

## A NEW SPECIES OF *CENTRUROIDES* OF THE "*NIGROVARIATUS*" GROUP (SCORPIONES: BUTHIDAE) FROM SOUTHERN MEXICO

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**Abstract:** The present paper deals with two species of *Centruroides* Marx, 1890 of the "*nigrovariatus*" group. One of them is described as new from two nearby localities of southwestern Oaxaca and southeastern Guerrero (in the Costa Chica region of the Pacific Coastal Plain), while the second represents a new record for *Centruroides rodolfoi* Santibáñez-López & Contreras-Félix, 2013. After this addition, the genus is represented in the country by 41 species, eight of them belonging to the "*nigrovariatus*" group.

**Key words:** Scorpiones, Buthidae, *Centruroides*, systematics, new species, Mexico.

**Una nueva especie de *Centruroides* del grupo "*nigrovariatus*" (Scorpiones: Buthidae) del sur de México.**

**Resumen:** En el presente artículo se abordan dos especies de *Centruroides* Marx 1890 del grupo "*nigrovariatus*". Una de ellas se describe como nueva a partir de dos localidades cercanas del suroeste de Oaxaca y el sudeste de Guerrero (en la región de Costa Chica de la Llanura Costera del Pacífico), mientras que la segunda representa un nuevo registro de localidad para *Centruroides rodolfoi* Santibáñez-López & Contreras-Félix, 2013. Tras esta adición, el género queda representado en el país por 41 especies, ocho de ellas pertenecientes al grupo "*nigrovariatus*".

**Palabras clave:** Scorpiones, Buthidae, *Centruroides*, sistemática, nueva especie, México.

**Taxonomía/Taxonomy:** *Centruroides poncei* n.sp.

### Introduction

The buthid scorpion genus *Centruroides* Marx, 1890 is highly diverse in Mexico, with 40 species currently recognized as valid (the number actually does not match amongst different sources, e.g., Baldazo-Monsivaiz *et al.* [2013], Ponce-Saavedra & Francke [2013], Santibáñez-López & Contreras-Félix [2013], and Rein [2014], but a clean-up process was made herein to find the correct value; see updated list below, at the end on the present text). Nevertheless, it is still far from being regarded as well-known: many additions have been already identified by our team, including new species, incorrect synonymies that need to be reverted, and one first record for the country (J. Ponce-Saavedra, R. Teruel, A. F. Quijano-Ravell & J. G. Baldazo-Monsivaiz, in preparation).

Inside the genus, the "*nigrovariatus*" group is a remarkable conglomerate of species, which are very closely-related on both geographical and morphologically grounds. First, they all occur across a well-defined, compact area that includes the peaks, intramontane valleys and foothills of the oriental Sierra Madre del Sur in southern Mexico (centered in Oaxaca State, but reaching adjacent parts of Guerrero, Puebla, Veracruz, and Chiapas; see fig. 38 herein). And second, according to its only available taxonomic diagnosis *sensu stricto* (Armas & Martín-Frias, 2003), enhanced herein, it can be recognized by the following combination of characters: (1) adult size 30–60 mm; (2) entire body and appendages very densely spotted with dark to blackish brown, tergites with two broad, continuous dark stripes; (3) pedipalp chelae slender and densely, minutely granulose in males; (4) metasoma becoming progressively wider and deeper distally, always in females and usually also in males; (5) metasomal segments I–

IV with well-developed, granulose to denticulate carinae, especially the dorsolaterals; (6) female basal pectinal plate with a central circular pit.

This group currently includes the following seven members: *Centruroides baergi* Hoffmann, 1932, *Centruroides franckei* Santibáñez-López & Contreras-Félix, 2013, *Centruroides hoffmanni* Armas, 1996, *Centruroides nigrovariatus* (Pocock, 1898), *Centruroides orizaba* Armas & Martín-Frias, 2003, *Centruroides rodolfoi* Santibáñez-López & Contreras-Félix, 2013, *Centruroides serrano* Santibáñez-López & Ponce-Saavedra, 2009. While identifying scorpion samples collected recently in some localities of southeast Mexico, we identified two morphospecies that clearly belong in this group: an undescribed species and a new locality record for *C. rodolfoi*; the description of the former is presented in this paper, complemented by the new finding.

### Material and methods

The specimens were studied and measured under a Zeiss Stemi 2000C tri-ocular microscope, equipped with line scale and grid ocular micrometers. The high-resolution digital photographs were taken using white light and then slightly processed with Adobe Photoshop®, only to remove background and to optimize brightness and contrast parameters for printing.

Nomenclature and measurements follow Stahnke (1970), except for trichobothriotaxy (Vachon, 1974), metasomal carinae (Francke, 1977), pedipalp chela carinae (Acosta *et al.*, 2008, as interpreted by Armas *et al.*, 2011), and sternum (Soleglad & Fet, 2003). Unless otherwise noted, all

morphologically diagnostic characters mentioned refer to adults of both sexes.

All specimens are preserved in ethanol 80% and deposited in the personal collections of the authors (RTO-first author, FKCP-second author).

## Systematics

### *Centruroides poncei*, new species

Figures 1–30, 37. Tables I–II.

**TYPE DATA.** MEXICO: OAXACA STATE: Villa de Tututepec de Melchor Ocampo Municipality: between San José del Progreso and San Pedro Tututepec, km 40 of state road 200 from Santiago Pinotepa Nacional to Puerto Escondido; September 19<sup>th</sup>, 2012; D. Hoferek; 1♂ **holotype** (born and raised to adulthood in captivity, FKCP), 4♂♂ and 7♀♀ **paratypes** (all males and two females born and raised to adulthood in captivity, FKCP), 2♂♂ and 4♀♀ **paratypes** (born and raised to adulthood in captivity, RTO). GUERRERO STATE: Cuajinicuilapa Municipality: Cuajinicuilapa; March 25<sup>th</sup>, 2014; coll. A. Silva; 1♀ **paratype** (RTO).

