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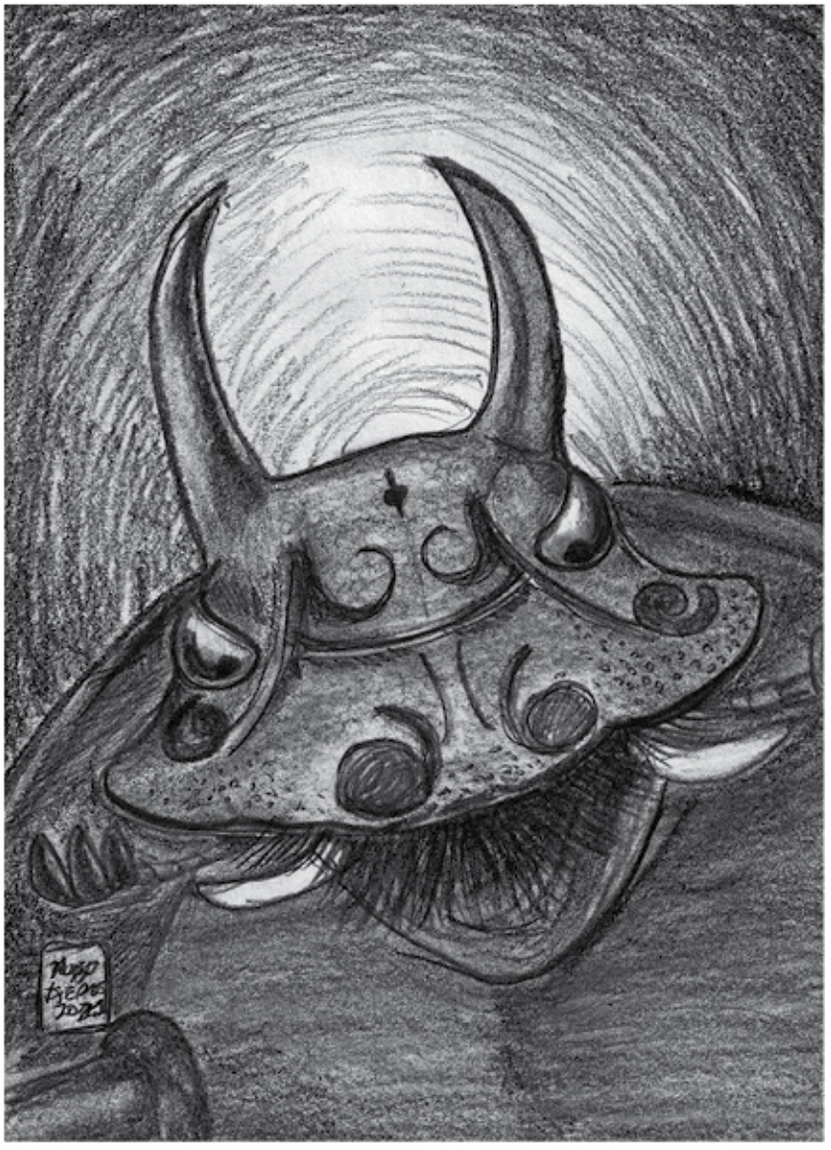

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A new species of *Vaejovis* from the mountains of west Mexico (Scorpiones: Vaejovidae)

Una nueva especie de *Vaejovis* de las montañas del occidente de México (Scorpiones: Vaejovidae)

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ABSTRACT

One new species of scorpion is described from the high lands of the Trans-Mexican Volcanic Belt province in the Mexican state of Jalisco; this species inhabit the pine forest of the Sierra de Quila mountain range. It is assigned to the "*mexicanus*" group and compared with other species geographically closer or morphologically similar, besides biology. The species honors Dr. Tila María Pérez Ortiz for its great career in arachnology.
Key Words: Scorpions, High lands, Endemism, "*mexicanus*" group, diversity, taxonomy.

RESUMEN

Se describe una nueva especie de escorpión de las montañas de la provincia de la faja volcánica transmexicana; esta especie habita los bosques de pino de la cadena montañosa de Sierra de Quila Esta especie es asignada al grupo "*mexicanus*" y se compara con las especies cercanas en distribución o morfológicamente similares. La especie es descrita en honor a la Dra. Tila María Pérez Ortiz por su gran carrera en la aracnología.
Palabras clave: Alacranes, montañas, endemismo, grupo "*mexicanus*", diversidad, taxonomía.

Scorpions is one of the mesodiverse groups within Arachnida, with 2761 species. The scorpion family Vaejovidae is the most diverse family in North America; this includes 25 genera and 234 species (Rein 2023). Within this family the genus *Vaejovis* C. L. Koch, 1836, still being the most diverse genera with 73 species; but the "*mexicanus*" groups *sensu* Contreras-Félix and Francke (2019) limits its distribution to only Mexico where only 34 species can be found. Description of species belonging to this group of scorpions has incremented greatly on past years; several works focused on particular regions of the country; to the south (Zárate-Gálvez and Francke 2009; Santibáñez-López and Francke 2010; Contreras-Félix and Francke 2021), north (Graham & Bryson 2010; Sissom *et al*. 2016; Barrales-Alcalá *et al*. 2018; Azzinari *et al*. 2021) and most works on the middle of the country (Miranda-López *et al*. 2012; Contreras-Félix and Francke 2014; Contreras-Félix *et al*. 2015; Contreras-Félix and Francke 2019; Chávez-Samayoa *et al*. 2022), all of them sum up to 19 new species described in less than fifteen years, yet there are many areas in México without any study or fieldwork; so there is no doubt that more species could be found in remote or unstudied areas from the country.

The Mexican state of Jalisco presents six species of the "*mexicanus*" group (Sissom 1989; Contreras-Félix *et al*. 2015; Contreras-Félix and Francke 2019) within its borders; all of them distributed in the biogeographical provinces of the Transmexican Volcanic Belt (*V. monticola* Sissom, 1989 and *V. tapalpa* Contreras-Félix and Francke, 2019), Sierra Madre del Sur (*V. santibagnezi* Contreras-Félix and Francke, 2019 and *V. talpa* Contreras-Félix and Francke, 2019) and Sierra Madre Occidental (*V. tenamaztlei* Contreras-Félix, Bryson Jr. and Francke, *V. aquascalentensis* Chávez-Samayoa and González-Santillá, 2022 and *V. aguazarca* Díaz-Plascencia and González-Santillán, 2022), these are three of the six province occurring in the state (Morrone *et al*., 2017). Sierra de Quila is located around 100 km SW from Guadalajara, Jalisco and can reach elevations up to 2560 masl; pine forest dominates most of the highest regions of this mountain range. Herein, we here described one new species of scorpions for the Sierra de Quila, Jalisco, Mexican, giving the comparative diagnosis with the nearest species.

MATERIALS AND METHODS

Nomenclature mensuration follows Stahnke (1970); trichobothrial, metasomal and pedipalps carinae terminology terminology follows González-Santillán and Prendini (2013); lateral ocelli terminology follows Loria and Prendini (2014). The hemispermatophore was dissected following Vachon (1952) and cleaned by hand with two entomological needles; terminology follows Chávez-Samayoa *et al.* (2022). Surfaces of the carapace, metasoma, and pedipalp were observed and photographed under UV light as described in Prendini (2003) and Volschenk (2005). Higher-level taxonomy of scorpions follows Santibáñez-López *et al.* (2019). Measurements were taken with an ocular micrometer calibrated at 10X and are given in millimeters. Measurements and proportions are given inside parenthesis for males (xx) and in brackets for females [xx]. Variation in setae on metasomal segments carinae and leg telotarsi ser following Contreras-Félix *et al*. (2015).
Abbreviations for depositores are as follows: CZUG–Centro de Estudios en Zoología, Universidad de Guadalajara; CNAN–Colección Nacional de Arácnidos, Instituto de Biología, Universidad Autónoma de México (UNAM); AMNH–American Museum of Natural History, New York , USA;. Other Abbreviations used: L= Length, W= Width,

D= Depth, C= Carapace, MSI= Metasomal segment I, MSV= Metasomal segment V, V= Vesicle, CG= Caudal gland, F= Pedipalp femur, P= Pedipalp patella, CM= Chela manus, FF: Fixed finger.

RESULTS

Scorpiones Linnaeus, 1752
Vaejovoidea Thorell, 1876
Vaejovidae Thorell, 1876
Vaejovinae Thorell, 1876
Vaejovis C. L. Koch, 1836
Vaejovis tilae sp. nov.

Figures. 1a, b; 2a-d; 3a-d; 4a-d; 5a-d; 6a-c; 7a-d; 8a-d; 9a-d; table 1-3.

