

## Systematic Revision of the *granulatus* Group of *Urophonius* Pocock, 1893 (Scorpiones, Bothriuridae), with Description of a New Species from Central Chile

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### ABSTRACT

A systematic revision of the *granulatus* group of the bothriurid scorpion genus *Urophonius* Pocock, 1893 is presented. *Urophonius pizarroi*, n. sp., a new species from central Chile, is described. *Urophonius granulatus* Pocock, 1898, *Urophonius somuncura* Acosta, 2003, and *Urophonius tregualemuensis* Cekalovic, 1981, are redescribed using modern standards. The adult males of *U. somuncura* and *U. tregualemuensis* are described for the first time. A distribution map and key to the species of the *granulatus* group are provided, along with a discussion of their phenology.

KEY WORDS: Scorpiones, Bothriuridae, *Urophonius*, systematics, Neotropics

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## INTRODUCTION

The bothriurid scorpion genus *Urophonius* Pocock, 1893, is endemic to mesic areas in southern South America. It has been recorded from Argentina, Brazil, Chile, and Uruguay. *Urophonius* is most closely related to *Cercophonius* Peters, 1861, a bothriurid endemic to mesic areas of Australia (Prendini, 2000, 2003).

*Urophonius* is currently divided into three species groups (Acosta, 1988): *brachycentrus*, *exochus*, and *granulatus* (table 1). Species of the *granulatus* group occur in central and southern Argentina and Chile, reaching southern Patagonia (fig. 1). The *granulatus* group contains the only species of *Urophonius* with a surface-activity period in spring and summer; species of the *brachycentrus* and *exochus* groups are active in late autumn and winter (Maury, 1968a, 1969, 1973, 1977, 1979a; Ojanguren-Affilastro, 2002, 2005).

Thus far, only three species are known in the *granulatus* group: *Urophonius granulatus* Pocock, 1898; *Urophonius somuncura* Acosta, 2003; and *Urophonius tregualemuensis* Cekalovic, 1981. Data on these species remains scarce. Only the systematics and distribution of *U. granulatus* is well known (Maury, 1979a; Ojanguren-Affilastro, 2005; San Martín, 1965; San Martín and Cekalovic, 1968). *Urophonius somuncura* and *U. tregualemuensis* are only known from female specimens collected at the type localities; the adult males of both species have never been described.

TABLE 1. Currently recognized species of the scorpion genus *Urophonius* Pocock, 1893, species groups to which assigned, and countries, provinces (Argentina), states (Brazil), regions (Chile) or departments (Uruguay) in which they have been recorded.

	Location
<i>brachycentrus</i> group	
<i>Urophonius achalensis</i> Abalos and Hominal, 1974	ARGENTINA: Córdoba
<i>Urophonius brachycentrus</i> (Thorell, 1876)	ARGENTINA: Buenos Aires, Córdoba, La Pampa, La Rioja, Río Negro, San Juan, San Luís, Santiago del Estero, Tucumán
<i>Urophonius iheringii</i> Pocock, 1893	ARGENTINA: Buenos Aires; BRAZIL: Río Grande do Sul; URUGUAY: Lavalleja, Maldonado, Montevideo, Tacuarembó
<i>Urophonius transandinus</i> Acosta, 1999	CHILE: Metropolitana de Santiago, Valparaíso
<i>exochus</i> group	
<i>Urophonius eugenicus</i> (Mello-Leitão, 1931)	ARGENTINA: Santa Cruz
<i>Urophonius exochus</i> (Penther, 1913)	ARGENTINA: Mendoza, Neuquén, Río Negro
<i>Urophonius mahuidensis</i> Maury, 1973	ARGENTINA: Buenos Aires
<i>Urophonius martinezi</i> Ojanguren-Affilastro and Cheli, 2009	ARGENTINA: Chubut
<i>granulatus</i> group	
<i>Urophonius granulatus</i> Pocock, 1898	ARGENTINA: Chubut, Santa Cruz; CHILE: Magallanes
<i>Urophonius pizarroi</i> , n. sp.	CHILE: Metropolitana de Santiago
<i>Urophonius somuncura</i> Acosta, 2003	ARGENTINA: Río Negro
<i>Urophonius tregualemuensis</i> Cekalovic, 1981	CHILE: Araucanía, Bio-Bio, Maule, Libertador Bernardo de O'Higgins
incertae sedis	
<i>Urophonius tumbensis</i> Cekalovic, 1981	CHILE: Bio-Bio

*Urophonius somuncura* is among several scorpion species endemic to the Somuncura Plateau of Río Negro Province, Argentina (Acosta, 2003, Ojanguren-Affilastro, 2007). This species was recently described using modern standards (Acosta, 2003) and it is very distinct from the other species of the *granulatus* group. However, the male of *U. somuncura* had not been collected until recently, despite several visits to the type locality (Acosta, 2003; Ojanguren-Affilastro, 2005). In early spring 2008, we collected a number of adult males of this species, providing an opportunity for their description in the present contribution.

*Urophonius tregualemuensis* was originally described from female specimens collected at Tregualemu and Llico, in the coastal area of southern Chile (regions VI and VII). Cekalovic's (1981) description did not adequately differentiate *U. tregualemuensis* from other species of *Urophonius*, however. Acosta (1988, 2003) revised part of the type material of this species, included it in the *granulatus* group, and provided additional taxonomic data to separate it from the other species of the genus known at the time. As no formal redescription of *U. tregualemuensis* has thus far been presented, we redescribe it here, including the first description and illustrations of the adult male.

During a recent visit to the Zoology Museum at the University of Concepción, Chile, we discovered several specimens of an undescribed *Urophonius* species in the *granulatus* group, from central Chile. In the present contribution, we describe this species as *Urophonius pizarroi*, n. sp., the northernmost species in the group.

Although there are modern redescriptions of *U. granulatus* (Maury, 1979a; Ojanguren-Affilastro, 2005), we consider it necessary to also include a new description of this species, using the same standards as for the other three species, for comparison. We also update the diagnosis of the *granulatus* group, to accommodate all four species currently recognized in it.

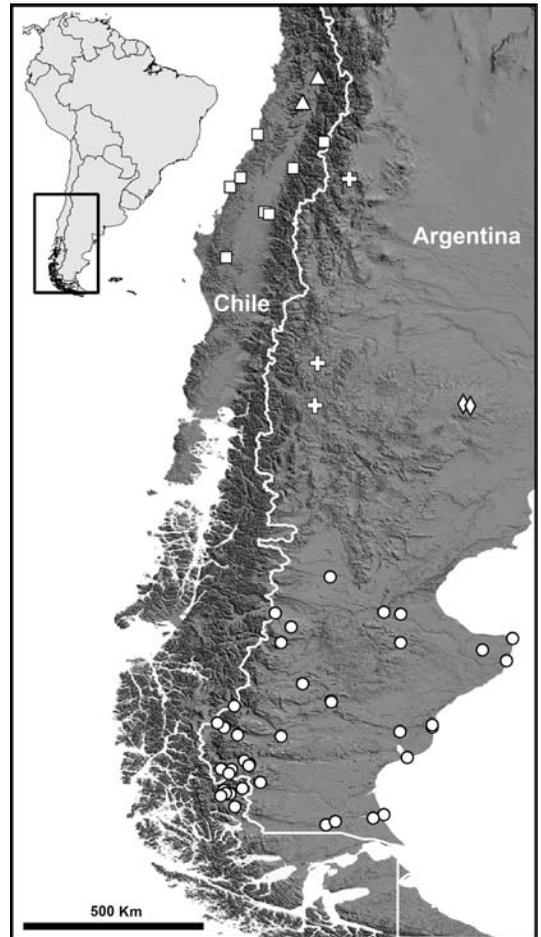


FIGURE 1. Map of the southern part of South America, plotting known locality records of species in the *Urophonius granulatus* group. *Urophonius granulatus* Pocock, 1898, circles. *Urophonius pizarroi*, n. sp., triangles. *Urophonius somuncura* Acosta, 2001, diamonds. *Urophonius tregualemuensis* Cekalovic, 1981, squares. Undescribed *Urophonius* species, crosses.

Finally, we present new data on the phenology of species in the *granulatus* group, as well as a distribution map, and key to their identification. This contribution raises to 13 the number of species described in the genus *Urophonius* (table 1). The systematics of the *brachycentrus* and *exochus* groups of *Urophonius* also remains to be rigorously studied.

## METHODS

New material reported here was collected manually by ultraviolet (UV) detection at night, and using pitfall traps. Abbreviations of collections are as follows: AMNH: American Museum of Natural History, New York, USA; BMNH, Natural History Museum, London, U.K.; CDA: Cátedra de Diversidad Animal I, Universidad Nacional de Córdoba, Argentina; LBRE: Laboratorio de Biología Reproductiva y Evolución, Universidad Nacional de Córdoba, Argentina; FML: Fundación Miguel Lillo, Tucumán, Argentina; IADIZA: Instituto Argentino de Investigación de Zonas Áridas, Mendoza, Argentina; LEA: Colección Luis Eduardo Acosta, Córdoba, Argentina; MACN-Ar: Museo Argentino de Ciencias Naturales “Bernardino Rivadavia,” Buenos Aires, Argentina; MHNC: Museo de Historia Natural, Facultad de Ciencias Biológicas, Universidad Nacional de San Antonio Abad del Cusco, Peru; MHNS: Museo de Historia Natural de Santiago, Chile; MZUC: Museo de Zoología de la Universidad de Concepción, Chile.

Measurements, taken using an ocular micrometer, were recorded in mm. Descriptive terminology follows Mattoni and Acosta (2005) for hemispermatothores; Vachon (1974) for trichobothria; Francke (1977) for metasomal carinae, abbreviated as follows: DL: dorsolateral; LIM: lateral inframedian; LSM: lateral supramedian; VSM: ventral submedian; VL: ventrolateral; VM: ventromedian; and Francke (1977) for pedipalp carinae, abbreviated as follows: DI: dorsal internal; DE: dorsal external; VI: ventral internal; VE: ventral external; D: digital; E: external; V: ventral; VM: ventral median; DM: dorsal marginal; DS: dorsal secondary.

Illustrations were produced using a Leica M165C stereomicroscope and camera lucida. Photographs were taken using a Microptics ML-1000 digital imaging system or a digital camera (Leica DFC290 or Nikon DS-Fi1) attached to a stereomicroscope (Leica M165C or Nikon SMZ1500), the focal planes fused with Helicon Focus 3.10.3 (<http://helicon.com.usa/heliconfocus/>) or CombineZM (©Alan Hadley, 2008; <http://hadleyweb.pwp.blueyonder.co.uk/>). Digital images of pigmentation pattern and habitus were taken under white light, images of external morphology under UV light.

Point locality records were georeferenced in the field with portable global positioning-system devices (Garmin® GPS II Plus, Etrex, Etrex Vista and Etrex Vista C) or retroactively using the GeoNet Names Server (<http://earth-info.nga.mil/gns/html/>).

The distribution map was generated using ArcMap 9.0 (©Environmental Systems Research Institute, Redlands, California), by superimposing the point locality records on a spatial dataset depicting the political boundaries and topography of Argentina and Chile. The topographic coverage (as a shaded relief) was generated using digital elevation model files (ca. 90 m resolution) from the CGIAR-CSI Consortium website (<http://srtm.csi.cgiar.org/>).

## SYSTEMATICS

Family Bothriuridae Simon, 1880

Genus *Urophonius* Pocock, 1893*Urophonius granulatus* group

Figure 1; table 1

DIAGNOSIS: The four species in the *granulatus* group of *Urophonius* can be separated from other species in the genus by means of the following combination of characters. Metasomal segment I, VSM carinae distinct, usually subparallel throughout length (diverging slightly at anterior margin of segment in some species) (figs. 3A, C, D, 4A, C, D), except for *U. somuncura*, in which it is absent or reduced to a few granules (figs. 3B, 4B). Metasomal segment I with two or three pairs of ventral macrosetae; II and III each with three pairs of ventral macrosetae (figs. 3, 4). Telotarsal spination, leg III: 5–5/5–6; IV: 5–6/6–7. Hemispermaphore, lobe region small to medium sized; capsular concavity very well developed; area between basal lobe and external lobe concave (fig. 8A, C, E, G); internal lobe with small, bilobed apophysis disconnected from distal lamina (fig. 8B, D, F, H). Trichobothrial pattern, neobothriotaxic major Type C, with one accessory trichobothrium in *V* series of chela; femur with 3 trichobothria (*d*, *i*, *e*); patella with 19 (3 *V*, 2 *d*, *i*, 3 *et*, *est*, 2 *em*, 2 *esb*, and 5 *eb*); chela with 27 (*Est*, 5 *Et*, 5 *V*, *Esb*, 3 *Eb*, *Dt*, *Db*, *et*, *est*, *esb*, *eb*, *dt*, *dst*, *dsb*, *db*, *ib*, and *it*); femoral trichobothrium *e* situated close to a single dorsal macroseta (M1), variable with respect to macrosetae in different species (figs. 10A, 13A, 16A, 19A). Chelicera, movable finger with two well-developed subdistal teeth. Metasomal segments, ventral surfaces each with paired VL and single VM pigmentation stripes, without paired VSM stripes.

KEY TO THE SPECIES IN THE *GRANULATUS* GROUP OF GENUS *UROPHONIUS*

1. Pedipalp femur, trichobothrium *e* situated proximal to dorsal macroseta M1 (fig. 10A); hemispermaphore, basal lobe with well-developed internal laminar extension, with internal notch (fig. 8A) ..... *U. granulatus*
- Pedipalp femur, trichobothrium *e* situated in same axis as or distal to dorsal macroseta M1 (figs. 13A, 16A, 19A); hemispermaphore, basal lobe without internal laminar extension or, if laminar extension present, weakly developed, forming concave surface without internal notch (fig. 8C, E, G) ..... 2
2. Pedipalp femur, trichobothrium *e* situated in same axis as dorsal macroseta M1 (fig. 13A); sternite VII and metasomal segment I, ventral surfaces without VSM carinae, only scattered granules evident; VL carinae weakly developed (♀), absent or almost indistinguishable (♂) (figs. 3B, 4B); hemispermaphore, distal lamina one third shorter than basal portion (fig. 8C) ..... *U. somuncura*
- Pedipalp femur, trichobothrium *e* situated distal to dorsal macroseta M1 (figs. 16A, 19A); sternite VII and metasomal segment I, ventral surfaces with

well-developed VSM carinae (more so in ♀) (figs. 3C, D, 4C, D); hemispermato-  
phore, distal lamina similar in length to basal portion (fig. 8F, H) . . . . . 3

- 3. Color yellowish with dark brown spots (fig. 15); carapace, anterior half weakly pigmented, with small dark spot medially on anterior margin (fig. 2C); metasomal segments IV and V, VL and VM pigmentation stripes not joining at posterior margins of segments; hemispermato-phore, lobe region weakly developed, basal lobe forming slightly concave surface (fig. 8E) . . . . . *U. tregualemuensis*
- Color dark brown with black spots (fig. 18); carapace, anterior half densely pigmented, with a well-developed dark spot occupying almost entire anterior margin (fig. 2D); metasomal segments IV and V, VL and VM pigmentation stripes joining at posterior margins of segments; hemispermato-phore lobe region well developed, basal lobe deeply excavated (fig. 8G) . . . . . *U. pizarroi*, n. sp.

*Urophonius granulatus* Pocock, 1898

Figures 1, 2A, 3A, 4A, 5A, 6A, 7A, E, 8A, B, 9–11; table 2

*Urophonius granulatus* Pocock, 1898: 392–394; Acosta, 1999: 158, 163; Lowe and Fet, 2000: 45 (complete reference list until 1998); Ojanguren-Affilastro, 2002: 182, 183, 185; Acosta, 2003: 7, 10; Ojanguren-Affilastro, 2005: 80, 126, 133–135, 144, 235; 2007: 48; Ojanguren-Affilastro and Cheli, 2009: 353, 354.

*Iophoroxenus exilimanus* Mello-Leitão, 1932: 23, 24, 35, 41 (synonymized by Maury, 1979a: 64).

*Urophonius paynensis* San Martin and Cekalovic, 1968: 82–90 (synonymized by Maury, 1979a: 65).

TYPE MATERIAL: 1 subad. ♀ holotype (BMNH), **CHILE**. *Iophoroxenus exilimanus*: 1 juv. holotype (MACN-Ar 4855), **ARGENTINA**: *Santa Cruz Province*: Lago Argentino [50°13'S 72°25'W]. *Urophonius paynensis*: holotype ♂ (MZUC 50), **CHILE**: **Region XII (Magallanes)**: *Magallanes Province*: Cerro Castillo [51°16'S 72°21'W].

NEW RECORDS: **ARGENTINA**: *Chubut Province*: Río Mayo, 45°40'56.4"S 70°16'51.1"W, 438 m, 20.i.2005, M. Magnanelli and E.G. López, 16 juv. (AMNH). *Santa Cruz Province*: Destacamento Policial Las Sierras, SW Pico Truncado, 47°18'14.2"S 68°31'57.7"W, 232 m, 16.i.2005, M. Magnanelli and E.G. López, 2 ♀, 1 subad. ♀, 4 juv. (AMNH); Gobernador Gregores, 48°44'31.2"S 70°15'20.2"W, 287 m, 17.i.2005, M. Magnanelli and E.G. López, 1 ♀, 3 juv. (AMNH); Los Antiguos, 46°34'18.3"S 71°38'44.8"W, 324 m, 19.i.2005, M. Magnanelli and E.G. López, 6 ♀, 3 subad. ♂, 1 juv. (AMNH). **CHILE**: **Region XII (Magallanes)**: *Última Esperanza Province*: Cerro Castillo [51°16'S 72°21'W], 22.ii.1991, L.E. Peña, 17 ♀, 7 juv. (AMNH). Parque Nacional Torres del Paine: 150 m, 10.ii.1985, N. Platnick and O.F. Francke, 5 ♀, 4 juv. (AMNH); Lago Sarmiento de Gamboa, 51°02'00"S 72°46'15"W, 100 m, pitfall, steppe, 6–9.xii.2000, J. Miller and I. Agnarsson, 1 ♀, 1 juv. (AMNH); Laguna Larga, 51°01'30"S 72°52'45"W, 300 m, under rocks in steppe, 7.xii.2000, J. Miller and I. Agnarsson, 2 ♀, 1 juv. (AMNH); near Refugio Chileno, 50°56'45"S 72°55'00"W, 400–600 m, 8–9.xii.2000, J. Miller and I. Agnarsson, 2 ♂, 1 ♀ (AMNH).