**ETIMOLOGY.** The proposed name is a patronymic honoring our great friend Dr. Javier Ponce Saavedra (Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, Mexico), for his relevant and continued contributions to the taxonomy and ecology of Mexican scorpions.

**DIAGNOSIS.** Adult size moderately small (males 30–42 mm, females 34–38 mm) for the genus. Coloration basically light yellow, very densely spotted with dark brown all over the body and appendages; carapace with four irregular dark stripes, tergites with two very broad dark stripes; pedipalp chelae with fingers conspicuously darker than hand. Pedipalps standard-sized and with ordinary setation; hand oval (length/width ratio 1.60–1.72 in males, 1.55–1.64 in females), with carinae moderately granulose to subcostate, internal surface with many minute granules scattered; fingers with eight principal rows of denticles, basal lobe/notch combination moderate. Carapace and tergites with intercarinal tegument very densely granulose, with many medium-sized, glossy granules scattered. Sternite V with the smooth patch obsolete. Metasoma short, slender, and slightly narrower distally, with 10/8/8/8/3 (male) to 10/8/8/8/5 (female) complete, well-developed, fine carinae; dorsolateral carinae without conspicuously enlarged terminal denticles; intercarinal spaces coriaceous to finely granulose, with many small granules scattered on both sexes (remarkably more in females). Telson oval elongate (male) to short (female), vesicle smooth, with well-defined laterodistal swellings in adult males, subaculear tubercle very large, sharp and not too close to the base of aculeus. Pectinal tooth count 19–21 (mode 20) in males, 17–19 (mode 18) in females; female basal plate with a small and somewhat deep, circular central pit.

**DESCRIPTION** (adult male holotype).

**Coloration** (fig. 1–2). Base color light yellow, becoming increasingly darker and with a reddish to brownish shade on metasomal segment V and telson. Chelicerae with manus densely reticulate with blackish brown, with pattern essentially uniform all along the segment; fingers irregularly infusate. Pedipalps with coxa, trochanter, femur and patella densely spotted with dark brown on almost all surfaces (only ventrally

immaculate), much denser and darker over carinae; chela with hand almost immaculate yellow (only with very subtle traces of irregular gray spots on external surface), but with fingers deeply and irregularly infusate, conspicuously darker than hand. Carapace symmetrically spotted with blackish brown, along the median area spots are irregularly arranged into four broad, sub-parallel, longitudinal dark stripes (somewhat reminding the pattern typically observed in the distantly-related congener *C. limpidus*), which are sparsely interconnected by dark reticulations (especially posteromedially) and also with additional dark spots posterolaterally; eyes, ocular tubercles and lateral margins blackish. Tergites with lateral margins irregularly infusate and with two very broad, continuous, longitudinal dark submedian stripes (present even over the inter-tergal membranes), separated by a thinner pale median stripe. Coxosternal region and genital operculum pale immaculate. Pectines whitish, with basalmost portion and basal plate conspicuously darker due to heavier sclerotization. Sternites with lateral margins faintly to moderately infusate; III–V essentially immaculate, VI sparsely spotted with brown, VII moderately spotted with dark brown, arranged into three irregular, longitudinal dark stripes (one submedian and two laterals); V with the smooth patch indistinct, translucent. Legs very densely infusate on all surfaces except internally. Metasoma with base color becoming slightly darker distally with a brownish to reddish shade, and with all segments moderately reticulated with dark brown (sparser dorsally and denser ventrally), especially over carinae; with a thin, complete, blackish ventromedian line all along from I through V. Telson with vesicle sparsely infusate, without definite pattern but becoming conspicuously darker and denser around apical portion and subaculear tubercle; aculeus deeply infusate basally, with distal half very dark reddish to blackish.

**Chelicerae** (fig. 5). Dentition typical of the genus; teeth short and wide but sharp. Tegument finely and sparsely granulose but glossy, dorsodistal portion of manus with coarse, glossy granules irregularly arranged transversally, defining a depressed area. Setation very dense ventrally, but essentially lacking dorsally, except for five rigid macrosetae around depressed area of manus.

**Pedipalps** (fig. 9–14). Size and slenderness standard for the genus, sparsely setose and orthobothriotaxic A-α. Femur essentially straight and sparsely setose, all carinae strongly granulose to serrate, intercarinal tegument very densely granulose, with many coarser granules scattered. Patella essentially straight and very sparsely setose, all carinae strongly crenulate to subcrenulate, intercarinal tegument very densely granulose, with many coarser granules scattered, internally with five very large and sharp tubercles. Chela somewhat elongate and moderately setose; hand oval (1.60 times longer than wide), slightly wider than patella (ratio 1.05), and with the distal half widest, with all carinae moderately granulose to subcostate, intercarinal tegument coriaceous to very finely and densely granulose, with many small, sharp granules scattered on dorsointernal and internal surfaces; fingers long and slender (movable finger 1.44 times longer than underhand), moderately curved and with 8/8 principal rows of denticles flanked by 1–5 supernumerary denticles on each side (usually two, but increasing in number basally and vice versa), movable finger with apical subrow of four denticles plus a large internal accessory denticle (large terminal denticle not included), basal lobe/notch combination moderate.

**Table I. Measurements (mm) of four type-specimens of *Centruroides poncei* n.sp.**

Abbreviations: length (L), width (W), posterior width (Wp), depth (H).