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Etymology: The species epithet is a patronym named after Dr. Tila María Pérez Ortiz one of the most prominent mexican acarologist and this species honor her great career in arachnology.

Holotype. México, Jalisco, *Mpio: Tecolotlán*, Sierra de Quila, Piedra Blanca (N 20.29959º, W 104.00053º, 2219 masl). August 15th, 2020. Collector: G. Contreras. 1 male, CZUG Types #CZUG-HA-0001. Paratypes: Same data as the Holotype. 1 male (CNAN); 1 males (AMNH). México, Jalisco, *Mpio: Tecolotlán*, Sierra de Quila, La Ciénega station (N 20.30271º, W 104.0372º, 2136 masl). December 13d 2019. Collectors: G. Contreras and A. Flores. 1 male, 3 females (CZUG-HA-0002). México, Jalisco, *Mpio: Tecolotlán*, Sierra de Quila, El Huehuentón (N 20.31307º, W 104.0149º, 2489 masl). December 14th 2019. Collectors: G. Contreras and A. Flores. 1 male, 1 female (CZUG-HA-0003). México, Jalisco, *Mpio: Tecolotlán*, Sierra de Quila, Salto de Tecolotlán (N 20.27598º, W 104.06295º, 1869 masl). December 14th 2019. Collectors: G. Contreras and A. Flores. 2 females (CNAN)

Other material examinated: MÉXICO: Jalisco, *Mpio: Tecolotlán*, Sierra de Quila, 2 km. to W from La Ciénega station (N 20.29894º, W 104.04758º, 2200 masl). 21-VII-2012. Collectors: O. Francke, D. Barrales, G. Contreras and A. Valdez. 3 females (CNAN).

Diagnosis: This is a medium size species for the "mexicanus" group, with adult length ranging from 25.5 to 37.9 (Fig, 1a, b; Table 1). Carapace (Fig. 2c) on males as long or shorter than the metasomal segment V (Carapace L/ MSV L 0.96 ±0.03), but on females longer [Carapace L/MSV L 1.08 ±0.05] and longer than the pedipalp femur on males and females (Carapace L/Femur L 1.18 ±0.02 [1.26 ±0.2]). Anterior margin of the carapace concave, with a median notch "U" shape, present. Terguite VII (Fig. 7a) with two pairs of lateral carinae strong; sternite V with a with patch at the posterior edge of the segment; sternite VII with a white patch at the posterior edge of the segment; lateral carinae weakly granular only presents at one-third of the segment. Metasomal segment I (Fig. 6a) wider than long (MSI L/W 0.66 ±0.06[0.65 ±0.06]); intercarinal surfaces, on the dorsal face shagreened to feebly granular, on the sides and ventral face feebly granular, granular on segment V; metasomal segment V, wider than depth (MSV W/D 1.25 ±0.03[1.25 ±0.06]). Vesicle (Fig. 7b-d) long and slender (Vesicle L/W 1.92 ±0.08 [1.93 ±0.1]; W/D 1.32 ±0.09[1.31 ±0.06]), dorsal surface with a big, white spot, present in one-third of the surface at the posterior half. Pedipalp femur (Fig. 3a-d) and patella (Fig. 4a-d) are less than three times longer than wide (Femur L/W 2.93 ±0.07 [2.75 ±0.3]; Patella L/W 2.76 ±0.01 [2.65 ±0.15]); prolateral median carina weak, almost absent composed by an irregular line of big and pointed granules. Chela manus (Fig. 5a-d) rounded (CM L/W 1.71 ±0.05 [1.74 ±0.2]; W/D 0.98 ±0.04 [0.99 ±0.02]), with prolateral ventral, prolateral ventrosubmedian and dorsal prosubmedian carinae strong, elevated from the cuticule and granular; dorsal median, dorsal retrolateral and retrolateral median strong elevated from the cuticule and faintly granular, ventral retrolateral and ventral median carinae weak, granular and almost at the same level than the cuticule. Laminar hooks of the hemispermatophore (Fig. 9b, c), rounded and almost merged; bent 90º. Capsular lobe present, well-sclerotized and with small denticles on the margin.

Vaejovis tilae sp. nov. is a species geographically and morphologically closer to *V. monticola* but differs as follows: V. *monticola* lacks a white patch at the mesosomal segment V, VII and the dorsal face of the vesicle, whereas on *V. tilae* sp. nov. the white patch is present on these three segments; pedipalps coloration on *V. monticola* are densely infuscated, with the chela manus carinae well-colored black, whereas on *V. tilae* sp. nov. the infuscation is almost absent on the pedipalp segments and the chela manus carinae are uncolored. Another species geographically and morphologically closer to *V. tilae* sp. nov. is *V. santibagnezi* but differs from this in: the total body length which of *V. tilae* sp. nov is a medium size scorpion (males length: 25.5 – 27.4 mm; female length 31.5 – 37.9mm) whereas on *V. santibagnezi* presents a bigger size (males length: 32.5 – 35.5 mm; female length 33.8 – 37.5 mm), noticeable on males; another difference between these species is the carinae presents on the retrolateral face of the pedipalp manus, whereas on *V. santibagnezi* these carinae are noticeable granulose, on *V tilae* sp. nov. are faintly granular to smooth; The hemispermatophore on *V. santibagnezi* presents the laminar hooks merged and the median lobe without denticles, whereas on *V. tilae* sp. nov., presents two small laminar hooks and denticles on the margin of the median lobe. The third species geographically and morphologically closer to *V. tilae* sp. nov. is *V. coalcoman* Contreras-Félix and Francke, 2014 but differs as follows: The yellowish color at the dorsal face of the vesicle on *V coalcoman* is absent, as this segment is entirely obscure, whereas on *V. tilae* sp. nov. is present; on the second pair of legs on *V. coalcoman* usually presents only two pi/ri setae; whereas *V. tilae* sp. nov. presents three; pectinal counts on *V. tilae* sp nov. are higher (15-16 for males and 13-14 for females), whereas on *V. coalcoman* are lower (13-14 for males and 13-14 for females); the laminar hooks on *V. tilae* sp. nov. are pointed sideward, whereas on *V. coalcoman* the laminar hooks are pointed upwards, the basal lateral trough is in *V. tilae* wide and shallow, whereas on *V. coalcoman* is narrow and elongated, additionally the capsular basal carina hooklets are well developed on *V. tilae* and feebly developed on *V. coalcoman*. Other species morphologically closer to *V. tilae is V. morelia* Miranda-López, Ponce-Saavedra and Francke, 2012, but it can be differentiated by the well-developed carinae on the dorsal face of the chelae in *V. tilae*, whereas on *V. morelia* they are poorly developed; additionally, *V. tilae* has a well-developed laminar latero-distal crest in the hemispermatophore, whereas *V. morelia* does not. Finally,

the last species geographically and morphologically closer to *V. tilae* sp. nov. is *V. ceboruco* but, differs as follows: On the second pair of legs on of *V. ceboruco* usually presents only two pi/ri setae; whereas *V. tilae* sp. nov presents three; pectinal counts on *V. tilae* sp nov. are higher (15-16 for males and 13-14 for females), whereas on *V. ceboruco* are lower (14-15 for males and 12-13 for females); pedipalp chela manus with ventral retrolateral, ventral prolateral on *V. tilae* sp. nov. feebly granular to granular, whereas on *V. ceboruco* these carinae are smooth to crenulated. Other species that can be related to *V. tilae* sp. nov. are *V. aguazarca* Díaz-Plascencia and González-Santillán, 2022, *V. aquascalentensis* Chávez-Samayoa and González-Santillán, 2022 and *V. tenamaztlei*, but can be distinguished from them for the general coloration; dark brown on *V. tilae* sp. nov., whereas on the other three species it is light yellow; also *V. aguazarca* has a laminar hooks on the spermatophore big and rounded, whereas *V. tilae* sp. nov. has the laminar hooks small and pointed; *V. aquascalentensis* does not has an obsolete laminar latero-distal crest, whereas *V. tilae* sp. nov. it is well-developed and *V. tenamaztlei* has a prominent concavity on the dorsal face of the vesicle, whereas *V. tilae* sp. nov. has a flat dorsal face.

