

Bothriurus picunche sp. nov., a New Scorpion from Chile (Bothriuridae)

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Abstract

Bothriurus picunche, a new species belonging to the *vittatus* species-group, is described. It can be separated from other species in the group by the pigmentation patterns of the prosoma, mesosoma and ventral side of metasoma; and by small differences in the arrangement of the ventral keels and setae of caudal segment V. The species is distributed in the Chilean provinces of Chacabuco, Cardenal Caro, Curicó, Talca and Cauquenes. Some zoogeographical aspects are discussed.

Resumen

Se describe *Bothriurus picunche*, nueva especie perteneciente al grupo *vittatus*. Esta forma se distingue de otras especies en el grupo por los patrones de pigmentación del prosoma, mesosoma y faz ventral del metasoma; y por pequeñas diferencias en la disposición de las carenas ventrales y quetas del segmento caudal V. La especie se distribuye en las provincias chilenas de Chacabuco, Cardenal Caro, Curicó, Talca y Cauquenes. Se discuten algunos aspectos zoogeográficos.

Keywords: *Bothriurus picunche* sp. nov., Scorpiones, Bothriuridae, Chile, Neotropics.

Introduction

The genus *Bothriurus* has 33 nominal species placed into two valid subgenera (Fet et al., 2000). The use of subgenera, however, has been abandoned in the last 20 years due to the fact that they were based on arbitrary characters. At present, the recognition and use of 'species-groups' in the genus have

received more support. Based on the morphology of the hemispermatophore, trichobothriotaxy and the structure of the caudal ventral keels, 11 'species groups' have been recognised (Maury, 1980, 1981, 1982; Acosta & Maury, 1998; Mattoni, in press). Although these groups do not currently have any nomenclatural value, they probably represent monophyletic units (Acosta & Peretti, 1998).

While revising the species of *Bothriurus* from Chile, I have had the opportunity to study abundant material from that country. In this process, I have found a new species. This new form belongs to the *vittatus* species-group (Mattoni, in press), and shares with *Bothriurus vittatus* (Guérin Meneville, [1838]) and two unnamed species a similar hemispermatophore morphology with two conspicuous apophyses on the internal lobe, and a common general arrangement of the caudal segment I ventral keels. The ventral keels of the caudal segment V have also the same general disposition in the group, but the species differ in the extension of the keels and in the number of intermediary granules. The number of pectinal teeth, often useful in the distinction of other scorpion species, does not have value at the moment for the recognition of the species inside the *vittatus* group.

Materials and methods

Terminology for general morphology conforms to that of Stahnke (1970), except for terminology for metasomal and pedipalp carinae (Francke, 1977) and trichobothrial nomenclature (Vachon, 1974). The nomenclature of the hemispermatophore structures follows San Martín (1963).

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Abbreviations and curators of studied collections: AMNH: American Museum of Natural History, New York (N. Platnick), UCCC: Universidad de Concepción Colecciones Científicas, Chile (V. Jerez, J. Artigas), MACN: Museo Argentino de Ciencias Naturales 'Bernardino Rivadavia,' Buenos Aires (M. Galiano, C. Scioscia), CDA: Cátedra de Diversidad Animal I, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Argentina (L. Acosta).

Abbreviations of descriptive terms

Keels of caudal segments:

DL: Dorsal lateral

LSM: Lateral suprmedian

LM: Lateral median

LI: Lateral infrmedian

VL: Ventral lateral

VSM: Ventral submedian

VM: Ventral median

Hemispermatothore:

L: Lamina

c.d.: distal crest of lamina

r.d.p.: posterodistal fold

l.i.: internal lobe of capsule

l.b.: basal lobe of capsule

l.e.: external lobe of capsule

Results

Bothriurus picunche sp. nov. (Figs. 1, 2)

Type material

Holotype ♂ and allotype ♀ (AMNH): Punta de Lobos, S of Pichilemu (34°26'S, 72°03'W), elev. 25 ft., coastal cliffs, under rocks, Province Cardenal Caro, 17 January 1985 (N. Platnick & O. Francke); 1 ♂ paratype (MACN 9897), 1 ♂ paratype (CDA 000.066), 1 ♀ paratype (MACN 9898): Cayurranquil, W of Cauquenes, Province of Cauquenes, 24–31 January 1981 (L. E. Peña); 1 ♂ paratype (UCCC 25709), 1 juv. paratype (UCCC 25710), 1 ♀ paratype (CDA 000.067): Llico, Province Curicó, 16 March 1967 (T. Cekalovic).