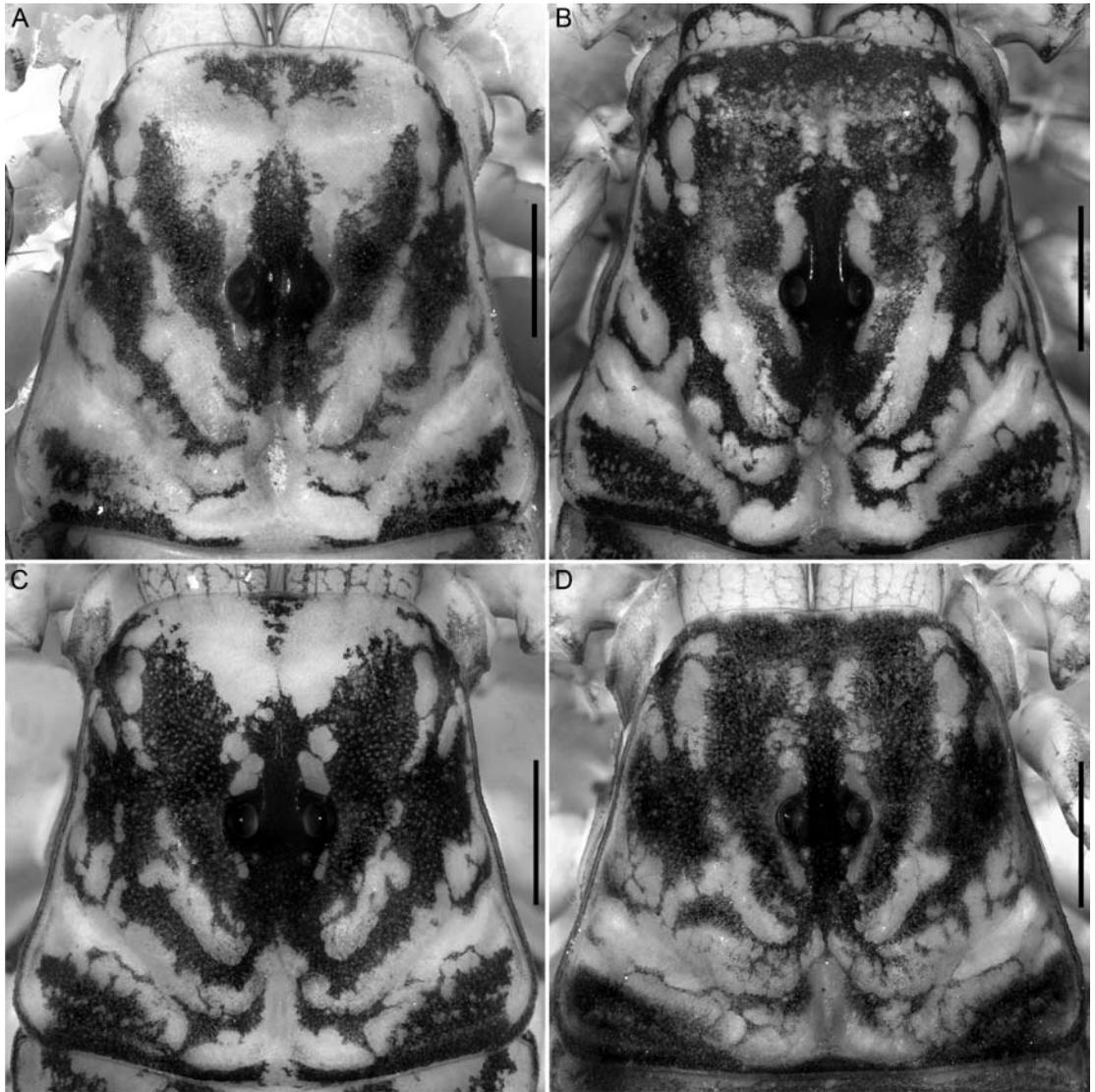


FIGURE 2. *Urophonius granulatus* group, carapace, dorsal aspect, showing pigmentation pattern. A. *Urophonius granulatus* Pocock, 1898, ♂ (MACN). B. *Urophonius somuncura* Acosta, 2001, ♂ (MACN). C. *Urophonius tregualemuensis* Cekalovic, 1981, ♂ (MACN). D. *Urophonius pizarroi*, n. sp., paratype ♂ (MZUC). Scale bars = 1 mm.

DIAGNOSIS: *Urophonius granulatus* can be distinguished from all other species of the *granulatus* group by the presence of an internal laminar extension with a well-developed notch on the internal surface of the hemispermatophore basal lobe (fig. 8A), absent in the other species (fig. 8C, E, G). It can also be distinguished from the other species of the group based on the position of pedipalp femoral trichobothrium *e*, which is situated proximal to dorsal macroseta M1; in the other species it is situated distally or in the same axis as M1.

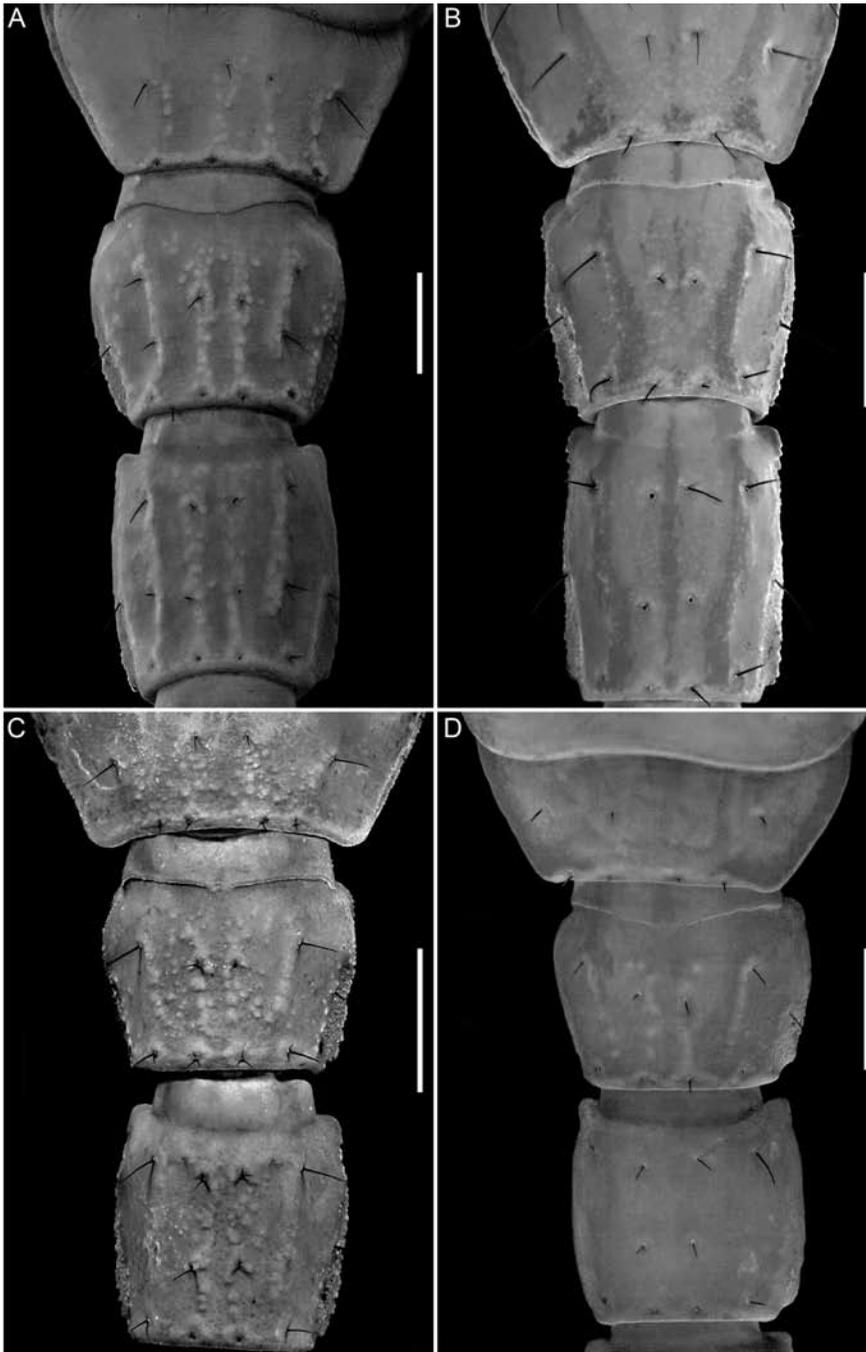


FIGURE 3. *Urophonius granulatulus* group, sternite VII and metasomal segments I and II, ventral aspect. A. *Urophonius granulatulus* Pocock, 1898, ♂ (MACN). B. *Urophonius somuncura* Acosta, 2001, ♂ (MACN). C. *Urophonius tregualemuensis* Cekalovic, 1981, ♂ (AMNH). D. *Urophonius pizarroi*, n. sp., paratype ♂ (MZUC). Scale bars = 1 mm.

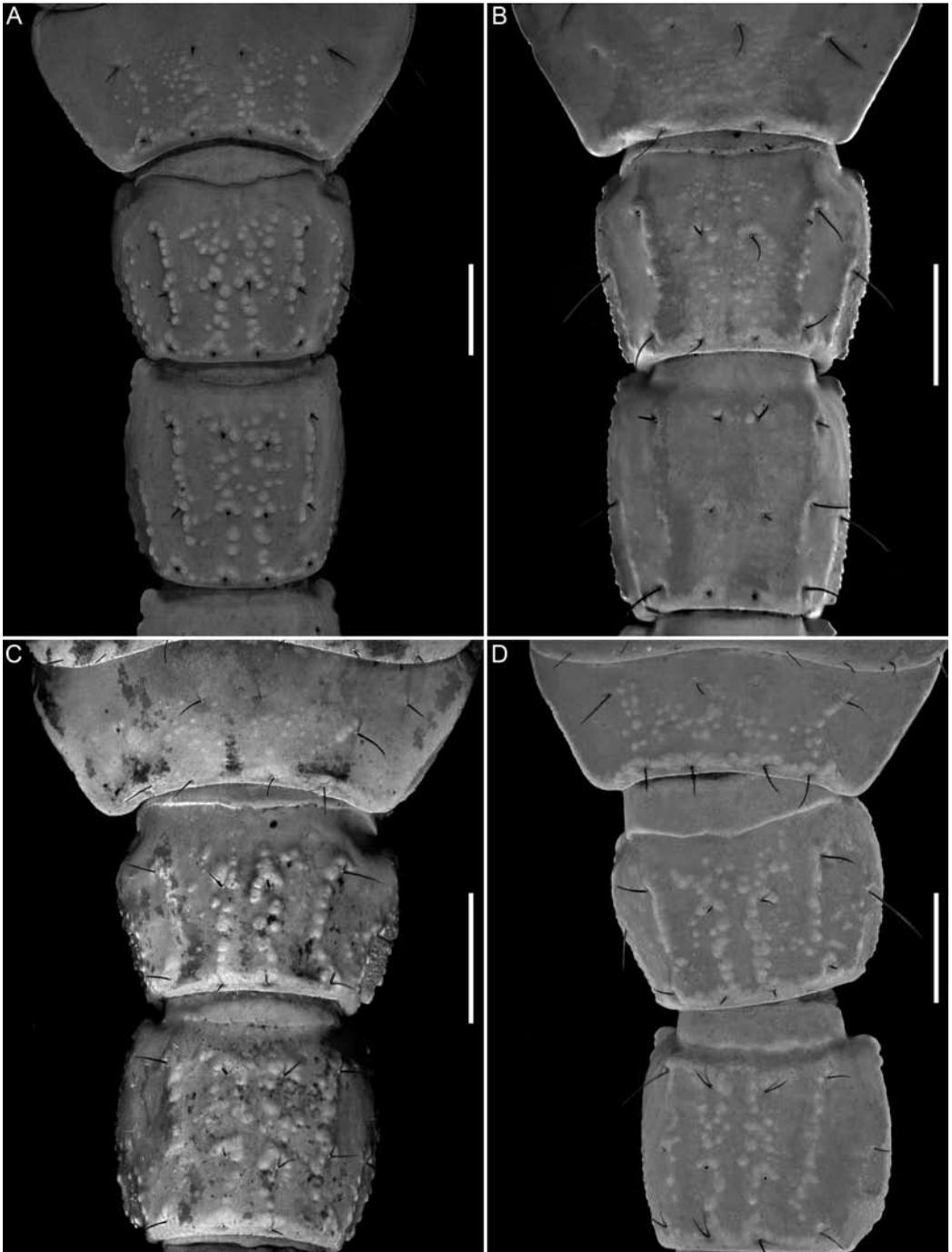


FIGURE 4. *Urophonius granulatus* group, sternite VII and metasomal segments I and II, ventral aspect. A. *Urophonius granulatus* Pocock, 1898, ♀ (LBRE). B. *Urophonius somuncura* Acosta, 2001, ♀ (MACN). C. *Urophonius tregualemuensis* Cekalovic, 1981, ♀ (AMNH). D. *Urophonius pizarroi*, n. sp., paratype ♀ (MZUC). Scale bars = 1 mm.

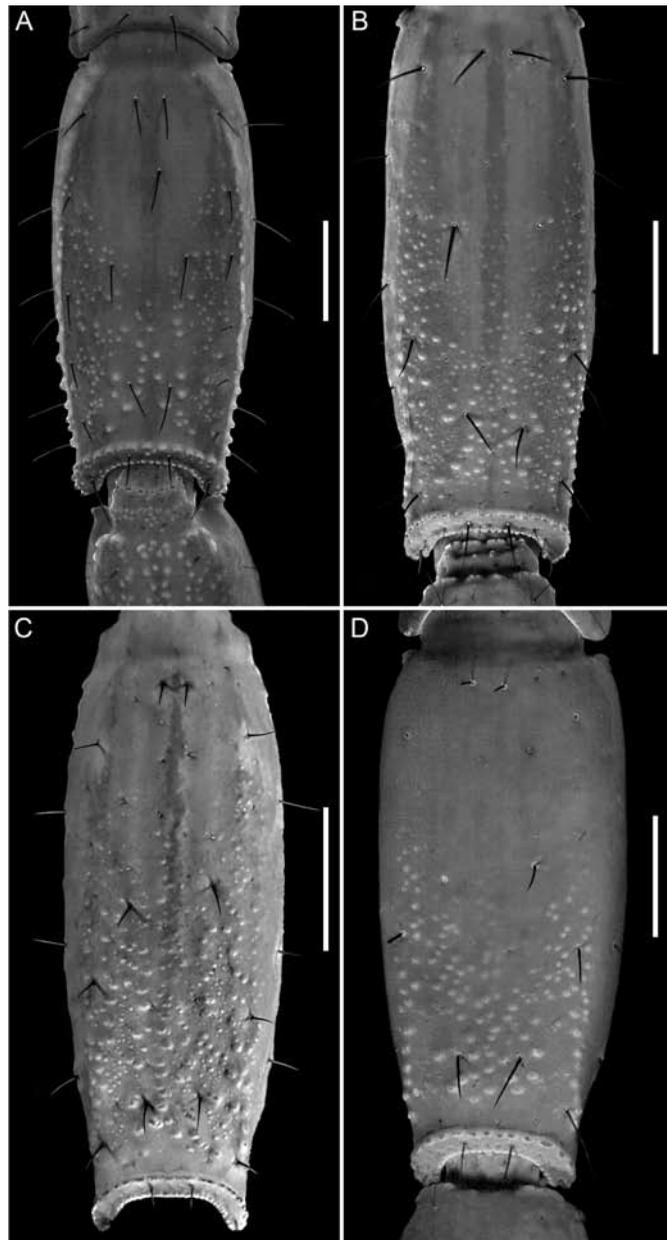


FIGURE 5. *Urophonius granulatus* group, metasomal segment V, ventral aspect. **A.** *Urophonius granulatus* Pocock, 1898, ♂ (MACN). **B.** *Urophonius somuncura* Acosta, 2001, ♂ (MACN). **C.** *Urophonius tregualemuensis* Cekalovic, 1981, ♂ (AMNH). **D.** *Urophonius pizarroi*, n. sp., paratype ♂ (MZUC). Scale bars = 1 mm.

*Urophonius granulatus* is most similar morphologically to *U. somuncura*, from which it may be separated by the following criteria: The VL and VSM carinae of the ventral surfaces of sternite VII and metasomal segments I and II are well developed in *U. granulatus* (figs. 3A, 4A), compared with *U. somuncura*, in which the VL carinae are weakly developed, and the VSM carinae absent, or represented only by scattered granules (figs. 3B, 4B). The telson of *U. granulatus* is more globose, with a telson length/height ratio of 2.62–3 ( $n = 10$ ; mean = 2.83) in ♂ and 2.72–3.07 ( $n = 10$ ; mean = 2.91) in ♀, than that of *U. somuncura*, in which the ratio is 3.18–3.37 ( $n = 10$ ; mean = 3.26) in ♂ and 3.02–3.37 ( $n = 10$ ; mean = 3.22) in ♀.

