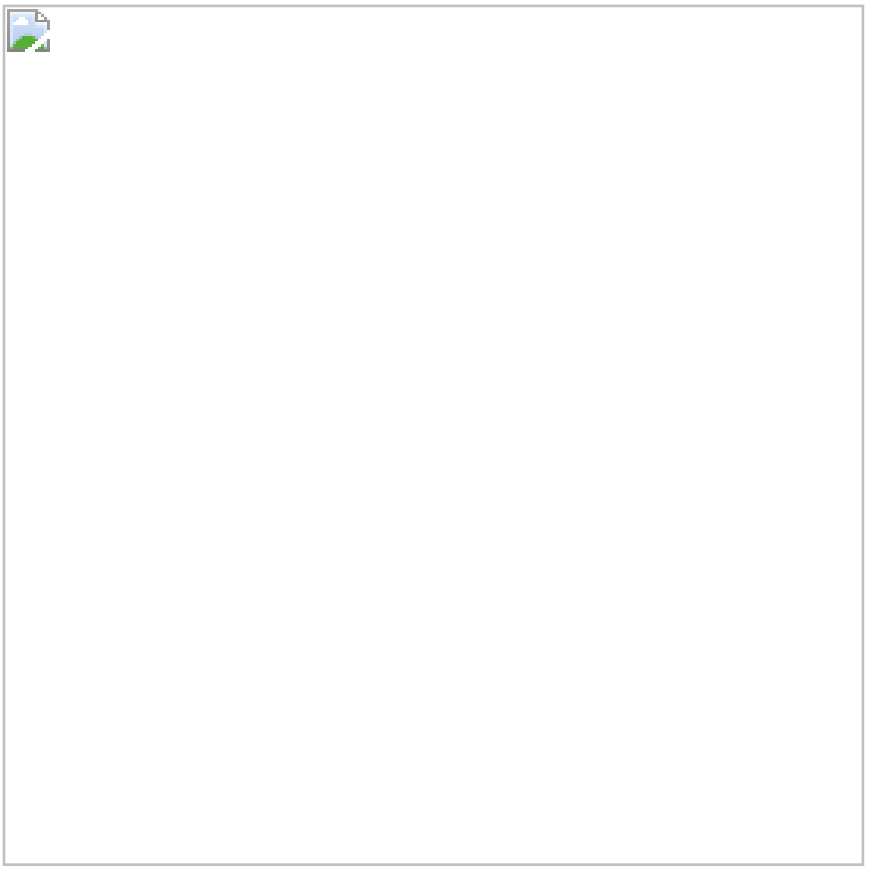

A New Species of Typhlochactas (Scorpiones, Typhlochactinae) from Eastern Mexico

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Source: American Museum Novitates, 2009(3647) : 1-11

Published By: American Museum of Natural History

URL: https://doi.org/10.1206/631.1

AMERICAN MUSEUM
Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, NY 10024
Number 3647, 11 pp., 7 figures, 2 tables June 25, 2009

A New Species of *Typhlochactas* (Scorpiones, Typhlochactinae) from Eastern Mexico

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ABSTRACT

Typhlochactas sissomi, a new species of troglomorphic scorpion in the subfamily Typhlochactinae Mitchell, 1971, is described, based on a single subadult male collected under a stone in a mesophilous forest in the mountains of the state of Queretaro, Mexico. This is the seventh species in the genus *Typhlochactas* Mitchell, 1971. Although all seven species are troglomorphic, four are troglobitic and two are humicolous. The new species described here is probably also humicolous. A key to the identification of *Typhlochactas* species is presented.

INTRODUCTION

The genus *Typhlochactas* Mitchell, 1971 (Typhlochactinae Mitchell, 1971) contains six species of troglomorphic scorpions that are endemic to Mexico (table 1). Four species are troglobites, known only from caves in the Sierra Madre Oriental. The other two are leaf litter inhabitants of forests in the same Sierra and therefore considered to be humicolous.

Typhlochactas cavicola Francke, 1986 is known only from the holotype female, collected in Cueva del Vandalismo, Tamaulipas (fig. 1). *Typhlochactas granulosus* Sissom and Cokendolpher, 1998 is known only from the holotype male, collected in Sotano de Poncho, Veracruz. *Typhlochactas reddelli* Mitchell, 1968 is known from the holotype female and three juveniles collected subsequently in La Cueva del Ojo de Agua de Tlilapan, also in Veracruz. The fourth troglobite, *Typhlochactas rhodesi* Mitchell, 1968, is known from three female specimens collected in La Cueva de La Mina, Tamaulipas. The two humicolous species, *Typhlochactas mitch-*

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 ISSN 0003-0082

TABLE 1

***Typhlochactas* Mitchell, 1971 species, locality, habitat and specimen data**

Abbreviations as follows: *T. cav.* = *T. cavicola* Francke, 1986; *T. gra.* = *T. granulosus* Sissom & Cokendolpher, 1998; *T. mit.* = *T. mitchelli* Sissom, 1988; *T. red.* = *T. reddelli* Mitchell, 1968; *T. rho.* = *T. rhodesi* Mitchell, 1968; *T. sis.* = *T. sissomi*, n. sp.; *T. syl.* = *T. sylvestris* Mitchell & Peck, 1977; OAX = Oaxaca; QRO = Queretaro; TAM = Tamaulipas; VER = Veracruz.