Etymology

The specific name is a noun in apposition, referring to a Mapuche tribe from south-central Chile.

Distribution

South-central Chile (Fig. 3): low altitude sectors of Chacabuco, Cardenal Caro, Curicó, Talca and Cauquenes Provinces.

Diagnosis and comparisons

The morphology of the hemispermatothore, in particular of l.i. with two apophyses on the external face, and the arrangement of the ventral keels of caudal segment I, clearly indicate the inclusion of *Bothriurus picunche* sp. nov. in the *vittatus* species-group (Mattoni, in press). *Bothriurus picunche* appears more closely related to *B. vittatus*, but *B. picunche* has shorter ventral keels and fewer intermediate granules on caudal segment V than *B. vittatus*. On the ventral aspect of caudal segment V, *B. vittatus* has an anterior pair of macrosetae; these setae are lacking in *B. picunche*. Finally, the pigmentation pattern of *B. picunche* clearly separates both species: *B. vittatus* has the three bands on metasoma ventral surface fused in posterior of each segment; these bands are separated in segments I–IV in *B. picunche*. Additionally, in *B. vittatus* the tergites show a median area without pigment that form a clear band, which is absent in *B. picunche*. The pigmentation patterns are also useful for the distinction of all the species in the group (two unnamed).

Description

Total length in adults: 26.57–38.18 mm in males, up to 38.05 mm in females. Measurements of holotype and allotype in Table 1.

The general colour is reddish-hazel, with markings of dark brown and black pigments. Yellow legs with diffuse markings on the prolateral side; pectines light yellow; dorsally spotted pedipalps and chela with diffuse dark markings. Pigmentation of caparace (Fig. 2: 8): dark ocular prominence, with connecting pigment bands toward the lateral eyes; anterior edge of caparace yellowish with a small median spot of pigment; posterior area with irregular pigmentation mostly concentrated near the postero-lateral margins, that area with a small central median spot. Tergites (Fig. 2: 9) with central dark spot connected by a band of dark pigment along the anterior edge to pairs of lateral blotches; paramedial posterior area of tergites without pigment. Sternites yellowish, I–IV immaculate, V with two posterolateral dark spots (Fig. 2: 10). Metasoma dark, reticulate on posterior lateral surfaces of segments I–V; ventral surface (Fig. 2: 10) with three bands of pigment, one axial (weak or absent on segment I) and two paramedians, that are separated in segments I–IV and fused in posterior fourth of segment V. Telson blackish, with bright bands: two thin and ventral, one lateral.

Keels and granules are more developed in males (except for VL and VSM keels of caudal segment I). Tegument of prosoma and tergites I–VI is finely granular; tergite VII with four short keels in the posterior half, two lateral and two paramedian. Sternites I–IV smooth, sternite V with four weak keels in distal fourth (especially weak in males). Caudal segments I–IV: DL keels complete, with blunt granules, the posterior ones in each segment more highly developed; LSM keels present only on distal third of segments; LI keels vestigial on distal third of segments I–III, absent on IV; VL and

