



## A new *Vaejovis* (Scorpiones: Vaejovidae) from Chiapas, México

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### Abstract

*Vaejovis ocotensis* sp. n. is described from “El Ocote Biosphere Reserve”, Chiapas, México. This is the third species of this genus reported for Chiapas, and the first belonging to the *nitidulus* group.

**Key words:** Scorpion, *nitidulus* group, El Ocote

### Introduction

Chiapas is considered to exhibit the second highest biodiversity among the states of Mexico (CONABIO 1998). The Selva El Ocote Biosphere Reserve, which is located between 16° 45′ 42″–17° 09′ 00″ N and 93° 54′ 19″–93° 21′ 20″ W, was established in the year 2000 for the protection and conservation of an important area of the Selva Zoque in the northwestern region of the state (SEMARNAT 2001). The Zoque ethnic culture inhabited most of Chiapas (and adjacent areas) during pre-Hispanic times, thus the name given to that region, which represents one of the most important biodiversity places in Mexico (Morrone & Márquez 2008). The Reserve has terrain with altitudes ranging from 180–1500 msnm and the vegetation most representative is evergreen seasonal forest, but there are other types such as lower montane rain forest, tropical deciduous forest, thorn woodland, short-three savannah and in the highlands pine-oak forest (Breedlove 1981). The “El Ocote” reserve and surrounding areas are characterized by their karstic landscapes, where there are numerous pits and caves. The objective of this contribution is to describe a new scorpion species from that area. It is the third *Vaejovis* species for Chiapas, and the first belonging to the *nitidulus* group. The previously reported taxa are *Vaejovis chiapas* Sissom and *Vaejovis trespicos* Zárate-Gálvez & Francke, both belonging to the *mexicanus* group.

The *nitidulus* group was originally proposed and characterized by Sissom and Francke (1985). Subsequently, Sissom (1991) added species and diagnostic characters to the group. Sissom and González-Santillán (2004) described another species and provided a key to the known taxa. Recent controversy regarding the treatment of the group by Soleglad and Fet (2005) has been discussed by others (Prendini & Wheeler 2005; McWest 2009) and will not be considered here.

### Material and methods

Nomenclature and mensuration for the most part follow Stahnke (1970), except for trichobothrial terminology after Vachon (1974), metasomal carinal terminology after Francke (1977) and pedipalp carinae terminology

after Acosta *et al.* (2008). Abbreviation for depository: CNAN—Colección Nacional de Arácnidos, Instituto de Biología, Universidad Nacional Autónoma de México, México, D. F.

It has become customary to include metasomal setae counts when describing new species of *Vaejovis* C. L. Koch; and usually the counts reported correspond to the distinctive reddish macrosetae located along the metasomal carinae. In several species groups the setae occur directly on the carinae (or where the carinae would be located if developed) and there are few or no setae on the intercarinal spaces, making such counts relatively simple and reliable. In some species of the *nitidulus* group, including the new one here, the setae are not always directly on the carinae, and depending on the distance from them an arbitrary decision has to be made on whether to include that “errant” seta on the count reported or not. Furthermore, in this species group there are often numerous setae on the intercarinal spaces, and again the decision to exclude or include those setae on the count reported is arbitrary (depending on the distance to the carinae). Finally, the setae are often lost and the count is based on the pores where the setae were inserted; however, there is often uncertainty as to whether a given pore corresponds to a “distinctive reddish macrosetae” or to an “ordinary whitish setae”. The metasomal setae counts reported herein contain a fair amount of uncertainty and are definitely not considered diagnostic of the species. They are presented in the format: segment I right side/left side: segment II right/left: segment III right/left: segment IV right/left. Segment V is reported separately because of the distinct metasomal carinae disposition.

## Taxonomy

### *Vaejovis ocotensis*, new species

(Figs 1–14, 16, 18)

**Type data.** Holotype female (CNAN T-0404) from Cueva del Metate [16° 53' 8" N–93° 25' 13" W, elevation 900 m], 3.6 km NW Ocuilapa de Juárez, Municipio Ocozocoautla de Espinoza, Chiapas, México, 7 March 1999, M. Hernández L. (col.). Paratypes: two adult females (CNAN T-0405) from “El Ocote, Chiapas, 8 March 1993, E. Barrera (col.)” [No details are available as to where in the Biosphere Reserve these two specimens were collected].

