

TWO NEW SPECIES OF *CLESSINIA* (GASTROPODA: STYLOMMATOPHORA: ODONTOSTOMIDAE) FROM ARGENTINA

EUGENIA SALAS OROÑO^{1*}, ABRAHAM S. H. BREURE^{2,3,4}

¹ Fundación Miguel Lillo, Tucumán, Miguel Lillo 251, 4000, San Miguel de Tucumán, Argentina (e-mail: esalas@lillo.org.ar);  <https://orcid.org/0000-0003-2058-8609>

² Royal Belgian Institute of Natural Science, Brussels, Belgium;  <https://orcid.org/0000-0001-9357-0501>

³ Natural History Museum, Department of Life Science, Invertebrate Division, London SW7 5BD, United Kingdom

⁴ Naturalis Biodiversity Center, P.O. Box 9517, NL-2300 RA Leiden, the Netherlands

* corresponding author

ABSTRACT: Two new species of Odontostomidae are described from Argentina: *Clessinia juramentoensis* sp. nov. (near Juramento river, Metán Political Department, Salta province) and *Clessinia subcylindrica* sp. nov. (from Chancani, Pocho Political Department, Córdoba province). Both species are compared with all the species of *Clessinia* represented in Argentina; images of the related species are presented. *C. juramentoensis* is characterised by its sub-pyriform shell, small, lustrous to naked eye; secondary ureter opening between the middle and the distal area of the lung roof; penis inner wall with penial area IV occupying 1/3 of penis total length. *C. subcylindrica* is characterised by its small sub-cylindrical-globose shell, penial area II sculptured with numerous, long, strongly contracted lamellae, penial area III with a pilaster formed of a single fold, much contracted, becoming scalloped. The purpose of this study is to provide complete data on shell morphology and internal anatomy, as well as the distributional information on both species.

KEY WORDS: anatomy; Argentina; distribution; taxonomy; *Clessinia*

Publication LSID [urn:lsid:zoobank.org:pub:33C62A61-EE0E-47A7-BB3C-8A8F1F4DCED7](https://zoobank.org/pub:33C62A61-EE0E-47A7-BB3C-8A8F1F4DCED7)

INTRODUCTION

The genus *Clessinia* Doering, 1875 (DOERING 1875a) belongs to the family Odontostomidae Pilsbry et Vanatta, 1898, a species rich family of pulmonate snails distributed in South America, southern Amazonia (CUEZZO et al. 2018). The genus is found mostly in the Chaco ecoregion in Argentina (northwest, northeast and central Argentina), plus dry areas of southern Bolivia, Brazil, Paraguay, and Uruguay. The Argentinean species have been treated in PILSBRY (1898), SALAS OROÑO (2007, 2010, 2021) and CUEZZO et al. (2013) under *Spixia* Pilsbry et Vanatta, 1898, and CUEZZO et al. (2018) under *Clessinia*. The latter authors stated that *Spixia* Pilsbry et Vanatta, 1898 was a synonym of *Clessinia* Doering,

1875 (DOERING 1875a) arguing that both genera shared morphological similarities and had overlapping distribution ranges. In the present study, these conclusions are maintained awaiting a forthcoming revision of this group. BREURE & ROMERO (2012) showed that *Clessinia* + *Spixia* formed a monophyletic group, but *Spixia* alone was paraphyletic. The number of species currently recognised totals 42: these have been reported from the Provinces of Catamarca, Córdoba, Corrientes, Formosa, La Rioja, Misiones, Salta, San Luis, Santiago del Estero, and Tucumán. In the course of revisionary work, two additional new species were discovered and are formally described herein.



MATERIAL AND METHODS

The newly described material is deposited in the malacological collection of the Fundación Miguel Lillo (FML) under the acronym (IFML-MOLL). Type material of related *Clessinia* species deposited in other museums was studied for comparative purposes. Relevant materials housed in the following Museums were analysed: Fundación Miguel Lillo, Tucumán, Argentina (FML); Museo de La Plata, Buenos Aires, Argentina (MLP); Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (MACN-In) and Senckenberg Museum, Frankfurt am Main, Germany (SMF). Shell measurements taken are expressed in mm. The apertural terminology follows PARODIZ (1951) modified by SALAS OROÑO (2007). Maxima and minima for each measurement are given with the mean value in parenthesis. When the material collected was sufficient, the morphometry was based on at least 10 individuals per collecting site. Radulae and jaws were prepared for scanning electron microscopy (SEM) according to BREURE & PLOEGER (1977). In the cases where shells presented characters that need to be studied under scanning microscope, SEM micrographs were taken. These were obtained using a JEOL 35 CF electron microscope at the Laboratory of Microscopy of Northwestern Argentina (CIME), UNT-CONICET at Tucuman National University, Argentina. Dry shell material was prepared and deposited in the dry collection. Live specimens were

drowned in deoxygenated water with a layer of menthol crystals, fixed in 96% ethanol, then preserved in 80% ethanol. The material was deposited in the ethanol collection of FML. Dissections were done under stereomicroscope and anatomical systems were drawn with the help of a camera lucida. A minimum of three dissections per collection site were performed when material was available. Colour of the animals was based on live specimens. The terminology used for anatomical descriptions follows TOMPA (1984) and SALAS OROÑO (2007). Organs close to the ovotestis in natural position were considered proximal and those located close to the genital pore were considered distal. In the genitalia, the penis was divided into four areas (I–IV) to allow for clear morphology comparisons with other species of the genus. All penial areas described are characterised by their specific internal sculpture as follows: I) proximal area where a constriction and/or a widening can be observed; II) proximal middle portion, from the widened area to the middle zone of the penis; III) distal middle portion, from distal middle zone of the penis to just before where the internal sculpture changes; IV) distal portion of the penis, from area III to the penial junction with the vagina. The following abbreviations are used in the text: D ap – aperture diameter; D maj – major shell diameter; H – shell height; H ap – aperture height.

SYSTEMATICS

Family Odontostomidae Pilsbry et Vanatta, 1898

Genus *Clessinia* Doering, 1875(a)

Type species *Bulimus (Clessinia) stelzneri* Doering, 1875(a)

Clessinia juramentoensis sp. nov.

Figs 1–27

urn:lsid:zoobank.org:act:1B4DE6EE-0292-4269-8809-28057D48E12E

Etymology. The specific name “*juramentoensis*” refers to the Juramento river, where the specimens were found in areas near this river.

Type material. Holotype IFML-MOLL 15167 (Figs 1–5); paratypes IFML-MOLL 15168 (6 specimens), 15168 (2 specimens).