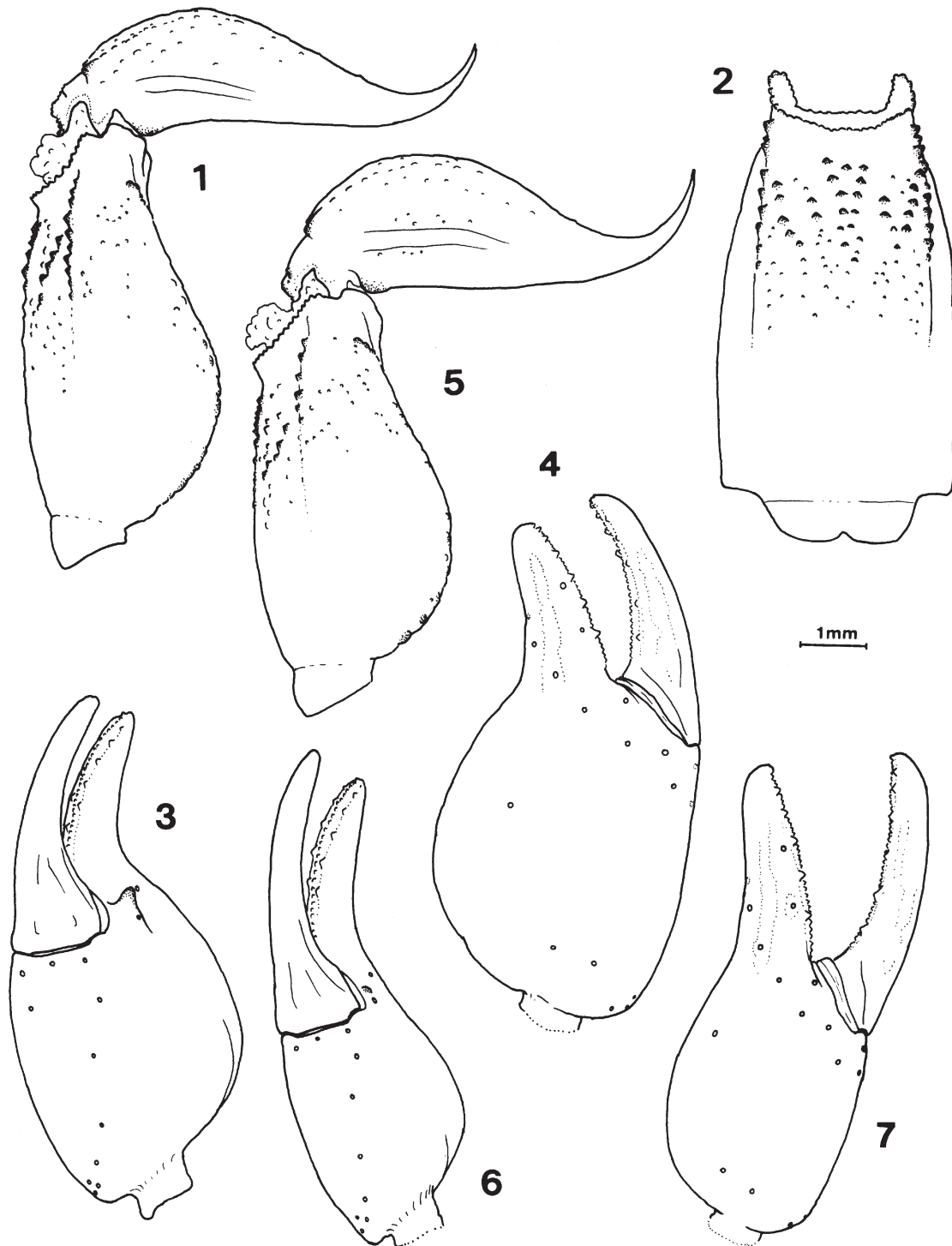


Fig. 1. *Bothriurus picunche* sp. nov. 1–4: ♂ holotype (AMNH). (1) Caudal segment V and telson, lateral view; (2) caudal segment V, ventral view; (3) right pedipal chela, ventromedial view; (4) right pedipal chela, external view. 5–7: ♀ allotype (AMNH). (5) Caudal segment V and telson, lateral view; (6) right pedipal chela, ventromedial view; (7) right pedipal chela, external view.