Dimensions (mm)		♂ paratype (Oaxaca)	♂ holotype (Oaxaca)	♀ paratype (Oaxaca)	♀ paratype (Guerrero)
Carapace	L / Wp	3.20 / 3.00	3.35 / 3.05	4.10 / 4.40	3.71 / 3.80
Mesosoma	L	7.55	12.3	11.00	9.90
Tergite VII	L / W	2.20 / 2.88	3.35 / 3.76	2.70 / 4.65	2.70 / 4.30
Metasoma	L	18.76	26.56	22.45	19.90
Segment I	L / W / H	2.10 / 1.57 / 1.40	3.25 / 2.10 / 1.90	2.50 / 2.34 / 2.05	2.40 / 2.03 / 1.82
Segment II	L / W / H	2.70 / 1.50 / 1.40	3.95 / 2.05 / 1.90	3.30 / 2.25 / 2.00	2.90 / 1.92 / 1.78
Segment III	L / W / H	3.08 / 1.50 / 1.40	4.45 / 2.00 / 1.95	3.70 / 2.22 / 2.15	3.20 / 1.87 / 1.78
Segment IV	L / W / H	3.50 / 1.42 / 1.30	4.85 / 1.98 / 1.90	3.90 / 2.10 / 1.96	3.50 / 1.90 / 1.70
Segment V	L / W / H	4.00 / 1.40 / 1.30	5.62 / 2.00 / 1.90	4.70 / 2.10 / 1.92	4.20 / 1.80 / 1.70
Telson	L	3.38	4.44	4.35	3.70
Vesicle	L / W / H	2.08 / 1.15 / 0.98	2.74 / 1.72 / 1.40	2.35 / 1.50 / 1.40	2.10 / 1.33 / 1.27
Aculeus	L	1.30	1.70	2.00	1.60
Pedipalp	L	11.29	14.93	14.55	13.05
Femur	L / W	2.89 / 0.81	3.75 / 1.10	3.50 / 1.10	3.30 / 1.00
Patella	L / W	3.35 / 1.15	4.40 / 1.65	4.20 / 1.65	3.60 / 1.40
Chela	L	5.05	6.78	6.85	6.15
Hand	L / W / H	2.10 / 1.22 / 1.20	2.78 / 1.74 / 1.55	2.55 / 1.65 / 1.55	2.29 / 1.40 / 1.40
Movable finger	L	2.95	4.00	4.30	3.86
<b>Total</b>	<b>L</b>	<b>29.51</b>	<b>42.21</b>	<b>37.55</b>	<b>33.51</b>

**Table II. Cumulative ages (in days) of significant reproductive events and litter size (number of offspring between parentheses) of two studied paratype females of *Centruroides poncei* n.sp.**

Age at:	adulthood	1 <sup>a</sup> parturition	2 <sup>a</sup> parturition	3 <sup>a</sup> parturition	4 <sup>a</sup> parturition	5 <sup>a</sup> parturition	death
♀ <sub>1</sub>	115	214 (28)	275 (31)	341 (24)	418 (21)	490 (17)	545
♀ <sub>2</sub>	116	217 (26)	281 (25)	353 (23)	430 (18)	–	502

**Carapace** (fig. 5). Trapezoidal and longer than wide; anterior margin very shallowly V-shaped, with two pairs of long macrosetae and many short microsetae. Carination essentially absent: the only definable carinae are the superciliary (very strong, formed by mostly anastomosed, coarse, glossy granules) and the posterior medians (moderate, formed by isolate, medium-sized, glossy granules). Furrows: anterior median, median ocular, central median, posterior median and posterior marginal fused, wide and deep, posterior laterals long, narrow and deep, other furrows indistinct. Tegument very densely granulose, with many medium-sized, glossy granules scattered over all dark patches. Median eyes very large, separated by slightly less than one ocular diameter; lateral eyes much smaller, all same-sized.

**Sternum** (fig. 6). Standard for the genus: type 1, medium-sized, slightly longer than wide, and triangular in shape, with two pairs of long macrosetae.

**Genital operculum** (fig. 6). Medium-sized, halves widely separated and subtriangular in shape, with three pairs of long macrosetae and several shorter setae. Genital papillae large and thick, tips narrowly conical and pointing ventrally. Prepectinal plate heavily sclerotized and widely crescent-shaped.

**Pectines** (fig. 6). Size and shape standard for the genus: long (exceeding leg IV trochanter), subrectangular and moderately setose; tooth count 21/21; basal plate heavily sclerotized, wider than long, anterior margin with a deep, V-shaped anteromedian furrow, posterior margin essentially straight.

**Legs** (fig. 19–22). Slender, with all carinae granulose to subserrate and intercarinal tegument coriaceous to minutely granulose. Tibial spurs absent, prolateral and retrolateral pedal spurs strong and sinuose in all legs. Ventral surface of all tarsomere II round and very densely covered by long, dark macrosetae irregularly arranged into two longitudinal, broad, dense rows converging basally, without median row of spinules. Claws somewhat short and strongly curved.

**Mesosoma** (fig. 5–6). Tergites with the same sculpture as on carapace; I–VI with only one well-defined median longitudinal carina (very long, strong, formed by partially anastomosed, medium-sized, glossy granules that do not project beyond posterior margin), without traces of accessory carinae on IV–VI; VII with five carinae (median, submedians and laterals) which are very long, strong and finely serrate. Sternites sparsely setose, with spiracles oblique and relatively short but slit-like; III acarinate, intercarinal tegument divided into a median triangular area which is smooth and glossy, and two lateral areas which are very densely granulose; IV acarinate, intercarinal tegument divided into a median rectangular area which is smooth and glossy, and two lateral areas which are irregularly granulose; V with a pair of weakly costate lateral carinae, intercarinal tegument essentially smooth and glossy, with some coarse punctures medially, and with smooth patch obsolete and translucent; VI with two pairs of weakly to moderately costate submedian and lateral carinae, intercarinal tegument essentially smooth and glossy; VII with two pairs of long and moderately to strongly costate to subcrenulate submedian and lateral carinae, intercarinal tegument very finely and densely granulose.