Description of the holotype male (considering the variation of the species) (Fig. 1a, b). Color: The body base color is dark brown. Cheliceral manus dorsal surface with a well-marked infuscation over the anterior edge of the hand and covering the anterior third; movable finger faintly infuscate. Carapace with dusky markings along the dorsal face of the prosoma, slightly denser on the anterior edge and surrounding the middle ocelli; it becomes less present on the posterior half of the carapace. Pedipalps: Patella and femur marginal carinae infuscated and intercarinal surfaces faintly infuscated, especially surrounding setae; chela carinae faintly infuscated; densely infuscated at the prolateral face, at the base of the fingers; dorsal surface in the anterior part faintly infuscated. Coxosternal region, genital operculum and pectinal teeth are immaculate. Mesosomal tergites with two pairs of narrow dusky markings along the tergite, along lateral margin and submedian surfaces and the carinae strongly infuscates; mesosomal sternites III-V immaculated; mesosomal sternites VI and VII infuscated over the lateral edges, stronger on the VII segment. Metasomal segments I-V with all dorsal carinae infuscated; intercarinal surfaces faintly infuscated on the anterior half of each segment, infuscation becomes strongly denser toward the posterior edge and on the ventral face of each segment. Telson vesicle base color yellowish orange; ventral surface faintly infuscated to immaculated; dorsal surface immaculated, posterior half of the segment bright yellow.

Prosoma. Chelicerae (Fig. 2a, b): Manus in a dorsal surface smooth, with two macroseta in the anterior margin of the manus; movable finger with five denticles, fixed finger with two denticles; serrula (Fig. 2b) with more than 20 denticles. Carapace (Fig. 2c): length of the carapace is almost twice the width (L/W: 1.9); surfaces uniformly granular; anterior the margin with a notch in the middle and three pairs of macrosetae; lateral ocelli type 3A, with PDMi less than half in diameter as the other lateral ocelli and lateral ocelli presents over a shallow tubercle; median ocelli with one pair of macrosetae, median ocular tubercle situated in anterior half of carapace.

Pedipalps: (Just the holotype with the variations of macrosetae). Othobothriotaxia "C" type. Femur (Fig. 3a-d) length is more than twice width (L/W: 2.5). The dorsal and ventral surfaces minutely granular to granular; the retrolateral surface is smooth to shagreened and the prolateral surface is minutely granular with some scattered big granules. Dorsal prolateral and dorsal retrolateral carinae strong, composed by a row of big rounded granules; retrolateral dorsosubmedian carina weak, composed by some scattered big, rounded granules disposed in line and only present on the posterior two-thirds of the segment; retrolateral ventral carina, faint, almost absent, composed by an elevation of the cuticule, ventral median carina strong, composed by a line of big, rounded granules; ventral retrosubmedian carina weak, diffuse between all the granules disposed on the ventral surface; ventral prolateral carina strong, composed by a line of granules well differentiated from each other; prolateral ventrosubmedian and prolateral ventral carinae faint, almost absents, only presents for two or three granules. Patella (Fig. 4a-d), more than twice longer than wide (L/W: 2.3); intercarinal surfaces are minutely granular to shagreened. Dorsal prolateral and dorsal retrolateral carina is strong, composed of an irregular row of big, rounded granules with gaps between them; retrolateral dorsosubmedian and retrolateral median carinae are weak, almost absent only present as a slightly elevation of the cuticule and some scattered granules; ventral median carina strong, composed by a line of rounded granules; ventral retrosubmedian and ventral prolateral carinae strong composed by an irregular line of rounded granules with some gaps on the prolateral carina; prolateral median carina weak, almost absent composed by an irregular line of big pointed granules. Chela manus (Fig. 5a-d) is as wide as long (L/W: 1.18), retrolateral carinae granular rows and intercarinal surfaces matte, prolateral surface granulated and carinae granular rows; trichobothria *ib* and *it* is located at the base of the fixed finger. Chela manus with prolateral ventral, prolateral ventrosubmedian and dorsal prosubmedian carinae strong, elevated from the cuticule and granular; dorsal median, dorsal retrolateral retrolateral median strong elevated from the cuticule and faintly granular, ventral retrolateral and ventral median carinae weak, granular and almost at the same level than the cuticule. Fingers straight.; movable finger with 7 denticles (an individual presented 5 denticles in one hand) and fixed finger with 6 denticles, notches and lobes absent. Trichobothria *Db* between carinae drsa and drl, *Dt* after the carinae drsa just above drl.

Mesosoma. Terguites I-VI shagreened on the anterior half, posterior half granulated; terguite VII (Fig. 7a) with two longitudinal and granular carina paramedially, surface granular and usually only presents 8 setae. Coxosternal region is smooth and pentagonal shape with 4-5 pairs of macrosetae. Genital operculum (Fig. 2d-e): wider than long; rhomboidal shape; male with two big papillae on the posterior edge; pectinal tooth count: 14-16 (♂), 13-14 (♀) (N=5 ♂, 6 ♀; mode 15 ♂, 13 ♀).

Metasoma (Fig. 6a-c): segment I is wider than long, dorsal intercarinal surfaces segments I-IV, shagreened, with some scattered granules along the segment. Dorsal lateral carinae on segments I-IV granulated terminating with a spiniform granule. Lateral median carinae on segments I-IV carinae granular terminating with a spiniform granule. Lateral inframedian carinae in segments I is granular and

complete; in segments II and III, it is granular and present only on the posterior half; in segment IV entirely absent. Ventrolateral carinae on segments I-IV granular. Ventral median carinae on segment I granular, but faintly elevated; on segment II-IV granular. Intercarinal surfaces granular on segment V, with small and short granules; dorsal lateral carinae granular, composed of several rows of granules; dorsal lateral carinae granular, present only on the anterior half of the segment; ventral lateral carinae granular, formed by a well-developed and straight line of granules; ventral median carinae granular, formed by a well-developed and straight line of granules, but with some scattered gaps. Macrosetal counts segments I–V carinae: Dorsal lateral, 0:0:1:2:4; lateral median, 0:2:2:2:3; lateral inframedian, 2:2:1:1; ventral lateral, 2:3:2:6-5:5-6; ventral submedian 2-3:3-4:3:4-3; ventral median 4-6. Telson (Fig. 7b-d): Vesicle longer than wide (L/W: 1.8), dorsal surface granulated; subaculear tubercle weak. Aculear glands and lateral aculear serrations absents.

Legs (Fig. 8a-d): Legs surfaces dorsally shagreened to coarsely granular and ventrally smooth. Setae count formula on holotype male 2/1: 3/2:3/3: 3/3.

Hemispermatophore (Fig. 9a-d): Laminar; laminar latero-distal crest well developed and present at the middle of the lamella, only present on the posterior fifth of the lamella. Capsular distal carina strong. Two spiniforms laminar hooks. Clasper obsolete; capsular basal carina well-developed. Lamella Length 3mm; trunk length 2.2mm, total length 5.2mm, width distal 0.5mm, width basal 1.1mm, basal lateral trough 0.4mm

Variation: Adult males differs from adult females in total body length (males length: 25.5 – 27.4 mm; females length 31.5 – 37.9mm). Mesosomal segment V and VII presents a white patch at the posterior margin in males, whereas in females is absent; also, the vesicle in males presents a noticeable yellowish coloration on the posterior half, meanwhile in females this coloration is absent. One of the males were found without the median ocelli. The full variation range in measurements are shown in tables 1, variation in metasomal setation is shown in table 2 and variation in setation in the telotarsus is shown in table 3.

Natural history: The adult males of this species were found before the rainy season and at the beginning of the winter, this could indicate that the mating season may take place all year long, but lings were observed to be born during May.

Habitat: *Vaejovis tilae* is a species that inhabits pine forests. It can be found under rocks or logs and is sympatric to a *Centruroides* sp. that occupy almost the same niche.

Distribution (Fig. 10): *Vaejovis tilae* can be found along the highest elevations of Sierra de Quila, all the localities known reach along 8 km lineal, with provides plenty of habitat for this species.

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LITERATURE CITED

Azzinnari, J.S., R.W. Bryson Jr., M.R. Graham, C. Solís-Rojas and W.D. Sissom. 2021. A new *Vaejovis* C.L. Koch from the Sierra Madre Occidental of Durango, Mexico (Scorpiones: Vaejovidae). *Insecta Mundi*, 0852: 1–12.