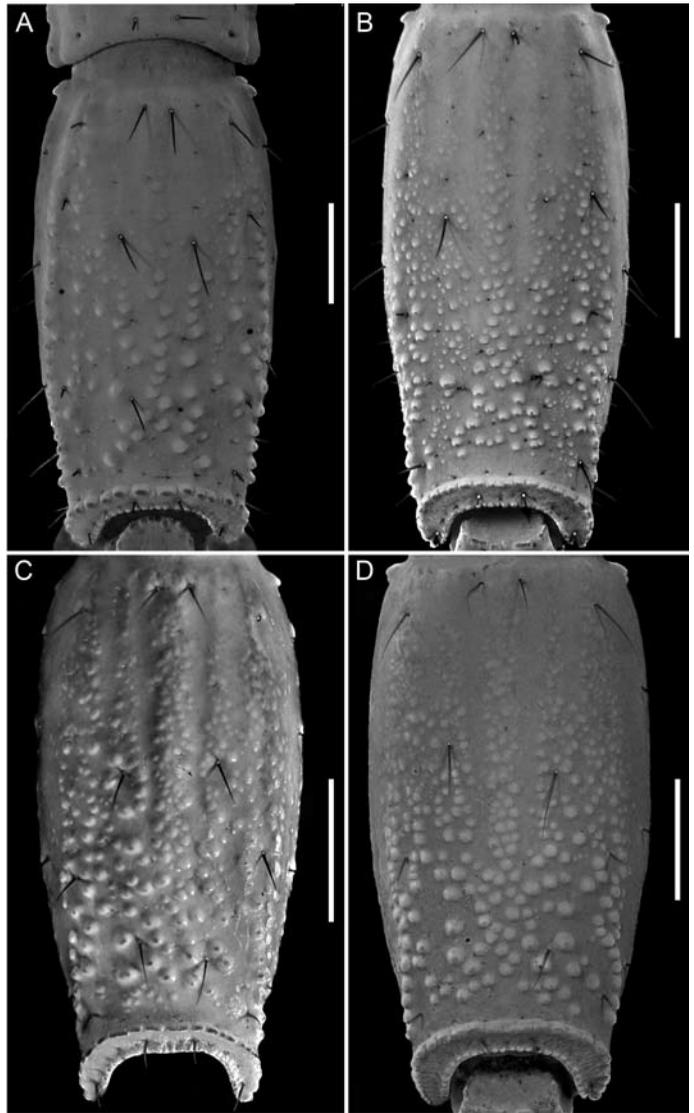


FIGURE 6. *Urophonius granulatus* group, metasomal segment V, ventral aspect. **A.** *Urophonius granulatus* Pocock, 1898, ♀ (LBRE). **B.** *Urophonius somuncura* Acosta, 2001, ♀ (MACN). **C.** *Urophonius tregualemuensis* Cekalovic, 1981, ♀ (AMNH). **D.** *Urophonius pizarroi*, n. sp., paratype ♀ (MZUC). Scale bars = 1 mm.

**DESCRIPTION:** Based on a ♂ and ♀ specimens deposited in the MACN.

**Total length:** 29–37 mm ( $n = 8$ ; mean = 34.5 mm) in ♂; 34–40 mm ( $n = 10$ ; mean = 38 mm) in ♀.

**Color:** Base color yellowish, with dark brown spots (fig. 9). Chelicerae with reticulate pigmentation on external surfaces of fingers and near articulation, in basal part of manus. Carapace, anterior margin with brown spot medially; median ocular tubercle and area around lateral ocelli dark brown (fig. 2A); two broad, dark stripes extending from median ocelli to anterior part of posterior longitudinal sulcus (in some specimens connected to anterior spot by reticulate pigmentation across most of anterior half of carapace); two stripes extending from lateral margins to posterior longitudinal sulcus; two dark spots posteriorly. Tergites I–VI each with paired dark spots, laterally and submedially, submedian spots converging at anteromedian margins of seg-

ments and in some specimens converging with lateral spots at posterior margins; VII with paired dark spots laterally and submedially, in some specimens converging at anterior margin. Sternum, genital opercula, pectines, and sternites III–VI unpigmented; sternite VII with three dark spots, two submedially and one medially, in posterior third. Metasomal segments I–III, dorsal surfaces each with two dark spots submedially, joining medially in most pigmented specimens, and with two thin stripes along DL carinae, connected to dorsosubmedian spots, and becoming broader at posterior margins, but not connected to lateral stripes; lateral surfaces each with broad, dark stripe below VSM carinae, not connected to VL stripes; ventral surfaces each with three, separate dark stripes (two broader VL and a narrower VSM stripe) along entire length of segment. Metasomal segment IV, similar to I–III but with DSM spots more elongated, joining medially, and with lateral stripes connected to VL stripes by reticulate pigmentation in posterior third. Metasomal segment V, dorsal surface with paired, faint submedian and lateral stripes in anterior half, that are almost indistinguishable in posterior half; lateral surface with reticulate pigmentation joining with VL stripes in posterior half; ventral surfaces as on other segments with three ventral stripes. Telson, vesicle dorsal surface unpigmented medially, pigmented along DL margins; other surfaces densely pigmented, except for paired, narrow VSM and VL unpigmented stripes; aculeus basally unpigmented, apex dark brown. Pedipalps, trochanter with dark spot dorsally; femur with two well-developed stripes along DI and DE margins, and weakly developed stripe along VE margin; chela with seven dark stripes along DI, DM, DS, D, E, V, and VM carinae; area near articulation of fixed and movable fingers, and base of fingers with sparse, reticulate pigmentation. Legs II–IV, trochanter with small spot prolaterally; femur pigmented near articulation with patella and along ventroexternal margin; patella pigmented near articulations and along dorsal and ventral margins; tibia slightly pigmented along dorsal and ventral margins; basitarsus unpigmented in most specimens, but slightly pigmented along ventral margin in some; other segments unpigmented.

*Carapace:* Surfaces slightly granular, more densely so near lateral margins (♂) or slightly granular near lateral margins, smooth medially (♀). Anterior margin straight, or with weakly developed median projection. Anterior longitudinal, interocular, posterior longitudinal and lateral sulci well developed. Median ocular tubercle pronounced, median ocelli large, almost 2 diameters apart. Three pairs of small lateral ocelli on each side of carapace; anterior and median ocelli situated very close together, in same horizontal axis, posterior ocellus situated slightly dorsal to others, 1 diameter apart.

*Tergites:* Surfaces, I–VI smooth (♀) or finely granular (♂), more coarsely so near posterior and lateral margins; VII with paired submedian and lateral carinae, comprising medium-sized granules, lateral carinae restricted to posterior half of segment, submedian carinae to posterior third, intercarinal surfaces with scattered granules.

*Sternites:* Surfaces, III–VI smooth, with small, elliptical spiracles; VII, anterior half smooth, posterior half slightly granular and with well-developed VSM and VL carinae, more developed in ♀ (figs. 3A, 4A).

*Metasoma:* Metasomal segment I, dorsal surface sparsely granular; DL and LSM carinae granular, extending entire length of segment; surface between DL and LSM carinae densely granular; LIM carinae restricted to posterior half of segment; one pair of LIM macrosetae;

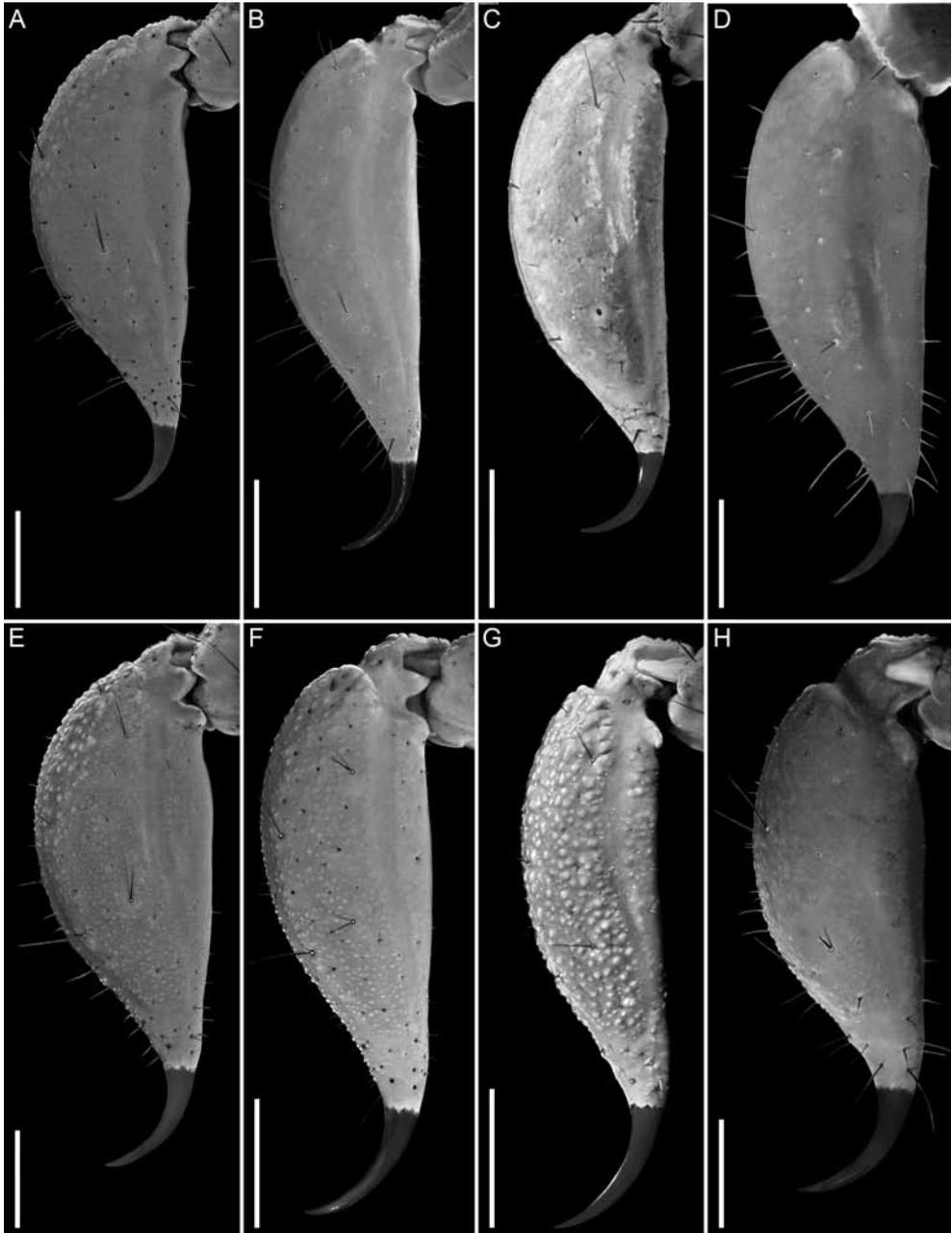


FIGURE 7. *Urophonius granulatus* group, telson, lateral aspect. A. *Urophonius granulatus* Pocock, 1898, ♂ (MACN). B. *Urophonius somuncura* Acosta, 2001, ♂ (MACN). C. *Urophonius tregualemuensis* Cekalovic, 1981, ♂ (AMNH). D. *Urophonius pizarroi*, n. sp., paratype ♂ (MZUC). E. *U. granulatus*, ♀ (LBRE). F. *U. somuncura*, ♀ (MACN). G. *U. tregualemuensis*, ♀ (AMNH). H. *U. pizarroi*, n. sp., paratype ♀ (MZUC). Scale bars = 1 mm.

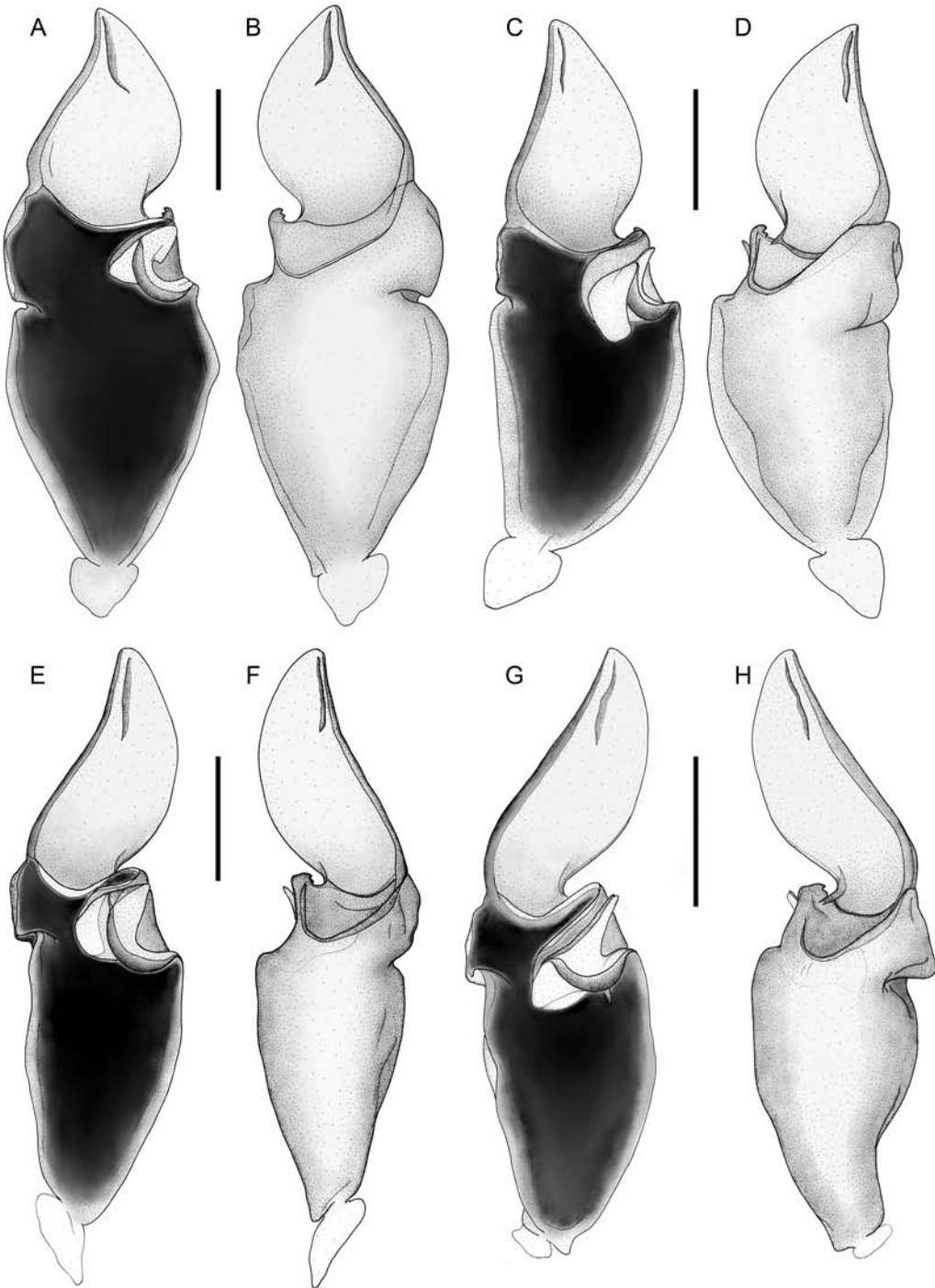


FIGURE 8. *Urophonius granulatus* group, sinistral hemispermaphore, ectal and ental aspects. **A, B.** *Urophonius granulatus* Pocock, 1898, ♂ (MACN). **C, D.** *Urophonius somuncura* Acosta, 2001, ♂ (MACN). **E, F.** *Urophonius tregualemuensis* Cekalovic, 1981, ♂ (MACN). **G, H.** *Urophonius pizarroi*, n. sp., paratype ♂ (MZUC). Scale bars = 1 mm.

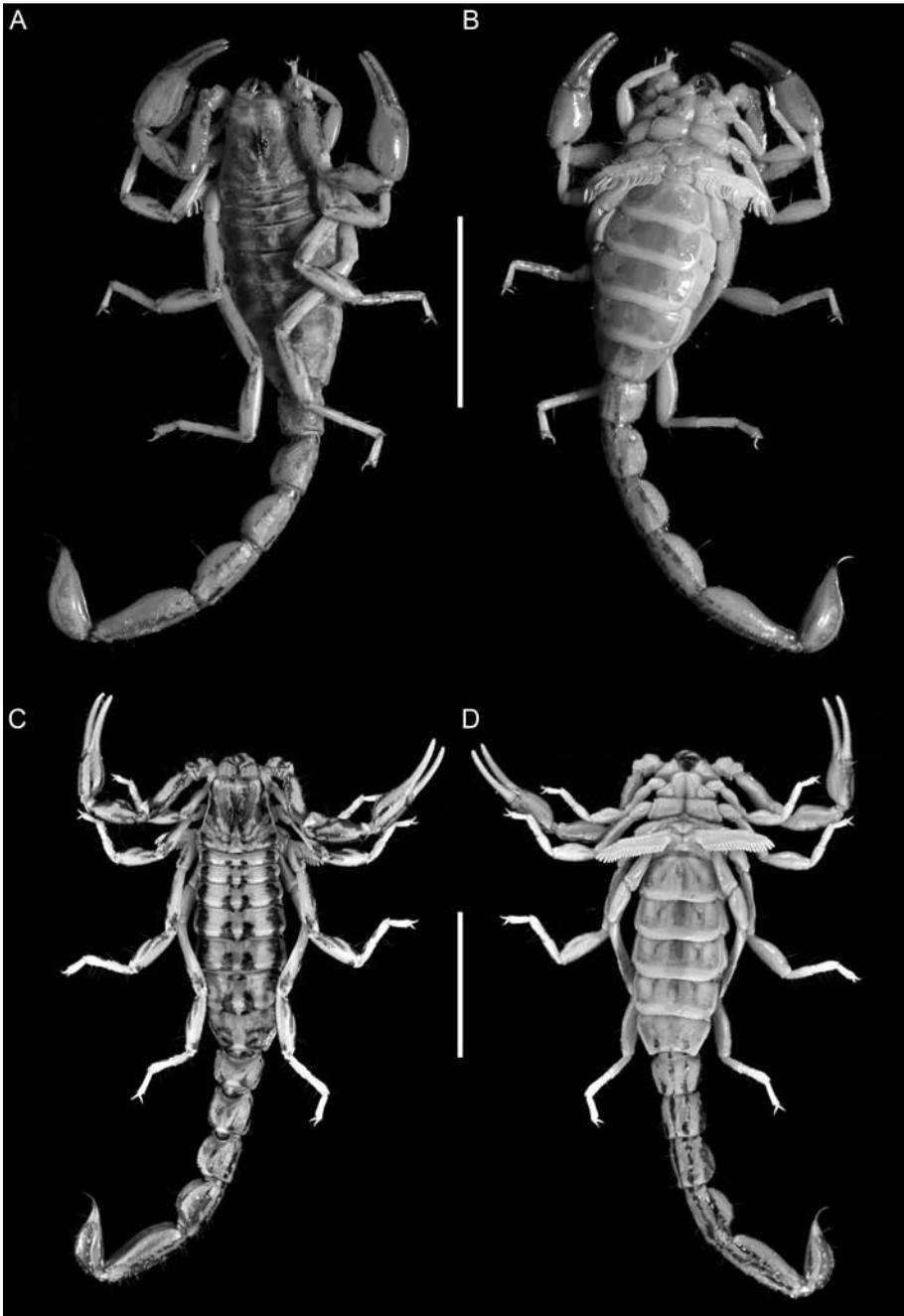


FIGURE 9. *Urophonius granulatus* Pocock, 1898, habitus. A, B. ♂ (MACN). C, D. ♀ (LBRE). A, C. Dorsal aspect. B, D. Ventral aspect. Scale bars = 10 mm.