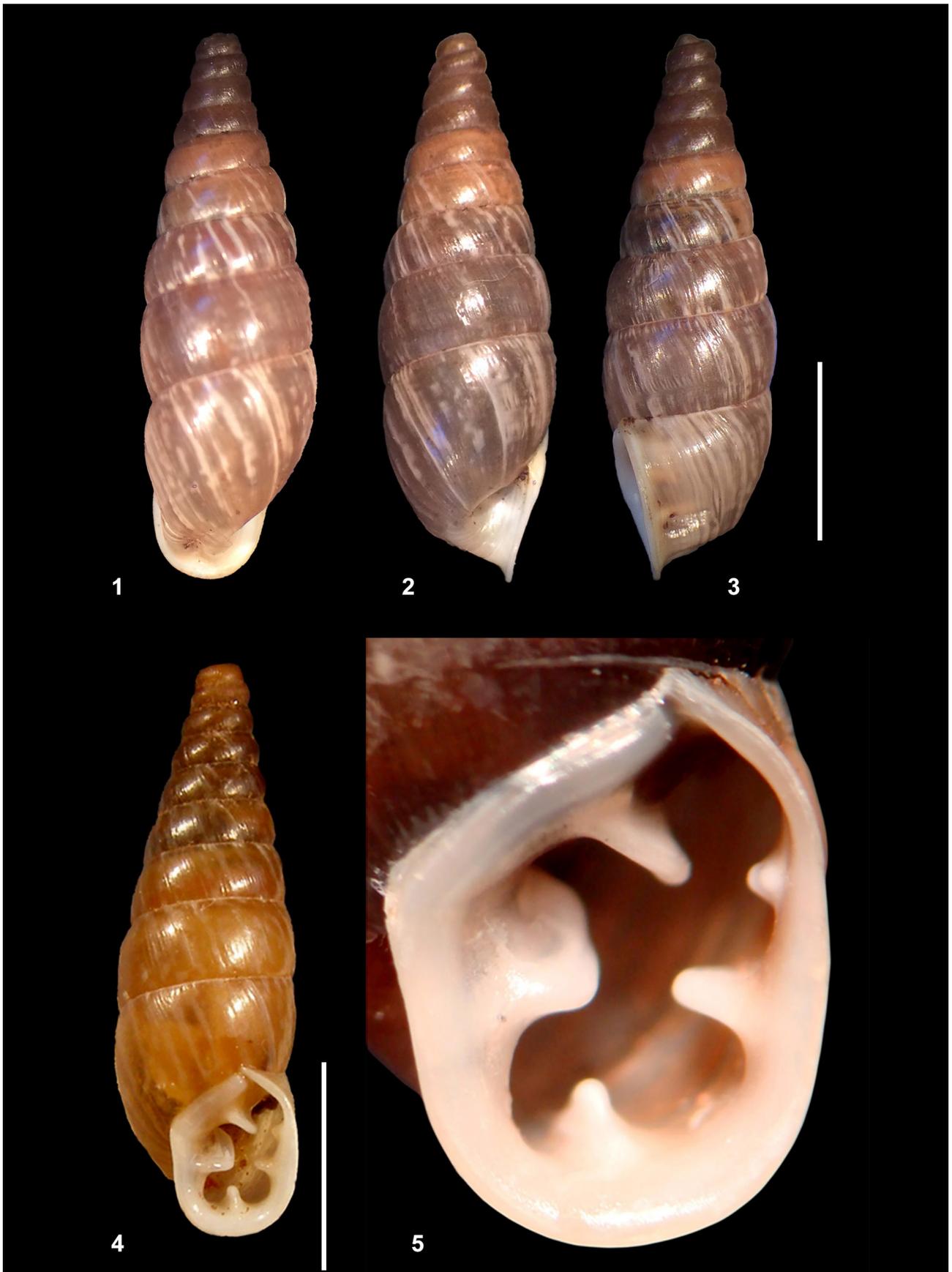
Type locality. Argentina, Province of Salta, Metán Department. Road from Route 9 to Cabra Corral Dam, parallel to the Juramento River, 800 m a.s.l., 25°13'46"S, 65°11'59"W, M. G. CUEZZO leg., 28 February 2000 (IFML-MOLL 15167, 15168). Additional localities: Idem, 951 m a.s.l.,

25°16'23.50"S, 65°14'01.60"W, E. SALAS OROÑO leg., 25 May 2008 (IFML-MOLL 15169/60 specimens); Idem, 889 m a.s.l., 25°16'23.41"S, 65°12'02.50"W, E. SALAS OROÑO leg., 25 May 2008 (IFML-MOLL 15170/36 specimens).

Diagnosis. Small (H: 13.6–16.4 mm; D maj: 4.4–5), sub-pyriform shell, highly lustrous to the naked eye. Pallial system with secondary ureter opening between the middle and the distal area of the lung roof. Penial area IV long, corresponding to 1/3 penis total length.

Shell measurements. Holotype IFML-MOLL 15167, H: 14.7; D maj: 4.6; H ap: 4.4; D ap: 3.3; Paratypes IFML-MOLL 15168 (n = 6), H: 13.6–16.4 (\bar{X} : 15.4); D maj: 4.4–5 (\bar{X} : 4.86); H ap: 4.1–4.9 (\bar{X} : 4.48); D ap: 3–3.5 (\bar{X} : 3.26). IFML-MOLL 15170 (n = 10), H: 14–16.4 (\bar{X} : 15.37); D maj: 4.4–5 (\bar{X} : 4.78); H ap: 4–4.9 (\bar{X} : 4.52); D ap: 3–3.5 (\bar{X} : 3.27).

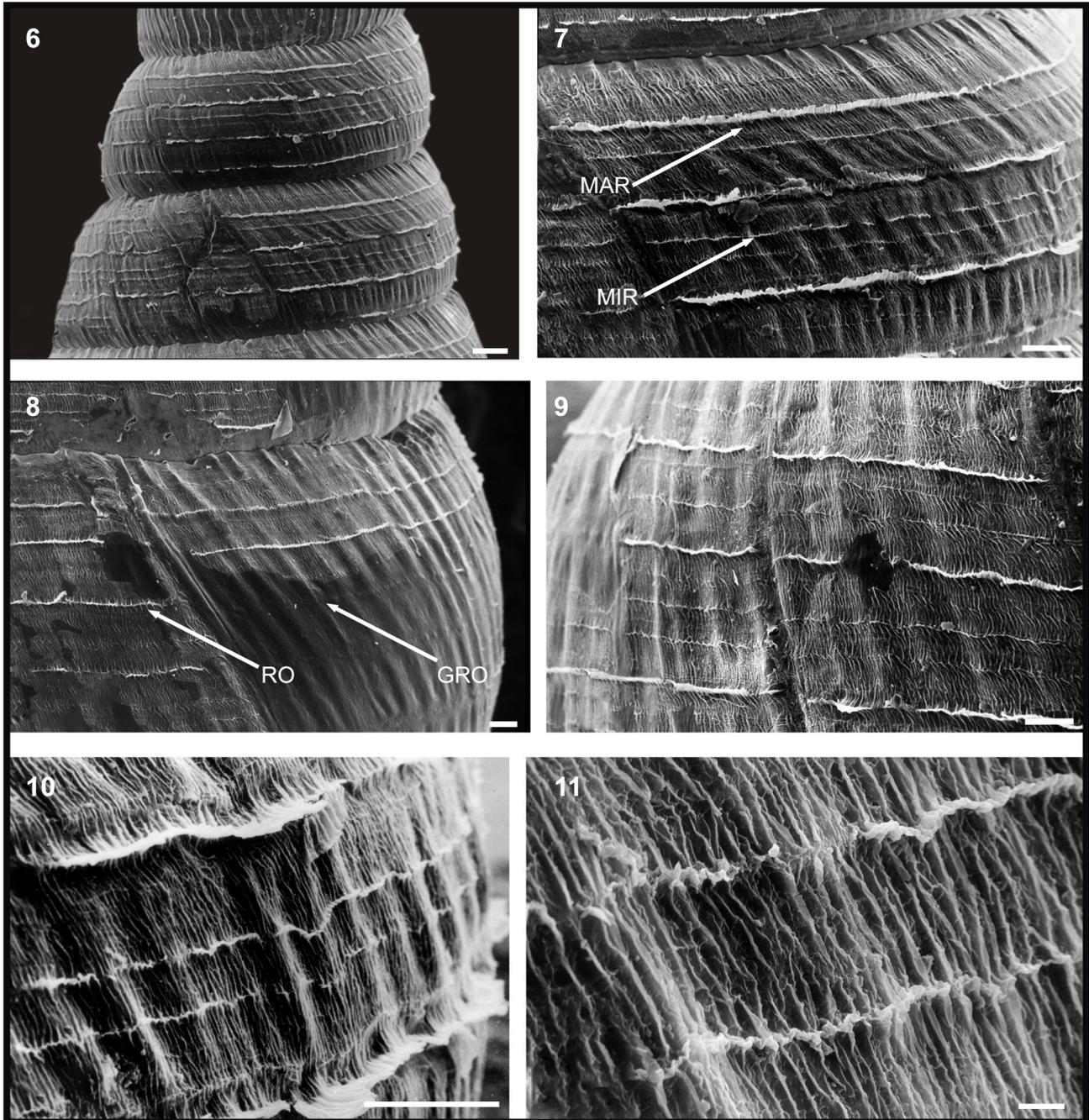
Shell (Figs 1–11). Small, subpyriform, the whorl diameter changes smoothly and uniformly from the first whorl to the body whorl. Nine whorls, slightly