VSM keels present only on segment I, irregular, vestigial (without granules) and with blunt granules in the area between VSM keels, which are more noticeable in females, VSM bifurcates toward proximal end. Caudal segment V: DL

keels weak with two posterior granules which are larger in the distal portion of each keel (Fig. 1: 1, 5); LSM keel absent; area between DL and VL keels with small granules in the posterior third; VL, VSM and VM keels developed only in distal

Table 1. Measurements (mm) of the ♂ holotype and ♀ allotype (AMNH) of *Bothriurus picunche* sp. nov.

	Holotype ♂	Allotype ♀
Total length	38.18	38.05
Caparace length/anterior width	4.95/3.10	4.88/2.97
Mesosoma length	9.53	10.99
Metasoma length	23.70	22.18
Caudal segment I length/width	2.33/3.83	2.18/3.76
Caudal segment II length/width	2.77/3.56	2.77/3.50
Caudal segment III length/width	3.23/3.50	2.97/3.43
Caudal segment IV length/width	3.82/3.50	3.50/3.37
Caudal segment V length/width/height	5.08/3.43/2.84	4.49/3.30/2.83
Telson length/width/height	6.47/2.57/1.67	6.27/2.84/2.05
Aculeus length	1.91	1.91
Pedipalp length	15.11	14.06
Femur length/width	3.56/1.45	3.23/1.52
Patella length/width	3.82/1.65	3.63/1.45
Chela length/width/height	7.73/3.03/3.76	7.20/2.23/2.77
Movable finger length	4.09	4.16
Pectinal teeth	16/16	14/14

third of the segment (Fig. 1: 2); VSM keels oblique and in contact posteriorly with VL; VM keel bifurcated posteriorly and area between ventral keels with few small granules; anterior pair of ventromedial macrosetae absent. Telson of male elongated and low (Fig. 1: 1), ventral surface granular, dorsal surface with soft glandular depression; telson of female higher than that of male (Fig. 1: 5), with rounded ventral surface and without dorsal glandular depression. Chelicera with two subdistal teeth. Pedipalp: femur three-keeled, dorsoexternal, dorsointernal and ventrointernal keels present in the proximal half with small blunt granules, internal face with scattered granules; patella two-keeled, dorsointernal and ventrointernal keels feeble; chela of male very dilated, with a strong conical apophysis on prolateral side near movable finger (Fig. 1: 3, 4); chela of female less inflated, with small blunt granule in the position of the apophysis of the male (Fig. 1: 6, 7). Trichobothrial pattern type C, neobothriotaxic major, with the following segment totals: femur 3 (1 *d*; 1 *i*; 1 *e*), patella 19 (2 *d*; 1 *i*; 13 *e*; 3 *v*) and chela 27 (17 manus -5 *V*-; 10 fixed finger); chela: *Esb* near to *Eb*₁ and *Eb*₂. Number of pectinal teeth: males 15–19, females 12–16 (see variability below). Hemispermaphore (Fig. 2: 11, 12): L slender, slightly S-curved, c.d. partitioned and straight; l.b. laminar, bifid; l.i. with two apophyses on the external face (one superior, one inferior); l.e. with semilunar shelf; r.d.p. well developed.

Variability

Number of pectinal teeth. Frequencies in ♂♂ (*n* = 7, 14 pectines, left/right): 16/15 (1), 16/16 (1), 17/17 (1), 18/16 (1), 17/18 (1), 19/17 (1), 19/18 (1); ♀♀ (*n* = 7, 13 pectines,

one broken): 14/12 (1), 14/14 (1), 15/14 (3), ? /15 (1), 16/15 (1).

Additional material examined

Chile. *Provincia Chacabuco*: Lampa, 10 Aug. 1980 (D. Jackson), 1 juv. (AMNH). *Provincia Curicó*: Torca Lagoon, Llico, 10 Dec. 1977 (M. Rivero), 1 ♀ (AMNH). *Provincia Talca*: 'Tonlema, Talca,' 14–21 Dec. 1984, 1 ♂, 1 ♀, 2 juvs. (AMNH); Putú Lake (N of Constitución), 1 Jan. 1981 (L. Peña), 2 juvs. (AMNH).