Barrales-Alcalá, D.A., O.F. Francke, T.R. Van Devender and G.A. Contreras-Félix. 2018. A new Sky Island species of *Vaejovis* C. L. Koch, 1836 from Sonora, Mexico (Scorpiones, Vaejovidae). *Zookeys*, 760: 37–53. https://doi. org/10.3897/zookeys.760.22714

Chávez-Samayoa, F., J.E. Díaz-Plascencia and E. González-Santillán. 2022. Two new species of *Vaejovis* (Scorpiones: Vaejovidae) belonging to the *mexicanus* group from Aguascalientes, Mexico, with comments on the homology and function of the hemispermatophore. *Zoologischer Anzeiger* 298: 148–169. https://doi.org/10.1016/j.jcz.2022.04.005

Contreras-Félix, G.A. and O.F. Francke. 2014. Description of a new species of *Vaejovis* from Michoacan, Mexico (Arachnida: Scorpiones: Vaejovidae). *Revista Mexicana de Biodiversidad*, 85(1): 24–30. https://doi.org/10.7550/rmb.37437

Contreras-Félix, G.A. and O.F. Francke. 2019. Taxonomic revision of the "*mexicanus*" group of the genus *Vaejovis* C.L. Koch, 1836 (Scorpiones: Vaejovidae). *Zootaxa*, 4596(1): 1–100. https://doi.org/10.7550/rmb.37437

Contreras-Félix, G.A. and O.F. Francke. 2021. New species of *Vaejovis* C.L. Koch, 1836 (Scorpiones: Vaejovidae) with comments on Lateral Aculear Serrations. *Southwetern Entomologist*, 46(1): 197–210. https://doi.org/10.3958/059.046.0119

Contreras-Félix, G.A., O.F. Francke and R.W. Bryson Jr. 2015. A new species of the "*mexicanus*" group of the genus *Vaejovis* C.L. Koch, 1836 from the Mexican state of Aguascalientes (Scorpiones: Vaejovidae). *Zootaxa*, 3936(1): 131–140. https://doi.org/10.3958/059.046.0119

Graham, M.R. and R. W. Bryson Jr. 2010. *Vaejovis montanus* (Scorpiones: Vaejovidae), a new species from the Sierra Madre Occidental of Mexico. *The Journal of Arachnology*, 38(2): 285–293. https://doi.org/10.1636/Ha09-90.1

González-Santillán, E. and L. Prendini. 2013. Redefinition and generic revision of the North American Vaejovid Scorpion subfamily Syntropinae Kraepelin, 1905, with description of six new Genera. *Bulletin of the American Museum of Natural History*, 381: 1–71. https://doi.org/10.1206/830.1

Loria, S. F. and L. Prendini. 2014. Homology of the lateral eyes of Scorpiones: A six-ocellus model. *PLoS ONE*, 9(12): e112913. https://doi.org/10.1371/journal.pone.0112913

Miranda-López, E. P., J. Ponce-Saavedra and O. F. Francke. 2012. Una nueva especie de *Vaejovis* (Scorpiones: Vaejovidae) del centro de México. *Revista Mexicana de Biodiversidad* 83(4): 966–975. https://doi.org/10.7550/rmb.30891

Morrone, J.J., T. Escalante and G. Rodríguez-Tapia. 2017. Mexican biogeographical provinces: Map and shapefiles. *Zootaxa*, 4277(2): 277–279. https://doi.org/10.11646/zootaxa.4277.2.8

Prendini, L. 2003. Revision of the genus *Liposoma* Lawrence, 1928 (Scorpiones: Bothriuridae). *Insect Systematics and Evolution*, 34(3): 241–264. https://doi.org/10.1163/187631203788964764

Rein, J.O. 2023. The Scorpion Files. Norwegian University of Science and Technology, on line at http://www.ub.ntnu.no/scorpion-files/ (accessed April 15, 2023).

Santibáñez-López, C.E. and O.F. Francke. 2010. New and poorly known species of the mexicanus group of the genus *Vaejovis* (Scorpiones: Vaejovidae) from Oaxaca, México. *Journal of Arachnology*, 38(3): 555–571. https://doi.org/10.1636/Ha09-64.1

Santibáñez-López, C.E., E. González-Santillán, L. Monod and P. Sharma. 2019. Phylogenomics facilitates stable scorpion systematics: Reassessing the relationships of Vaejovidae and a new higher-level classification of Scorpiones (Arachnida). *Molecular Phylogenetics and Evolution* 135: 22–30. https://doi.org/10.1016/j.ympev.2019.02.021

Sissom, W.D. 1989. Systematic studies on *Vaejovis granulatus* Pocock, and *Vaejovis pussilus* Pocock, with descriptions of six new related species (Scorpiones, Vejovidae). *Revue Arachnologique*, 8(9): 131–157.

Sissom, W.D., M.R. Graham, T.G. Donaldson and R.W. Bryson Jr. 2016. Two new *Vaejovis* C.L. Koch 1836 from highlands of the Sierra Madre Occidental, Durango, México (Scorpiones, Vaejovidae). *Insecta Mundi*, 0477: 1–14.

Stahnke, H.L. 1970. Scorpion nomenclature and mensuration. *Entomological News*, 81(12): 297–316.

Vachon, M. 1952. *Étude sur les Scorpions.* Institut Pasteur d'Algérie. Algeria.

Volschenk, E.S. 2005. A new technique for examining surface morphosculpture of Scorpions. *Journal of Arachnology*, 33(3) 820–825. https://doi.org/10.1636/s03-047.1

Zárate-Gálvez, K. and O.F. Francke. 2009. Nueva especie de *Vaejovis* (Scorpiones: Vaejovidae) de Chiapas, México. *Revista Ibérica de Aracnología*, 17: 21–28.

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Table 1. Measurements of on selected specimens from the of the type series of *V. tilae* sp. nov. Measurements are given in mm.

	Holotype ♂	♂	♂	♂	♀	♀	♀	♂	♀	♀	♀	♀
Total length	300	309	217.9	222.1	237	249.7	234.2	298	338	330	258.5	237
Carapace L/W	4/2.1	4.2/2.3	4/2.2	4/2.1	4.3/2.4	4.5/2.5	4.2/2.4	4/2.2	4.5/2.6	4.5/2.5	4.6/2.7	4.3/2.4
Mesosoma length	9.5	10.1	9.1	9.7	10.6	11.4	10.9	9.3	11.7	11.5	11.8	10.6
Metasoma length	12.9	13.0	83.4	81.6	84.6	8.7	79.6	13.0	13.5	13.1	90.2	84.6
Vesicle Length	3.6	3.6	3.5	3.5	3.6	3.7	3.6	3.5	4.1	3.9	4.3	3.6
Vesicle width	1.8	2.0	1.9	1.9	2	2.1	2	1.9	2.1	2.3	2.1	2
Vesicle depth	1.5	1.5	1.4	1.5	1.5	1.6	1.5	1.5	1.6	1.7	1.7	1.5
Femur length	3.4	3.4	3.3	3.3	3.5	3.7	3.4	3.3	3.8	3.8	3.8	3.5
Width	1.3	1.3	1.3	1.3	1.3	1.5	1.5	1.2	1.4	1.5	1.5	1.3
Depth	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.1	1.1	1.2	1.0
Patella length	3.7	3.7	3.5	3.5	3.8	4.2	3.9	3.6	4.1	4.1	4.2	3.8
Width	1.5	1.5	1.4	1.5	1.5	1.6	1.5	1.4	1.7	1.6	1.8	1.5
Depth	1.3	1.3	1.2	1.3	1.4	1.5	1.5	1.4	1.5	1.5	1.5	1.4
Chela length	3.6	3.5	3.5	3.5	3.8	4.0	3.7	3.5	4.1	4.0	4.2	3.8
Width	2.4	2.3	2.0	2.3	2.3	2.5	2.2	2.3	2.4	2.5	2.5	2.3
Depth	2.5	2.5	2.3	2.4	2.5	2.8	2.5	2.6	2.7	2.6	2.8	2.5
Movable finger length	3.5	3.5	3.5	3.5	3.8	3.9	3.5	3.5	3.9	3.9	3.9	3.8
Fixed finger length	3.0	3.0	2.9	2.7	3.0	3.0	2.9	3.0	3.2	3.1	3.4	3.0
Pectinal tooth count	15-14	16-16	15-15	16-16	14-14	13-13	13-13	15-16	14-14	13-13	14-14	14-14

Table 2. Variation on the metasomal setae counts on on selected specimens from the the type series of *V. tilae* sp. nov.