lateral margins sparsely granular; ventral surface with paired VL and VSM carinae, more developed in ♀, diverging slightly at anterior margins; surface between VL and VSM carinae sparsely granular; three pairs of VL and two pairs of VSM macrosetae, sometimes with additional, intermediate row of 1 or 2 macrosetae. Segment II, similar to I, except with carinae less developed; LSM carinae almost smooth medially; one pair of LSM macrosetae; LIM carinae restricted to posterior margin of segment; VL and VSM carinae well developed (♀) or weakly developed (♂); three pairs of VSM macrosetae. Segment III, similar to segment II, except with VL and VSM carinae weakly developed (♀) or obsolete (♂). Segment IV, DL carinae extending entire length of segment, obsolete (♂); LSM carinae vestigial, restricted to anterior and posterior margins of segment; LIM carinae absent; one pair of DL, LSM, and LIM macrosetae; ventral surface smooth; three to four pairs of VL and VSM macrosetae. Segment V elongated (figs. 5A, 6A); length/width ratio 2–2.27 ( $n = 10$ ; mean = 2.13) in ♂, 1.68–1.97 ( $n = 10$ ; mean = 1.79) in ♀; length/height ratio 2.39–2.76 ( $n = 10$ ; mean = 2.6) in ♂, 2.12–2.29 ( $n = 10$ ; mean = 2.22) in ♀; dorsal and lateral surfaces smooth; DL carinae reduced to granules at anterior

margin of segment; one pair of DL macrosetae; LSM carinae represented only by pair of macrosetae at posterior margin; LIM carinae represented by four or five pairs of macrosetae; ventral surface granular in posterior half (♂) or posterior three-quarters (♀) of segment; VL carinae reduced to posterior three-quarters (♀) or posterior two-thirds (♂) of segment, comprising larger granules near posterior margin; VL and VM carinae equally well developed; VSM carinae subparallel to VL carinae but diverging in posterior third; five pairs of VL macrosetae, three pairs of VSM macrosetae, and two pairs of macrosetae at posterior margin of segment.

*Telson*: Vesicle globose, slightly more so in ♂ than ♀ (fig. 7A, E), length/height ratio 2.62–3 ( $n = 10$ ; mean = 2.83) in ♂, 2.72–3.07 ( $n = 10$ ; mean = 2.91) in ♀; ventral surface granular (♀) or smooth (♂), except for some anterior granules; dorsal surface smooth, with (♂) or without (♀) elliptical median depression, corresponding to telson gland. Aculeus short, shallowly curved.

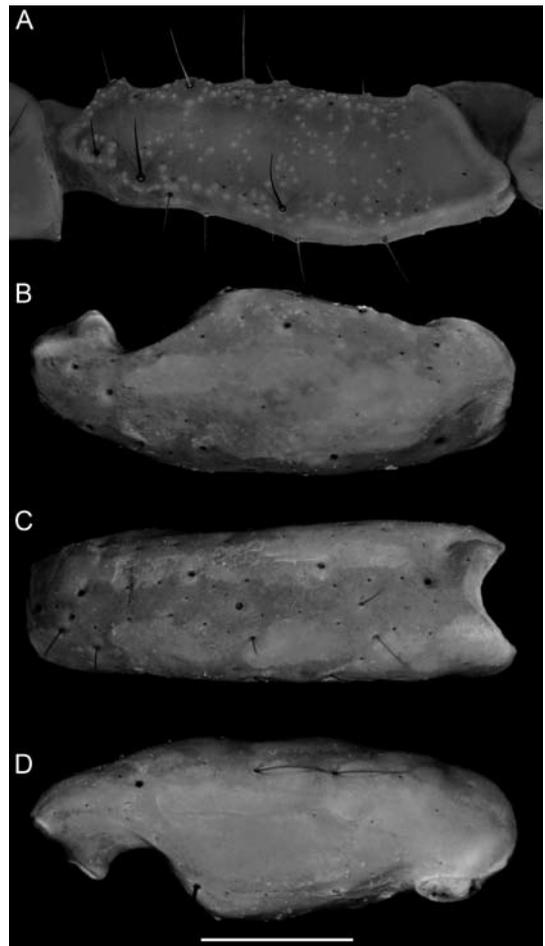


FIGURE 10. *Urophonius granulatus* Pocock, 1898, ♂ (MACN), dextral pedipalp segments. A. Femur, dorsal aspect. B. Patella, dorsal aspect. C. Patella, external aspect. D. Patella, ventral aspect. Scale bar = 1 mm.

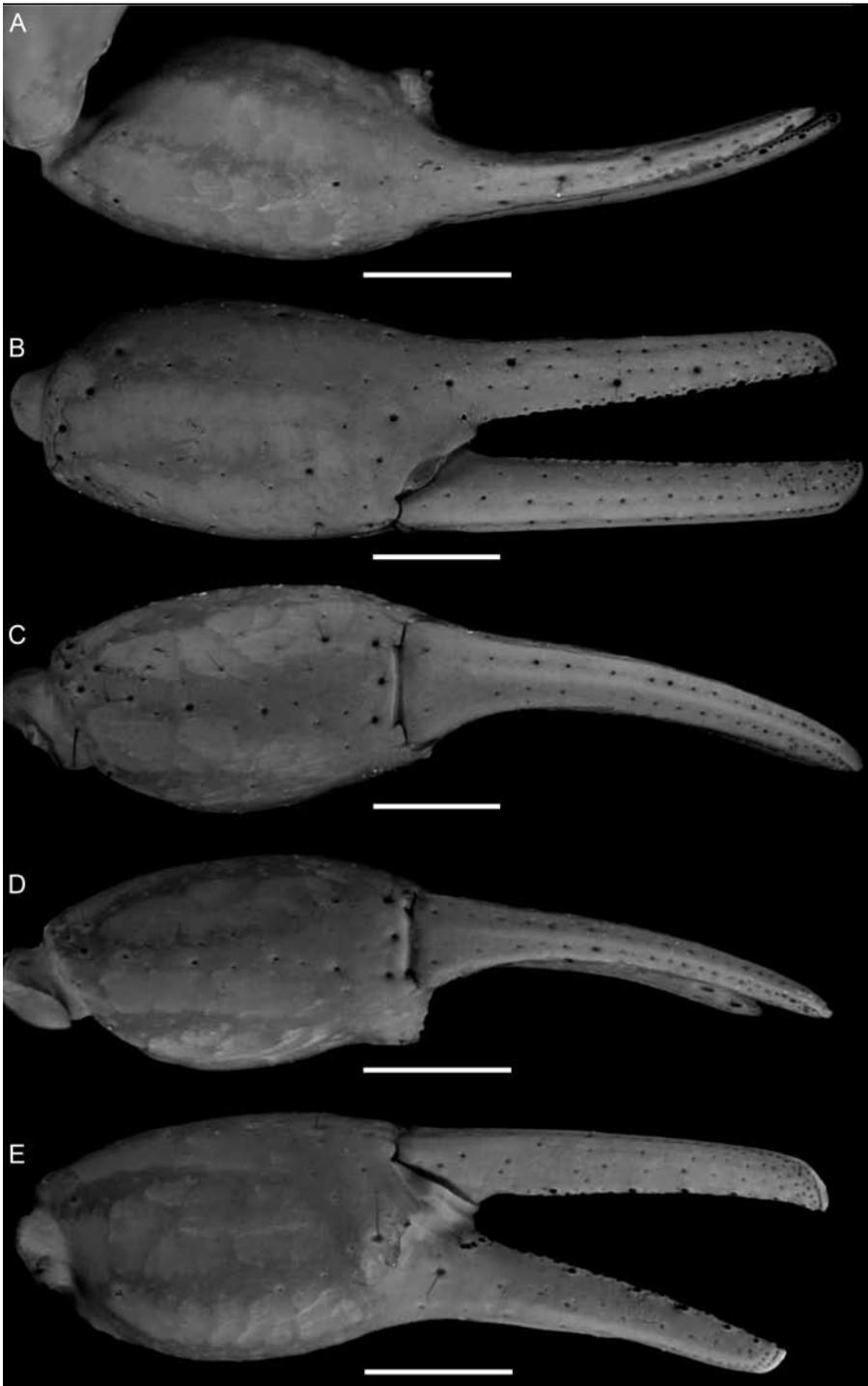


FIGURE 11. *Urophonius granulatus* Pocock, 1898, dextral pedipalp chela. **A, D, E.** ♂ (MACN). **B, C.** ♀ (LBRE). **A.** Dorsal aspect. **B.** External aspect. **C, D.** Ventral aspect. **E.** Internal aspect. Scale bar = 1 mm.

*Pedipalps*: Femur with DI, DE, and VI carinae granular, slightly more developed in ♂, extending entire length of segment (fig. 10A); trichobothrium *e* situated distal to dorsal macroseta M1. Patella with DI and DE carinae obsolete, visible only as slight curvature of surface, along entire length of segment; VI carina distinct, granular extending distal three-quarters of segment (fig. 10B–D). Chela manus slender (more robust in ♂), acarinate (fig. 11), internal surface with pronounced, subtriangular projection and shallow depression, with group of 3 or 4 granules and 1 or more additional granules between this group of granules and median denticle row of fixed finger, near base of fixed finger (♂; fig. 11E); fingers elongated, median denticle row medially uneven (but not forming a clear double row), with five pairs of accessory granules.

*Legs*: Surfaces smooth. Basitarsi each with two well-developed, equal-length pedal spurs. Telotarsi elongated (more so in ♂), shallow, each with well-developed ventromedian row of hyaline setae, and paired rows of ventrosubmedian spiniform setae, with following counts on each telotarsus: I: 1/1, II: 2/2, III: 4–5/5–6 (mode = 5/5), IV: 5–6/5–6 (mode = 5/6); the only pair of setae on I and first pair on II are setiform, whereas the rest are stout and spiniform. Ungues strongly curved, equal in length.

*Pectines*: Tooth count: 15–20 ( $n = 8$ ; mode = 18) in ♂; 15–18 ( $n = 15$ ; mode = 17) in ♀.

*Hemispermaphore*: Basal portion well developed. Distal lamina well developed, ca. 30% shorter than basal portion; distal crest oriented in same direction as principal axis of hemispermaphore, with basal part diverging from posterior margin; frontal crest (distal posterior flexure) present; internal lobe with two well-developed denticles, disconnected from distal lamina (fig. 8B), external denticle ca. 50% larger than internal denticle. Lobe region weakly developed (fig. 8A); basal lobe well developed, barely protruding, with internal laminar extension, anterior surface straight, with internal notch. We examined the hemispermaphores of more than 15 specimens, and observed variation only in the development of the internal notch of the internal lobe, which is more developed in some specimens than others. However, the internal notch is present and conspicuous in all specimens examined. We did not observe any structure that could be assigned to the genital plug in this species (cf. the description of the hemispermaphore of *U. tregualemuensis*), but we had access only to adult male specimens collected more than 20 years ago. This structure is almost impossible to recover after clearing the hemispermaphore of old or poorly preserved specimens.

**DISTRIBUTION**: This species is endemic to the southern part of South America, in southern Patagonia. It has been recorded from the Chubut and Santa Cruz provinces of southern Argentina and the Magallanes Region of southern Chile (fig. 1).

**ECOLOGY**: All records of *U. granulatus* occur in the Patagonian phytogeographic province (Cabrera and Willink, 1980), a shrub steppe habitat. Records of this species from La Carlota (51°50'14.17"S; 70°23'33.14"W) and Río Gallegos (51°38'23.5"S; 69°17'9.94"W) are probably the world's southernmost records of any species of scorpion. Records of *Bothriurus sanctaecrucis* Mattoni, 2007, and *Urophonius eugenicus* (Mello-Leitão, 1932) are located slightly to the north in Santa Cruz Province (Mattoni, 2007; Ojanguren-Affilastro and Cheli, 2009), while records of *Bothriurus burmeisteri* Kraepelin, 1894, from Tierra de Fuego (Ringuelet, 1953; Maury, 1968b) are dubious (Mattoni, 2007; Maury, 1979b; Ojanguren-Affilastro, 2005).

*Urophonius somuncura* Acosta, 2003

Figures 1, 2B, 3B, 4B, 5B, 6B, 7B, F, 8C, D, 12–14; table 2

*Urophonius somuncura* Acosta, 2003: 1–12. Ojanguren-Affilastro, 2005: 80, 126, 135, 136, 144, 235; 2007: 47, 48, 52; Ojanguren-Affilastro and Cheli, 2009: 353, 354, 355.

TYPE MATERIAL: **ARGENTINA:** *Río Negro Province:* Holotype ♀ (CDA 000.151), Meseta de Somuncurá, Laguna Pelada, 7.xii.1985, L. Acosta. Paratypes: same data, 9 ♀, 4 juv. (LEA), 2 ♀ (FML), 2 ♀ (IADIZA); Laguna Chara, 1 ♀ (MACN), 18.xii.1968, J. M. Cei.

NEW RECORDS: **ARGENTINA:** *Río Negro Province:* Meseta de Somuncurá, 41°25'20.6"S, 66°58'37.6"W, 1465 m, 29.x.2008, A. Ojanguren-Affilastro, S. Nenda, and L. Compagnucci, 18 ♂, 19 ♀, 4 juv. (MACN-Ar), 2 ♂, 2 ♀, 2 juv. (AMNH), 2 ♂, 2 ♀, 2 juv. (LBRE), 2 ♂, 2 ♀, 2 juv. (MHNC).

DIAGNOSIS: *Urophonius somuncura* is most similar morphologically to *U. granulatus*, from which it may be separated on the following criteria. The VL carinae on the ventral surfaces of sternite VII and metasomal segments I and II are weakly developed, and the VSM carinae absent, or represented only by scattered granules (figs. 3B, 4B) in *U. somuncura* compared with *U. granulatus*, in which these carinae are well developed (figs. 3A, 4A). The telson of *U. somuncura* is less globose, with a telson length/height ratio of 3.18–3.37 ( $n = 10$ ; mean = 3.26) in ♂ and 3.02–3.37 ( $n = 10$ ; mean = 3.22) in ♀, than that of *U. granulatus*, in which the ratio is 2.62–3 ( $n = 10$ ; mean = 2.83) in ♂ and 2.72–3.07 ( $n = 10$ ; mean = 2.91) in ♀.

The external morphology and hemispermaphore of *U. somuncura* are also similar to that of *U. tregualemuensis*, from which it may be distinguished by the shorter distal lamina of the hemispermaphore (fig. 8C, D) and the position of pedipalp femoral trichobothrium *e*, which is situated in the same axis as dorsal macroseta M1 (fig. 13A), rather than proximal to it (fig. 16A). Both species can be also distinguished by means of the pigmentation pattern of the carapace, the anterior margin of which is densely pigmented in *U. somuncura* (fig. 2B), but exhibits a wide, unpigmented triangle in *U. tregualemuensis* (fig. 2C). The two species may be further distinguished by means of the VL and VSM carinae of sternite VII and metasomal segments I and II: the VL carinae are weakly developed, and the VSM carinae absent, or represented only by scattered granules (figs. 3B, 4B) in *U. somuncura* compared with *U. tregualemuensis*, in which these carinae are well developed (figs. 3C, 4C).

DESCRIPTION: Based on the holotype ♀ (CDA) and a ♂ from the MACN.

*Total length:* 23.2–29.5 mm ( $n = 10$ ; mean = 26.3 mm) in ♂; 25.5–33 mm ( $n = 10$ ; mean = 29.7 mm) in ♀.

*Color:* Base color yellowish, with dark brown spots (fig. 12). Chelicerae with reticulate pigmentation on external surfaces of fingers and near articulation, in basal part of manus. Carapace with two broad, dark stripes, extending from anterior margin to anterior part of posterior longitudinal sulcus, covering most of anterior half; median ocular tubercle and area around lateral ocelli dark brown (fig. 2B); two lateral stripes extending from lateral margins to posterior longitudinal sulcus; two dark spots posteriorly. Tergites I–VI each with paired dark spots, laterally and submedially, submedian spots converging at anteromedian margins of segments

and in some specimens converging with lateral spots at posterior margins; VII with paired dark spots laterally converging at anteromedian margin. Sternum, genital opercula and pectines weakly pigmented, with some faint spots. Sternites III–VI, lateral margins densely pigmented; posterior margins faintly pigmented; VII densely pigmented on lateral margins, with three dark spots, two submedially and one medially, in posterior third. Metasomal segments I–III, dorsal surfaces each with two dark spots submedially, joining medially, and with two thin stripes along DL carinae, connected to dorsosubmedian spots, becoming broader at posterior margins, and connecting to lateral stripes; lateral surfaces each with broad, dark stripe below LSM carinae, not connected to VL stripes; ventral surfaces each with three, separate dark stripes (two broader VL and a narrow VSM stripe) along entire length of segment. Metasomal segment IV, similar to I–III but with DSM spots more elongated. Metasomal segment V, dorsal surface with paired, narrow submedian stripes and broad lateral stripes in anterior half, joining in posterior half; lateral surface with reticulate pigmentation joining dorsal and VL stripes in posterior half; ventral surfaces as on other segments with three ventral stripes. Telson, vesicle dorsal surface mostly covered by unpigmented gland; other surfaces densely pigmented, except for paired, narrow VSM and VL unpigmented stripes; aculeus basally unpigmented, apex dark brown. Pedipalps, trochanter with dark spot dorsally; femur with two well-developed stripes along DI and DE margins, and with two weakly developed stripes along VI and VE margins; chela with seven dark stripes along DI, DM, DS, D, E, V, and VM carinae; area near articulation of fixed and movable fingers, and base of fingers with sparse, reticulate pigmentation. Legs, coxae slightly pigmented; trochanters spotted pro- and retrolaterally; femur pigmented near articulation with patella and along ventroexternal margin; patella pigmented near articulations and along dorsal margin; tibia pigmented on articulation with patella; basitarsi pigmented near articulation with tibia; telotarsi unpigmented.