Discussion

The *vittatus* group contains four species: *B. vittatus*, *B. picunche*, and two unnamed forms. The group is restricted to South-central Chile ('Central Chilean province' from Morrone, 1996); and as was also noticed in other species-groups of *Bothriurus* (Acosta & Peretti, 1998), species show allopatric distribution.

The *vittatus* group is probably related to the *prospicius* group. Their species have a similar external morphology and the small denticle of the l.i. of the hemispermaphore in the species of the *prospicius* group might be homologous (but reduced) to the inferior apophysis seen in the *vittatus* group. The *prospicius* group has four allopatric species distributed in an arc between northwestern and central Argentina and Uruguay. All of these sectors are related with old mountains (Acosta & Peretti, 1998). This distributional pattern also occurs in other taxa (harvestmen, ferns, etc; Mattoni &

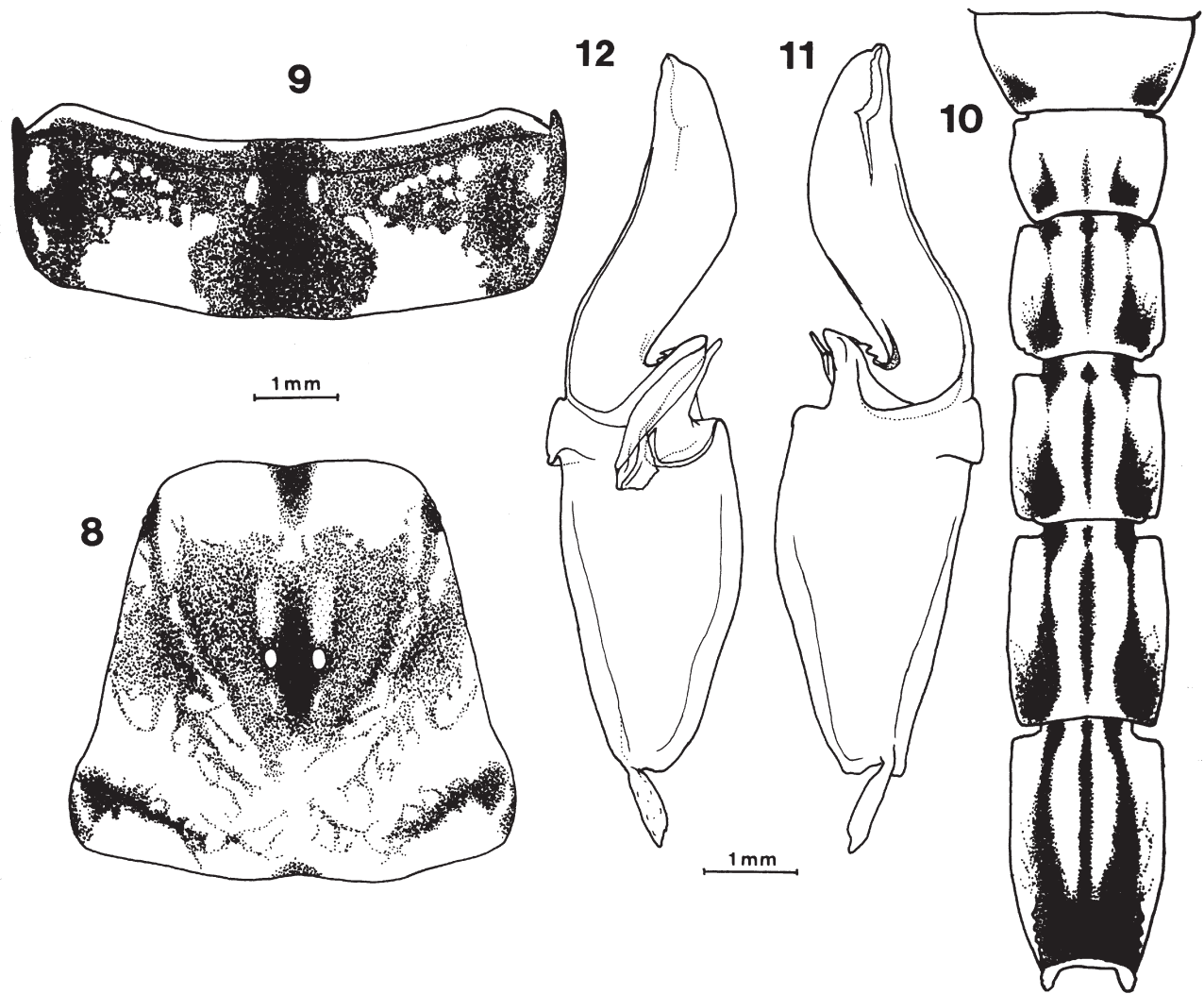


Fig. 2. *Bothriurus picunche* sp. nov. (8) Pigmentation of ♀ allotype (AMNH), prosoma; (9) pigmentation of ♀ allotype (AMNH), tergite IV; (10) generalized pigmentation pattern of sternite V and metasoma, ventral view, not to scale; (11) ♂ holotype, left hemispermatophore, external view; (12) ♂ holotype, left hemispermatophore, internal view.