Figs 1–5. *Clessinia juramentoensis* sp. nov.: 1 – holotype IFML-MOLL 15167, dorsal view; 2 – holotype lateral view with umbilicus; 3 – holotype lateral view; 4 – holotype front view. Scale bars 5 mm; 5 – aperture enlarged

convex. Shell dark brown, highly lustrous, with very fine whitish axial bands (Figs 1–4). Protoconch: two whorls, with small, fine axial micro ribs spaced at regular intervals, intercostal space with flat transverse bands (Fig. 6). Teleoconch sculpture with low axial rugosities, interspersed with growth lines (Figs 1–4). From second to fourth or fifth whorl of teleoconch fine spiral grooves (when periostracum is absent) corresponding to spiral periostracal rows of continuous appearance. Four major spiral rows per

whorl, and three or four minor rows between major rows (Figs 6–9). Between the spiral rows, axial and transverse micro-folds are wavy, resulting in an irregular lattice (Figs 10–11). Suture simple. Aperture sub-ovate to sub-quadrangular with expanded thick peristome (Figs 1–5). Parietal callus developed; towards parietal side, an incision is present. Aperture with four lamellae and one tooth. Suprapalatal tooth with rounded distal portion, located perpendicular to peristome. Palatal lamella perpendicular to per-



Figs 6–11. *Clessinia juramentoensis* sp. nov.: 6 – view of part of protoconch, third and fourth whorls; 7 – major and minor spiral rows in detail: four major rows per whorl; 8 – shell with and without periostracum, note spiral grooves corresponding to spiral rows; 9–10 – view of major and minor spiral rows; 11 – micro sculpture between spiral rows. Scale bars 100 µm. Abbreviations: GRO – groove; MAR – major row; MIR – minor row; RO – row

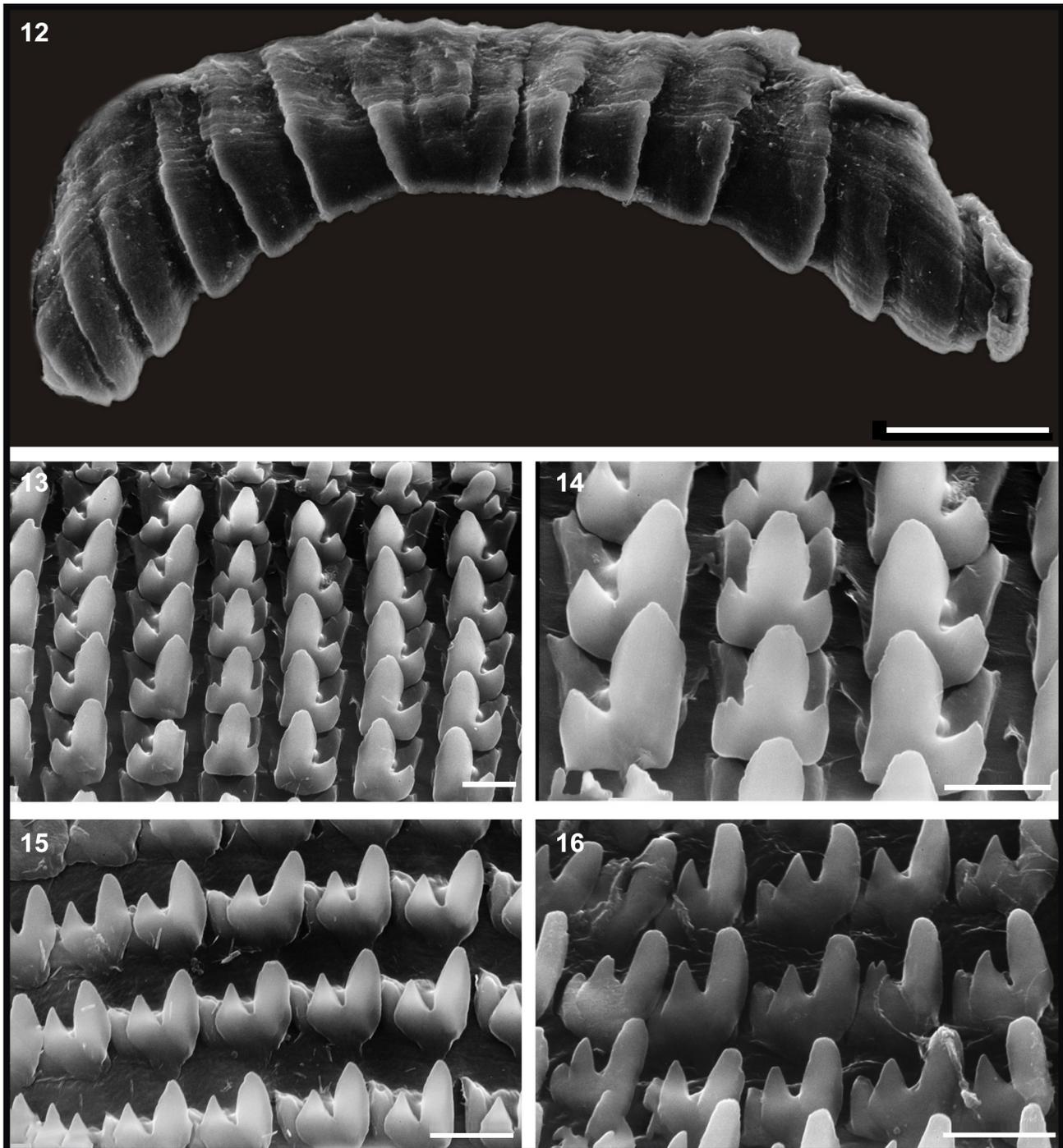
istome, hill-shaped, slightly concave on both sides, with rounded edges. Basal lamella, short, diagonal to peristome, bell-shaped, slightly inclined towards palatal side. Columellar lamella inside aperture, short, flattened, plateau-shaped. Parietal lamella narrow, bell-shaped, slightly diagonal to peristome (Fig. 5). Umbilicus narrow (Fig. 2).

External morphology. Surface of cephalopedal region uniformly light brown with lighter pedal area.

Surface of cephalopedal region with rounded to irregularly shaped pustules (Fig. 20).

Jaw (Fig. 12). Jaw with 14 plates, with a trapezoidal central plate subdivided into three portions. Lateral plates slightly overlapping. Lower edge of jaw irregular due to projection of plates. Jaw plates finely striated transversely (Fig. 12).

Radula (Figs 13–16). Central tooth small, tricuspid, with high, smooth mesocone and pointed ectocones



Figs 12–16. *Clessinia juramentoensis* sp. nov.: 12 – jaw; 13 – radula, view of central and lateral teeth; 14 – central and lateral teeth in detail; 15 – transition between lateral and marginal teeth; 16 – marginal teeth. Scale bars 100 μ m (12), 10 μ m (13–16)

(Figs 13–14). Lateral teeth bicuspid with high mesocone and one pointed ectocone on the side opposite to central tooth (Fig. 15). Tricuspid marginal teeth with two pointed ectocones, one behind the other (Fig. 16).

Pallial system (Fig. 17). Kidney triangular, pale yellowish, homogeneous, internally sculptured with longitudinal lamellae of granular texture; bordering proximally by intestine, left edge by pericardial cavity and right side by primary ureter. Primary ureter ascends to top of pulmonary roof, bordering intestine and descends towards mantle collar, parallel to rectum, as secondary ureter. Ureter and rectum enveloped by the same layer of connective tissue. Pulmonary vein extending from pericardial cavity into mantle collar parallel to rectum. Distal portion of pulmonary vein branched. Parallel to pulmonary

vein, afferent marginal vein borders a vascularised zone and descends from the last third of lung roof to the distal portion of lung bordering mantle gland. Elongated pallial gland located between lung and mantle gland. Between this gland and mantle collar lies an area of spongy consistency with impressions of apertural lamellae. Between pallial gland and lung roof extends marginal vein, which runs parallel to pallial gland. Secondary ureter opens before rectum, between middle to distal portion of lung roof, in a groove, which joins another groove, parallel to pallial gland. Distally this common groove opens parallel to rectum opening between folds of mantle collar. Pulmonary roof with marked venation and slightly pigmented; distal portion of lung, a dark pigmented on dorsal side. Inter-ramus zone rectangular, with narrower proximal portion.