*Carapace:* Surfaces slightly granular, more densely granular so near lateral margins. Anterior margin slightly convex. Anterior longitudinal and interocular sulci weakly developed; posterior longitudinal and lateral sulci well developed. Median ocular tubercle pronounced, median ocelli large, ca. 2 diameters apart. Three pairs of small lateral ocelli on each side of carapace; anterior and median ocelli situated very close together, in same horizontal axis, posterior ocellus (which is 50% smaller) situated slightly dorsal to others, 1 diameter apart.

*Tergites:* Surfaces, I–VI finely granular, more coarsely so near posterior and lateral margins; VII with paired submedian and lateral carinae restricted to posterior two-thirds of segment, intercarinal surfaces with scattered medium-sized granules, rest of surface finely granular.

*Sternites:* Surfaces, III–VI smooth, with small, elliptical spiracles; VII, anterior half smooth, posterior two-thirds sparsely granular, more densely so in ♀; VSM and VL carinae usually absent (figs. 3B, 4B), but VL carinae obsolete in some specimens.

*Metasoma:* Metasomal segment I, dorsal surface sparsely granular; DL and LSM carinae granular, extending entire length of segment, with posterior three to five granules double the size of others and arranged in semicircle, usually surrounding small macroseta; surface between DL and the LSM carinae sparsely granular; LIM carinae restricted to posterior half of segment; one pair of LIM macrosetae; lateral margins and ventral surface sparsely granular; VL carinae

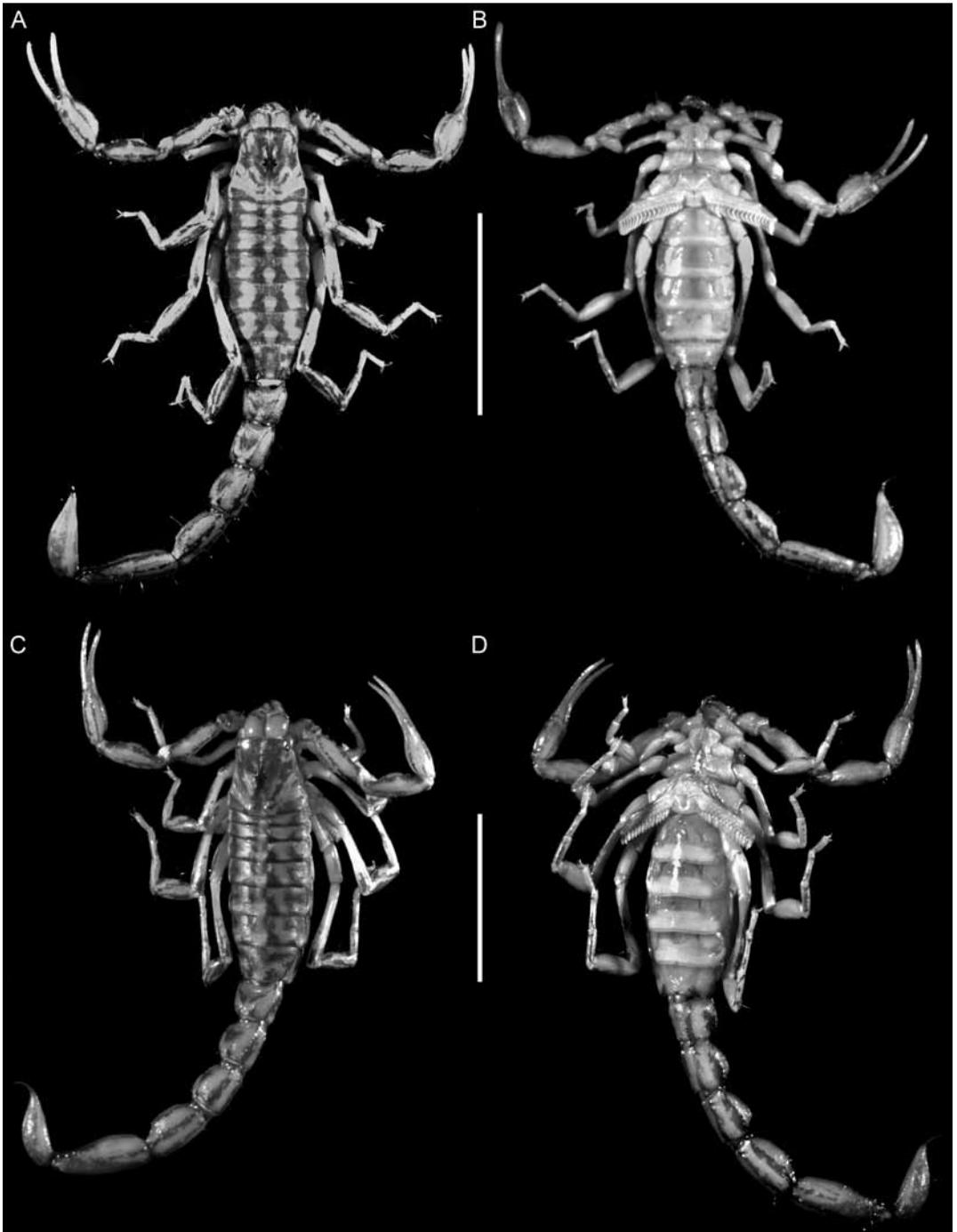


FIGURE 12. *Urophonius somuncura* Acosta, 2001, habitus. A, B. ♂ (MACN). C, D. ♀ (MACN). A, C. Dorsal aspect. B, D. Ventral aspect. Scale bars = 10 mm.

weakly developed (obsolete or absent in some ♂ specimens); VSM carinae absent; two pairs of VL and VSM macrosetae. Segment II, similar to I, except with carinae less developed; one pair of LSM and LIM macrosetae; LIM carinae restricted to posterior third of segment; ventral surface sparsely granular; VL carinae obsolete; three pairs of VSM macrosetae. Segment III, similar to segment II, except with less developed carinae; LSM carinae comprising small, sparse granules medially; LIM carinae absent; one pair of DL, LSM, and LIM macrosetae; ventral surface smooth. Segment IV, DL carinae granular, extending entire length of segment, connected to posterior margin of LSM carinae by scattered granules forming accessory carina; LSM carinae vestigial, restricted to anterior and posterior margins of segment; LIM carinae absent; one pair of DL, LSM, and LIM macrosetae; ventral surface smooth; three pairs of VSM and VL macrosetae. Segment V elongated (figs. 5B, 6B); length/width ratio 2.31–2.55 ( $n = 10$ ; mean = 2.49) in ♂, 1.90–2.15 ( $n = 10$ ; mean = 2.03) in ♀; length/height ratio 2.67–3 ( $n = 10$ ; mean = 2.88) in ♂, 2.22–2.54 mm ( $n = 10$ ; mean = 2.41) in ♀; dorsal and lateral surfaces with small, scattered granules; DL carinae reduced to granules in anterior third of segment; one pair of DL macrosetae; LSM carinae represented only by pair of macrosetae at posterior margin; LIM carinae represented by three pairs of macrosetae; ventral surface granular in posterior half of segment; VL carinae reduced to posterior two-thirds of segment, comprising larger granules near posterior margin; VSM carinae subparallel to VL carinae but diverging from them in posterior third of segment; VM carinae obsolete, reduced to scattered granules in posterior third of segment (♂) or more developed and occupying posterior half of segment (♀); three or four pairs of VL macrosetae, three pairs of VSM macrosetae, and two pairs of macrosetae at posterior margin of segment.

*Telson*: Vesicle slightly elongated, shallow, more so in ♀ than ♂ (fig. 7B, F); length/height ratio 3.18–3.37 ( $n = 10$ ; mean = 3.26) in ♂, 3.02–3.37 ( $n = 10$ ; mean = 3.22) in ♀; ventral surface smooth (♂) to slightly granular (♀); dorsal surface smooth, with (♂) or without (♀) an elliptical median depression, corresponding to telson gland. Aculeus short, shallowly curved.

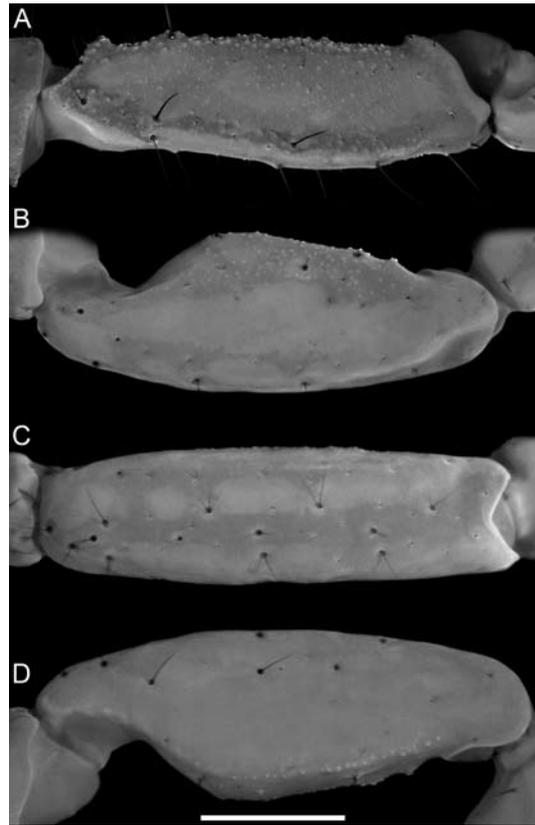


FIGURE 13. *Urophonius somuncura* Acosta, 2001, ♂ (MACN), dextral pedipalp segments. A. Femur, dorsal aspect. B. Patella, dorsal aspect. C. Patella, external aspect. D. Patella, ventral aspect. Scale bar = 1 mm.

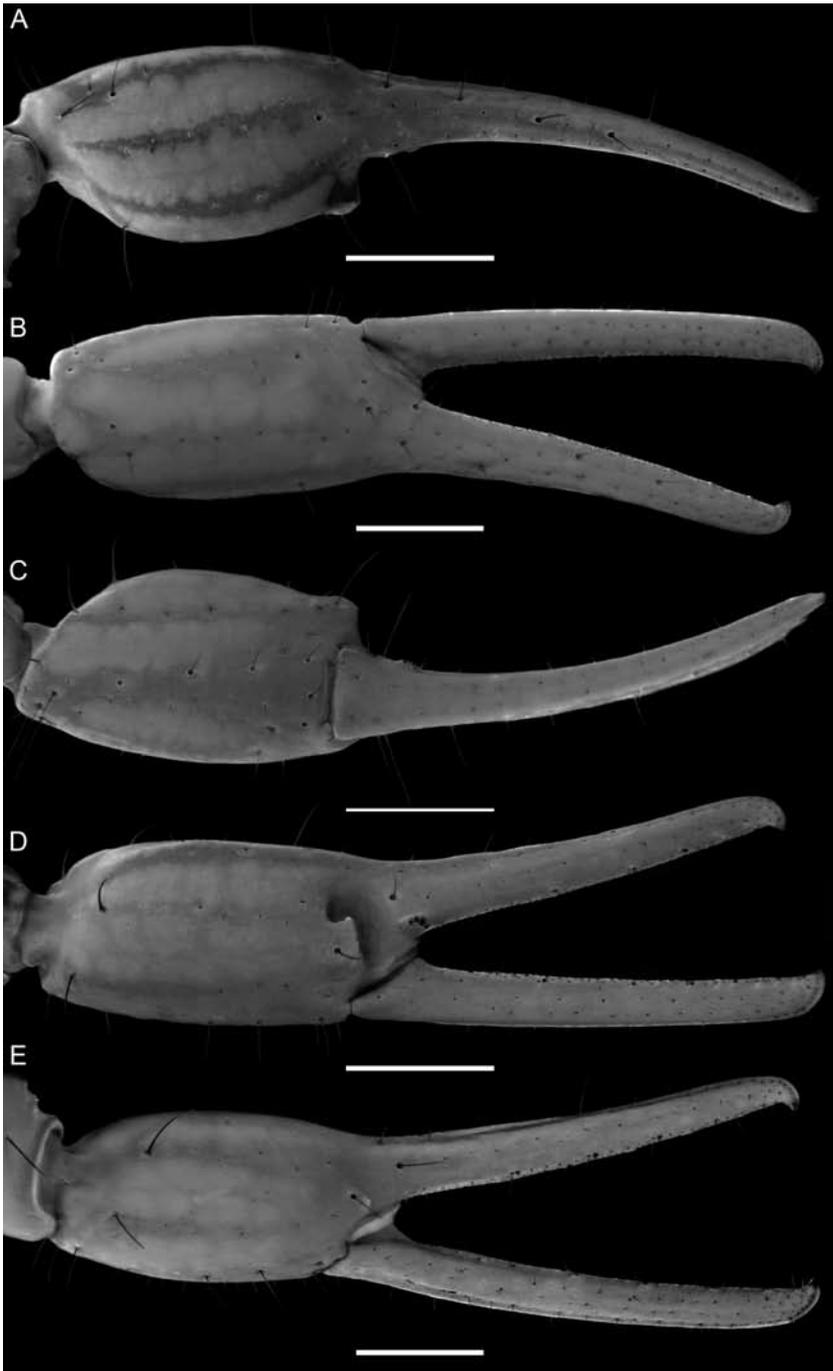


FIGURE 14. *Urophonius somuncura* Acosta, 2001, dextral pedipalp chela. **A, C, D.** ♂ (MACN). **B, E.** ♀ (MACN). **A.** Dorsal aspect. **B.** External aspect. **C.** Ventral aspect. **D, E.** Internal aspect. Scale bar = 1 mm.

*Pedipalps*: Femur with DI, DE, and VI carinae granular, extending entire length of segment (fig. 13A); intercarinal surfaces sparsely covered with medium-sized granules; trichobothrium *e* situated in same axis as dorsal macroseta M1. Patella with DI and VI carinae distinct, granular, extending entire length of segment (fig. 13B–D); DE carina obsolete, visible only as slight curvature of surface, along entire length of segment. Chela manus slender (more robust in ♂), acarinate (fig. 14), internal surface with slight bulge near articulation of movable finger (♀) or pronounced, subtriangular projection and shallow depression, with group of 4 or 5 granules and, in some specimens, 1 or more additional granules between this group of granules and median denticle row of fixed finger, near base of fixed finger (♂); fingers elongated, median denticle row medially uneven (but not forming a clear double row), with five pairs of accessory granules.

*Pectines*: Tooth count: 16–19 ( $n = 26$ ; mode = 17) in ♂; 14–16 ( $n = 66$ ; mode = 15) in ♀.

*Legs*: Surfaces smooth. Basitarsi each with two well-developed, equal-length pedal spurs. Telotarsi elongated, shallow, each with well-developed ventromedian row of hyaline setae, and paired rows of ventrosubmedian spiniform setae, with following counts on each telotarsus: I: 1/1, II: 2/2, III: 4–5/5–6, (mode = 5/6), IV: 5–6/6–7 (mode = 5/6). Ungues strongly curved, equal in length.

*Hemispermatothore*: Basal portion well developed. Distal lamina well developed, ca. 30% shorter than basal portion; distal crest slightly undulated, oriented in same direction as principal axis of hemispermatothore; frontal crest (distal posterior flexure) present; internal lobe with two well-developed denticles, disconnected from distal lamina (fig. 8D), external denticle ca. 50% larger than internal denticle. Lobe region weakly developed (fig. 8C); basal lobe well developed, barely protruding, without internal laminar extension, anterior surface forming broad, concave excavation; internal surface with well-developed lamina, completely covering basal lobe (fig. 8C), which probably corresponds to half the genital plug, and is connected to hemispermatothore by a very fragile fold, destroyed in most specimens during removal of paraxial organ tissues; internal part of hemispermatothore as in figure 8A. We examined the hemispermatothores of 10 specimens and observed no conspicuous variation in its structure.

**DISTRIBUTION**: This species is endemic to the summit of the Somuncura Plateau, central Río Negro Province, Argentina, above 1000 m (fig. 1).

**ECOLOGY**: The Somuncura Plateau is an “island” of Patagonian steppe habitat deep inside the Monte phytogeographic province (Acosta, 2003; Ojanguren-Affilastro, 2007). Most specimens of *U. somuncura* were collected between 1200–1500 m, in sympatry with *Bothriurus ceii* Ojanguren-Affilastro, 2007. Males of this species were collected for the first time in mid-spring (29 October, 2008), supporting Acosta’s (2003) suggestion that they are active on the surface only in spring. During previous collecting trips to the type locality, conducted in summer (Acosta, 2003; Ojanguren-Affilastro, 2005), only females and juveniles were active on the surface. Specimens were collected on the rocky slope of a low hill near a lagoon. Most specimens were found on rock walls up to 1 m above the ground surface, but several specimens were also found on the ground.

*Urophonius tregualemuensis* Cekalovic, 1981

Figures 1, 2C, 3C, 4C, 5C, 6C, 7C, G, 8E, F, 15–17; table 2

*Urophonius tregualemuensis* Cekalovic, 1981: 195, 196, 198, 199; Acosta, 1999: 157, 158, 163; Lowe and Fet, 2000: 49 (complete reference list until 1998); 2003: 7, 8; Ojanguren-Affilastro, 2005: 133; Ojanguren-Affilastro and Cheli, 2009: 353, 355.

**TYPE MATERIAL:** **CHILE:** Holotype ♀ (MZUC 603), **Region VII (Maule):** *Maule Province:* Tregualemu [36°03'51"S 72°45'58.4"W], 27.ii.1969, H. Moyano. Paratypes: Tregualemu [36°03'51"S 72°45'58.4"W], 27.ii.1969, H. Moyano, 1 ♀ (MZUC 605), 14.iii.1967, T. Cekalovic, 3 ♀ (MZUC 479, 639, 639a). **Region VI (Libertador Bernardo de O'Higgins):** *Curicó Province:* Llico [34°46'S 72°05'W], 16.iii.1967, T. Cekalovic, 1 ♀ (MZUC 483).