Species	State	Municipio	Localities	Habitat	Holotype	Paratypes	Other
T. cav.	TAM	Guemez	Cueva del Vandalismo	cave	1 ♀		
T. gra.	VER	Tlaquilpa	Sótano de Poncho	cave	1 ♂		
T. mit.	OAX	San Jose Tenango	Cerro Ocote	under stones buried in litter	1 ♂	1 ♂, 1 subad. ♀	
T. red.	VER	Tlilapan	Cueva del Ojo de Agua de Tlilapan	cave	1 ♀		1 juv. ♂[1], 2 juv. ♀[1]
T. rho.	TAM	Gómez Farias	Cueva de la Mina	cave	1 ♀	1 ♀[2], 1 subad. ♀	
T. sis.	QRO	Jalpan	Cañada de La Joya	under stone	1 subad. ♂[1]		
T. syl.	OAX	Valle Nacional	Valle Nacional, 25 km S	litter	1 ♀		

[1]Deposited at the Instituto de Biología, Universidad Nacional Autonóma de México, Mexico City.
[2]Deposited at the Muséum National d'Histoire Naturelle, Paris. All other specimens deposited at the American Museum of Natural History, New York.

elli Sissom, 1988, known from two males and one subadult female, and *Typhlochactas sylvestris* Mitchell and Peck, 1977, known only from the holotype female, inhabit leaf litter in montane forests in Oaxaca.

In total, the genus *Typhlochactas* is known from only fourteen specimens. As such, the recent discovery of a fifteenth, representing a new species, is significant. In the present contribution we describe the seventh species of *Typhlochactas*. The single specimen on which this description is based (fig. 2) was collected under a stone in a mesophilous forest in the mountains of the state of Queretaro, approximately halfway between the type localities of the two northern troglobites in the state of Tamaulipas, and the two southern ones in the state of Veracruz, and quite distant from the type localities of the two humicolous species in the state of Oaxaca. The collection of this new species under a stone on the surface, instead of inside a cave, suggests that it may also be humicolous.

MATERIAL AND METHODS

Measurements were taken and illustrations prepared using a Nikon SMZ-800 stereomicroscope fitted with an ocular micrometer and a camera lucida. Measurements follow Stahnke (1970) and were recorded in mm. Morphological terminology follows Vachon (1974) for trichobothrial nomenclature, but we adopt the interpretation of *Typhlochactas* trichobothrial patterns presented by Prendini and Wheeler (2005), Hjelle (1990), and Sissom (1990) for pedipalp segmentation; Stahnke (1970), Sissom (1990), and Prendini (2000) for remaining features. Photographs were taken under UV and visible light using a Microptics™ ML-1000 digital imaging system. The holotype is deposited in the Colección Nacional de Arácnidos (CNAN), Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City. Left leg I, removed from the specimen and preserved in 95% ethanol for DNA isolation, is deposited in the Ambrose Monell Cryocollection (AMCC) at the American Museum of Natural History, New York. Distribution maps were produced using ArcView GIS

