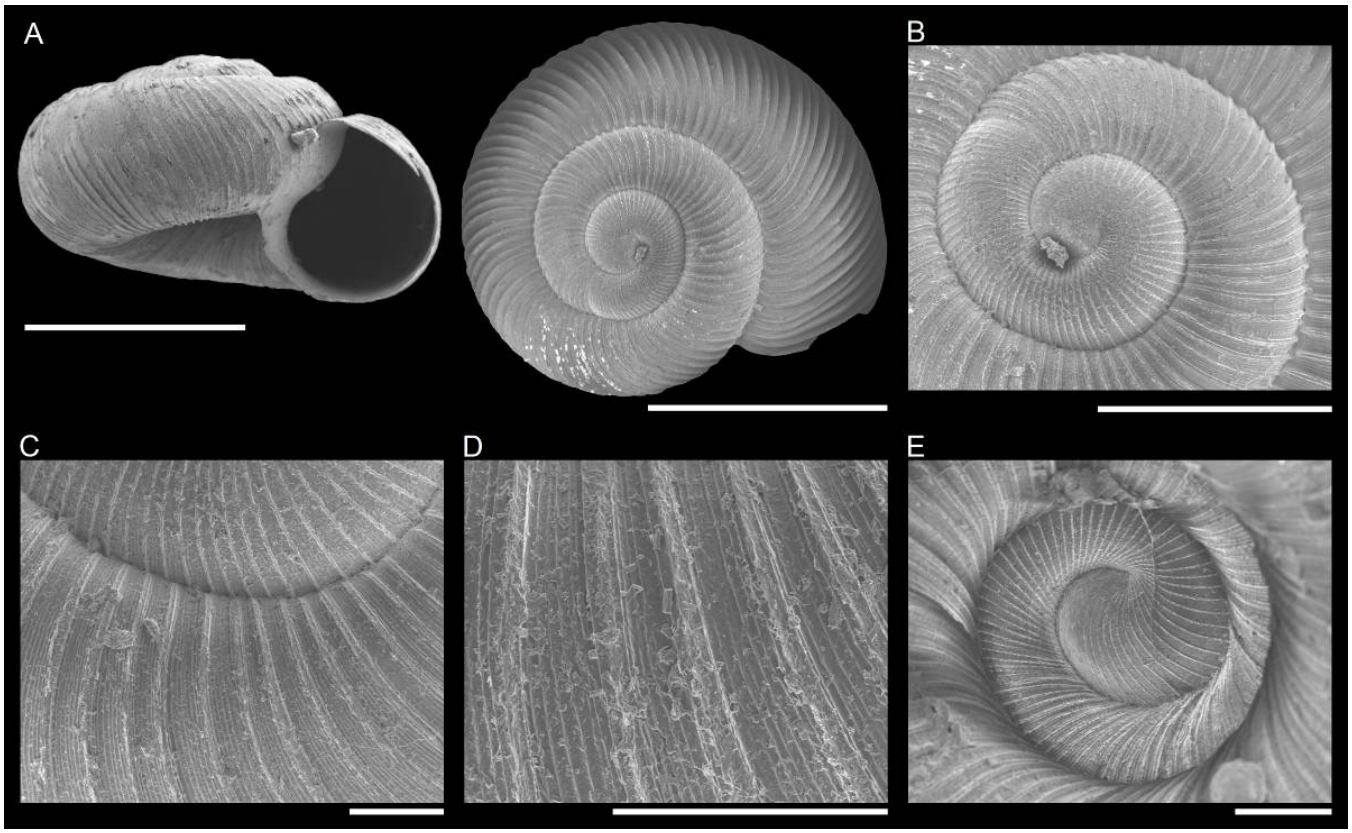


Figure 2. *Stephacharopa miqueli* sp. nov. **A**, apertural (paratype MNHNCL MOL 205501) and apical views (holotype MNHNCL MOL 205500). **B**, detail of protoconch and first teleoconch whorls of holotype. **C**, detail of sculpture on last and penultimate whorl in holotype. **D**, detail of sculpture of ribs and interspaces in holotype. **E**, detail of sculpture of umbilicus (paratype MNHNCL MOL 205502). Scale bars: A =1 mm; B = 500 μm; C–E = 100 μm.



Figure 3. Habitat and microhabitat of *Stephacharopa miqueli* sp. nov. at Santo Domingo. **A**, green areas are patches of *Carpobrotus chilensis*. **B**, microhabitat showing *C. chilensis* (native) and *A. chamissoides* (introduced).

N.E.Br. (a native species), with a small proportion of *Ambrosia chamissonis* (Less.) Greene (an introduced species), in an area which is maintained as a park and which consists of a few rocky outcrops in Holocene dunes.

Etymology. The species is named after Dr Sergio Miquel (Museo de Historia Natural Bernardino Rivadavia, Buenos Aires, Argentina) in recognition of his extensive contribution to the research of South American land snails, particularly microsnails, and for his enduring friendship.