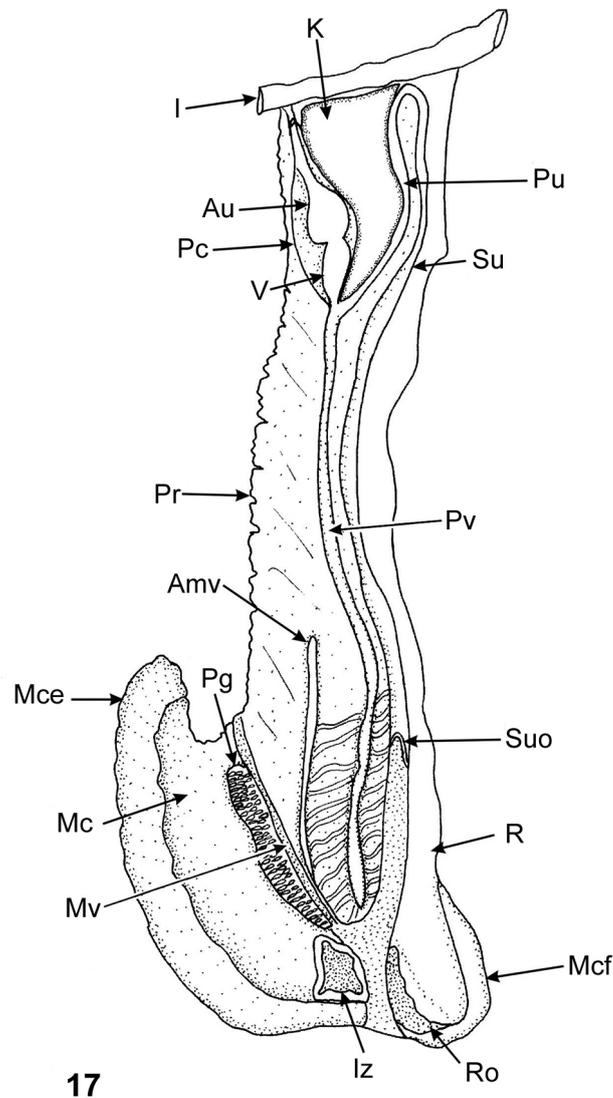
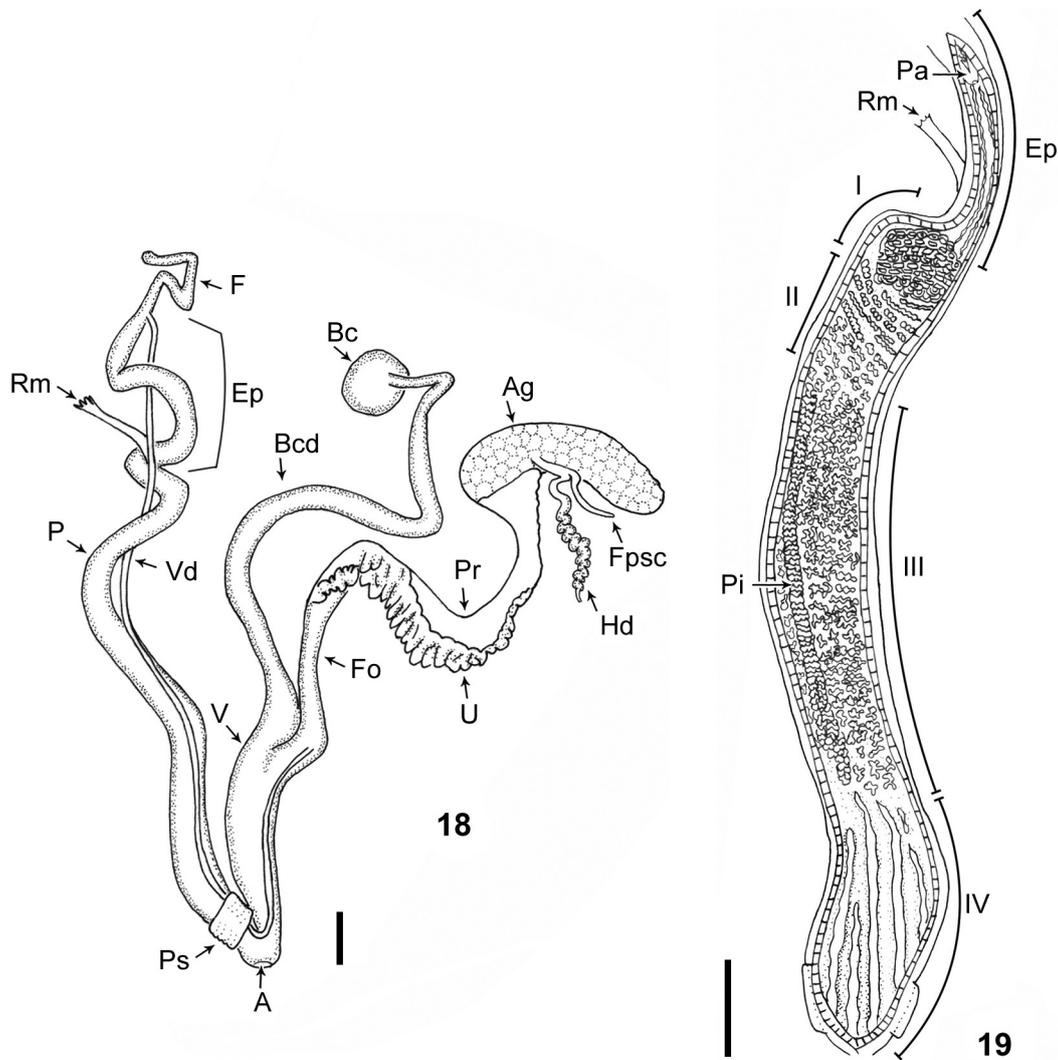


Fig. 17. *Clessinia juramentoensis* sp. nov. pallial system, scale bar 2 mm. Abbreviations: Amv – afferent marginal vein, Au – auricule, I – intestine, Iz – interramus zone, K – kidney, Mc – mantle collar, Mce – mantle collar edge, Mcf – mantle collar fold, Mv – marginal vein, Pc – pericardial cavity, Pg – pallial gland, Pr – pulmonary roof, Pu – primary ureter, Pv – pulmonary vein, R – rectum, Ro – rectum opening, Su – secondary ureter, Suo – secondary ureter opening, V – ventricle

Genital system (Figs 18–19). Ovotestis consisting of four fan-shaped racemes with numerous acini, fine, digitiform and branched with uniform orange pigmentation. Distal portion of hermaphroditic duct leads to fertilisation pouch-spermathecal complex (Fpsc), the latter with a widened base and distal portion elongated, filiform. Albumen gland, whitish granular in appearance, continuous with spermoviduct, consisting of uterus and prostate. Uterus orange in colour and strongly contracted. Prostate with granular consistency, yellowish in colour. Long free oviduct corresponds to half total length of spermoviduct. Bursa copulatrix duct long, exceeding total length of the spermoviduct by 1/3, slightly widened at distal portion. Phallic complex consisting of penis, epiphallus and flagellum. Flagellum long, filiform, corresponding to 3/4 of total length of epiphallus

(Fig. 18). Inner wall sculpted with fine zigzag scalloped folds. Vas deferens inserts at boundary between epiphallus and flagellum, runs freely along epiphallus, attaches to retractor muscle, runs freely along penis, passes under penial sheath and through penile-vaginal junction, finally inserts into distal portion of spermoviduct. Epiphallus tubular in shape. Length of epiphallus about 1/3 of penis total length. Retractor muscle attached to middle portion of epiphallus, accompanied by vas deferens. Internally, a papilla small and rounded present. Penis tubular with penial area I not widened; in some specimens there is a small constriction in the proximal portion of penis. Internally, inner wall sculptured with a set of minute rings, mixed with a fine mesh of lamellae. Penial area II upholstered with short, diagonally arranged, semi-quadrangular-edged lamellae (Fig. 19).



Figs 18–19. *Clessinia juramentoensis* sp. nov.: 18 – view of reproductive system without ovotestis; 19 – penis inner wall. Scale bars 2 mm (18), 1 mm (19). Abbreviations: A – atrium, Ag – albumen gland, Bc – bursa copulatrix, Bcd – bursa copulatrix duct, Ep – epiphallus, F – flagellum, Fo – free oviduct, Fpsc – fertilisation pouch-spermathecal complex, Hd – hermaphroditic duct, P – penis, Pa – papilla of epiphallus, Pi – pilaster, Pr – prostate; Ps – penial sheath, Rm – retractor muscle, U – uterus, V – vagina; Vd – vas deferens. Penial complex inner wall: I – proximal portion, II – proximal medial portion, III – distal medial portion, IV – distal portion: from III to penial junction with vagina

Penial area III sculptured with highly scalloped, short lamellae, randomly distributed and slightly inclined diagonally. Occasionally, a pilaster of imbricate irregular lamellae is present. Penial area IV smooth with some longitudinal semi-straight folds separated from each other. Penial sheath short and translucent.