	Holotype ♂	♂	♀	♀	♀	♂	♀	♀
DL	0/0/1/2/4	0/1/1/2/6	0/1/1/2/4	0/1/1/2/4	0/1/1/2/6	0/1/1/2/5	0/0/1/2/4	0/0/1/2/5
LM	0/2/2/2/3	0/2/2/2/4	0/2/2/2/3	0/2/2/2/4	0/2/2/2/4	0/2/2/4/4	0/1/2/2/2	0/1/2/2/4
LI	2/2/1/1	2/2/2/-	2/2/2/-	3/3/2/-	2/2/1-2/1	2/2/1-2/1	2/2/1 y 2/1/1	2/2/1 y 2/1/1
VL	2/3/2/5-6/5-6	2/2/2/3/4	2/2/2/4/5	2/2/2/4/7	2/2/2/2/5	2/3/4/4/7	2/2/2/3/5	2/2/2/3/4
VS/M	2-3/3-4/3/3-4/4-6	3/3/3/5/7	2/3/3/4/5	2/3/3/4/5	3/3/3/4/6	3/3/3/3-5/7	3/3/3/3/6	3/3/3/3/6
	♀	♂	♀	♀	♀	♂	♂	♀
DL	0/0/1/2/4	0/1/1/2/5	0/0/1/2/5	0/0/1/2/5	0/1/1/2/5	0/0/1/2/4	0/1/1/2/5	0/0/1/2/5
LM	0/1/2/2/2	0/2/2/3/4	0/1/2/2/4	0/1/2/2/4	0/2/2/2/4	0/2/2/2-3/3	0/2/2/3/4	0/1/2/2/4
LI	2/2/1 y 2/1/1	2/2/2//	2/2/1 y 2/1/1	3/2/2//	2/2/2/-	2/2/1-2/1	2/2/2//	3/2/2//
VL	2/2/2/3/5	2/2/2/4/5	2/2/2/3/4	1/2/2/4/5	2/3/3/4/7	2/2/2/4/5	2/2/2/4/5	1/2/2/4/5
VS/M	3/3/3/3/6	3/3/3/4/5	3/3/3/3/6	2/3/3/3-4/6	2/3/3/4/6	2-3/4-3/4-3/4-3/7	3/3/3/4/5	2/3/3/3-4/6

Table 3. Variation on the telotarsus setae pv/rv counts on selected specimens from the type series of *V. tilae* sp. nov.

	Holotype ♂	♂	♂	♂	♂	♀
Leg I/II/III/IV	2/2:3/3:3/3:3/3	2/2:2/2:3/3:3/3	2/2:2/2:3/3:3/3	2/2:3/3:2/3:3/3	2/2:2/3:3/3:3/3	2/2:3/2:3/3:3/4
	♀	♀	♀	♀	♀	♀
Leg I/II/III/IV	2/2:3/3:3/3:3/3	2/2:3/3:3/3:3/3	2/2:3/3:3/3:3/3	2/2:3/3:3/3:3/3	2/2:2/3:3/3:3/3	2/2:2/3:3/3:3/3

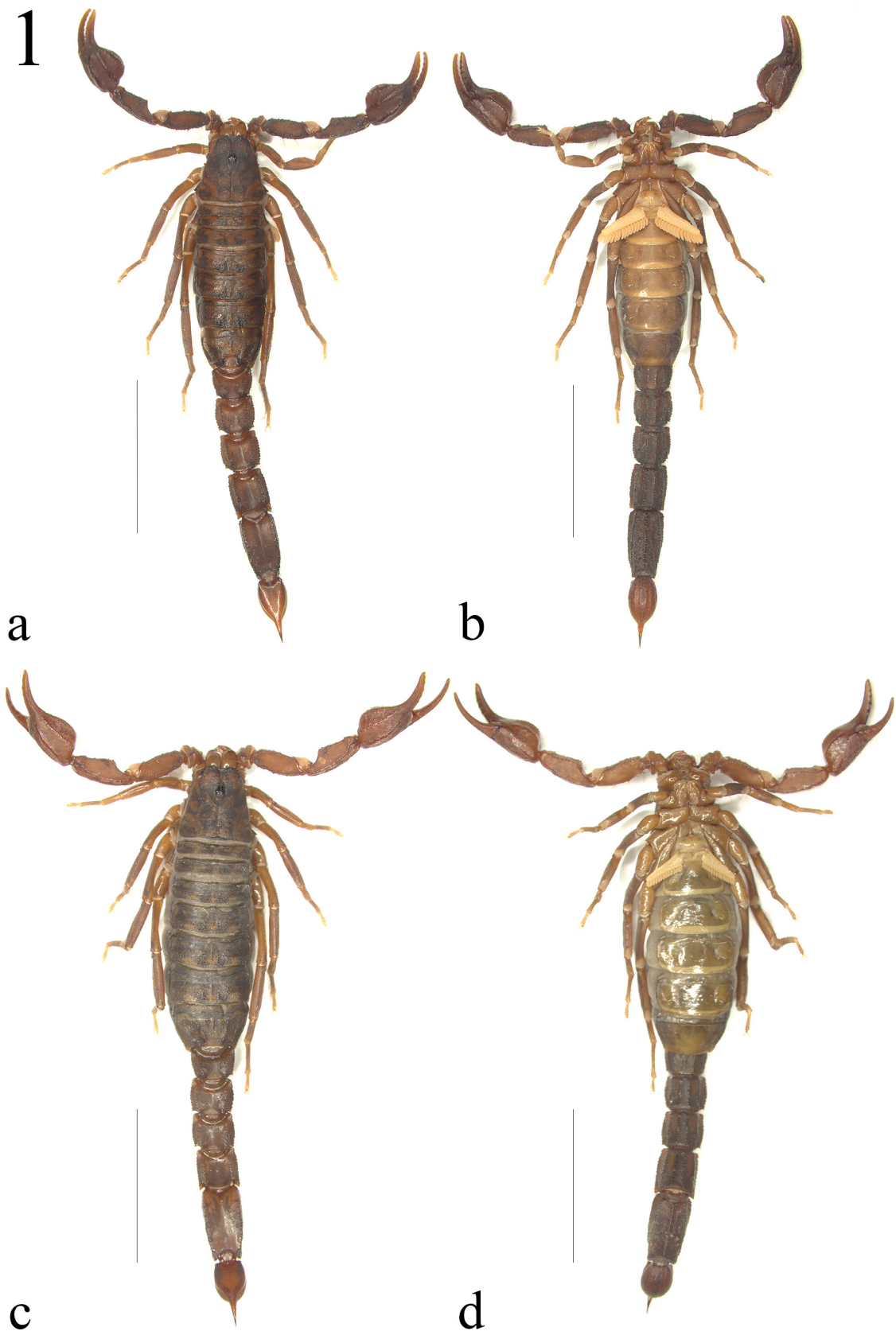

Figure 1: a- *Vaejovis tilae* sp. nov. habitus holotype male, dorsal view; b- *V. tilae* sp. nov. habitus holotype male, ventral view; c- *V. tilae* sp. nov. habitus paratype female, dorsal view; d- *V. tilae* sp. nov. habitus paratytpe female, ventral view. Scale bar 1 cm.