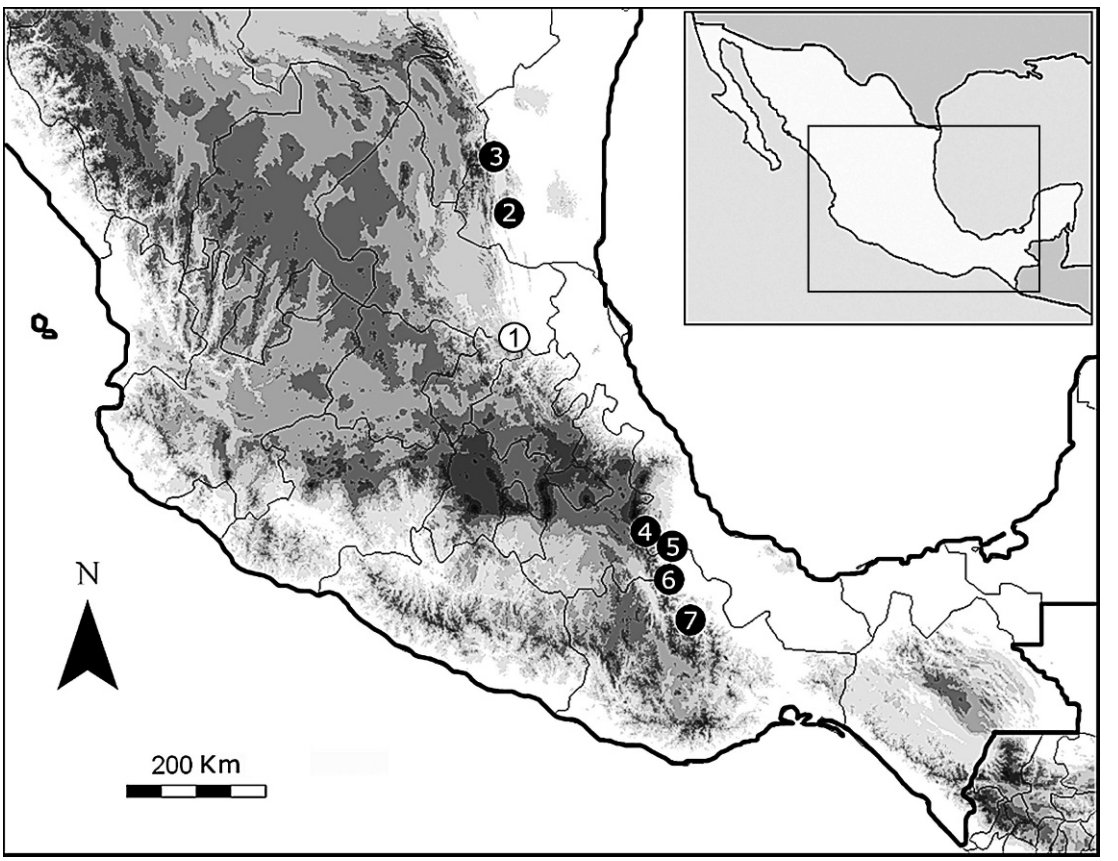

Fig. 1. Map of Mexico showing type localities of known species of *Typhlochactas* Mitchell, 1968: *T. sissomi*, n. sp. (1); *T. rhodesi* Mitchell, 1968 (2); *T. cavicola* Francke, 1986 (3); *T. reddelli* Mitchell, 1968 (4); *T. granulosus* Sissom and Cokendolpher, 1998 (5); *T. mitchelli* Sissom, 1988 (6); *T. sylvestris* Mitchell and Peck, 1977 (7).

Version 8.3 (Environmental Systems Research Institute, Redlands, California) by superimposing georeferenced point locality records on spatial datasets of topography (contour intervals of 500 m) and the boundaries of Mexican states.

SUBFAMILY TYPHLOCHACTINAE Mitchell, 1971

Typhlochactas Mitchell, 1971

Key to species of *Typhlochactas* Mitchell, 1968

1. Prolateral pedal spurs absent 2
– Prolateral pedal spurs present 4
2. Cheliceral fixed finger, median and basal teeth fused into a bicusp . . . . . *T. granulosus*
– Cheliceral fixed finger, median and basal teeth separate, not fused 3
3. Cheliceral movable finger with four dorsal teeth . . . . . *T. cavicola*
– Cheliceral movable finger with five dorsal teeth . . . . . *T. rhodesi*
4. Cheliceral fixed finger, median and basal teeth fused into a bicusp . . . . . *T. reddelli*
– Cheliceral fixed finger, median and basal teeth separate, not fused 5
5. Cheliceral fixed finger with four teeth. . . . . *T. sissomi*, n. sp.
– Cheliceral fixed finger with three teeth 6
6. Cheliceral movable finger with four dorsal teeth . . . . . *T. sylvestris*
– Cheliceral movable finger with three dorsal teeth . . . . . *T. mitchelli*