Acosta, 1997), and was named 'peripampasic track' (Acosta, 1993). Some elements belonging to this track show an interesting relationship with the Chilean biota because the latter includes a species of *Urophonius* from the *brachycentrus* species-group (Scorpiones, Bothriuridae) (Acosta, 1998), and three species of ferns (De La Sota, 1967). The distributional patterns of freshwater Decapoda (Crustacea) show similar connections between areas on both sides of the Andes (Morrone & Lopretto, 1994). They argued for the possible existence of an ancient tropical freshwater biota that in the past extended further south, and they suggested that it became fragmented later by vicariant processes (Morrone & Lopretto, 1994, 1995; Morrone, 1996). We would speculate that a tropical terrestrial fauna with a similar distribution – southern South America – probably experienced the same process.

These patterns suggest that *Bothriurus* is probably older than the Andean orogeny (late Miocene or early Pliocene). This hypothesis could explain the fact that only the *prospicuus* type of hemispermatophore is present in Chile (Acosta & Peretti, 1998; Mattoni & Acosta, unpublished), perhaps representing the plesiomorphic status in the genus.

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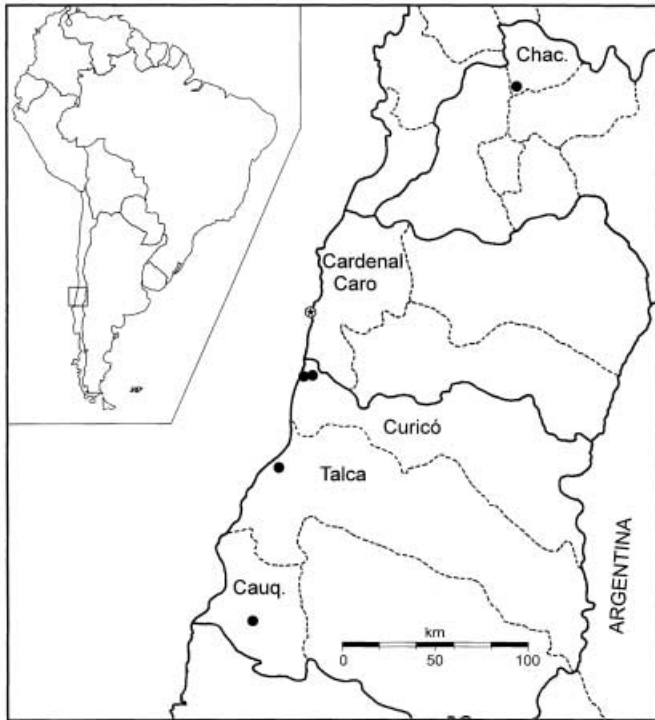


Fig. 3. Distribution of *Bothriurus picunche* sp. nov. in five provinces of South-central Chile. Chac. = Chacabuco; Cauq. = Cauquenes. The type locality is indicated by a star. Solid lines: regional boundaries; dotted lines: provincial boundaries.