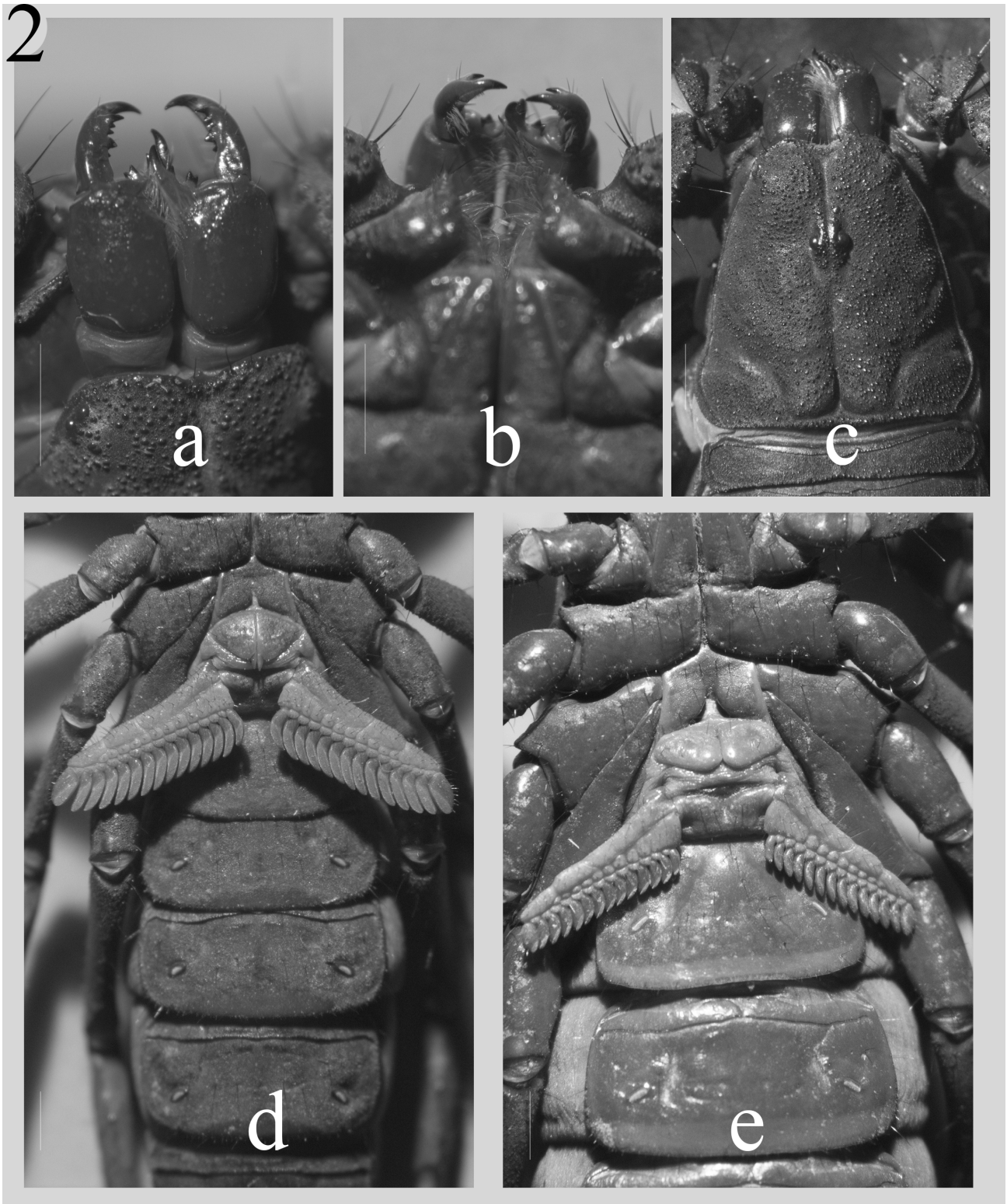

Figure 2. a- *V. tilae* sp. nov. chelicera holotype male, dorsal view; b- *V. tilae* sp. nov., chelicerae holotype male, ventral view; c- *V. tilae* sp. nov. carapace holotype male, dorsal view; d- *V. tilae* sp. nov. pectines holotype male, ventral view; e- *V. tilae* sp. nov. pectines paratype female, ventral view. Scale bar 1 mm.

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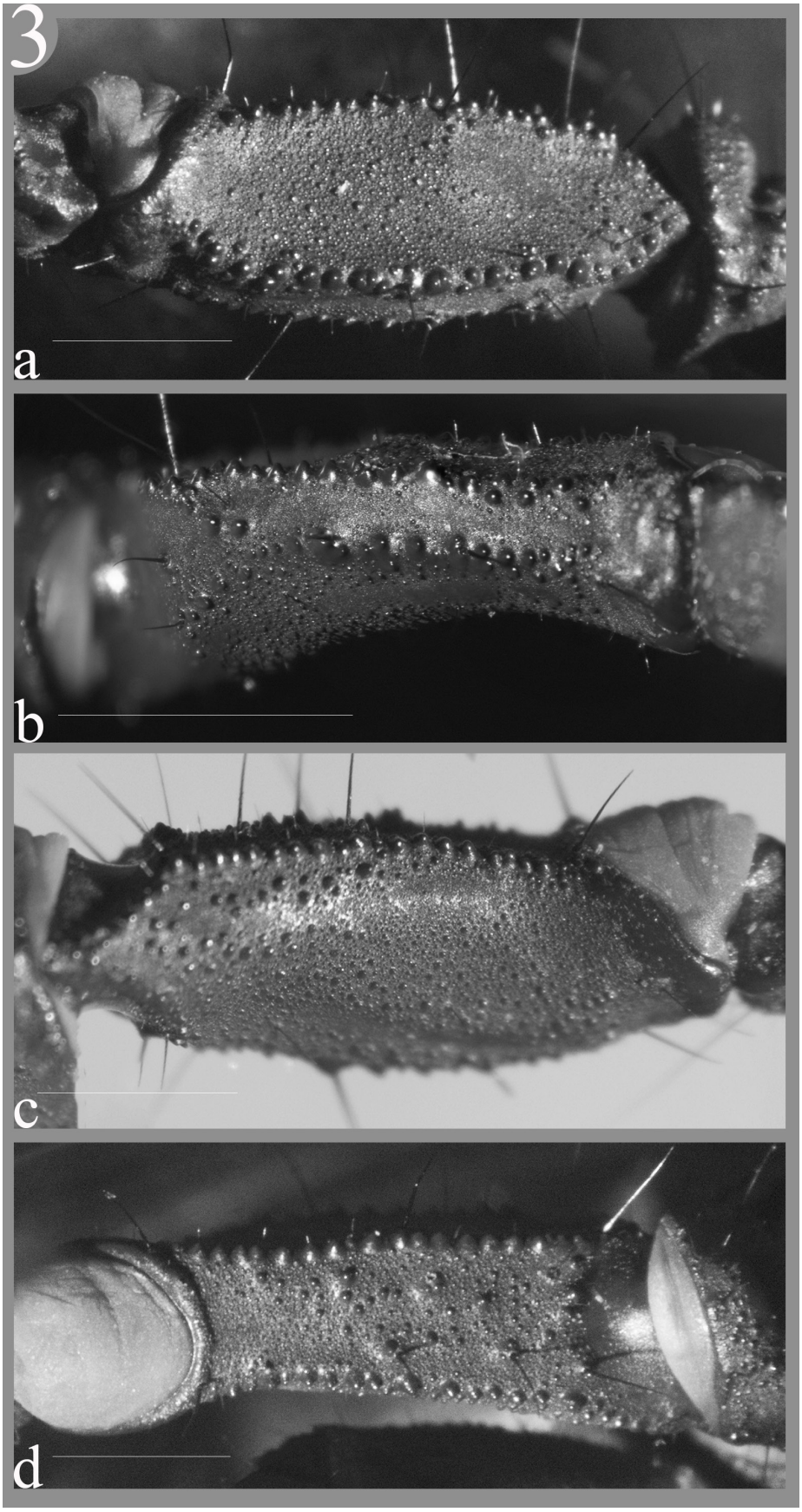

Figure 3. Pedipalp femur holotype male. a- dorsal view; b- retrolateral view; c- ventral view; d- prolateral view. Scale bar 1 mm.

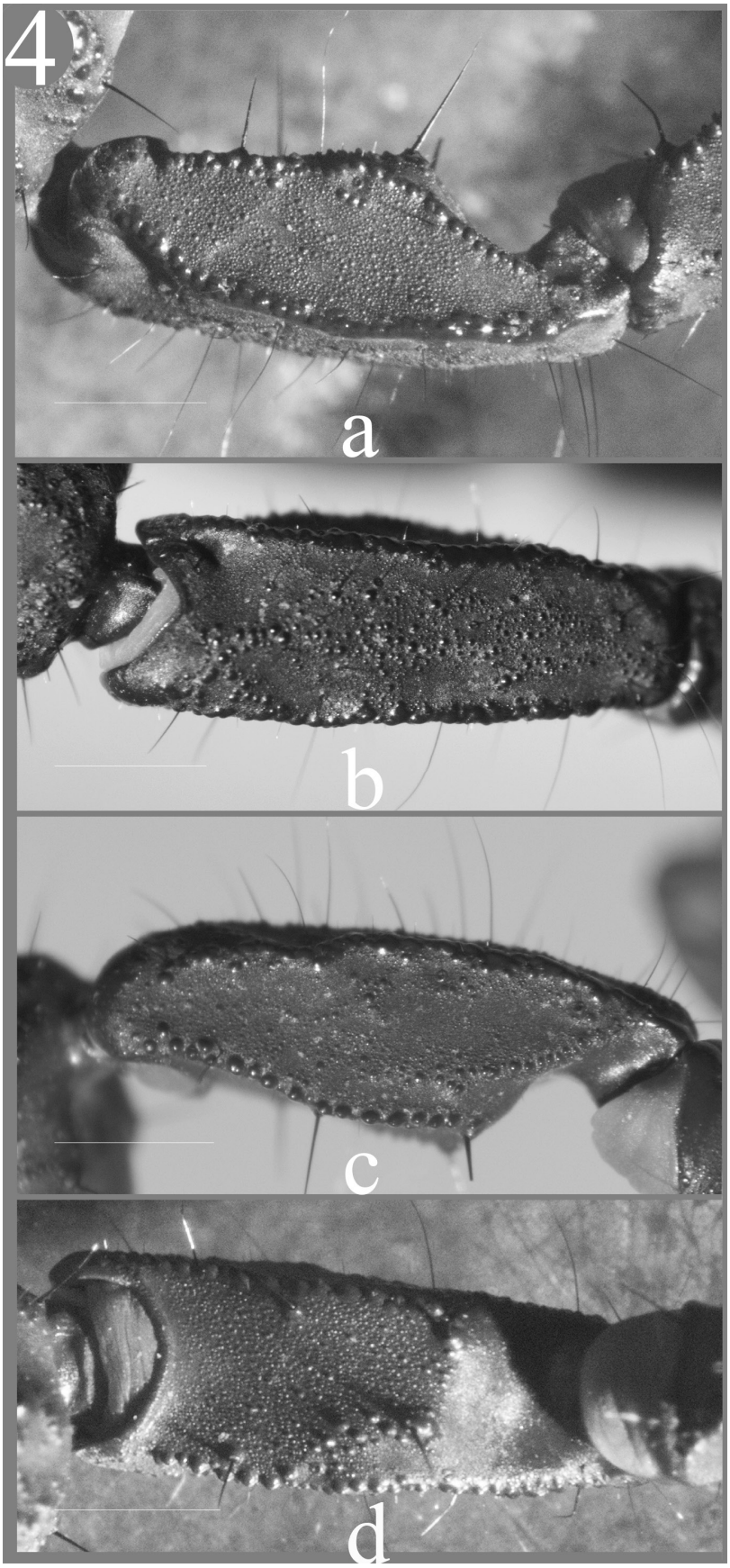

Figure 4. Pedipal patella holotype male. a- dorsal view; b- retrolateral view; c- ventral view; d- prolateral view. Scale bar 1 mm.