Habitat. *Clessinia juramentoensis* sp. nov. lives under rocks and at the base of Bromeliaceae (Fig. 21).

Distribution. The new species was found only on the road from Metán to Dique Cabra Corral, in areas close to the road that runs parallel to the Río Juramento, in the province of Salta. Chaco Seco Serrano ecoregion (Figs 22, 27).

Remarks. *Clessinia juramentoensis* sp. nov. (Fig. 23) differs from its congeners in the combination of sub-pyriform shape, small size, lustrous shell, opening of secondary ureter on middle of pulmonary roof, and sculpture of penis inner wall.

The sub-pyriform shape at this small size has not been observed in other species of the genus. Other

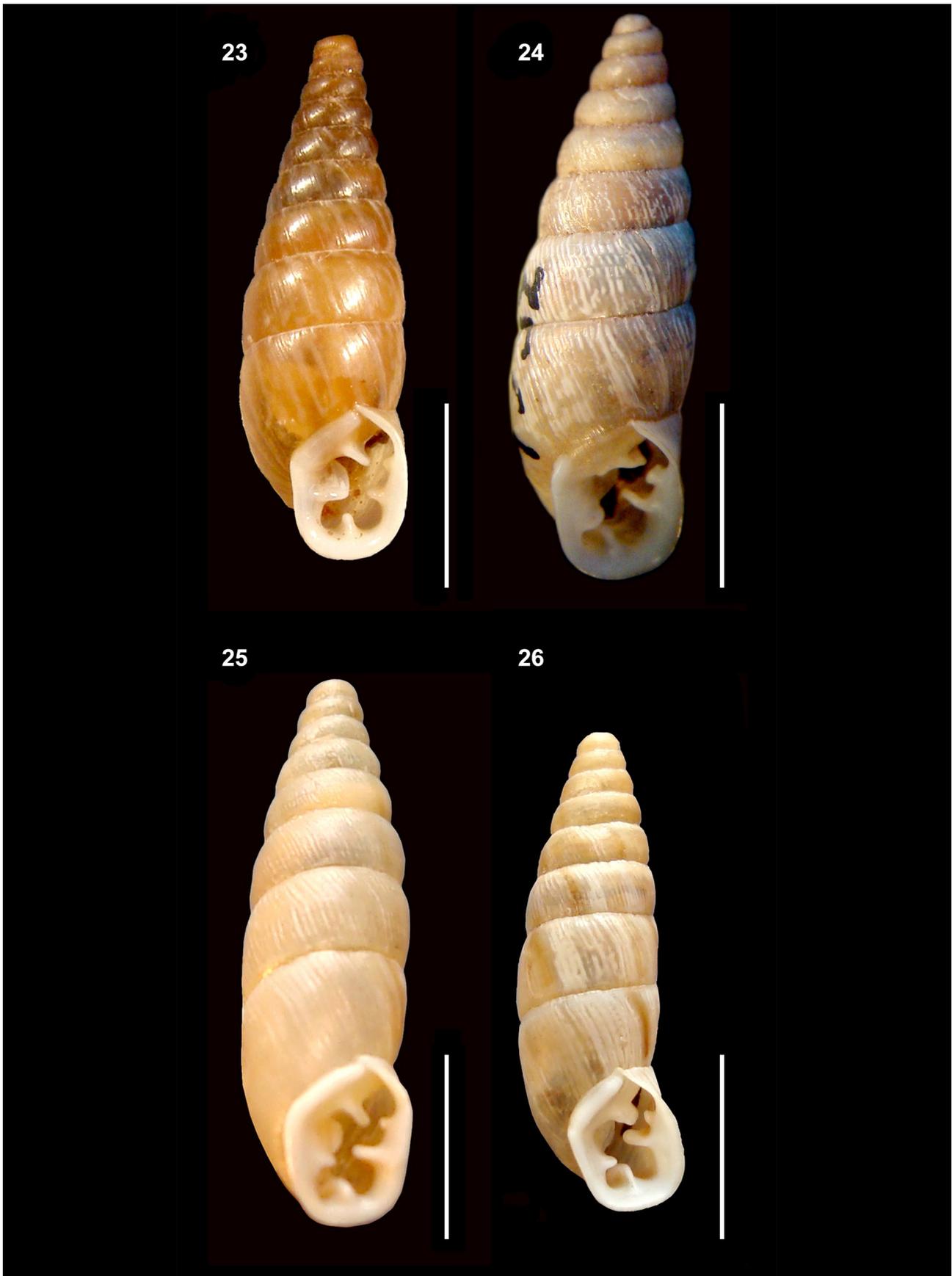
species of *Clessinia* with sub-pyriform shells are much larger: *C. doellojuradoi* (Parodiz, 1941) (holotype measurements: H: 25; D maj: 10; H ap: 9.2; D ap: 6) and *C. tucumanensis* (Parodiz, 1941) (holotype measurements: H: 25.5; D maj: 9; H ap: 8.3; D ap: 6).

The highly lustrous shell, observed in live specimens with naked eye, is not usual in many species of *Clessinia*. The presence of periostracum is observed most often in juvenile specimens.

Concerning the shell size, *C. juramentoensis* sp. nov. (Fig. 23) may be compared with the closest related species, i.e. *C. champaquiiana* (Doering, 1877) (Fig. 24), *C. pucarana* (Doering, 1875) (Fig. 25) and *C. tumulorum* (Doering, 1875) (DOERING 1875a, b, 1877) (Fig. 26). In those species the shell height (mean) is less than 15 mm but the shape is fusiform. The teleoconch sculpture in *C. juramentoensis* sp. nov. consists only of low axial rugosities, in contrast to the other species in which low ribs are present but these species do not have lustrous teleoconch. In



Figs 20–22. *Clessinia juramentoensis* sp. nov.: 20 – live specimen; 21 – microhabitat where live specimens were found along the road from Metán to Cabra Corral Dam; 22 – Juramento River in Metán Political Department, specimens were found in areas surrounding the river



Figs 23–26. Comparison of *C. juramentoensis* sp. nov. with closest related species: 23 – *C. juramentoensis* sp. nov.; 24 – *C. champaquiana*; 25 – *C. pucarana*; 26 – *C. tumulorum*. Scale bars 5 mm

the aperture, the parietal callus is developed as in *C. tumulorum* and *C. pucarana*, but in these species the callus is longer and narrower. In *C. champaquiana*, the parietal callus is usually absent. *C. juramentoensis* sp. nov. has a larger intra-apertural space than *C. pucarana*, *C. tumulorum* and *C. champaquiana*, due to the higher development of lamellae and teeth in the three species compared. The columellar lamella in *C. juramentoensis* sp. nov. is short, flattened, plateau-shaped; in *C. tumulorum* it is tongue-shaped: with its central portion much sunken, and less sunken in *C. champaquiana* and *C. pucarana* respectively. The palatal lamella is taller in the three species, compared to *C. juramentoensis* sp. nov.

The study of internal anatomy, particularly the penis inner wall, allows a clear differentiation of the new species from its congeners. Penial area I in *C. juramentoensis* sp. nov. shares some similarities with other species of *Clessinia*, although *C. juramentoensis* sp. nov. has two different kinds of sculpture: minute rings and the mesh of lamellae (usually in the other species only one kind of sculpture is present). Penial area II shares location and shape of the lamellae with *C. parodizi* (Hylton Scott, 1951), *C. pyrgula* (Hylton Scott, 1951), *C. subsexdentata* (Doering, 1875), *C. profundidens* (Doering, 1875) and *C. tumulorum* (Doering, 1875). Penis area IV is longer than in the other spe-

cies, corresponding to 1/3 of penis total length, while in the other species it occupies 1/4 or 1/5 of penis total length. The presence of a pilaster in penial area III is variable.

Within the genus *Clessinia* infraspecific variation is common in most species; however, in *C. juramentoensis* sp. nov. this variation was not so evident. One interesting fact is that the diagnostic characters of *C. juramentoensis* sp. nov. could be shared by other species of the genus, but it is the combination of these characters that has not been observed in the other species.

Another interesting fact is the distribution, as the species is restricted to the localities where it has currently been found. Despite an exhaustive search between Route 9 and Dique Cabra Corral, specimens have been only found in three places close to each other, as can be seen in the material examined.