**Metasoma** (fig. 23–25). Slightly elongated and progressively narrower distally; I with ten complete, fine carinae, II–IV with eight, and V with three: dorsolaterals strongly serrate to subdentate on I–II, strongly serrate to denticulate on III, moderately serrate to denticulate on IV, absent on V; lateral supramedians strongly serrate on I, strongly serrate to denticulate on II–III, weakly serrate on IV, absent on V; lateral inframedians strongly serrate on I, absent on II–V (suggested by a 3–4 small granules distally on II); ventrolaterals strongly subserrate to crenulate on I–III, moderately crenulate on IV, vestigially granulose on V; ventrosubmedians strongly serrate on I, moderately serrate on II–IV, absent on V; ventromedian absent on I–IV, vestigially granulose on V. Intercarinal tegu-

ment coriaceous to very finely and densely granulose, with many minute granules scattered (especially dorsally). Dorsal furrow shallow but complete on all segments. Two pairs of dark ventrolateral macrosetae, plus some inconspicuous microsetae scattered over all carinae.

**Telson** (fig. 15). Essentially bare, with a few setae and microsetae scattered all over. Vesicle elongate oval and slightly depressed (1.59 times longer than wide, 1.23 times wider than deep), with well-defined, round laterodistal swellings, tegument smooth and coriaceous, ventromedian carina obsolete. Subaculear tubercle very large, sinuose and sharply conical, neither too close nor far from the base of aculeus, pointing towards its sub-basal part. Aculeus sharp, shorter than vesicle and moderately curved.

**FEMALE** (paratype from Oaxaca: fig. 3–4, 7–8, 16–18, 26–28; tab. I). Very similar to the male in coloration (only with blackish pattern slightly darker and more contrasting), but morphologically there is a well-marked sexual dimorphism: (1) pedipalp hand shorter and rounder; (2) genital papillae and pre-pectinal plate absent; (3) pectines narrower, shorter (not reaching the coxa-trochanter joint of leg IV) and with lower tooth count; (4) basal pectinal plate wider, softer, with posterior margin widely convex, and with a small and somewhat deep, circular central pit; (5) sternites much less granulose, almost completely smooth; (6) mesosoma wider, with sides strongly convex; (7) metasomal segments and telson conspicuously shorter, wider and deeper; (8) metasomal segments with remarkably stronger carinae and intercarinal granulation, especially on IV–V.

**VARIATION.** Adult size varied from 29.5–42.2 mm in males and 33.5–37.6 mm in females (tab. I); the examined sample appears to contain two size-classes among adults of each sex. As usually observed amongst scorpions, smaller adults invariably exhibit the weaker expression of secondary sexual dimorphic characters such as the elongation of pedipalps and metasoma, i.e., smaller males are always the less attenuate and have pedipalps and metasoma more strongly carinate. Nevertheless, the dimorphism is always well-evident and adults of any size-class can be easily sexed to unaided eye, as usual for most members of the genus.

The base color presented only minor shade variations among different individuals, some being subtly paler and some others somewhat darker. In all cases such variation was clearly age-related, i.e., darker specimens were always the oldest (e.g., cheliceral dentition, leg claws and body setation markedly worn down) and vice versa.

The number of principal rows of denticles in pedipalp fingers was eight in all examined specimens. Similarly, the apical subrow of movable finger was invariable amongst the entire sample.

Pectinal tooth counts in specimens from Oaxaca varied as follows: males with 19 teeth (4 pectines), 20 (6) and 21 (4); females with 17 (1), 18 (13) and 19 (6), the single specimen of this sex from Guerrero has 17/18. In the pooled sample, the pectinal tooth counts varied from 19–21 in males and 17–19 in females, with well-defined modes of 20 and 18 for each sex.

**COMPARISON.** Four of the seven described members of the "*nigrovariatus*" species-group have the metasoma progressively much wider distally (club-like) in adult males and usually also markedly in females: *C. nigrovariatus*, *C. oriza-*

*ba*, *C. rodolfoi*, and *C. serrano*; this character at once is useful to distinguish *C. poncei* n.sp. from them all, even to unaided eye.

The remaining three species (*C. baergi*, *C. franckei*, and *C. hoffmanni*) share with *C. poncei* n.sp. the opposite state, i.e., metasoma progressively narrower distally in adult males (even though females have it slightly widened, evidencing their membership in this group, among other characters). But these three taxa can be unambiguously distinguished from it as follows:

- *C. baergi*: according to specimens examined herein and updated literature (Armas & Martín-Frías, 1999; Santibáñez-López, 2009), it clearly differs by: **a)** adult size larger (40–60 mm); **b)** telson conspicuously shorter, with vesicle more globose and subaculear tubercle vestigial to obsolete; **c)** pectinal tooth counts much higher, 20–23 (mode 23) in males and 18–22 (mode 20) in females; **d)** female with pedipalps and metasoma remarkably more slender (e.g., segment V length/width ratio = 2.60–2.70, vs. 2.24–2.33 in *C. poncei* n.sp.). Also, its distribution area is located far away northwards, along the intramontane valley of Tehuacán-Cuicatlán in southern Puebla and northern Oaxaca, on the other side of the Sierra Madre del Sur (Fig. 37).