**NEW RECORDS:** **CHILE:** **Region VI (Libertador Bernardo de O'Higgins):** *Curicó Province:* Vegas del Flaco [34°57'S 70°26'W], 24.xi.1969, L. Peña, 1 ♂ (MZUC 715), 1 ♀ (MZUC 713). **Region VII (Maule):** *Cauquenes Province:* Los Ruiles National Reserve, NW Cauquenes, 35°50'01.68"S 72°30'36.87"W, 146 m, 13.xii.2003, C.I. Mattoni, J.A. Ochoa and L. Prendini, UV detection on cool, still, dark, humid night in *Nothofagus* forest on steep W-facing slope, small river at base, dense litter layer with rocks, specimens common leaf litter and also climbing bushes and tree trunks, syntopic with *Centromachetes* sp., 51 ♂, 25 ♀, 1 juv. (AMNH); 8 ♂, 13 ♀ (LBRE); 2 ♂, 2 ♀ (MHNC). *Maule Province:* Tregualemu [36°03'51"S 72°45'58.4"W], 27.ii.1969, H. Moyano, 3 juv. (MZUC 329), 8.xi.2003, V. Cekalovic, 1 ♂ (AMNH). *Talca Province:* Alto Vilches [35°36'S 71°12'W], 12.xii.1971, M. Pino, 1 ♂ (MZUC 633), 5.xii.1999, J. Mondaca, 1 ♀ (MHNS), 16–17.i.1984, E. Maury, 1 ♀, 1 juv. (MACN); Vilches Alto [35°36'S 71°12'W], 2160 m, 4.xii.1999, J. Mondaca, 1 ♀ (MHNS), 18.xi.2000, J. Mondaca, 1 ♀ (MHNS), 29–30.xi.2003, J. Mondaca, 1 ♂, 3 ♀ (MACN); Vilches [35°36'S 71°12'W], 7–8.i.1989, 1 ♀ (MACN). **Region VIII (Bio Bio):** *Ñuble Province:* Piedras Comadres, 20 km W Chillán [36°41'S 71°55'W], 2.xii.2004, J. Mondaca, 1 ♀ (MACN); Recinto, 8 km E [36°44'S 71°48'W], 16.xi.1989, 1 ♀ (MACN). **Region IX (Araucania):** *Malleco Province:* Las Quilmas campsite and surrounds, El Manzano (between Vegas Blancas and Angol), 37°48'16.560"S 72°52'17.940"W, 599 m, under stones and UV in native *Nothofagus* forest, riverside of stream and *Pinus* forest, 2 ♀, 5 juv. (AMNH), 6 ♀ (LBRE), 16.i.2006, C. Mattoni, M. and F. Vivanco.

**DIAGNOSIS:** *Urophonius tregualemuensis* is most similar morphologically to *U. pizarroi*, n. sp., from central Chile. Both species share the following combination of characters: the hemispermatophore distal lamina is elongated (fig. 8E–H); the carinae of metasomal segment V are weakly developed; pedipalp femoral trichobothrium *e* is situated proximal to dorsal macroseta M1 (fig. 19A).

*Urophonius tregualemuensis* may be distinguished from *U. pizarroi*, n. sp., by its paler pigmentation. The carapace anterior margin exhibits a wide, unpigmented triangle and the tergites a median unpigmented stripe, in *U. tregualemuensis*, whereas the carapace is almost completely pigmented, and there is no median unpigmented stripe on the tergites, in *U. pizarroi*, n. sp. The two species may also be distinguished by the shape of the lobe of the hemispermatophore,

which is less developed, does not protrude, and has a slightly excavated, concave internal surface in *U. tregualemuensis* (fig. 8E), compared with *U. pizarroi*, n. sp., in which the lobe is well developed and protruding, without an internal laminar extension, and with a deeply excavated internal surface (fig. 8G).

*Urophonius tregualemuensis* is also morphologically similar to *U. somuncura*, from which it may be distinguished by the more elongated distal lamina of its hemispermatophore (fig. 8C–F) and the position of pedipalp femoral trichobothrium *e*, which is situated proximal to dorsal macroseta M1 (fig. 16A), rather than in the same axis (fig. 13A). Both species may also be distinguished by means of the pigmentation pattern of the carapace, the anterior margin of which exhibits a wide, unpigmented triangle in *U. tregualemuensis* (fig. 2C), but is densely pigmented in *U. somuncura* (fig. 2B). The two species may be further distinguished by means of the VL and VSM carinae of sternite VII and metasomal segments I and II, which are well developed in *U. tregualemuensis* (figs. 3C, 4C), compared with *U. somuncura*, in which the VL carinae are weakly developed, and the VSM carinae absent, or represented only by scattered granules (figs. 3B, 4B).

DESCRIPTION: Based on ♂ and ♀ specimens deposited in the LBRE.

*Total length*: 23–31.5 mm ( $n = 8$ ; mean = 25.95 mm) in ♂; 26–33 mm ( $n = 10$ ; mean = 28.76 mm) in ♀.

*Color*: Base color yellowish or reddish, with dark-brown spots of pigmentation (fig. 15). Chelicerae with reticulate pigmentation on external surfaces of fingers and near articulation, in basal part of manus. Carapace, anterior margin with unpigmented triangle, and small black spot or narrow stripe anteromedially in most specimens (fig. 2C); two broad, dark stripes, extending from posterior margin of unpigmented triangle to anterior margin of posterior longitudinal sulcus; median ocular tubercle and area around lateral ocelli dark brown; two lateral stripes extending from lateral margins to posterior longitudinal sulcus; two dark spots posteriorly. Tergites I–VI, each with paired, dark spots laterally, not reaching lateral margins of segments, and leaving unpigmented stripe medially; in some specimens, anterior margin of spots on I–VI poorly developed, leaving unpigmented area medially, which forms unpigmented stripe, such that three unpigmented longitudinal stripes (one median on I–VII and two submedian on I–VI) are exhibited. Sternum, genital opercula, and pectines weakly pigmented, with some faint spots. Sternites III–VI, lateral margins weakly pigmented, with three broad, faint stripes, two submedially and one medially, absent in some specimens; VII densely pigmented on lateral margins, with three narrow, dark stripes, two submedially and one medially, extending entire length of segment. Metasomal segments I–III, dorsal surfaces each with two dark spots submedially, connected to two narrow stripes along DL carinae, becoming broader at posterior margins, and connecting to lateral stripes; lateral surfaces each with broad, dark stripe below LSM carinae, connected to lateral stripes by reticulate pigmentation; ventral surfaces each with three separate dark stripes (two broader VL and a narrow VSM stripe) along entire length of segment, not joined to posterior margin. Metasomal segment IV, similar to I–III but with DSM spots reduced to narrow lines connected to DL stripes. Metasomal segment V, dorsal surface with paired, narrow submedian stripes and broad, lateral stripes in anterior half, joining in posterior half; lateral surface with reticulate pigmentation joining with dorsal

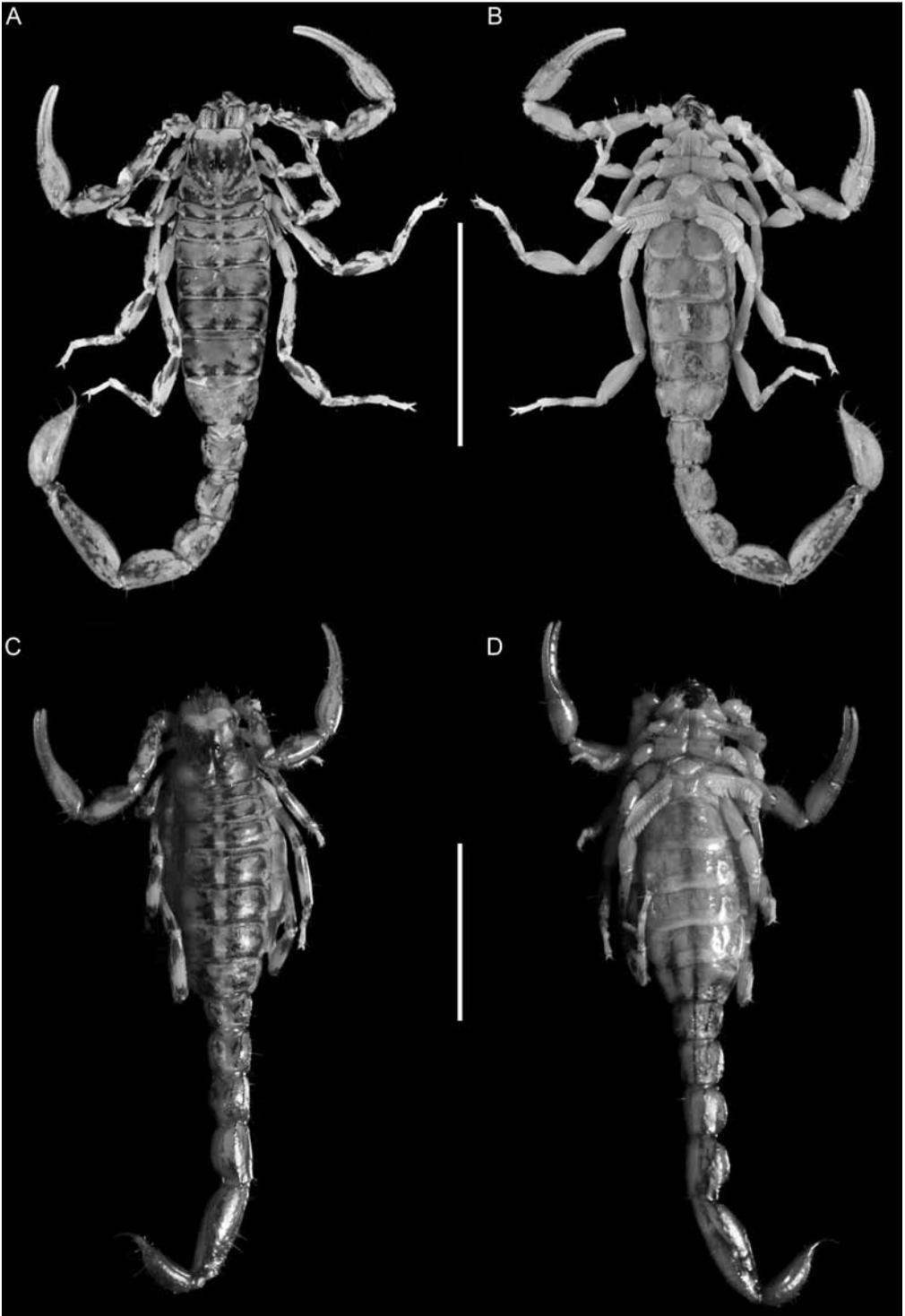


FIGURE 15. *Urophonius tregualemuensis* Cekalovic, 1981, habitus. **A, B.** ♂ (AMNH). **C, D.** ♀ (AMNH). **A, C.** Dorsal aspect. **B, D.** Ventral aspect. Scale bars = 10 mm.

and VL stripes in posterior half; ventral surfaces as in other segments with three ventral stripes not connected at posterior margin. Telson, vesicle densely pigmented, except for paired narrow VSM and VL unpigmented stripes; aculeus basally unpigmented, apex dark brown. Pedipalps, trochanter with dark spot dorsally; femur and patella densely pigmented dorsally and externally, unpigmented ventrally; chela with seven dark stripes along DI, DM, DS, D, E, V, and VM carinae; area near articulation of fixed and movable fingers, and base of fingers densely pigmented. Legs, coxae, and trochanters slightly pigmented, femur pigmented at articulation with patella and along external margin; patella, tibia, and basitarsi pigmented near articulations; telotarsi unpigmented.

**Carapace:** Surfaces slightly granular, more densely so near lateral margins ( $\sigma$ ) or slightly granular near lateral margins, smooth medially ( $\text{♀}$ ). Anterior margin straight, or with weakly developed median projection. Anterior longitudinal and interocular sulci weakly developed; posterior longitudinal and lateral sulci well developed. Median ocular tubercle shallow, median ocelli large, ca. 1 diameter apart. Three pairs of small lateral ocelli on each side of carapace; anterior and median ocelli situated very close together, in same horizontal axis, posterior ocellus situated slightly dorsal to others, 1 diameter apart.

**Tergites:** Surfaces, I–VI almost smooth, with scattered granules near posterior margin ( $\text{♀}$ ) or finely granular, more coarsely so near posterior and lateral margins ( $\sigma$ ); VII with paired submedian and lateral carinae, comprising medium-sized granules, lateral carinae restricted to posterior two-thirds of segment, submedian carinae to posterior third.

**Sternites:** Surfaces, III–VI smooth, with small, elliptical spiracles; VII, anterior half smooth, posterior half granular, with VSM and VL carinae obsolete, represented only by scattered granules, more pronounced in  $\text{♀}$  (figs. 3C, 4C).

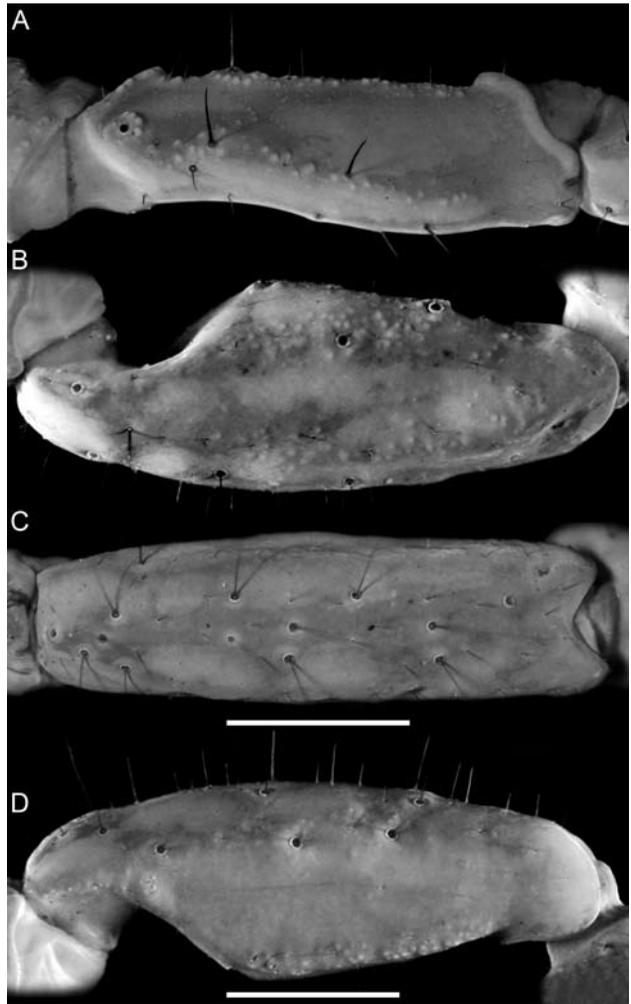


FIGURE 16. *Urophonius tregualemuensis* Cekalovic, 1981,  $\sigma$  (AMNH), dextral pedipalp segments. A. Femur, dorsal aspect. B. Patella, dorsal aspect. C. Patella, external aspect. D. Patella, ventral aspect. Scale bar = 1 mm.



FIGURE 17. *Urophonius tregualemuensis* Cekalovic, 1981, dextral pedipalp chela. A–D. ♂ (AMNH). E, F. ♀ (AMNH). A. Dorsal aspect. B. External aspect. C, F. Ventral aspect. D, E. Internal aspect. Scale bar = 1 mm.

*Metasoma*: Metasomal segment I, dorsal surface sparsely granular; DL and LSM carinae granular, extending entire length of segment; surface between DL and LSM carinae densely granular; LIM carinae restricted to posterior half of segment; one pair of LIM macrosetae; lateral margins sparsely granular; ventral surface with paired VL and VSM carinae, more developed in ♀, diverging slightly at anterior margins; surface between VL and VSM carinae sparsely granular; two pairs of VL and VSM macrosetae, sometimes with additional, intermediate row of 1 or 2 macrosetae. Segment II, similar to segment I, except with carinae less developed; one pair of LSM macrosetae and, in some specimens, one pair of DL macrosetae; LIM carinae restricted to posterior margin of segment; VL and VSM carinae well developed (♀) or weakly developed (♂); three pairs of VSM macrosetae. Segment III, similar to segment II, except with VL and VSM carinae weakly developed (♀) or obsolete (♂); one pair of DL macrosetae. Segment IV, DL carinae granular, extending entire length of segment, but weakly developed medially in some specimens, and connected to posterior margins of LSM carinae by scattered granules, forming accessory carina; LSM carinae vestigial, restricted to anterior and posterior margins of segment; LIM carinae absent; one pair of DL, LSM, and LIM macrosetae; ventral surface smooth; three pairs of VL and VSM macrosetae. Segment V elongated (figs. 5C, 6C); length/width ratio 2.24–2.48 ( $n = 8$ ; mean = 2.34) in ♂, 1.86–2.08 ( $n = 10$ ; mean = 1.94) in ♀; length/height ratio 2.42–2.83 ( $n = 8$ ; mean = 2.64) in ♂, 2.08–2.29 ( $n = 10$ ; mean = 2.21) in ♀; dorsal and lateral surfaces finely and sparsely granular; DL carinae reduced to granules at anterior margin of segment; one or two pairs of DL macrosetae; LSM carinae represented by pair of macrosetae at posterior margin; LIM carinae represented by three pairs of macrosetae; ventral surface granular in posterior half (♂) or posterior three-quarters (♀) of segment; VL carinae reduced to posterior three-quarters (♀) or posterior half (♂) of segment, comprising larger granules near posterior margin; VL and VM carinae equally well developed; VSM carinae subparallel to VL carinae but diverging in posterior third; three or four pairs of VL macrosetae, three pairs of VSM macrosetae, and two pairs of macrosetae at posterior margin of segment.

*Telson*: Vesicle shallow, more globose in ♂ than ♀ (fig. 7C, G), length/height ratio 3.22–3.44 ( $n = 8$ ; mean = 3.34) in ♂, 3.22–3.68 mm ( $n = 10$ ; mean = 3.49) in ♀; ventral surface granular (♀) or smooth (♂); dorsal surface smooth, with (♂) or without (♀) an elliptical median depression, corresponding to telson gland. Aculeus short, shallowly curved.