Clessinia subcylindrica sp. nov.

Figs. 27–37

urn:lsid:zoobank.org:act:D26BEC53-93BF-46D8-906E-DCE7C15729EC

Etymology. The specific name “*subcylindrica*” refers to the particular shell shape.

Type material. Holotype: IFML-MOLL 15708 (1 specimen) Paratypes 17158 (2 specimens) Type lo-

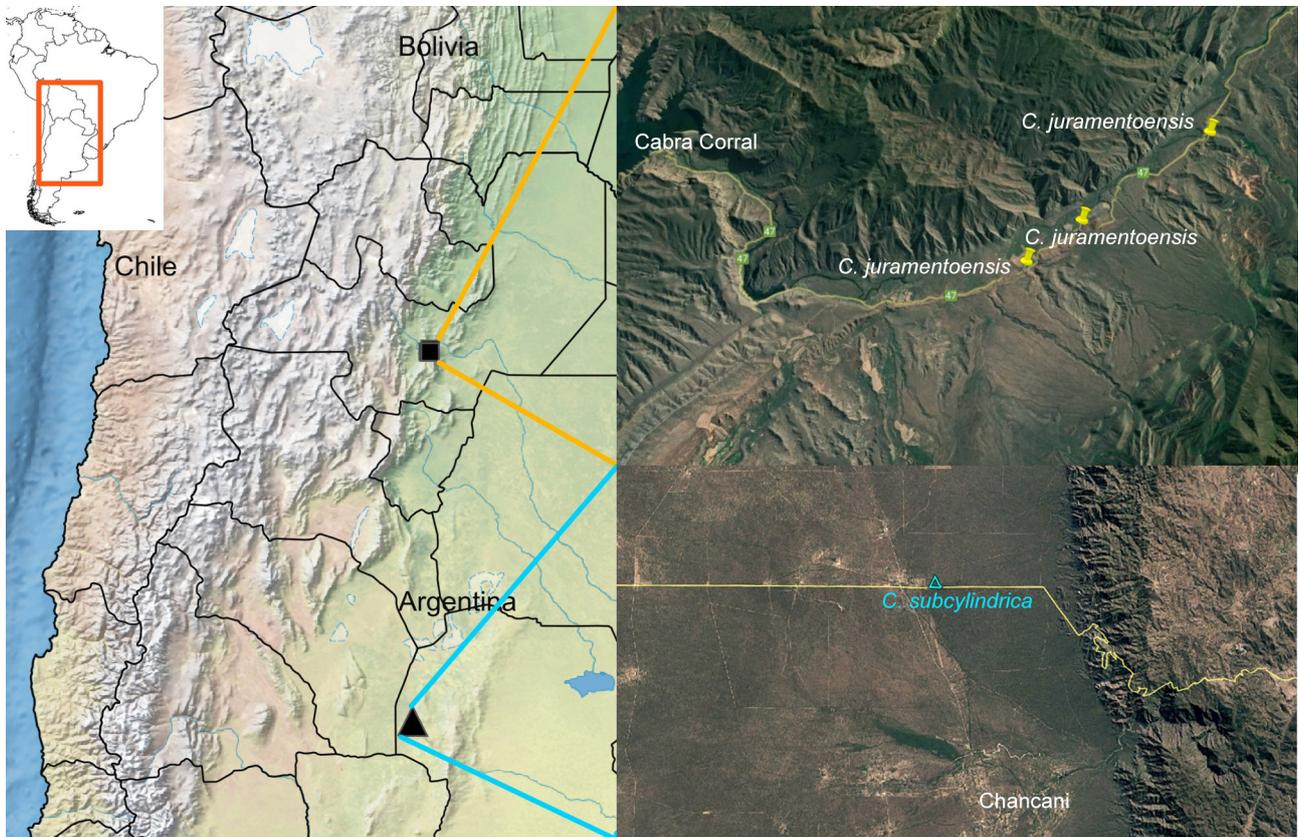


Fig. 27. Distribution of *Clessinia juramentoensis* sp. nov. (■ Salta Province) and *Clessinia subcylindrica* sp. nov. (▲ Córdoba Province)

cality: Argentina, Córdoba, Depto. Pocho, Chancaní, road to Villa Dolores (from Sierra de Pocho to Villa Dolores), 31°20'21"S, 65°29'09"W, 330 m a.s.l. N. PELEGRIN and S. BURELA, leg., March 2007.

Shell measurements. IFML-MOLL 15708, 17158 (n = 3), H: 13.17–13.77 (\bar{X} : 13.57); D maj: 4.56–5.17 (\bar{X} : 4.79); H ap: 4.18–4.31 (\bar{X} : 4.33); D ap: 3.50–3.67 (\bar{X} : 3.56).

Diagnosis. Shell small and sub-cylindrical-globose (H: \bar{X} : 13.57 mm). On penis inner wall, penial area II sculptured with numerous long strongly contracted lamellae. In penial area III, a pilaster constituted by a single much contracted fold, becoming scalloped.

Shell (Figs 28–33). Small, sub-cylindrical-globose; 9.5 to 10 slightly convex whorls. Light beige and uni-

form in colour. Protoconch with fine axial micro ribs spaced at regular intervals, intercostal space with flat transverse striae. Teleoconch with low axial ribs, regular in shape. Periostracum absent. Suture shallow. Aperture sub-circular with slightly thickened and expanded peristome. Parietal callus well-developed, elevated with a marked incision between parietal and palatal side. One apertural tooth and four lamellae. Suprapalatal tooth small with narrow and rounded base, located diagonally in relation to peristome. Palatal lamella, narrow, bell-shaped, with rounded edge. Basal lamella with rounded edge, slightly inclined towards palatal lamella. Columellar lamella flattened plateau-shaped, elongated towards inside of the aperture. Parietal lamella, flattened pla-



Figs 28–33. *Clessinia subcylindrica* sp. nov.: 28 – holotype: front view of the shell; 29 – holotype, lateral view with umbilicus; 30 – holotype, dorsal view; 31 – holotype, lateral view; 32 – aperture enlarged; 33 – live specimen. Scale bar 2 mm

teau-shaped, slightly concave towards columellar side. Umbilicus wide (Fig. 29).

Pallial system (Fig. 34). Similar as in *C. juramentoensis*. Ureter and rectum covered by the same layer of connective tissue. Both open between mantle collar folds. Pulmonary roof with venation at distal third portion, slightly pigmented. Inter-ramus zone semi-triangular.

Genital system (Figs 35–36). Similar to *C. juramentoensis*. Phallic complex constituted by penis, epiphallus and flagellum. Flagellum long, filiform, corresponding to approximately half of epiphallus length. Epiphallus tubular in shape, papilla of epiphallus small and rounded. Epiphallus length about 1/3 of penis total length. Vas deferens inserts at the boundary between epiphallus and flagellum, runs freely along epiphallus, joins retractor muscle, runs freely along penis, passes under penial sheath and through penial-vaginal junction, finally inserts into distal portion of spermoviduct. Retractor muscle attached to penis proximal portion. Penis tubular in shape with penial area I slightly widened (Fig. 35). Internally, inner wall covered with a set of minute rings arranged in chains. Penial area II sculptured with numerous long, highly contracted, scalloped lamellae, arranged longitudinally. In penial area III inner wall smooth, with raised, irregularly spaced and irregularly shaped folds; a pilaster formed of one continuous fold highly scalloped and elevated. Penial area IV with semi-straight longitudinal folds (Fig. 36). Penial sheath short and translucent.

Habitat. Live specimens of *Clessinia subcylindrica* were found under fallen cacti or under dead trees.

Distribution. *Clessinia subcylindrica* is restricted to the dry chacoan area of Chancaní National Park, on the western slope of the Sierra de Pocho, Cordoba province (Figs 27, 37).

Remarks. *Clessinia subcylindrica* sp. nov. (Fig. 38) differs from its congeners in the combination of small size, sub-cylindrical-globose shape, and the sculpture of the penis inner wall. Two species are of a similar shell height: *C. tumulorum* (Doering, 1875) (Fig. 39) and *C. olainensis* (Doering, 1875) (Fig. 40) but their shells are fusiform. Another difference is the inner apertural space, which in *C. subcylindrica* is wider, due to the size of apertural lamellae which are smaller than in the other two species, where the apertural lamellae are more developed (Figs 38–40). The shape of lamellae and teeth also differs, especially the columellar lamella: in *C. subcylindrica* it is short, plateau-shaped, in *C. olainensis* tall, and tongue-shaped, circular, and in *C. tumulorum* this lamella is tongue-shaped and sunken in its central portion. The suprapalatal tooth also differs, especially from *C. olainensis* where this tooth is bigger, elongated and located parallel to the peristome.