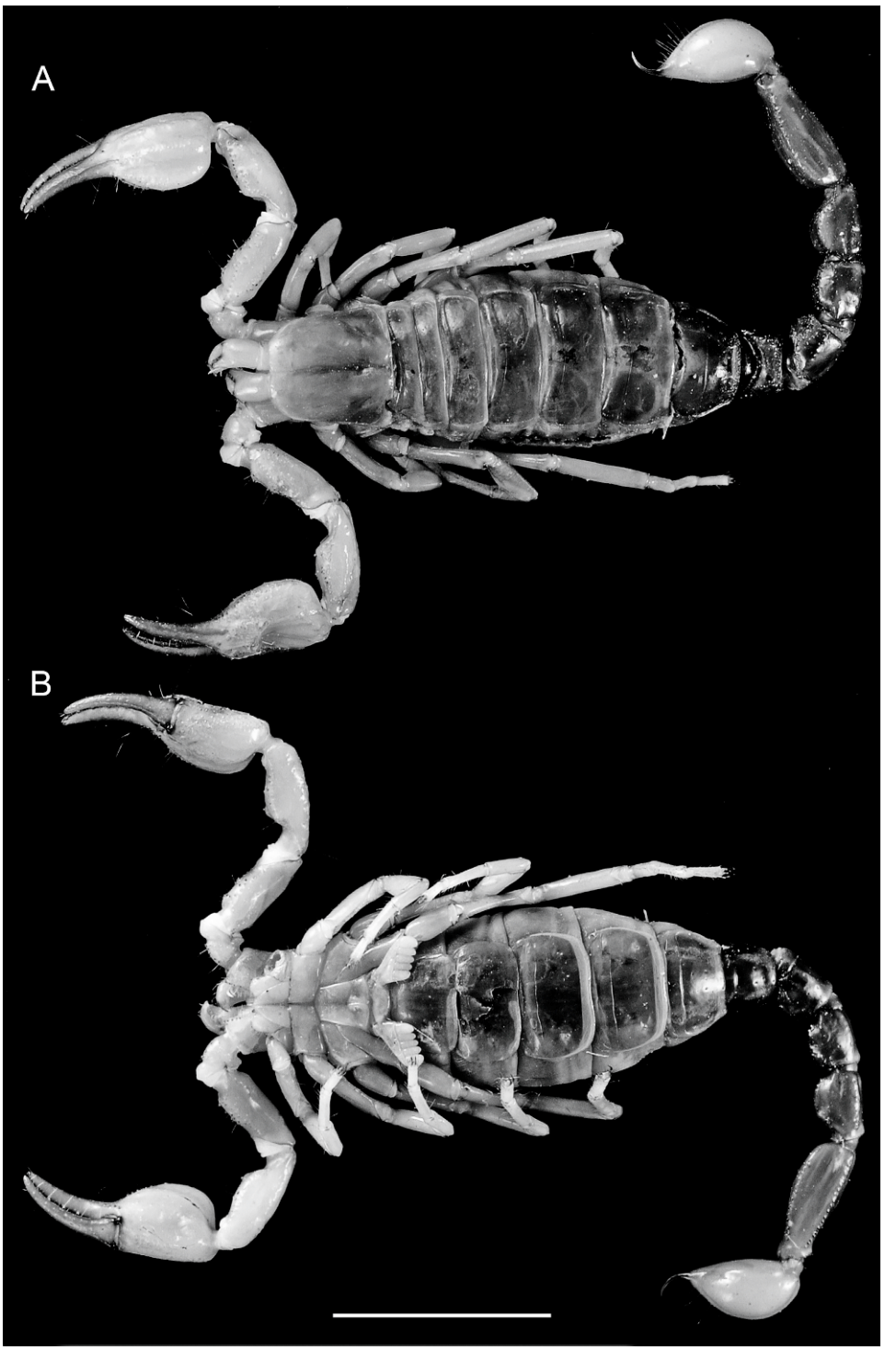

Fig. 2. *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308), habitus. A. Dorsal aspect. B. Ventral aspect. Scale = 5 mm.

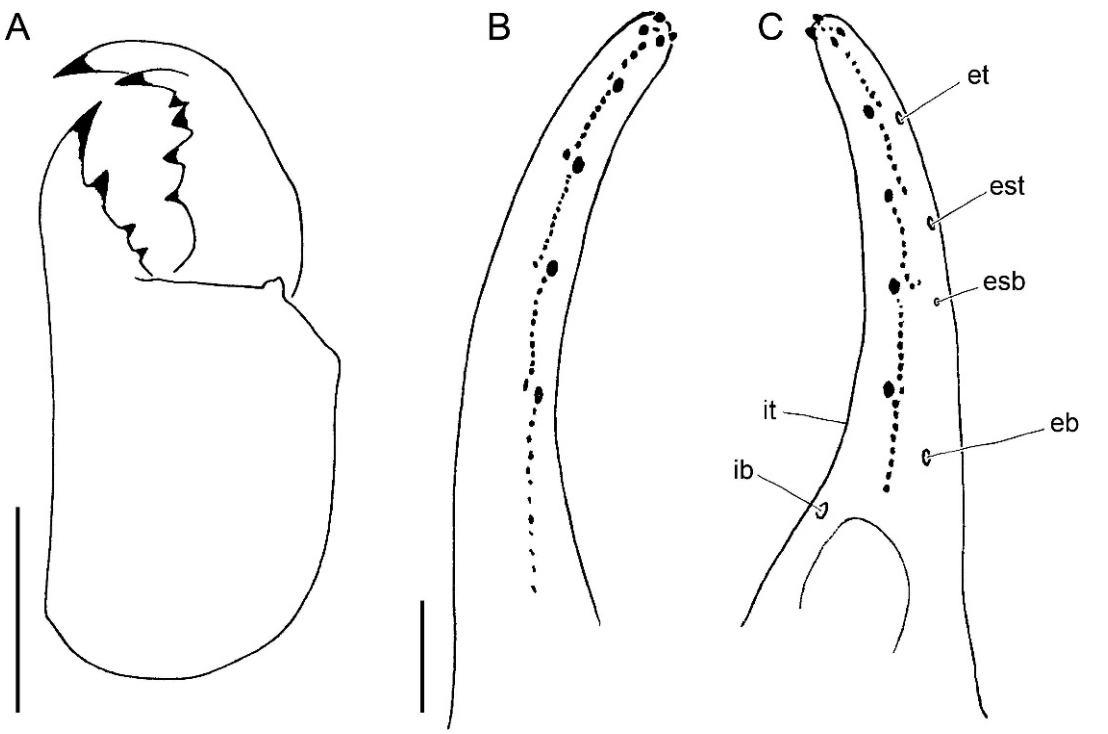

Fig. 3. *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308), dextral chelicera and sinistral pedipalp chela finger dentition. A. Chelicera, dorsal aspect. B. Chela, movable finger dentition, dorsal aspect. C. Chela, fixed finger dentition and distribution of trichobothria, dorsal aspect. Scales = 0.5 mm.

Typhlochactas sissomi, n. sp.
Figures 1–7, table 2

TYPE MATERIAL: Holotype: 1 subadult ♂ (CNAN T-0308), leg (AMCC), Mexico: Queretaro: Municipio de Jalpan: Cañada de La Joya, 21°27′23″N 99°08′26″W, 1944 m, H. Montaño and A. Valdez, 12.vi.2004, rock-rolling.

ETYMOLOGY: The new species is named in honor of Dr. W. David Sissom, West Texas A&M University, Canyon, Texas, U.S.A., for his numerous contributions to scorpion taxonomy.

DIAGNOSIS: *Typhlochactas sissomi* differs from all other species in the genus on the basis of the following combination of characters: cheliceral fixed finger with four teeth, median and basal teeth not forming a bicusp; cheliceral movable finger with five dorsal teeth; pedipalp chela fixed and movable fingers each with six imbricated subrows of denticles in median denticle row, terminal subrow very short, comprising single denticle; prolateral pedal spurs present on all legs.