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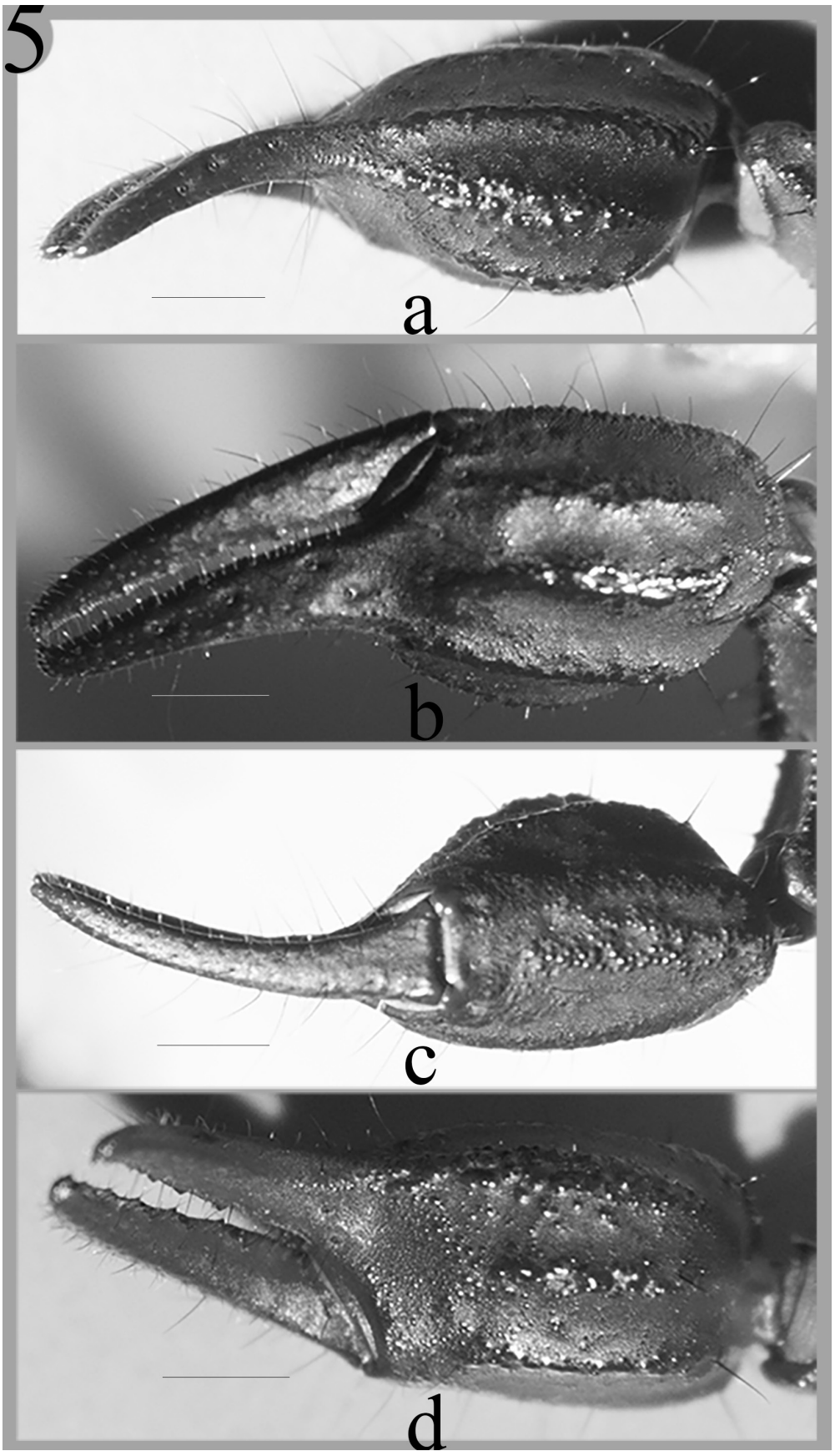

Figure 5. Pedipal chela holotype male. a- dorsal view; b- retrolateral view; c- ventral view; d- prolateral view. Scale bar 1 mm.

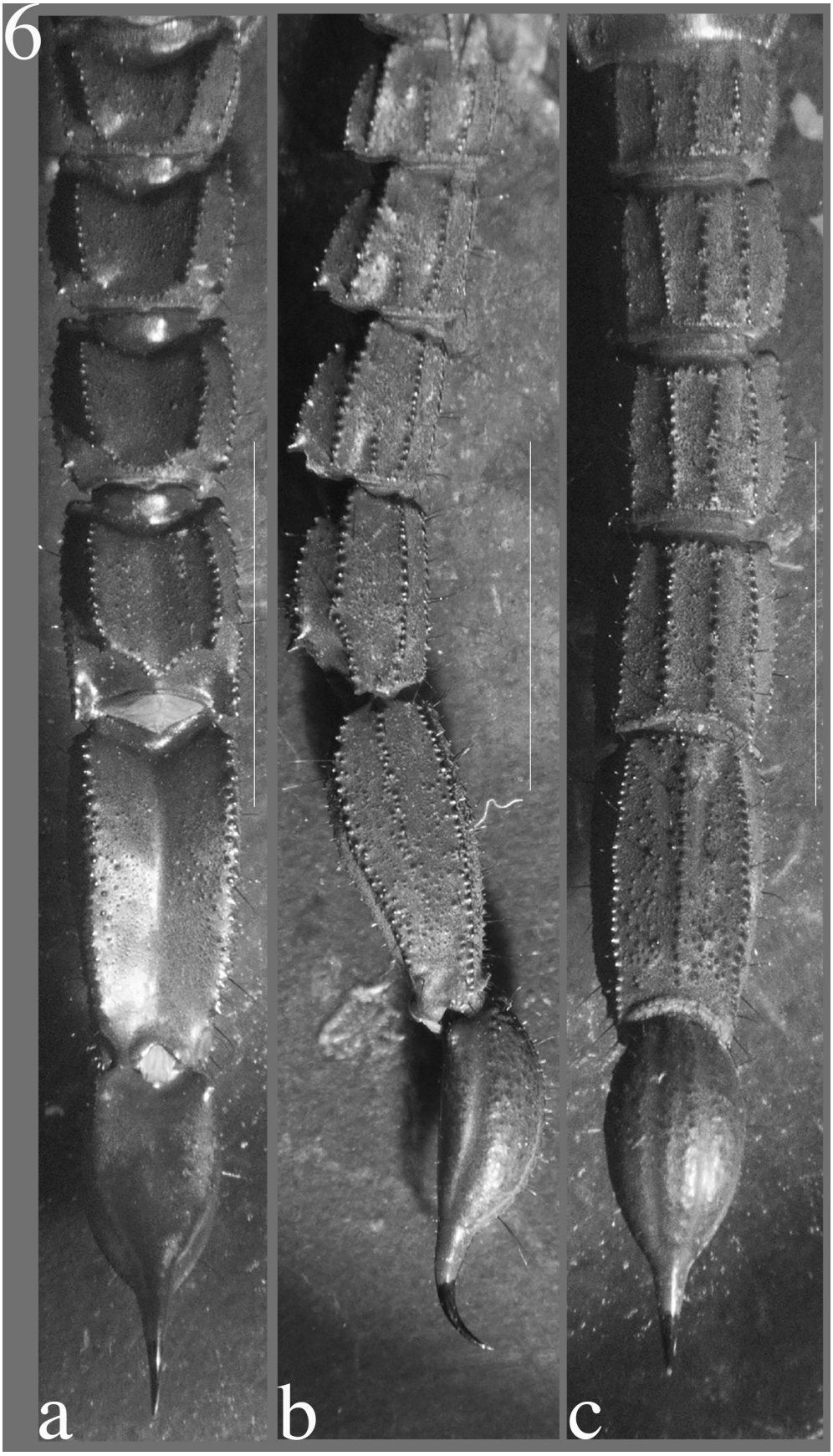

Figure 6. Metasoma holotype male. a- dorsal view; b- lateral view; c- ventral view. Scale bar 5 mm.