**Etymology.** The specific epithet is an adjective derived from the type locality.

**Diagnosis.** The following characters place this species in the *nitidulus* group: (1) carapace obtusely emarginated, with distinct anteromedian notch; (2) chela trichobothria *ib* and *it* located at the base of the fixed finger; (3) pectinal teeth on females are subequal in size; (4) cheliceral movable finger with distinct serrula; and (5) ventral spinule row of telotarsus terminating distally with one or two spinules only.

Pedipalp chela fixed finger with primary row of denticles divided into six subrows. Pedipalp patella with two *esb* trichobothria. Metasoma with ventral submedian carinae present on segments I–IV, weak to moderate, granular. Metasomal segment I wider than long, others longer than wide; segment V length/width ratio 2.30–2.57. Pectinal tooth count 18–20 on females. Chelal carinae obsolete, except for a few granules along prodorsal and dorsal marginal carinae.

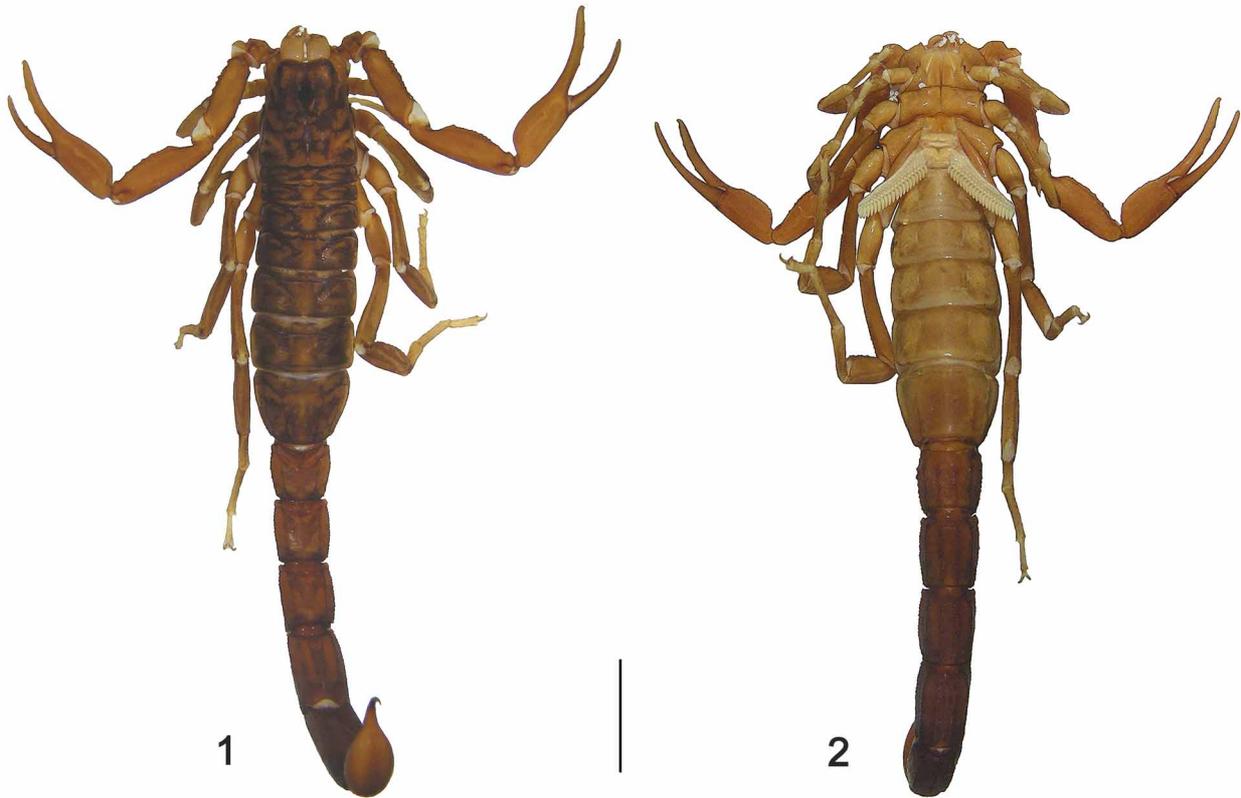
Although the holotype was collected in or near a cave, the species shows no troglomorphies whatsoever.