RELATIONSHIPS: The trichobothrial pattern of *T. sissomi* is similar to that of its congeners, except that the patellar *em* group is displaced distally. *Typhlochactas sissomi* resembles the four troglobitic species of *Typhlochactas* in possessing four teeth on the cheliceral fixed finger; the two humicolous species each possess only three teeth. As in most species of the genus, the two basal teeth on the cheliceral fixed finger of *T. sissomi* are clearly separated; the basal teeth are fused, forming a bicusp, in *T. granulosus* and *T. reddelli* only. The new species is similar to *T. reddelli* and *T. rhodesi* in possessing five dorsal teeth on the cheliceral movable finger, whereas the other species possess either three or four dorsal teeth. As with *T. reddelli* and the two humicolous species, *T. sissomi* possesses prolateral pedal spurs, which are absent in the other three troglobites. Finally, *T. sissomi* displays six subrows of denticles in the median denticle row

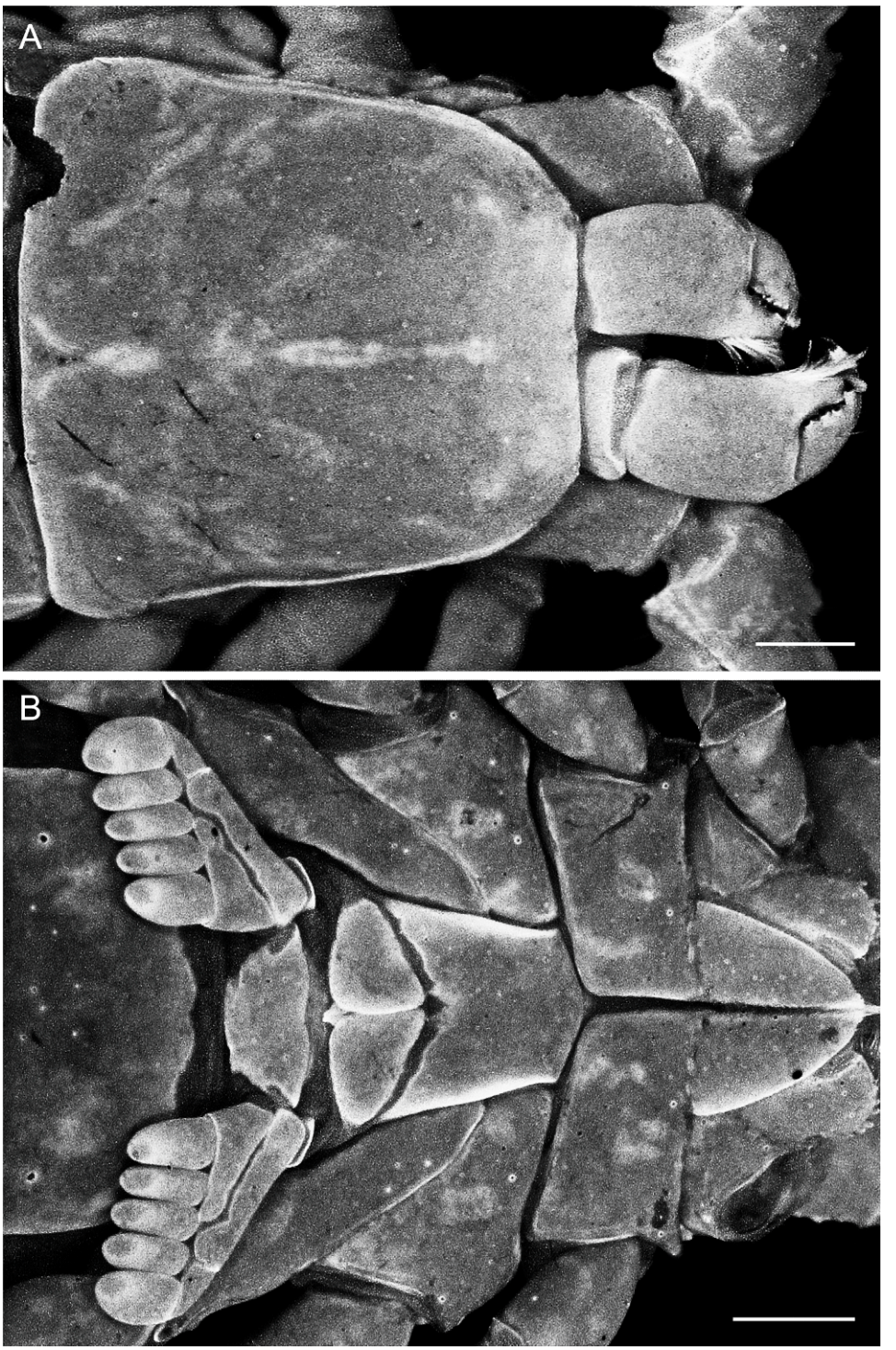

Fig. 4. *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308). A. Carapace, dorsal aspect. Scale = 0.5 mm. B. Sternum, genital operculum, pectines and sternite III, ventral aspect. Scale = 0.5 mm.