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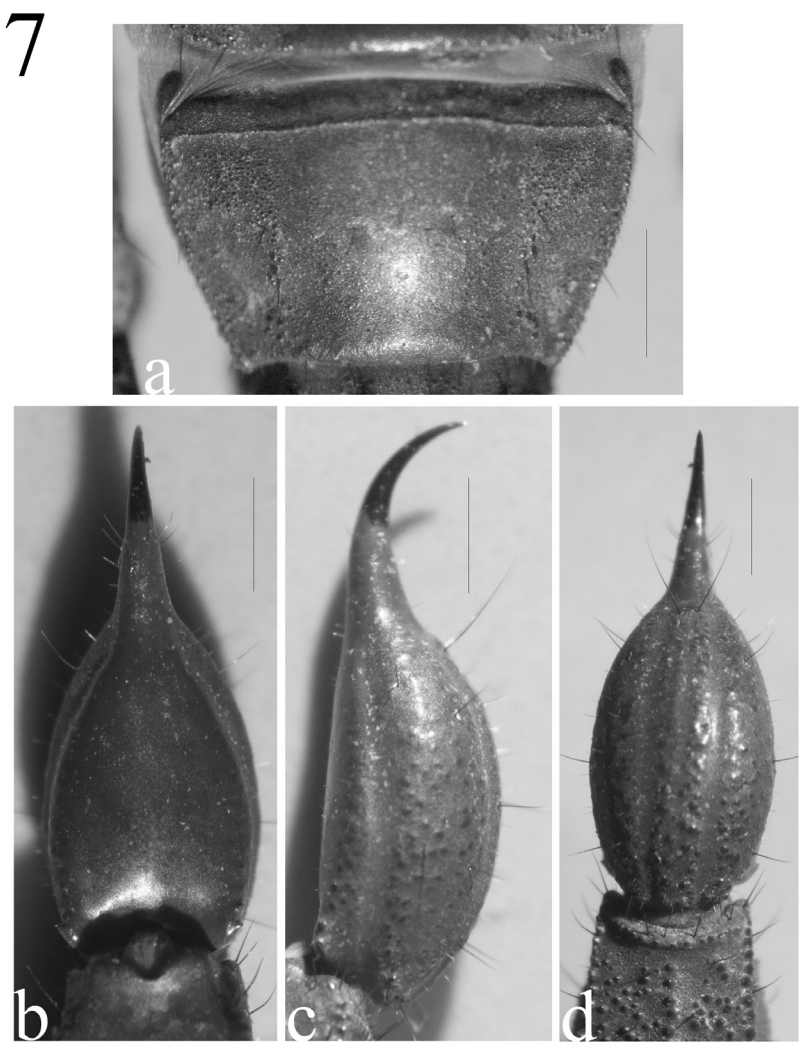

Figure 7. a- Sternite VII, holotype male; vesicle holotype male: b- dorsal view; c- lateral view; d- ventral view. Scale bar 1 mm.

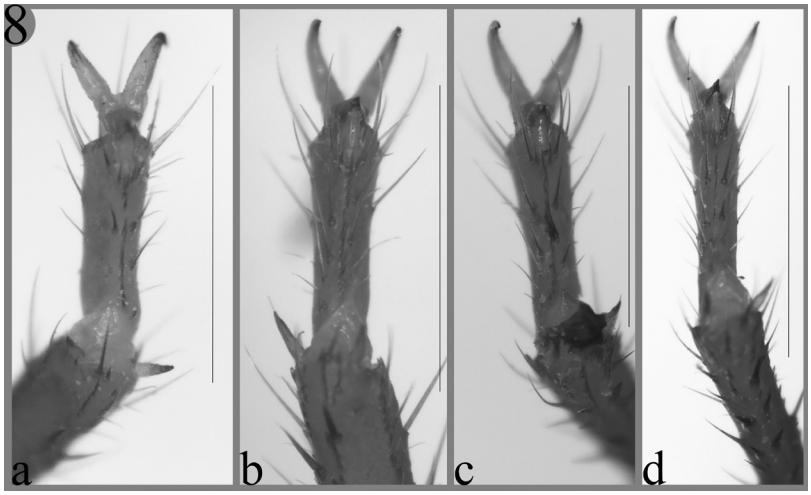

Figure 8. Telotarsal setae prolateral inferior and retrolateral inferior on holotype male. a- Leg I, ventral view; b- leg II, ventral view; c- leg III, ventral view; d- leg VI, ventral view. Scale bar 1 mm.

Figure 9. Hemispermatophore holotype male. a, d- lateral aspect; b, c- contralateral aspect. Scale bar 1mm.

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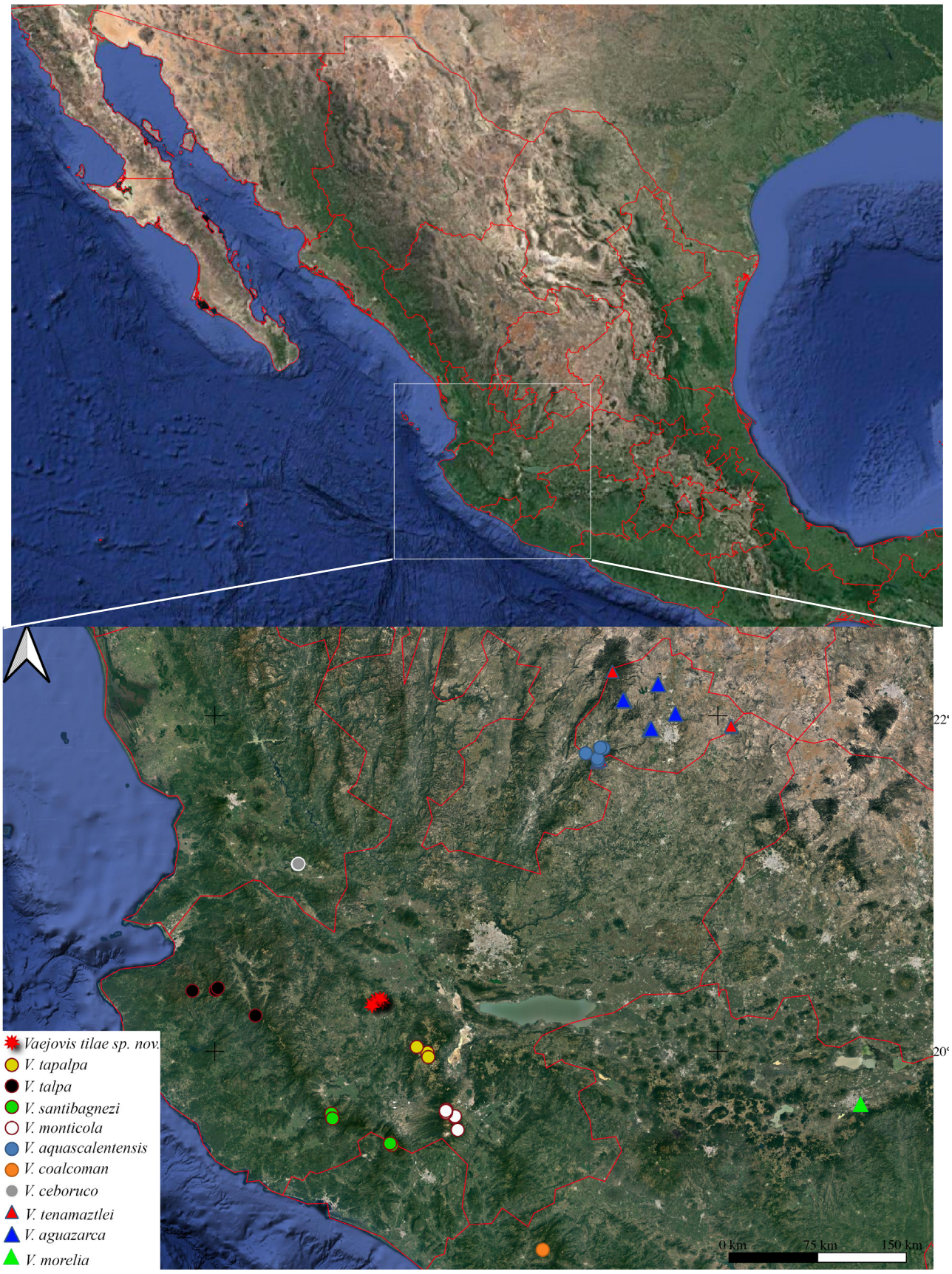

Figure 10. Map of the species of *Vaejovis* C.L. Koch, 1836 on the occidental part of Mexico.