Description of the female holotype (Figs 1–2)

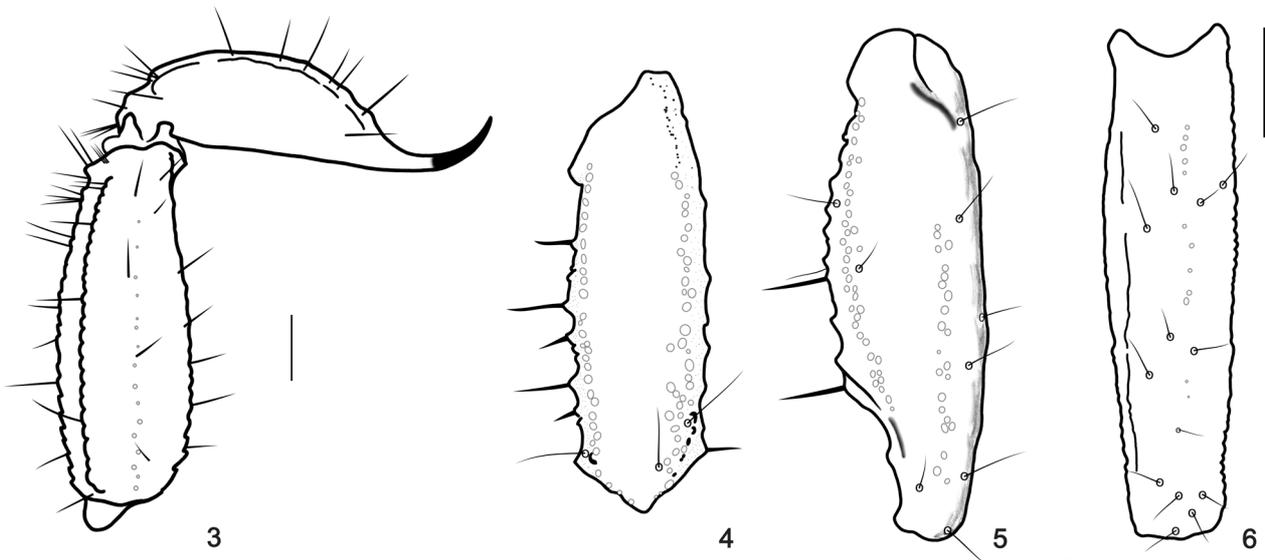
**Color:** Base color dorsally medium brown, metasoma darkening distally to reddish brown; variegated fuscosity throughout, gradually fainter toward metasoma; segment V without distinct fuscosity. Ventrally pale yellow, except metasoma moderately infuscate. Pedipalps and telson yellow-orange. Chelicera pale yellow to cream, manus dorsally with a slight variegated fuscosity. Legs yellow-orange gradually lightening to pale yellow on basitarsus and telotarsus; with longitudinal fuscous bands on femur, tibia and stronger in patella.

**Prosoma:** Carapace longer than wide, surface shagreened to minutely granulose throughout; anterior margin obtusely emarginated, with distinct anteromedian notch, with three pairs of setae. Ocular tubercle low, located on anterior one-third; three pairs of lateral eyes, posterior-most eye about one-half diameter of anterior

two. Anterior median furrow moderately deep and broad; posterior median furrow shallow and broad near median eyes, gradually becoming deeper and narrower; posterolateral furrows shallow and broad. Sternum pentagonal, with five pairs of setae; median longitudinal furrow deep and broad.