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References

- Acosta LE (1993): Escorpiones y opiliones de la provincia de Córdoba (Argentina): diversidad y zoogeografía. *Bull Soc Neuchât Sci Nat (XIIIe Coll Europ Arachnol)* 116: 11–17.
- Acosta LE (1998): *Urophonius transandinus* sp. nov. (Bothriuridae), a scorpion from central Chile. *Stud Neotrop Fauna Environm* 33: 157–164.
- Acosta LE, Maury EA (1998): Escorpiones. In: Morrone JJ, Coscarón S (eds.) *Biodiversidad de artrópodos argentinos*. La Plata, Argentina, Ediciones Sur, pp. 545–559.
- Acosta LE, Peretti AV (1998): Complemento a la descripción de *Bothriurus cordubensis* (Scorpiones, Bothriuridae) con anotaciones sobre patrones evolutivos del género en Argentina. *Rev Arachnol* 12: 95–108.
- De La Sota ER (1967): Composición, origen y vinculaciones de la flora pteridológica de las sierras de Buenos Aires (Argentina). *Bol Soc Arg Bot* 11: 105–128.
- Fet V, Sissom WD, Lowe G, Braunwalder ME (2000): *Catalog of the scorpions of the world (1758–1998)*. New York, New York Entomological Society.
- Francke OF (1977): Two emendations to Stahnke's (1974) Vaejovidae revision (Scorpionida, Vaejovidae). *J Arachnol* 4: 125–135.
- Guérin Méneville FE ([1838]): Arachnides. In: Bertrand A, ed., *Voyage autour du monde, exécuté par ordre du Roi, sur la corvette de sa Majesté, la Coquille, pendant les années 1822, 1823, 1824 et 1825, par L.I. Duperrey*, Zoologie, Vol. 2, 2, pp. 47–50.
- Maury EA (1980): Usefulness of the hemispermaphore in the systematics of the scorpion family Bothriuridae. *8th Int Congr Arachnol Vienna 1980*: 335–339.
- Maury EA (1981): A new *Bothriurus* from Bolivia (Scorpiones, Bothriuridae). *Bull Am Mus Nat Hist* 170: 29–33.
- Maury EA (1982): Dos *Bothriurus* del Nordeste Brasileño (Scorpiones, Bothriuridae). *Rev Soc Ent Argentina* 41: 253–265.
- Mattoni CI (in press): La verdadera identidad de *Bothriurus vittatus* (Guérin Méneville, [1838]) (Scorpiones, Bothriuridae). *Rev Arachnol*.
- Mattoni CI, Acosta LE (1997): Scorpions of the insular sierras in the Llanos District (Province of La Rioja, Argentina) and their zoogeographical links. *Biogeographica* 73: 67–80.
- Morrone JJ (1996): The biogeographical Andean subregion: a proposal exemplified by arthropod taxa (Arachnida, Crustacea, and Hexapoda). *Neotropica* 42: 3–7.
- Morrone JJ, Lopretto EC (1994): Distributional patterns of freshwater Decapoda (Crustacea: Malacostraca) in southern South America: a panbiogeographic approach. *J Biogeogr* 21: 97–109.
- Morrone JJ, Lopretto EC (1995): Parsimony analysis of endemism of freshwater Decapoda (Crustacea: Malacostraca) from southern South America. *Neotropica* 41: 3–8.
- San Martín PR (1963): Una nueva especie de *Bothriurus* (Scorpiones, Bothriuridae) del Uruguay. *Bull Mus Natl Hist Nat (Sér 2)* 35: 400–418.
- Stahnke HL (1970): Scorpion nomenclature and mensuration. *Entomol News* 81: 297–316.
- Vachon M (1974): Étude des caractères utilisés pour classer les familles et les genres de scorpions (Arachnides). 1. La tricobothriotaxie en Arachnologie. Sigles tricobothriax et types de tricobothriotaxie chez les scorpions. *Bull Mus Natl Hist Nat (Sér 3), 140 Zool* 104: 857–958.