In its penial sculpture, *C. subcylindrica* (Fig. 42) is similar to *C. tumulorum* mainly in penial areas I and III (Fig. 41). In area I both species show minute rings, in area II *C. tumulorum* differs from the new species in its smaller and less folded lamellae, arranged horizontally and well-spaced; in *C. subcylindrica* the lamellae are much folded, more numerous and longitudinally located. In penial area III both species share a smooth wall with irregular folds, in *C. tumulorum* these folds are larger and more numerous. The pilaster observed in area III of *C. subcylindrica* is not observed in the other species, it is continuous, wide and much folded, becoming scalloped. In other species the pilaster is formed by intertwined lamellae, which may differ in size; in other cases, this pilaster is thin and not so much folded. Some specimens of *C. tumulorum* were also found in an area close to the locality where *C. subcylindrica* was collected (Fig. 27).

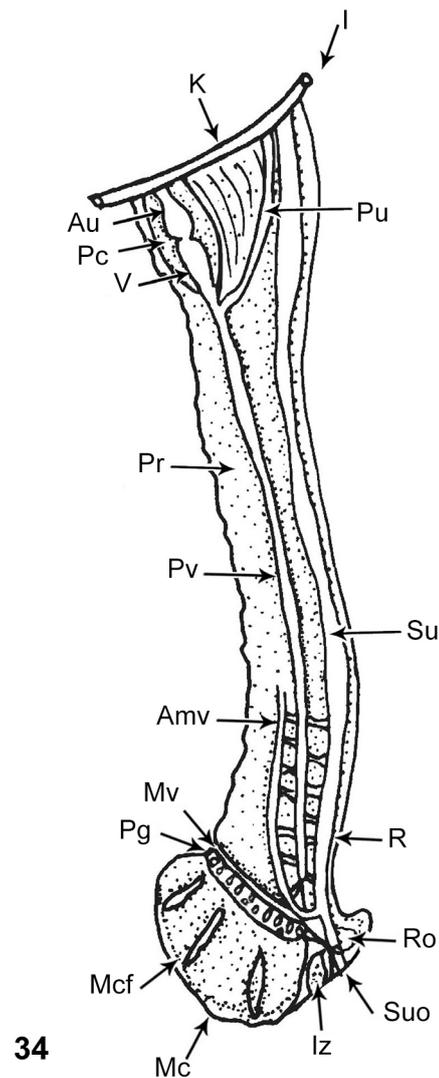
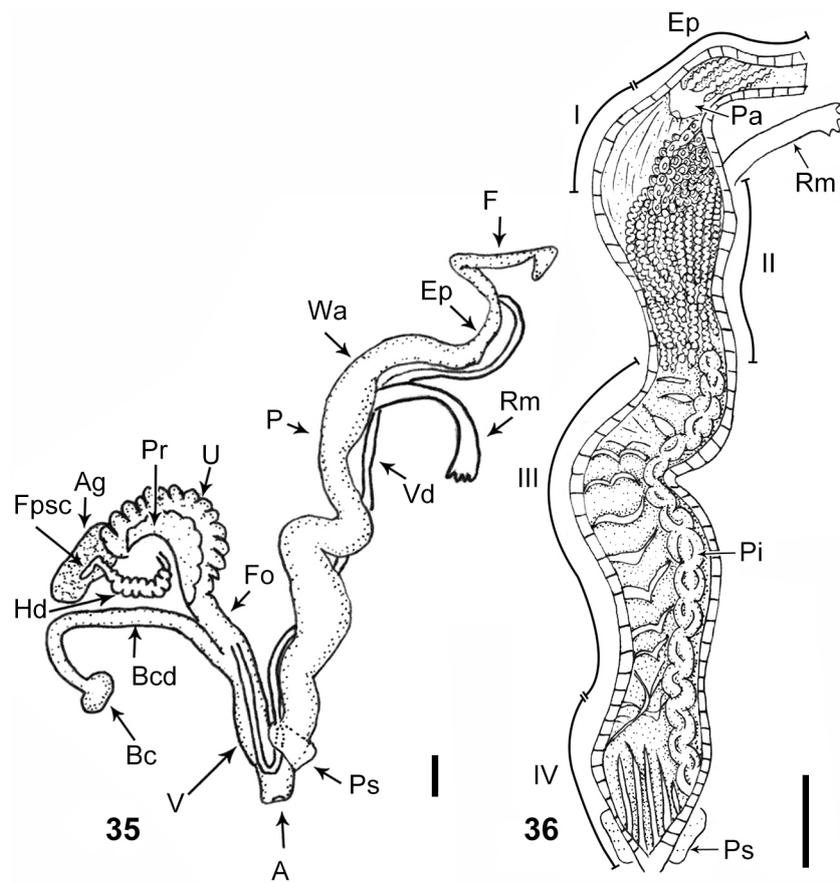


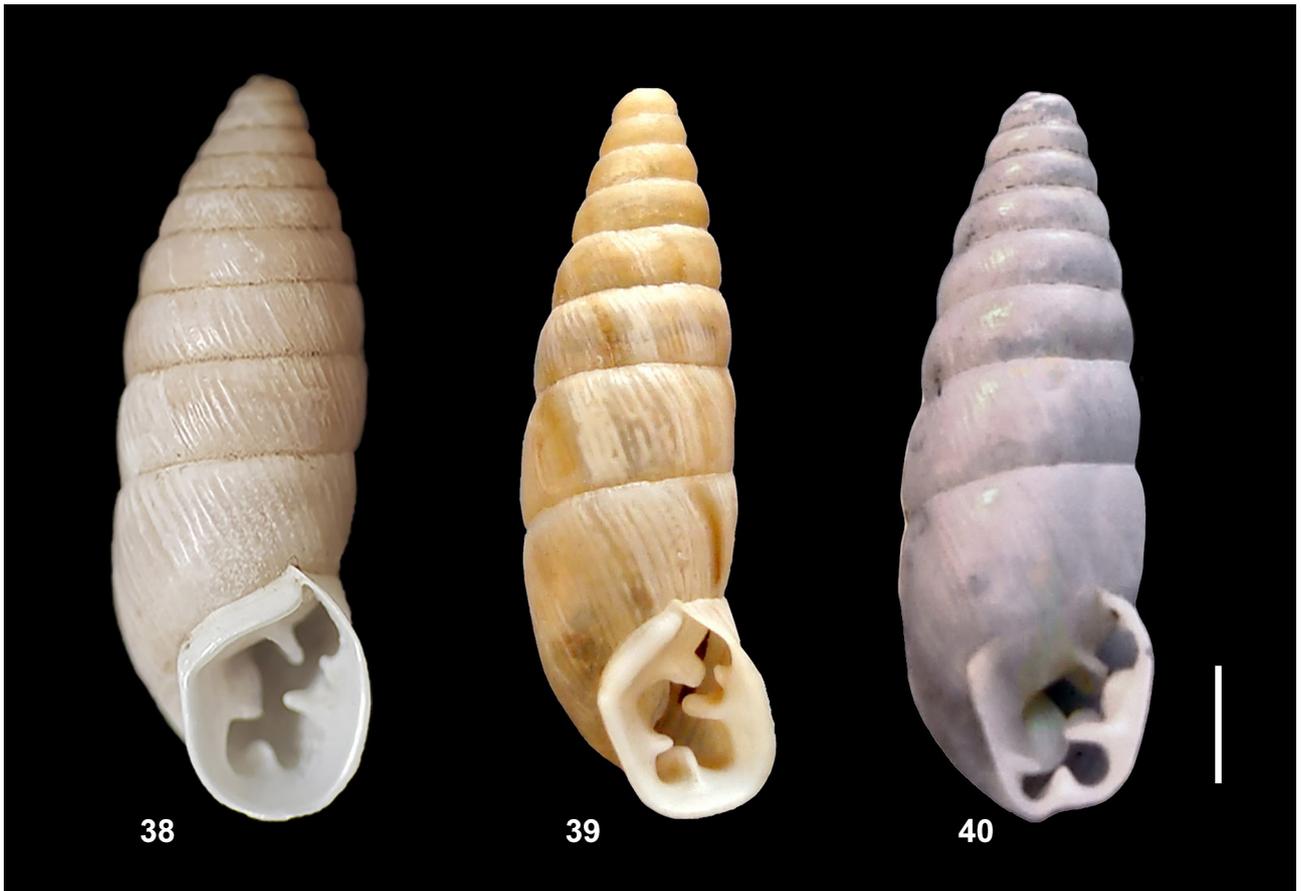
Fig. 34. *Clessinia subcylindrica* sp. nov.: pallial system. Scale bar 1 mm. For lettering see caption to Fig. 17