*Pedipalps*: Femur with DI, DE, and VI carinae comprising discontinuous row of small granules along entire length of segment (fig. 16A); trichobothrium *e* situated proximal to dorsal macroseta M1. Patella with DI, DE, and VI carinae obsolete, visible only as slight curvature of surface, along entire length of segment (fig. 16B–D). Chela manus slender (more robust in ♂), acarinate (fig. 17), internal surface with pronounced, subtriangular projection and shallow depression, with group of 4 or 5 granules (and, in some specimens, 1 or more additional granules between this group of granules and median denticle row of fixed finger), near base of fixed finger (♂; fig. 17D); fingers elongated, median denticle row medially uneven, forming double row in places, with five pairs of accessory granules.

*Legs*: Surfaces smooth. Basitarsi each with two well-developed, equal-length pedal spurs. Telotarsi elongated, shallow, each with well-developed ventromedian row of hyaline setae, and

paired rows of ventrosubmedian spiniform setae, with following counts on each telotarsus: I: 1/1, II: 2/2, III: 5/5, IV: 5/6; the only pair of setae on I and first pair on II are setiform, whereas the rest are stout and spiniform. Ungues strongly curved and equal in length.

*Pectines*: Tooth count: 15–17 ( $n = 8$ ; mode = 16) in ♂; 12–15 ( $n = 10$ ; mode = 14) in ♀.

*Hemispermatothore*: Basal portion very well developed. Distal lamina well developed, elongated, similar in length to basal portion; distal crest straight, oriented in the same direction as principal axis of hemispermatothore; frontal crest (distal posterior flexure) present; internal lobe with two well-developed denticles (fig. 8F), external denticle ca. 50 % larger than internal denticle. Lobe region well developed (fig. 8E), basal lobe well developed, barely protruding, without internal laminar extension; internal surface forming broad, concave excavation. We examined the hemispermatothores of 10 specimens and observed no obvious variation. In recently collected specimens, we observed a thin lamina partially covering the external margin of the basal lobe (fig. 8E), which probably corresponds to half the genital plug (Mattoni and Peretti, 2004). This structure is almost impossible to recover in poorly preserved specimens as it is extremely delicate and tends to break during dissection of the hemispermatothore.

**DISTRIBUTION**: *Urophonius tregualemuensis* is endemic to central and southern Chile (fig. 1), in regions VI (Libertador Bernardo de O'Higgins), VII (Maule), VIII (Bio Bio), and IX (Araucania).

**ECOLOGY**: Records of this species are situated in humid forest habitats, from the coast to the base of the Andes at 2000 m, an area that belongs to the Bosque Caducifolio botanical region (Gajardo, 1993). Specimens have been observed on the surface at night with UV light in spring and summer. At Los Ruiles National Reserve (13 December, 2003), we collected both sexes inside a mixed *Nothofagus* forest. Most specimens were located on small grasses or bamboos at about 30–70 cm from the ground, apparently hunting. They dropped down, trying to disappear into the dry foliage, at the slightest vibration. At Las Quilmas campsite (16 January, 2006), in a mixed but extremely disturbed *Nothofagus* forest, only females were captured, and all specimens were walking on the ground. Males appear to be active on the surface only during spring (late October–early December), as in the other species of the *granulatus* group. *Urophonius tregualemuensis* was collected in sympatry with a species of *Centromachetes* Lönnberg, 1897, at Los Ruiles National Reserve.

### *Urophonius pizarroi*, n. sp.

Figures 1, 2D, 3D, 4D, 5D, 6D, 7D, H, 8G, H, 18–20; table 2

**TYPE MATERIAL**: **CHILE: Región Metropolitana de Santiago**: Holotype ♂ (MZUC), Cerro Manquehue [33°20'S 70°35'W], 25.xi.1966, W. Duarte. Paratypes: same data, 3 ♂, 8 ♀ (MZUC); Cantillana [33°51'S 70°57'W], 10–22.xii.1983, L. Irrazaval, 1 ♀ (AMNH).

**ETYMOLOGY**: This species is dedicated to Chilean biologist Jaime Pizarro Araya (Universidad de La Serena, Chile), who conducted extensive work on the ecology and systematics of the epigeal arthropod fauna of northern Chile in recent years, dramatically increasing the knowledge of this fauna.

DIAGNOSIS: *Urophonius pizarroi*, n. sp., can be distinguished from all other species of the genus by its dark pigmentation. The carapace and tergites of this species are almost completely pigmented and there is no median unpigmented stripe on the tergites, as observed in the other species.

This species is most similar morphologically to *U. tregualemuensis* from central and southern Chile. Both species share the following combination of characters: the hemispermatophore distal lamina is elongated (fig. 8E–H); the carinae of metasomal segment V are weakly developed; pedipalp femoral trichobothrium *e* is situated proximal to dorsal macroseta M1 (fig. 19A).

*Urophonius pizarroi*, n. sp., can be distinguished from all other species in the *granulatus* group by the shape of the lobe of the hemispermatophore, which is well developed and protruding, without an internal laminar extension, and with a deeply excavated internal surface (fig. 8G). In other species of the *granulatus* group, the basal lobe is less developed, does not protrude, and its internal surface is only slightly excavated, concave in *U. tregualemuensis* (fig. 8E) and *U. somuncura* (fig. 8C), or bearing an internal laminar extension in *U. granulatus* (fig. 8A).

DESCRIPTION: Based on the holotype ♂ and a paratype ♀, both in MZUC.

Total length: 21.5–28 mm ( $n = 4$ ; mean = 25.75 mm) in ♂; 27–32 mm ( $n = 8$ ; mean = 30 mm) in ♀.

Color: Base color dark reddish brown, with black or dark-brown spots of pigmentation (fig. 18). Chelicerae with reticulate pigmentation on external surfaces of fingers (densely so on movable finger) and near articulation, in basal part of manus. Carapace almost entirely pigmented (fig. 2D); dark, triangular area extending from anterior margin of carapace, past median ocular tubercle, to anterior margin of posterior longitudinal sulcus; median ocular tubercle and area around lateral ocelli dark brown or black; two lateral stripes extending from lateral margins to median part of posterior longitudinal sulcus; two dark spots occupying almost entire posterior margin of carapace. Tergites I–VII, each almost entirely, densely pigmented, with some isolated unpigmented areas surrounded by pigmentation. Sternum, genital opercula, and pectines weakly pigmented, with some faint spots. Sternites III–VI, unpigmented medially, weakly pigmented at lateral margins; VII densely pigmented on lateral margins, with two VSM stripes, usually extending entire length of the segment but in some specimens, restricted to the posterior two-thirds and with small VM spot at posterior margin. Metasomal segments I–III, dorsal surfaces each with single triangular dark spot medially, and pair of narrow stripes along DL carinae; lateral surfaces densely pigmented between LSM and LIM carinae, pigmentation connecting to VL stripes in posterior third of segment; ventral surfaces each with three separate dark stripes (two VL stripes, broader in posterior half of segment and a VSM stripe, broader medially) extending entire length of segment, but not connected at posterior margin. Metasomal segment IV, similar to I–III but with triangular DSM spot reduced to broad median stripe connecting with posterior pigmentation; in most specimens, ventral stripes join in posterior third of segment. Metasomal segment V, dorsal surface with paired, narrow DSM stripes and broad, DL stripes in anterior half, joining in posterior half; lateral surface with a dark stripe joining VL stripes in posterior half of segment; ventral surfaces as in other segments with three

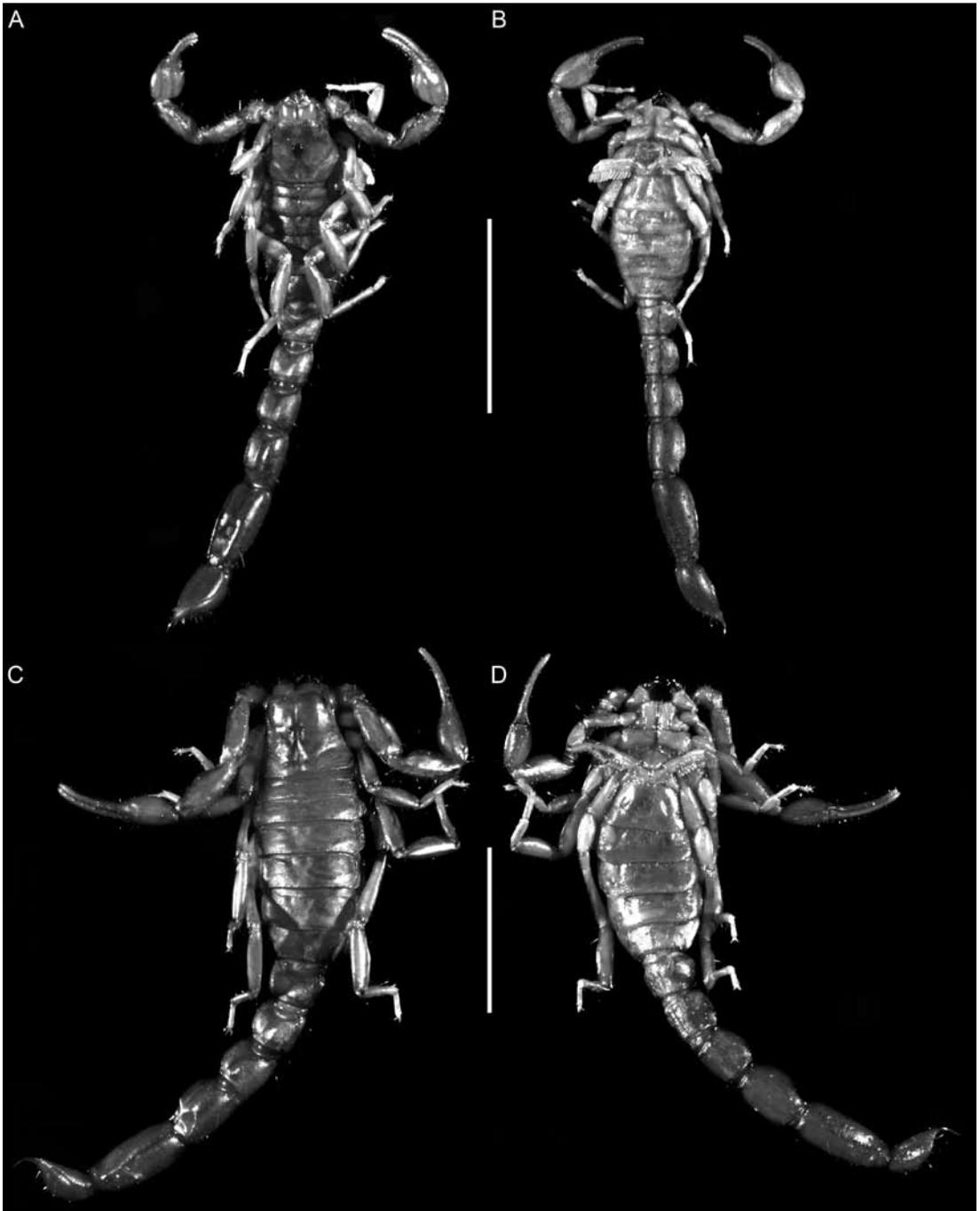


FIGURE 18. *Urophonius pizarroi*, n. sp., habitus. A, B. Paratype ♂ (MZUC). C, D. Paratype ♀ (MZUC). A, C. Dorsal aspect. B, D. Ventral aspect. Scale bars = 10 mm.

ventral stripes, except that VL stripes join with VM stripe, to form single dark spot, in posterior third of segment. Telson, vesicle densely pigmented, except for paired narrow VSM and VL unpigmented stripes; aculeus basally unpigmented, apex dark brown. Pedipalps, trochanter, femur, and patella densely pigmented; chelae with seven dark stripes along DI, DM, DS, D, E, V, and VM carinae; area near the articulation of fixed and movable fingers, and base of fingers densely pigmented. Legs with all segments, except telotarsi, densely pigmented.

**Carapace:** Surfaces slightly granular, more densely so near lateral margins ( $\delta$ ) or slightly granular near lateral margins, smooth medially ( $\text{♀}$ ). Anterior margin straight. Anterior longitudinal and interocular sulci weakly developed; posterior longitudinal and lateral sulci well developed. Median ocular tubercle shallow, median ocelli large, almost 2 diameters apart. Three pairs of small lateral ocelli on each side of carapace, 1 diameter apart; anterior and median ocelli situated in same horizontal axis, posterior ocellus situated slightly dorsal to others.

**Tergites:** Surfaces, I–VI almost smooth ( $\text{♀}$ ) or sparsely and finely granular, more coarsely so near posterior and lateral margins ( $\delta$ ); VII with paired submedian and lateral carinae, comprising medium-sized granules, lateral carinae restricted to posterior two-thirds of segment, submedian carinae to posterior third, intercarinal surfaces with scattered coarse granules, rest of surface finely granular.

**Sternites:** Surfaces, III–VI smooth, with small, elliptical spiracles; VII, anterior half smooth, posterior half granular, with VSM and VL carinae absent ( $\delta$ ) or obsolete, represented only by scattered granules ( $\text{♀}$ ) (figs. 3D, 4D).

**Metasoma:** Metasomal segment I, dorsal surface sparsely granular; DL and LSM carinae granular, extending entire length of segment; some specimens with one pair of LSM macrosetae; surface between DL and LSM carinae densely granular; LIM carinae restricted to posterior half of segment; one pair of LIM macrosetae; lateral margins sparsely granular; ventral surface with paired VL and VSM carinae, more developed in  $\text{♀}$ , diverging slightly at anterior margins; two pairs of VL and VSM macrosetae. Segment II, similar to segment I, except with carinae less developed; one pair of LSM macrosetae; LIM carina restricted to posterior margin

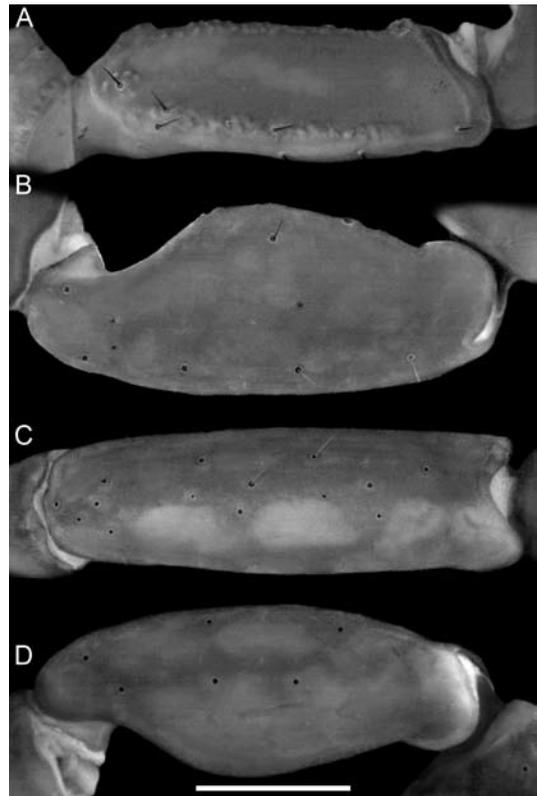


FIGURE 19. *Urophonius pizarroi*, n. sp., paratype  $\delta$  (MZUC), dextral pedipalp segments. A. Femur, dorsal aspect. B. Patella, dorsal aspect. C. Patella, external aspect. D. Patella, ventral aspect. Scale bar = 1 mm.