- *C. franckei*: according to the very detailed original description and color photographs (Santibáñez-López & Contreras-Félix, 2013), it clearly differs by: **a)** coloration remarkably paler and less densely spotted all over, especially on pedipalps (hand not contrastingly paler than fingers, patella and femur altogether) and metasoma (dorsal and lateral surfaces essentially immaculate, carinae only subtly infuscate to immaculate); **b)** carapace and tergites with granulation finer and sparser; **c)** metasoma with all carinae weaker (especially dorsolaterals and lateral supramedians) and intercarinal granulation much finer and sparser (more evidently in females); **d)** females with metasoma somewhat more robust (e.g., segment V length/width ratio = 2.08–2.12, vs. 2.24–2.33 in *C. poncei* n.sp.); **e)** adult males with pedipalp chelae noticeably larger. Its single known locality lies about 50 km north, up in the Sierra Madre del Sur (Fig. 37).

- *C. hoffmanni*: according to specimens examined herein and updated literature (Martín-Frías *et al.*, 2005), it clearly differs by: **a)** adult size larger (36–58 mm); **b)** coloration paler and less densely spotted all over, especially on pedipalps (hand only slightly paler than fingers, patella and femur altogether), but with telson much darker (vesicle with two very broad, compact, dark longitudinal stripes); **c)** pectinal tooth counts much higher, 21–24 (mode 22–23) in males and 20–22 (mode 21) in females; **d)** metasoma somewhat less slender and with all carinae coarser (more evidently in females); **e)** male with telson more globose (length/depth ratio = 1.75–1.96, vs. 1.96–2.12 in *C. poncei* n.sp.). Also, its distribution area is located far away eastwards, in the Pacific coastal plain and foothills of the Tehuantepec Isthmus (Fig. 37).

**DISTRIBUTION** (fig. 37). Known only from two localities in Guerrero and Oaxaca States, separated by about 100 km, along the Pacific coastal plain section traditionally known as "Costa Chica".

**ECOLOGICAL DATA.** All specimens from the type-locality were found under the bark of a living tree that formed part of a fence bordering a plantation (fig. 29). According to the



verbal information kindly supplied by the collector, the single individual from Cuajinicuilapa was captured under a brick lying on gravel, in a house backyard.

The two known localities have the same ecological conditions: both lie about 20 km inland from the coast in the foothills of the Sierra Madre del Sur mountain range, at altitudes lower than 100 m (e.g., the type-locality lies about 95 m above sea level and Cuajinicuilapa at 53 m a.s.l.). The original vegetation in both sites was the tropical semicaducifolious forest, which has been extensively degraded by anthropic activity such as farming, logging, and ranching.

During the collecting at the type-locality, only five adult females were found and all were brought alive to the laboratory and kept by one of us (D. Hoferek) under conditions similar to those observed in nature, in order to study their reproductive biology and to obtain additional specimens, especially the unknown males. The five females gave birth almost simultaneously and the second-instars were raised all together as a colony in a small terrarium; temperature was fixed at 25–27°C, water and food (the small cricket *Acheta domestica*) were supplied *ad libitum*. Breeding was highly successful and the initial five females produced 13 additional adults, including seven males (see above, in Type Data section).

First instar (newborns, pre-nymphs, pulli) made their ecdysis five days after birth in all cases, the remaining immature instars molted at cumulative ages of 27–29 days (nymphs I), 50–58 days (nymphs II), 84–113 days (nymphs III), and 115–142 days (nymphs IV). Except for one male which reached adulthood from nymph III at a cumulative age of 96 days, all adults were obtained from nymphs IV.

Those specimens raised in captivity were still kept together. Two females were selected as study for reproductive biology and longevity, and the main results are presented in Tab. II herein. The data obtained reveal that, at least under these conditions, *C. poncei* **n.sp.** have a very great reproducing potential: females can give birth at least 4–5 times during a minimum space of 63–69% of their entire lifetime; note that actual capability may well be longer, as this minimum was calculated for each studied individual as: ([age at last recorded parturition *minus* age at reaching adulthood] *divided by* age at death) *multiplied by* 100.

Also, gestation between consecutive parturitions lasted in these two females for 61, 66, 77, and 72 days (female 1) and 64, 72, and 77 days (female 2). Both produced nine litters as a whole and the number of offspring (Tab. II) showed the same clear tendency to decreasing sequentially across time, as observed in other buthid scorpions (Teruel & Armas, 2012: 165).

### ***Centruroides rodolfoi* Santibáñez-López & Contreras-Félix, 2013**

Figures 31–37.

*Centruroides rodolfoi* Santibáñez-López & Contreras-Félix, 2013: 130, 132–133, 136–139; fig. 1c–d, 2c–d, 3c–d, 4c–d, g–h, 6–7; tab. 2.

NEW RECORD. MEXICO: OAXACA STATE: Santa María del Rosario Municipality: Casa Blanca, on state road 125 between San Martín Huamelúlpam and Heroica Ciudad de Tlaxiaco; September 18, 2012; D. Hoferek; 2♂♂ and 4♀♀ (FKCP), 1♂ and 2♀♀ (RTO).

ECOLOGICAL DATA. All specimens were found under barks of pine stumps in mixed pine-oak forest (fig. 35–36), at an alti-

tude about 2,300 m a.s.l. These conditions are remarkably similar to those recorded in the original description of the species by Santibáñez-López & Contreras-Félix (2013), as it could be expected from the closeness between both localities (see Remarks section below).

All specimens recorded herein were collected in the field, brought alive to the laboratory, and kept by one of us (D. Hoferek) under conditions similar to those observed in nature, in order to study their reproductive biology and to obtain additional specimens. Nevertheless, *C. rodolfoi* seems to be more difficult to breed than *C. poncei* **n.sp.**: only two females gave birth to 20 and 22 newborns, which they both cannibalize a few days later.