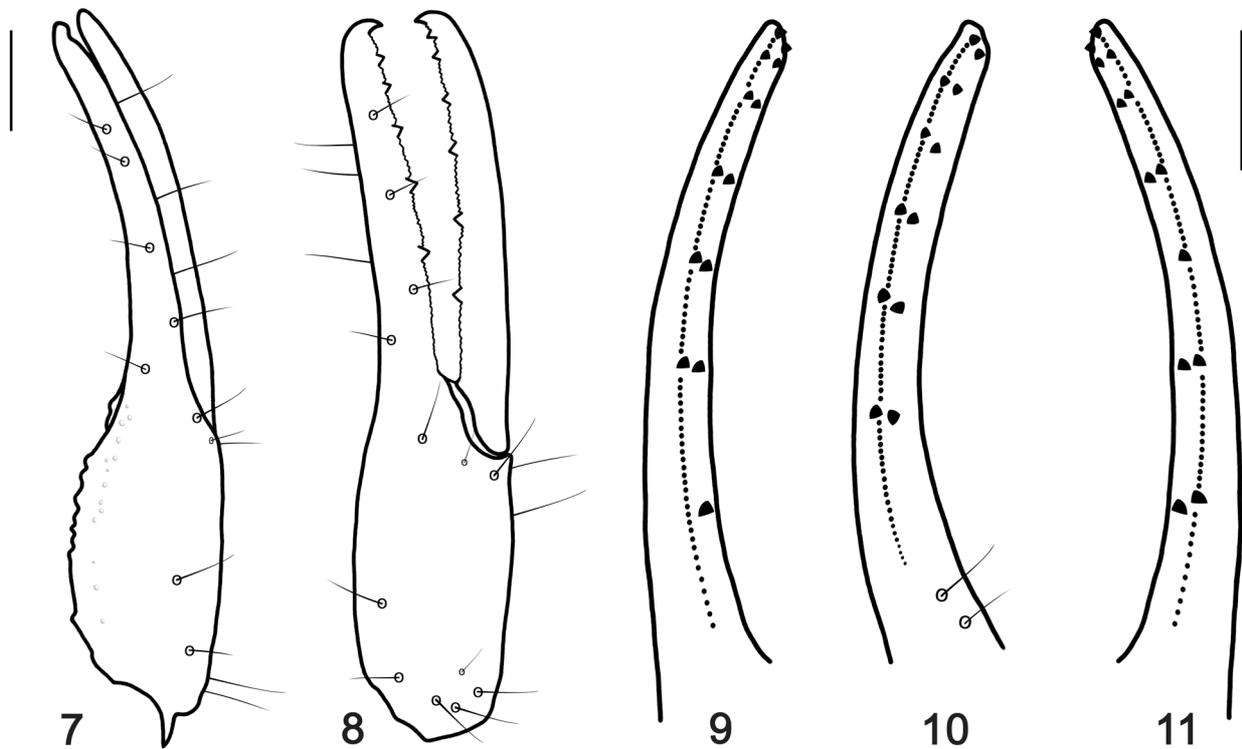
FIGURES 1–2. *Vaejovis ocotensis* sp. n. Female holotype. 1 dorsal view; 2 ventral view. Scale line = 5 mm.



FIGURES 3–6. *Vaejovis ocotensis* sp. n. Female holotype. 3 Lateral view of metasomal segment V and telson. 4–6 Pedipalp femur and patella (4 dorsal view of pedipalp femur, 5 dorsal view of pedipalp patella, 6 retrolateral view of pedipalp patella). Scale line = 1 mm.

**Mesosoma:** Tergites with dense and fine granulation, segments III–VII with some sparse, slightly larger granules towards posterior margins; VII with two pairs of strong, subserrate carinae, lateral margins

subserrated. Sternites III–VI smooth and lustrous; VII with dense and fine granulation; submedian carinae absent, lateral carinae moderately strong, granular; lateral margins crenulate. Genital opercula with two pairs of setae, with almost complete median longitudinal membranous connection. Pectinal tooth count 20–20; teeth subequal in size.



**FIGURES 7–11.** *Vaejovis ocotensis* sp. n. Female holotype. 7–8 Chela of pedipalp (7 dorsal view, 8 retrolateral view). 9–11 Fingers of pedipalp chela (9 left movable finger, 10 right fixed finger, 11 right movable finger). Scale line = 1 mm.