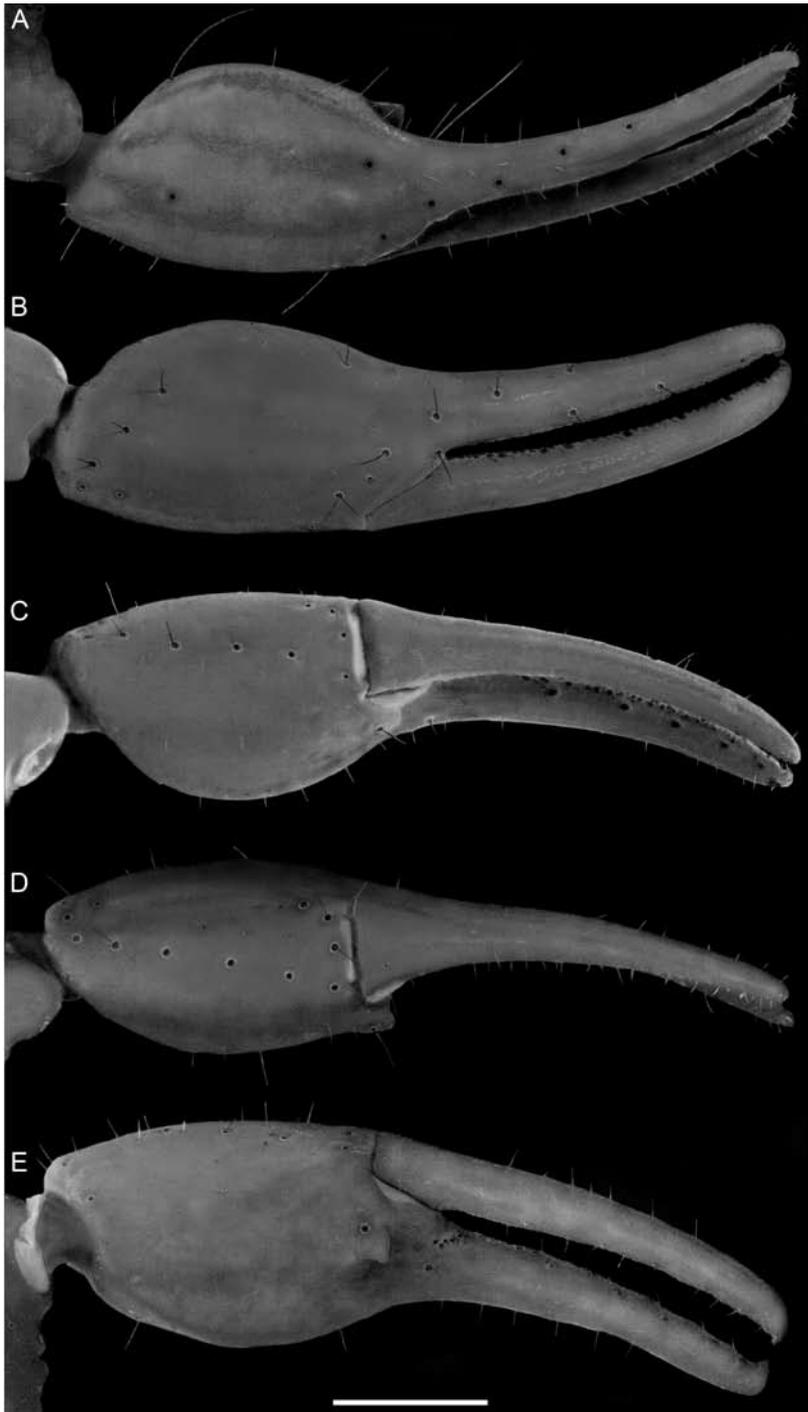


FIGURE 20. *Urophonius pizarroi*, n. sp., dextral pedipalp chela. **A, D, E.** Paratype ♂ (MZUC). **B, C.** Paratype ♀ (MZUC). **A.** Dorsal aspect. **B.** External aspect. **C, D.** Ventral aspect. **E.** Internal aspect. Scale bar = 1 mm.

of segment; VL and VSM carinae well developed (♀) or absent (♂); three pairs of VSM macrosetae. Segment III, DL carinae granular (♀) or smooth (♂), extending entire length of segment; LSM carina vestigial, restricted to anterior and posterior margins of segment; LIM carina absent; one pair of DL, LSM, and LIM macrosetae; ventral surface smooth; two pairs of VL macrosetae and three pairs of VSM macrosetae. Segment IV, DL carinae absent or granular, extending entire length of segment, but weakly developed medially, and connected to posterior margin of LSM carina by scattered granules, forming accessory carina; LSM carinae vestigial, restricted to anterior and posterior margins of segment; LIM carina absent; one pair of DL, LSM, and LIM macrosetae; ventral surface smooth; three pairs of VL and VSM macrosetae. Segment V elongated (figs. 5D, 6D); length/width ratio 2.07–2.27 ( $n = 3$ ; mean = 2.14) in ♂, 1.74–1.83 ( $n = 7$ ; mean = 1.78) in ♀; length/height ratio 2.19–2.43 ( $n = 3$ ; mean = 2.27) in ♂, 1.94–2.1 ( $n = 7$ ; mean = 2.03) in ♀; DL carinae granular, restricted to anterior quarter of segment; one pair of DL macrosetae; LSM carinae represented by pair of macrosetae at posterior margin; LIM carinae represented by three pairs of macrosetae; ventral surface granular in posterior third (♂) or posterior two-thirds (♀) of segment; VL carinae reduced to posterior two-thirds of segment, comprising larger granules near posterior margin; VSM carinae restricted to median part of segment, subparallel to VL carinae but diverging in posterior third; VM carina restricted to posterior half of segment and obscured by granules; three pairs of VL and VSM macrosetae, and two pairs of macrosetae at posterior margin of segment.

*Telson*: Vesicle shallow, more globose and elongated in ♂ than ♀ (fig. 7D, H), length/height ratio 2.83–3.27 ( $n = 4$ ; mean = 3.09) in ♂, 2.9–3.2 mm ( $n = 6$ ; mean = 3.03) in ♀; ventral surface slightly granular (♀) or smooth (♂); dorsal surface smooth, with (♂) or without (♀) an elliptical median depression, corresponding to telson gland. Aculeus short, shallowly curved.

*Pedipalps*: Femur with DI, DE, and VI carinae granular, extending entire length of segment (fig. 19A); trichobothrium *e* usually situated proximal to dorsal macroseta M1 but, in some specimens, situated almost in same axis. Patella with VI carina granular, extending entire length of segment; DI and VI carinae obsolete, visible only as slight curvature of surface, along entire length of segment (fig. 19B–D). Chela manus slender, acarinate (fig. 20), internal surface with pronounced, subtriangular projection and shallow depression, with group of 3 or 4 granules near base of fixed finger (♂); fingers elongated, median denticle row medially uneven (but not forming a clear double row), with five pairs of accessory granules.

*Legs*: Surfaces smooth. Basitarsi each with two well-developed, equal-length pedal spurs. Telotarsi elongated, shallow, each with ventromedian row of hyaline setae, and paired rows of ventrosubmedian spiniform setae, with following counts on each telotarsus: I: 1/1, II: 2/2, III: 5/6, IV: 6/7; the only pair of setae on I are weakly developed and setiform, whereas the rest are stout and spiniform. Ungues strongly curved and equal in length.

*Pectines*: Tooth count: 15–17 ( $n = 5$ ; mode = 16) in ♂; 12–15 ( $n = 8$ ; mode = 14) in ♀.

*Hemispermatothore*: Basal portion very well developed. Distal lamina well developed, elongated, similar in length to basal portion; distal crest slightly undulated, oriented in same direction as principal axis of hemispermatothore; frontal crest (distal posterior flexure) present; internal lobe with two well-developed denticles (fig. 8H), external denticle ca. 50 % larger than internal denticle. Lobe region well developed (fig. 8G), basal lobe very well developed,

TABLE 2. Measurements (mm) of *Urophonius granulatus* Pocock, 1898, *Urophonius somuncura* Acosta, 2001, *Urophonius tregualemuensis* Cekalovic, 1981, and *Urophonius pizarroi*, n. sp.<sup>a</sup>

Specimen:	type: sex: collection:	<i>U. granulatus</i>		<i>U. somuncura</i>		<i>U. tregualemuensis</i>		<i>U. pizarroi</i>	
		♂ MACN	♀ MACN	♂ MACN	Holotype ♀ CDA	♂ LBRE	♀ LBRE	Paratype ♂ MZUC	Paratype ♀ MZUC
Carapace:									
length		3.7	4.42	3.44	4.1	2.72	3.2	3.08	3.64
anterior width		2.47	2.88	2.24	2.8	2	2.48	2.12	2.52
posterior width		3.91	4.73	3.4	4.4	2.92	3.72	3.6	4.4
Chela:									
length		5.66	6.49	5.33	6.1	4.44	4.85	4.85	5.25
width		1.65	1.75	1.29	1.2	1.04	1.05	1.45	1.4
height		1.85	1.85	1.37	1.3	1.04	1.13	1.54	1.45
movable finger length		3.19	3.71	3.23	4	2.88	2.99	3.15	3.23
Patella:									
length		3.29	3.91	3.08	3.8	2.68	2.88	3.08	3.4
width		1.23	1.44	1.12	1.3	0.92	1.12	1.2	1.32
Femur:									
length		3.09	3.39	3.04	3.5	2.68	2.52	2.68	2.88
width		1.03	1.13	0.84	1	0.72	0.84	1.04	1.04
Mesosoma:									
length		8.55	11.12	6.79	8.9	6.66	8.48	5.66	7.11
Metasoma I:									
length		1.75	2.06	1.48	1.9	1.28	1.48	1.52	1.8
width		2.37	2.78	1.96	2.5	1.64	2.16	2.16	2.48
Metasoma II:									
length		2.06	2.37	1.87	2.2	1.4	1.56	1.6	1.96
width		2.06	2.47	1.72	2.3	1.48	1.92	1.92	2.36
Metasoma III:									
length		2.26	2.47	2	2.3	1.6	1.64	1.8	2
width		1.96	2.47	1.72	2.2	1.48	1.84	1.84	2.2
Metasoma IV:									
length		2.78	2.98	2.44	2.9	2	2.28	2.28	2.4
width		1.96	2.37	1.66	2.2	1.44	1.72	1.84	2.28
Metasoma V:									
length		3.81	4.22	3.92	4.3	3.4	3.68	3.8	4.04
width		1.96	2.47	1.68	2.1	1.44	1.88	1.92	2.32
height		1.54	2.06	1.36	1.9	1.36	1.64	1.76	2
Metasoma:									
total length		17.71	19.57	11.71	18.8	9.68	10.64	11	12.2
Telson:									
total length		5.04	5.46	4.4	5.2	4	3.8	4.4	4.24
vesicle length		3.7	4	3.6	4.9	3.12	3	3.4	3
vesicle width		1.85	2.06	1.52	1.9	1.4	1.28	1.76	1.72
vesicle height		1.65	1.85	1.32	1.5	1.24	1.08	1.4	1.36
aculeus length		1.34	1.44	0.8	1.3	0.88	0.8	1	1.24
Total length:		29.97	35.12	26.34	31.8	23.06	31.4	24.14	27.19

<sup>a</sup>Institutional acronyms as follows: CDA: Cátedra de Diversidad Animal I, Universidad Nacional de Córdoba, Argentina; LBRE: Laboratorio de Biología Reproductiva y Evolución, Universidad Nacional de Córdoba, Argentina; MACN: Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, Argentina; MZUC: Museo de Zoología de la Universidad de Concepción, Chile.

protruding, without internal laminar extension; internal surface forming deep, concave excavation. We examined the hemispermatothores of four specimens and observed no conspicuous variation. The lobe region of the hemispermatothore of *U. pizarroi*, n. sp., is remarkable in being conspicuously more developed than in other species of the *granulatus* group, as in species of the *brachycentrus* group of *Urophonius* (Acosta, 1999). However, the other morphological characters of *U. pizarroi*, n. sp., are clearly shared with the *granulatus* group, suggesting that the well-developed lobe region is plesiomorphic.

**DISTRIBUTION:** This species is known only from two localities in the Region Metropolitana de Santiago of central Chile (fig. 1). The type locality of this species is the northernmost record for the *granulatus* group.

**ECOLOGY:** The habitat of the area in which the type locality is located comprises a mixture of shrub steppe and sclerophilous forests, representing the Matorral y Bosque Esclerofilo botanical region (Gajardo, 1993).

## DISCUSSION

In Argentina, the *granulatus* group is restricted to the steppes of the Patagonian phytogeographic province, which occupies the southernmost parts of Argentina and Chile, and extends northwards along the eastern slopes of the Andes, in a narrow strip of intermediate altitude, reaching the north of Mendoza Province in central Argentina (Cabrera and Willink, 1980). *Urophonius granulatus* is recorded from Chubut and Santa Cruz provinces, *U. somuncura* from eastern Río Negro Province, and two undescribed species from eastern Neuquén and southeastern Mendoza provinces, respectively.

In Chile, the *granulatus* group also occupies the small area of Patagonian steppe in the southern part of the country (Magallanes Region), near the border with Argentina; only *U. granulatus* is recorded from this area. However, the other two Chilean species of the *granulatus* group occur in very different habitats: *U. pizarroi*, n. sp., inhabits sclerophilous forests in central Chile, whereas *U. tregualemuensis* inhabits humid *Nothofagus* forests in the south of the country. The *granulatus* group has not been recorded, to date, from the humid forests of southern Argentina or the Valdivian *Araucaria* forests of southern Chile. However, records of scorpions in both areas are scarce to nonexistent, and more surveys are needed to determine whether this apparent absence is real or artifactual.

All species of the *granulatus* group appear to have a similar phenology, regardless of the habitat in which they occur. The peak of activity for these species is early spring: October, November, and early December are the only months of the year during which males have been collected on the surface. During the summer (late December, January, and February), only females and juveniles have been collected on the surface.

An undescribed species of the *granulatus* group, clearly separated from *U. granulatus* and *U. somuncura*, occurs near the Andes in eastern Neuquén Province, Argentina, at similar latitude to *U. somuncura*, but in an area of Patagonian steppe habitat. Another undescribed species of this group occurs in southeastern Mendoza Province, Argentina (fig. 1). These two species will be described when more specimens have become available.

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## REFERENCES

- Acosta, L.E. 1988. Contribución al conocimiento taxonómico del género *Urophonius* Pocock, 1893 (Scorpiones, Bothriuridae). *Journal of Arachnology* 16: 23–33.
- Acosta, L.E. 1998 [1999]. *Urophonius transandinus* sp. nov. (Bothriuridae), a scorpion from central Chile. *Studies on Neotropical Fauna and Environment* 33: 157–164.
- Acosta, L.E. 2003. Description of a new Patagonian species of *Urophonius* Pocock (Scorpiones, Bothriuridae), from Meseta de Somuncurá, Argentina *Zootaxa* 187: 1–12.
- Cabrera, A.L., and A. Willink. 1980. Biogeografía de América Latina. Secretaría General de la Organización de los Estados Americanos (OEA), Departamento de Asuntos Científicos y Tecnológicos, Monografía 13 (Serie de Biología), 122 pp.
- Cekalovic, T. 1981. Dos nuevas especies y un nuevo registro del género *Urophonius* para Chile (Scorpiones, Bothriuridae). *Boletín de la Sociedad de Biología de Concepción* 52: 195–201.
- Francke, O.F. 1977. Scorpions of the genus *Diplocentrus* Peters from Oaxaca, Mexico. *Journal of Arachnology* 4: 145–200.
- Gajardo, R. 1993. La vegetación natural de Chile, clasificación y distribución geográfica. Santiago: Editorial Universitaria. 165 pp.
- Lowe, G., and V. Fet. 2000. Family Bothriuridae Simon, 1880. In V. Fet, W.D. Sissom, G. Lowe, and M.E. Braunwalder, *Catalog of the scorpions of the world (1758–1998)*: 17–53. New York: New York Entomological Society.
- Mattoni, C.I. 2007. The *Bothriurus* scorpions (Scorpiones, Bothriuridae) from Patagonia. *Insect Systematics & Evolution* 38: 173–192.
- Mattoni, C.I., and L.E. Acosta. 2005. A new species of *Bothriurus* from Brazil (Scorpiones, Bothriuridae). *Journal of Arachnology* 33 (3): 735–744.
- Mattoni, C.I., and A.V. Peretti. 2004. The giant and complex genital plug of the *asper* group of *Bothriurus* (Scorpiones, Bothriuridae): morphology and comparison with other genital plugs in scorpions. *Zoologischer Anzeiger* 243 (1–2): 75–84.

- Maury, E.A. 1968a. Aportes al conocimiento de los escorpiones de la República Argentina. I. Observaciones biológicas sobre *Urophonius brachycentrus* (Thorell, 1877) Bothriuridae. *Physis*, Sec. C 27 (75): 407–418.
- Maury, E.A. 1968b. Aportes al conocimiento de los escorpiones de la República Argentina. II. Algunas consideraciones sobre el género *Bothriurus* en la Patagonia y Tierra del Fuego con la descripción de una nueva especie (Bothriuridae). *Physis*, Sec. C 28 (76): 149–164.
- Maury, E.A. 1969. Observaciones sobre el ciclo reproductivo de *Urophonius brachycentrus* (Thorell 1877) (Scorpiones, Bothriuridae). *Physis* Sec. C 29 (78): 131–139.
- Maury, E.A. 1973. Los escorpiones de los sistemas serranos de la Provincia de Buenos Aires. *Physis*, Sec. C 32 (85): 351–371.
- Maury, E.A. 1977. Comentarios sobre dos especies de escorpiones del género *Urophonius* (Bothriuridae). *Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"* 5 (7): 143–160.
- Maury, E.A. 1979a. Escorpiofauna patagónica. II. *Urophonius granulatus* Pocock 1898 (Bothriuridae). *Physis* Sec. C 38 (94): 57–68.
- Maury, E.A. 1979b. Apuntes para una zoogeografía de la escorpiofauna Argentina. *Acta Zoológica Lilloana* 35: 703–719.
- Mello-Leitão, C. de 1932. Notas sobre escorpiões Sul-Americanos. *Arquivos do Museu Nacional* 34: 9–46.
- Ojanguren-Affilastro, A.A. 2002. Nuevos aportes al conocimiento del género *Urophonius* Pocock, 1893 (Scorpiones, Bothriuridae). *Revista Ibérica de Aracnología* 6: 181–186.
- Ojanguren-Affilastro, A.A. 2005. Estudio monográfico de los escorpiones de la República Argentina. *Revista Ibérica de Aracnología* 11: 75–241.
- Ojanguren-Affilastro, A.A. 2007. A new endemic scorpion species from the Somuncura Plateau, in northern Patagonia (Scorpiones; Bothriuridae). *Zootaxa* 1466: 47–56.
- Ojanguren-Affilastro, A.A., and G. Cheli. 2009. New data on genus *Urophonius* Pocock 1893 in Patagonia, with a description of a new species of the *exochus* group (Scorpiones; Bothriuridae). *Journal of Arachnology* 37: 346–356.
- Pocock, R.I. 1893. A contribution to the study of Neotropical scorpions. *Annals and Magazine of Natural History* (6) 12: 77–103.
- Pocock, R.I. 1898. Descriptions of some new scorpions from central and South America. *Annals and Magazine of Natural History* (7) 1: 384–394.
- Prendini, L. 2000. Phylogeny and classification of the superfamily Scorpionoidea Latreille 1802 (Chelicerata, Scorpiones): an exemplar approach. *Cladistics* 16 (1): 1–78.
- Prendini, L. 2003. A new genus and species of bothriurid scorpion from the Brandberg Massif, Namibia, with a reanalysis of bothriurid phylogeny and a discussion of the phylogenetic position of *Lisposoma* Lawrence. *Systematic Entomology* 28 (2): 149–172.
- Ringuelet, R.A. 1953. Geonemia de los escorpiones en la Argentina y las divisiones zoogeográficas basadas en su distribución. *Revista del Museo de La Plata (N. S.), Zoología* 4: 277–284.
- San Martín, P.R. 1965. Escorpiofauna Argentina. I. Bothriuridae. Redescrípción del holotipo y descripción del alotipo hembra de *Urophonius eugenicus* (Mello-Leitão, 1931). *Physis*, Sec. C 25 (70): 283–290.
- San Martín, P.R., and T. Cekalovic. 1968. Escorpiofauna Chilena. I. Bothriuridae. Una nueva especie de *Urophonius* para Chile. *Investigaciones Zoológicas Chilenas* 13: 81–100.
- Vachon, M. 1973 [1974]. Étude des caractères utilisés pour classer les familles et les genres de scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les scorpions. *Bulletin du Muséum National d'Histoire Naturelle* 3e sér. 140: 857–958.







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