REMARKS. This is the second documented finding of *C. rodolfoi*. Nevertheless, the two known localities are very near each other (roughly 10 km air-distance) and have the same conditions of altitude, soil, and vegetation. Thus, this species is expected to be more widespread across continuous landscapes of this part of the Sierra Madre del Sur.

Last, the updated list of the 41 species of *Centruroides* confirmed to occur in Mexico is presented here (taxa endemic from the country marked with an asterisk and new species included):

1. *C. baergi* Hoffmann, 1932\*
2. *C. balsasensis* Ponce-Saavedra & Francke, 2004\*
3. *C. bertholdii* (Thorell, 1876)\*
4. *C. chamela* Ponce-Saavedra & Francke, 2011\*
5. *C. chamulaensis* Hoffmann, 1932\*
6. *C. chiapanensis* Hoffmann, 1932\*
7. *C. edwardsii* (Gervais, 1843)
8. *C. elegans* (Thorell, 1876)\*
  - *C. elegans insularis* Pocock, 1902\*
9. *C. exilicauda* (Wood, 1863)
10. *C. flavopictus* (Pocock, 1898)\*
  - *C. flavopictus meridionalis* Hoffmann, 1932\*
11. *C. franckei* Santibáñez-López & Contreras-Félix, 2013\*
12. *C. fulvipes* (Pocock, 1898)\*
13. *C. gracilis* (Latreille, 1804)
14. *C. hirsutipalpus* Ponce-Saavedra & Francke, 2009\*
15. *C. hoffmanni* Armas, 1996\*
16. *C. infamatus* (C.L. Koch, 1844)\*
17. *C. limpidus* (Karsch, 1879)\*
18. *C. margaritatus* (Gervais, 1841)
19. *C. mascota* Ponce-Saavedra & Francke, 2011\*
20. *C. meisei* Hoffmann, 1939\*
21. *C. nigrescens* (Pocock, 1898)\*
22. *C. nigrimanus* (Pocock, 1898)\*
23. *C. nigroviratus* (Pocock, 1898)\*
24. *C. noxius* Hoffman, 1932\*
25. *C. ochraceus* (Pocock, 1898)\*
26. *C. orizaba* Armas & Martín-Frías, 2003\*
27. *C. ornatus* Pocock, 1902\*
28. *C. pallidiceps* Pocock, 1902\*
29. *C. poncei* Teruel, Kovařík, Baldazo-Monsivaiz & Hoferek, 2015\*
30. *C. rileyi* Sissom, 1995\*
31. *C. rodolfoi* Santibáñez-López & Contreras-Félix, 2013\*
32. *C. schmidtii* Sissom, 1995
33. *C. sculpturatus* Ewing, 1928

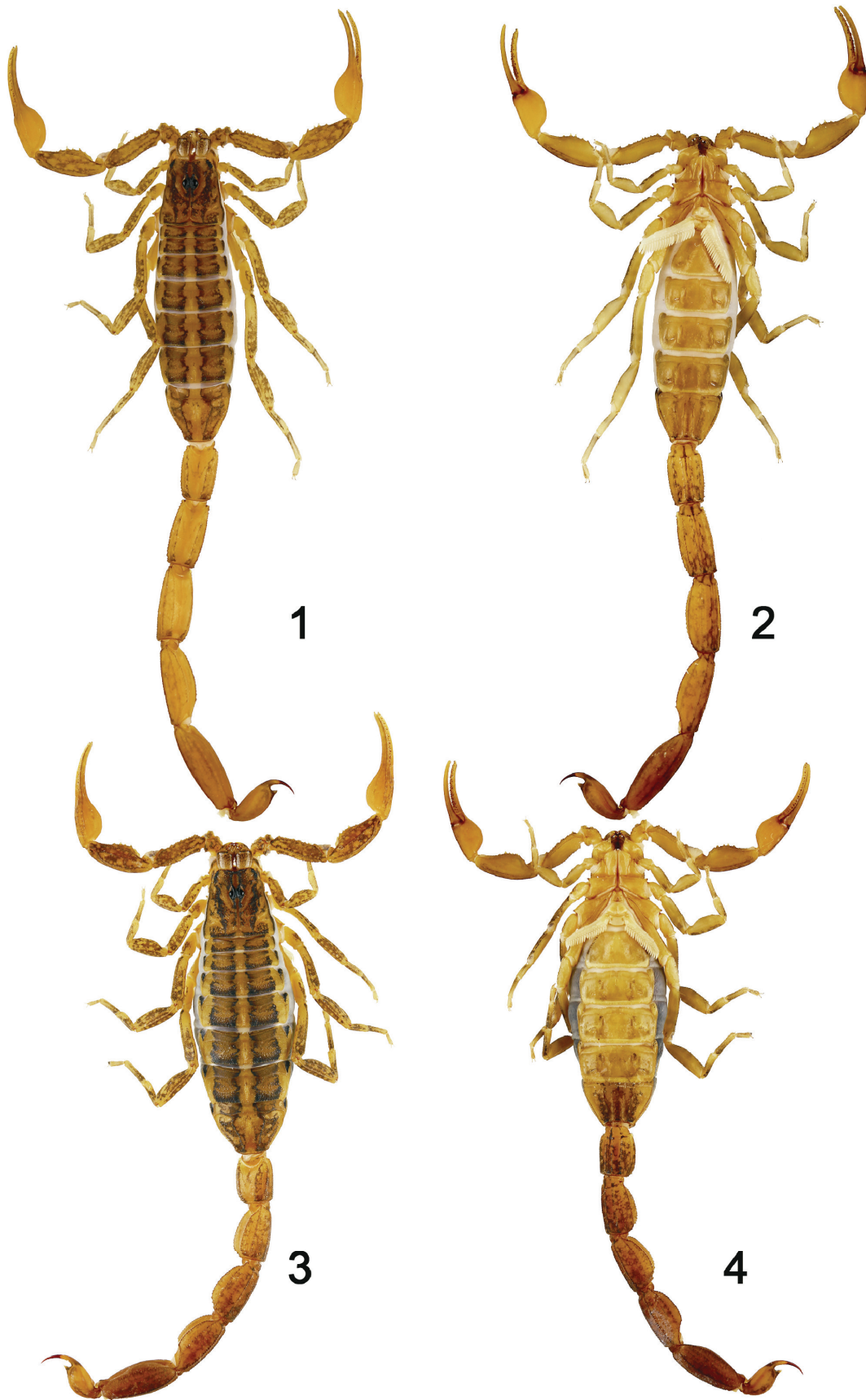
34. *C. serrano* Santibáñez-López & Ponce-Saavedra, 2009\*
35. *C. sissomi* Armas, 1996\*
36. *C. suffusus* (Pocock, 1902)\*
37. *C. tapachulaensis* Hoffmann, 1932
38. *C. tecomanus* Hoffmann, 1932\*
39. *C. tuxtla* Armas, 1999\*
40. *C. villegasi* Baldazo-Monsivaiz, Ponce-Saavedra & Flores-Moreno, 2013\*
41. *C. vittatus* (Say, 1821)