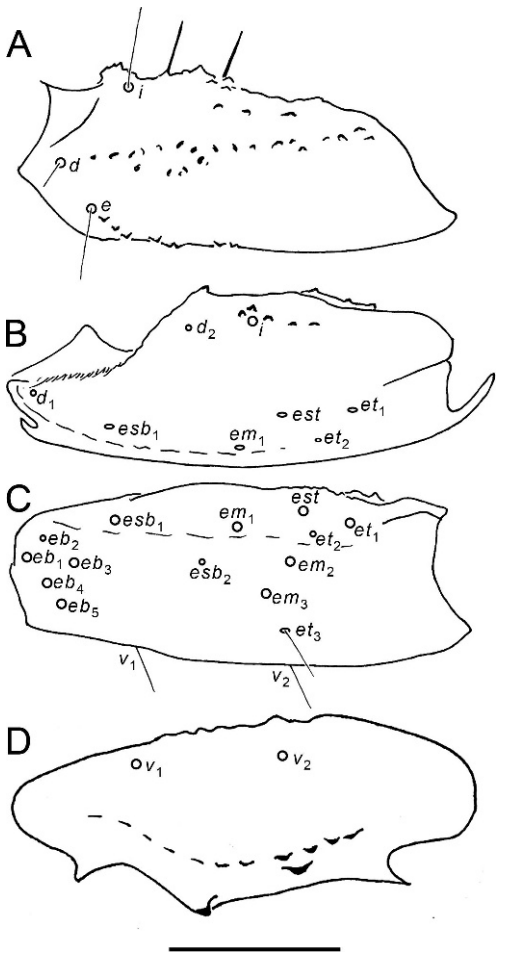

Fig. 5. *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308), dextral pedipalp femur and patella showing distribution of trichobothria. A. Femur, dorsal aspect. B. Patella, dorsoexternal aspect. C. Patella, external aspect. D. Patella, ventrointernal aspect. Scale = 1 mm.

of both the fixed and movable fingers of the pedipalp chela, as in *T. rhodesi*, whereas the other species display different numbers and are usually asymmetrical, with one less subrow on the fixed finger than on the movable finger (Sissom and Cokendolpher, 1998: 287, table 1).

DESCRIPTION: This description is based on the holotype and only known specimen (fig. 2), complete measurements of which are provided in table 2.

Color: Cheliceral manus pale yellow, teeth light brown. Carapace, pedipalps, tergites, and metasoma, straw-colored. Coxosternal region, legs, sternites, and telson vesicle, pale yellow. Telson aculeus reddish-brown.

Chelicerae: Fixed finger with four distinct, separate teeth dorsally; median and basal teeth separate, not forming a bicusp (fig. 3A). Movable finger with five teeth dorsally and strong, prominent serrula ventrally.

Carapace: Carapace surfaces smooth, shiny; posteromedian and posterolateral sulci shallow, broad; anterior margin straight; ocelli absent (fig. 4A).

Pedipalps: Pedipalp femur rounded in cross-section, with poorly defined carinae (fig. 5A); dorsal and internal surfaces sparsely and coarsely granular; ventral and external surfaces smooth. Patella dorsointernal carina well developed and coarsely granular; internomedian carina comprising only a basal granule; dorsoexternal carina weakly developed, smooth; all other carinae obsolete, smooth (fig. 5B–D). Chela manus surfaces smooth proximally, becoming moderately granular medially (fig. 6A–D); dorsomedian, dorsal secondary and ventroexternal carinae weakly granular. Fixed and movable fingers each with six imbricated subrows of denticles in median denticle row; terminal subrow short, comprising one or two denticles (fig. 3B, C).

Trichobothria: Pedipalps orthobothriotaxic Type C. Femur, patella, and chela with three, 19 and 26 trichobothria, respectively. Femur with three dorsal trichobothria (fig. 5A): *i*, *d*, *e*. Patella with 19 trichobothria (fig. 5B–D): three dorsal: d_1 (petite), d_2 (petite), *i*; two ventral: v_1, v_2; and 14 external: et_1, et_2 (petite), et_3, *est*, em_1–em_3, esb_1, esb_2 (petite), eb_1, eb_2 (petite), eb_3–eb_5. Chela manus with 16 trichobothria (fig. 6), two dorsal: *Db* (petite), *Dt*; four ventral: V_1 (petite), V_2–V_4; and 10 external: Et_1–Et_3, Et_4 (petite), Et_5 (petite), *Est*, *Esb* (petite), Eb_1–Eb_3. Fixed finger with 10 trichobothria: four dorsal, distributed across proximal two-thirds of finger: *dt*, *dst*, *dsb*, *db* (petite); four external, equally distributed: *et*, *est*, *esb* (petite), *eb*; two internal, situated proximally on finger: *it*, *ib* (fig. 6A–C).

Legs: Prolateral pedal spurs present. Retrolateral pedal spurs absent. All surfaces covered with scattered transparent microsetae. Basitarsi with fewer setae than telotarsi. Basitarsus I, ventral surface with short rows of closely aligned, distally directed spinules.