Remarks. *Stephacharopa miqueli* sp. nov. differs from all its congeners (Table 1) in having a smaller shell (W to 1.98 mm, while other species are 2.10–5.90 mm in W), and in having a somewhat lunate aperture almost as wide as high. The new species is most similar to *S. paposensis* in general dimensions, but it differs in having a larger protoconch, a lower spire, weaker sculpture (axial ribs and spiral microsculpture are stronger in *S. paposensis*), a comparatively larger aperture (0.74 of H *vs* 0.45–0.55 of H in *S. paposensis*), a narrower umbilicus (umbilical width c. 0.26 of W *vs* 0.34 in *S. paposensis*), and fewer whorls in fully grown shells. From *S. calderaensis*, the new species differs in having fewer whorls, more axial ribs on both the protoconch and teleoconch, a rounder aperture (i.e. height and width nearly equal), and a much narrower umbilicus. The new species differs from *S. distincta* differs in having a rounder aperture (lunate in *S. distincta*), more whorls, a suture which lacks canaliculation, and more axial ribs on both the protoconch and teleoconch. From *S. perversa*, the largest species in the genus, the new species differs in being dextral (*S. perversa* is sinistral), and in having a larger W relative to H, fewer whorls, and far fewer axial ribs on the teleoconch. Finally, the new species differs from *S. testalba* in having a larger, rounder aperture (smaller, *c.* 0.76 of H, and lunate in *S. testalba*), and about half as many axial ribs on the teleoconch.

Discussion

The humid, coastal habitat of *Stephacharopa miqueli* sp. nov. is similar to the habitats of *S. calderaensis* and *S. paposensis* in northern Chile. However, the new species was found at a much at lower elevation, only 5 m above the sea, and in a substantially more humid environment than these two other *Stephacharopa* species. The distinctly coastal occurrence of the new species resembles that of the cystopeltid microsnail *Lilloiconcha lopezi* Araya & Aliaga, 2015, which is only known from under native vegetation on a rocky coast at Los Molles (Araya & Aliaga 2015), which approximately 156 km north of the type locality of the new species. However, while the new species lives under *Carpobrotus*, which is like a carpet of vegetation with a thin litter–soil layer on an old sand dune, *L. lopezi* inhabits rocky ground with boulders and large shrubs (Araya & Aliaga 2015).

However, unlike *L. lopezi*, which is sympatric with several other land-snail species (Araya 2016), no other land-snail species were found to coexist with *S. miqueli* sp. nov. The microhabitat of *S. miqueli* sp. nov. is a thin layer of soil beneath the *Carpobrotus* mats on relict sand dunes, which may represent a specialised niche for this charopid. Because the new species is restricted to a narrow coastal strip between

Table 1. Shell morphometric measurements (in mm) and rib counts of *Stephacharopa* species. Abbreviations: W= Shell width; H= Shell height; AH= Aperture height; AW= Aperture width; UW= Umbilicus width; NW= Number of whorls; PR= Protoconch ribs; TR= Teleoconch ribs (TR).

Species	W	H	AH	AW	UW	NW	PR	TR
Stephacharopa calderaensis Miquel & Araya, 2013	2.10–3.00	1.10	0.55–0.80	0.65–1.05	0.80–1.00	3.75–4.50	50	112*
Stephacharopa distincta (Hylton Scott, 1970)	2.10	1.30	1.10	0.5	0.72	4.00	70	150
Stephacharopa paposoensis Araya & Miquel, 2018	2.35	1.45	0.65–0.80	0.65–0.80	0.60	4.00	55	125
Stephacharopa perversa (Hylton Scott, 1969)	5.90	3.30	2.50	1.30	1.30	4.50	70	300
Stephacharopa testalba (Hylton Scott, 1970)	2.60	1.70	1.30	0.65	0.90	4.50	60	250
Stephacharopa miqueli sp. nov.	1.98	1.17	0.86	0.86	0.67	3.50	52–66	115–124

*The original description reported 90 ribs on the last whorl.

the urban area of Santo Domingo and the sea, its conservation is particularly vulnerable to localised threats, such as droughts, wildfires, or erosion and storm surges exasperated by rising sea level, which directly endanger the stability of this fragile microenvironment.

Although only a single living specimen was found, the abundance of empty shells and fragments in all samples suggests that *S. miqueli* sp. nov. is locally common. The striking absence of living specimens can be perhaps explained by the sampling season, as austral summers are characterised by low humidity, with moisture restricted to nighttime and early mornings. The association of this minute land snail (with potentially limited mobility) with *Carpobrotus chilensis* may be critical for its survival and may explain its presence within a heavily modified landscape in coastal central Chile. Apart from the small areas of *Carpobrotus* found in the littoral of Santo Domingo, there seems to be little undisturbed native vegetation areas with no human intervention in central Chile, particularly in coastal areas, as most of the lands have been used for agriculture and most recently for housing development (Rangel-Buitrago *et al.* 2018). Documenting the diversity of microsnails in Chile is important, particularly considering that many known charopid species are highly imperilled in the country (Collado *et al.* 2025).

This new *Stephacharopa* species bridges a gap in the previously disjunct distribution of the genus, which may be the result of a wider past distribution fragmented by the progressive aridification of Chile (Garreaud *et al.* 2017; Zambrano *et al.* 2025). We foresee that similar microsnails must be living in remote or undisturbed areas of the Chilean Coastal Range, and that even flat littoral areas like the ones examined here, can be reservoirs of this specialised molluscan fauna.

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Supplementary Material

Spreadsheet (CSV file) documenting all 62 sites searched in the vicinity of San Antonio and Santo Domingo, central Chile: https://jconch.net/index.php/jconch/article/view/514/433.

Keyhole Markup Language (KML) file of all sites searched in the vicinity of San Antonio and Santo Domingo, central Chile: available on FigShare: https://doi.org/10.6084/m9.figshare.35125210.