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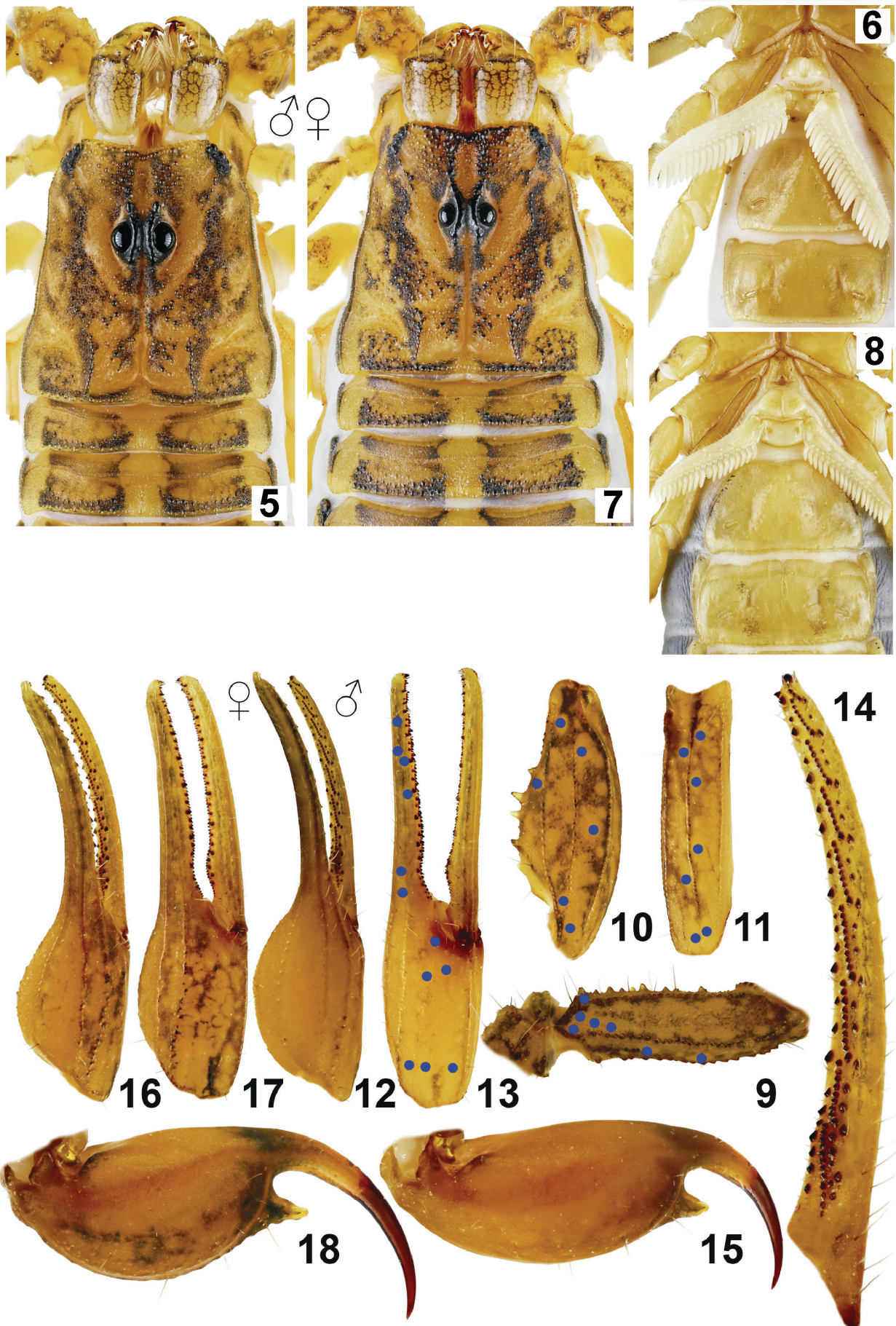
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**Fig. 1-4.** Male holotype (1-2) and female paratype (3-4) of *Centruroides poncei* n.sp. from Oaxaca, dorsal and ventral views.