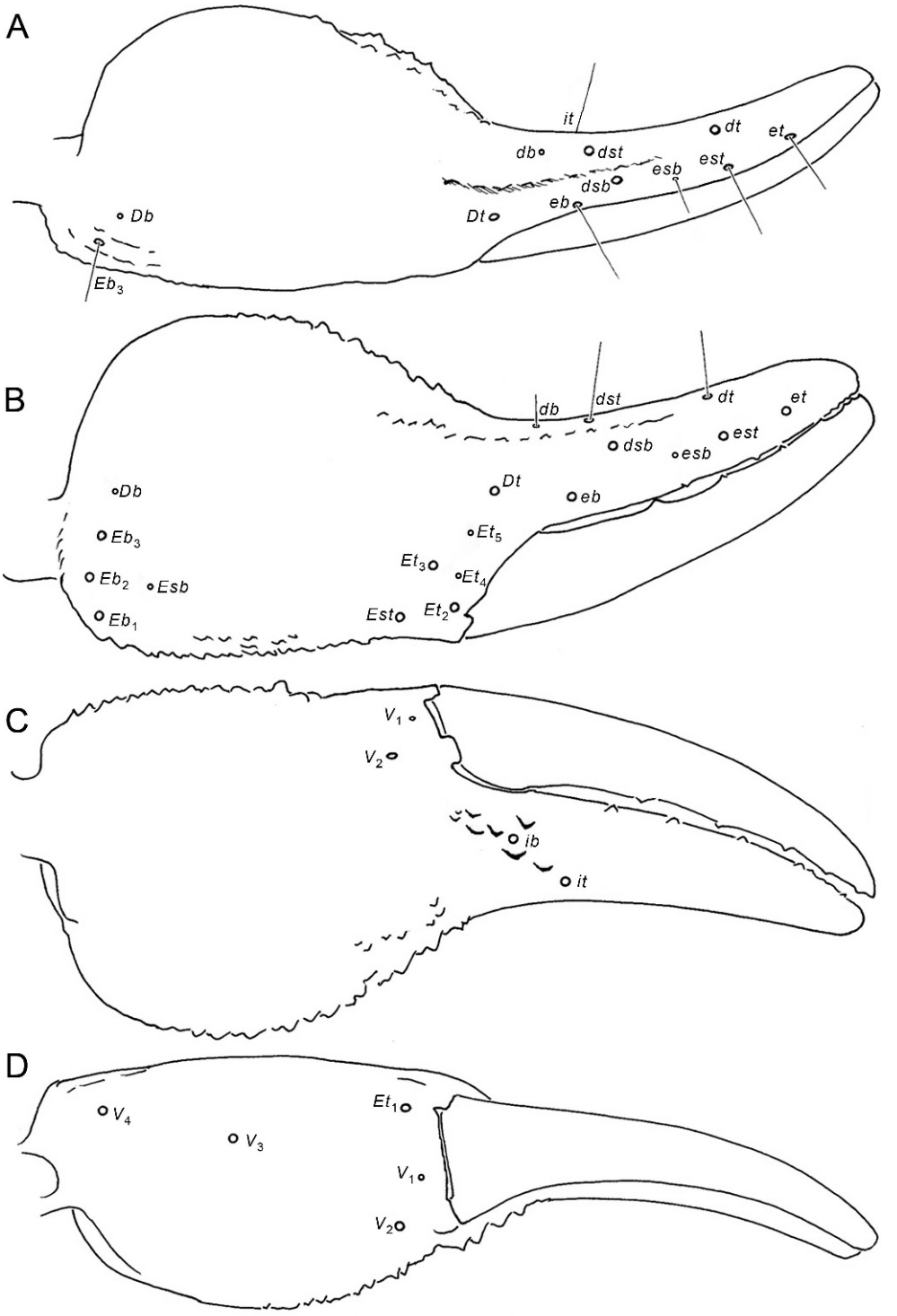

Fig. 6. *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308), dextral pedipalp chela showing distribution of trichobothria. A. Dorsal aspect. B. External aspect. C. Ventrointernal aspect. D. Ventral aspect. Scale = 1 mm.