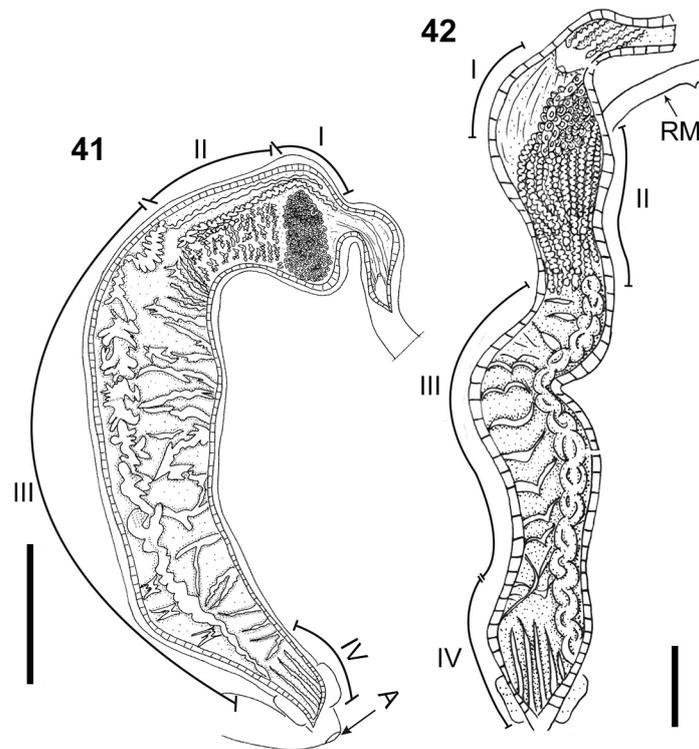
Figs 35–36. *Clessinia subcylindrica* sp. nov.: 34 – view of reproductive system without ovotestis; 35 – penis inner wall. Scale bars 1 mm. For lettering see caption to Figs 18–19



Fig. 37. Chancaní, habitat where live specimens of *Clessinia subcylindrica* sp. nov. were found



Figs 38–40. Comparison of *C. subcylindrica* sp. nov. with closest related species: 38 – *C. subcylindrica* sp. nov.; 39 – *C. tumulorum*; 40 – *C. olainensis*. Scale bar 5 mm



Figs 41–42. Comparison of sculpture of penis inner wall: 41 – *C. tumulorum*, scale bar 2 mm; 42 – *C. subcylindrica* sp. nov. Scale bars 2 mm (41) and 1 mm (42). For lettering see caption to Figs 18–19



ACKNOWLEDGEMENTS

We are most grateful to JONATHAN ABLETT (Natural History Museum, London) for his linguistic advice on drafts of the manuscript. Thanks are extended to Centro Integral de Microscopía Electrónica (CIME), UNT-CONICET. To RONALD JANSSEN (SMF, Germany), ALEJANDRO TABLADO and SERGIO MIQUEL (MACN-In, Argentina) and curators of MLP (Argentina) for allowing us to work in those malacological collections. Thanks are extended to PABLO PEREYRA (FML) and AUGUSTO FRANK for helping

with the editing of the figures. We are grateful to JULIA PIZÁ (Universidad Nacional Del Sur, Argentina) who donated material of *C. subcylindrica* to the malacological collection of FML. We extend our thanks to the anonymous reviewers, whose remarks contributed to improve this work. The collecting trips during 2005–2010 were funded by PIP 6048 (CONICET) y PICT 2006–00528. During the period 2005–2010, the author was a CONICET fellow. Recent sampling was funded by the Miguel Lillo Foundation within the framework of the Z Project Z-0091-1.

REFERENCES

- BREURE A. S. H., PLOEGER S. 1977. Notes on Bulimulidae (Gastropoda, Euthyneura), 6. The structure of the radula in some *Simulopsis* species. *Basteria* 41: 59–64.
- BREURE A. S. H., ROMERO P. 2012. Support and surprises: molecular phylogeny of the land snail superfamily Orthalicoidea using a three-locus gene analysis with a divergence time analysis and ancestral area reconstruction (Gastropoda: Stylommatophora). *Archiv für Molluskenkunde* 141: 1–20.
<https://doi.org/10.1127/arch.moll/1869-0963/141/001-020>
- CUEZZO M. G., MIRANDA M. J., OVANDO X. 2013. Species catalogue of Orthalicoidea in Argentina (Gastropoda: Stylommatophora). *Malacologia* 56: 135–191.
<https://doi.org/10.4002/040.056.0210>
- CUEZZO M. G., MIRANDA M. J., VOGLER R. E., BELTRAMINO A. A. 2018. From morphology to molecules: a combined source approach to untangle the taxonomy of *Clessinia* (Gastropoda, Odontostomidae), endemic land snails from the Dry Chaco ecoregion. *PeerJ* 6: 1–54.
<https://doi.org/10.7717/peerj.5986>
- DOERING A. 1875a. Estudios sistemáticos y anatómicos sobre los moluscos pulmoníferos de los países del Plata. *Periódico Zoológico* 1: 129–204, Pl. 4 (1874).
- DOERING A. 1875b. Apuntes sobre la fauna de moluscos de la República Argentina (Segunda parte). *Boletín de la Academia Nacional de Ciencias Exactas en Córdoba, Buenos Aires*, 1 (1874): 424–457.
- DOERING A. 1877. Apuntes sobre la fauna de moluscos de la República Argentina (Tercera parte). *Boletín de la Academia Nacional de Ciencias Exactas en Córdoba, Buenos Aires* 2 (1876): 300–339.
<https://www.biodiversitylibrary.org/page/33246605>
- HYLTON SCOTT M. I. 1951. Nuevos moluscos terrestres del Norte Argentino. *Acta Zoológica Lilloana* 10: 5–29.
- PARODIZ J. J. 1941. Four new species of *Spixia* from Argentina. *The Nautilus* 54: 92–95.
- PARODIZ J. J. 1951. Métodos de Conquiliometría. *Physis* 20: 241–248.
- PILSBRY H. A. 1898. Notes on the genus *Odontostomus*. *The Nautilus* 12: 57–58.
<https://www.biodiversitylibrary.org/page/1746611#page/73/mode/1up>
- PILSBRY H. A., VANATTA E. G. 1898. Material towards a natural classification of the Cylandrelloid snails. *Proceedings of the Academy of Natural Sciences of Philadelphia* 50: 264–286.
<https://www.biodiversitylibrary.org/page/1647758#page/266/mode/1up>
- SALAS OROÑO E. 2007. Taxonomic review of the *Spixia pyriformis* species complex (Gastropoda: Pulmonata: Odontostominae). *Zootaxa* 1498: 1–25.
<https://doi.org/10.11646/zootaxa.1498.1.1>
- SALAS OROÑO E. 2010. A new species of *Spixia* from Argentina (Gastropoda, Stylommatophora, Odontostomidae). *Journal of Conchology* 40: 305–313.
- SALAS OROÑO E. 2021. *Spixia josei*: Una nueva especie para la provincia de Córdoba, Argentina (Gastropoda: Stylommatophora: Odontostomidae). *Acta Zoológica Lilloana* 65: 144–160.
<https://doi.org/10.30550/j.azl/2021.65.1/2021-04-21>
- TOMPA A. S. 1984. Land snails (Stylommatophora). In: TOMPA A. S., VERDONK H. H., VAN DEN BIGGELAAR J. A. (eds). *The Mollusca*, VII. Academic Press, New York, pp. 47–140.

Received: November 7th, 2021

Revised: February 23rd, 2022

Accepted: April 5th, 2022

Published online: 19th April, 2022