**Fig. 5-8.** Male holotype (5–6) and female paratype (7–8) of *Centruroides poncei* n.sp.: chelicerae, carapace, and tergites I–II dorsal (5, 7), sternopectoral region and sternites III–IV ventral (6, 8). **Fig. 9-18.** Male holotype (9–15) and female paratype (16–18) of *Centruroides poncei* n.sp.: pedipalp trochanter and femur dorsal (9), patella dorsal (10) and external (11), chela dorsal (12, 16) and external (13, 17), movable finger dorsal (14), telson lateral (15, 18). Note: trichobothrial pattern depicted in fig. 9–11 and 13.





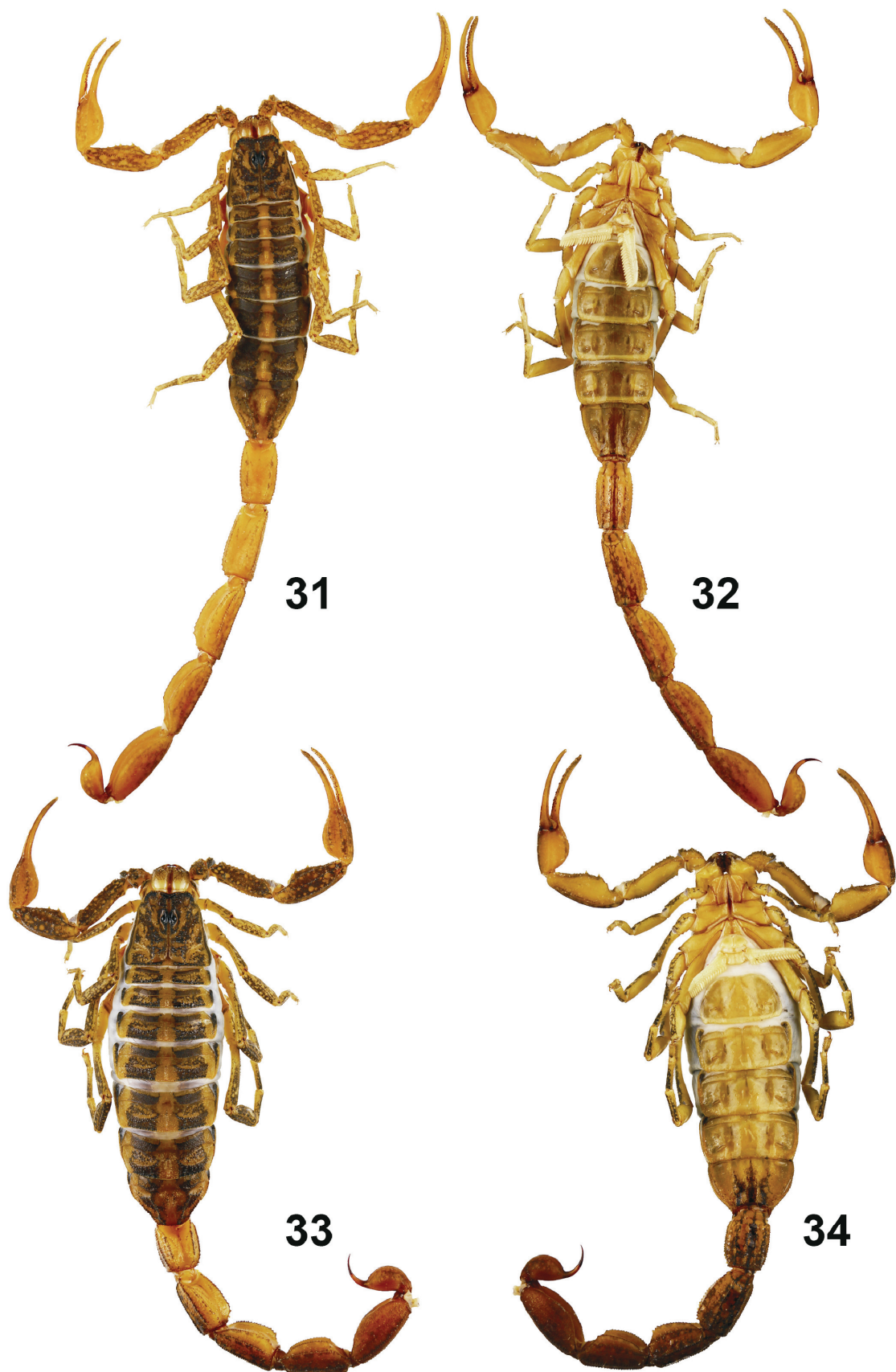
**Fig. 19-22.** Male holotype of *Centruroides poncei* n.sp.: legs I-IV ventrointernal. **Fig. 23-28.** Male holotype (23-25) and female paratype (26-28) of *Centruroides poncei* n.sp.: metasoma and telson lateral (23, 26), dorsal (24, 27) and ventral (25, 28).





Fig. 29-30. Habitat and live adult male paratype of *Centruroides poncei* n.sp., at the type-locality.





**Fig. 31-34.** Adult male (31–32) and female (33–34) of *Centruroides rodolfoi* from Casa Blanca, dorsal and ventral views.





**Fig. 35-37.** Habitat and live adult female of *Centruroides rodolfoi*, at Casa Blanca. **Fig. 38.** Known distribution of all species of the "nigrovariatus" group of *Centruroides*: *C. baergi* (1), *C. franckei* (2), *C. hoffmanni* (3), *C. nigrovariatus* (4), *C. orizaba* (5), *C. poncei* n.sp. (6), *C. rodolfoi* (7, upper symbol depicts the new locality herein recorded), and *C. serrano* (8). Data taken from personally examined specimens and updated literature (Martín-Frías *et al.*, 2005; Armas & Martín-Frías, 2008; Santibáñez-López & Contreras-Félix, 2013).