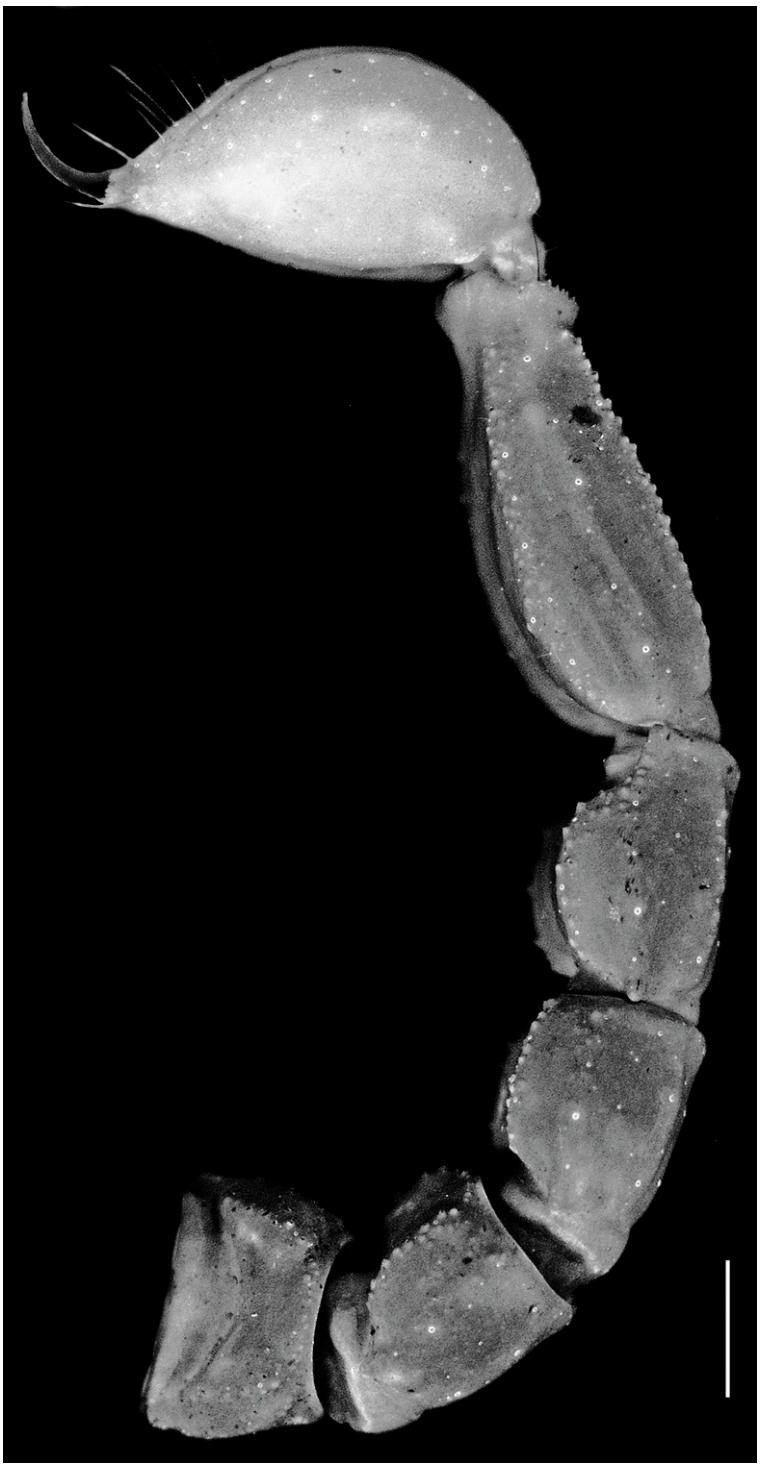

Fig. 7. *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308), metasoma and telson, dorsolateral aspect. Scale = 1 mm.

TABLE 2
Meristic data for *Typhlochactas sissomi*, n. sp., subadult ♂ holotype (CNAN T-0308)

Carapace	anterior width:	2.05
	posterior width:	2.8
	length:	2.9
Chelicera	length:	1.4
	width:	0.7
	movable finger length:	0.8
	fixed finger length:	0.5
Chela	maximum width:	1.8
	maximum height:	1.6
	length:[1]	4.8
	length of ventroexternal carina:	2.1
	length of movable finger:	2.7
	length of fixed finger:	2.2
Patella	maximum width:	1.0
	maximum height:	1.0
	length:	2.5
Femur	maximum width:	0.9
	maximum height:	1.0
	length:	2.5
Pedipalp	total length (incl. trochanter):	10.8
Mesosoma	total length (tergites):	6.9
Sternite VII	width:	2.6
	length:	1.55
Metasoma I	maximum width:	1.7
	maximum height:	1.3
	length:	1.2
Metasoma II	maximum width:	1.5
	maximum height:	1.3
	length:	1.5
Metasoma III	maximum width:	1.5
	maximum height:	1.3
	length:	1.6
Metasoma IV	maximum width:	1.5
	maximum height:	1.3
	length:	1.7
Metasoma V	maximum width:	1.5
	maximum height:	1.3
	length:	3.1
Telson	maximum width:	1.7
	maximum height:	1.5
	aculeus length:	0.8
	total length:	3.5
Metasoma	total length:[2]	12.6
Total length	pro-+meso-+metasoma:	22.4
Pectines	total length:	1.05
	length along dentate margin:	0.93
	tooth count (left/right):	5/5

[1] Measured from base of condyle to tip of fixed finger.
[2] Sum of metasomal segments I–V and telson.

Basitarsi, retrolateral surfaces with very short row of tiny spinules distally. Telotarsi, prolateral, and retrolateral margins each with six to eight pairs of large macrosetae, without median row of spinules ventrally. Ungues moderately long; dactyl moderately developed, slightly curved.

Tergites: Surfaces I–VI smooth, shiny (fig. 2A); VII coarsely granular in posterior half, acarinate.

Sternum: Subpentagonal, wider than long posteriorly; longitudinal sulcus shallow, indistinct (fig. 4B). Coxosternal region smooth, asetose.

Genital operculum: Opercula separated, smooth, shiny, asetose. Genital papillae present (fig. 4B).

Pectines: Each pecten with two marginal lamellae, one median lamella, no fulcra, and five teeth (fig. 4B).

Sternites: Surfaces III–VI smooth, shiny, with book lung stigmata (spiracles) very small and round (fig. 4B); VII acarinate.

Metasoma: Metasoma, intercarinal surfaces smooth, shiny (fig. 7). Dorsosubmedian carinae, segments I–IV, moderately developed, coarsely and sparsely granular; V, absent. Dorsolateral carinae, segments I–IV, absent to obsolete, smooth; V, obsolete, sparsely granular. Median lateral carinae, segments I–V, absent. Ventrolateral carinae, segment I, absent; II–IV, obsolete, smooth; V, moderately developed, granular. Ventrosubmedian carinae, segments I–IV, absent. Ventromedian carina, segment V, absent.

Telson: Vesicle relatively large, globose, smooth, with sparse setae ventrally and distally. Aculeus short.

Hemispermatophore: Hemispermatophore unknown (holotype was dissected and no paraxial organs were found).

Remarks: The metasoma of the holotype is separated from the body at the articulation of segments I and II, the left pedipalp chela is crushed, and the posterior margin of the carapace is slightly damaged (fig. 4A). Left leg I was removed and retained at the AMCC for DNA isolation, amplification and sequencing.

DISTRIBUTION: Known only from the type locality (fig. 1).

ECOLOGY: This troglomorphic species was taken from under a stone on the ground

surface in a mesophilous forest. The fact that it was not collected inside a cave, taken together with its similar habitus to the two humicolous species, *T. mitchelli* and *T. sylvestris*, suggests that it is probably also humicolous.

ACKNOWLEDGEMENTS

We are grateful to Alejandro Valdez and Héctor Montaño, collectors of the holotype, for donating it the Colección Nacional de Arácnidos, Instítuto de Biología, UNAM, and to Edmundo González Santillán for sharing it with us. The second author was supported by two grants from the Theodore Roosevelt Memorial Fund (2004, 2005) at the AMNH. The third author was supported by National Science Foundation grant BIO-DEB 0413453.

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