**Metasoma:** Intercarinal spaces densely, minutely granulose. Ventral submedian carinae granular, on I weak, on II–IV moderate. Ventrolateral carinae strong, on I–IV subserrate. Lateral inframedian carinae subserrate, on I strong; on II strong, on distal third only; on III represented by two small, distal granules; on IV absent. Lateral supramedian carinae on I–III strong and serrate, with distalmost denticle enlarged, spinoid (on I smaller than II and III); on IV strong, serrate to distally crenulate. Dorsolateral carinae strong, serrate, distally ending in an enlarged, spinoid denticle, larger than distalmost denticles of lateral supramedian carinae. Segment V (Fig 3): ventromedian and ventrolateral carinae, moderate and granular; lateromedian carinae weak, granulose, present only on basal two-thirds; dorsolateral carinae moderate, subserrate-granular on basal one-fifth, weak and granulose beyond.

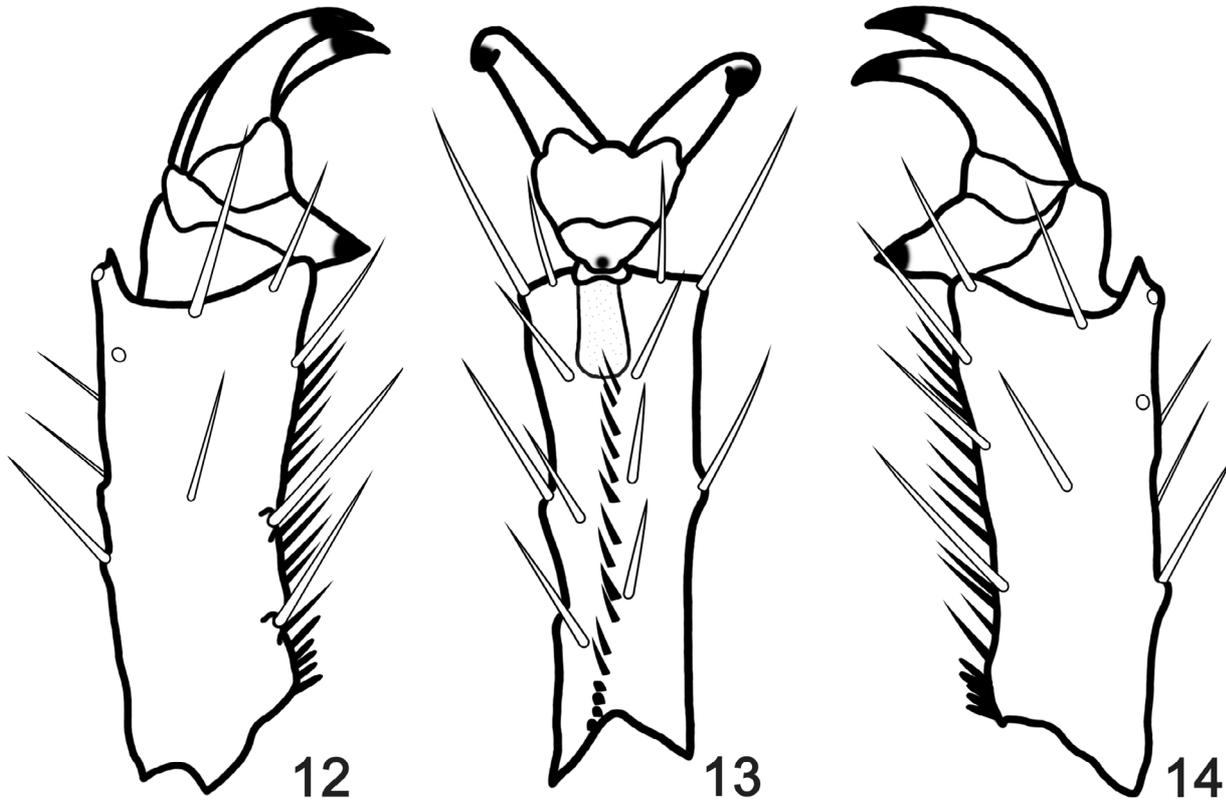
Metasomal setal counts: on dorsolateral carinae 1/1:3/3:3/3:3/3; on lateral supramedian carinae 4/4:4/3:3/3:3/3; on lateral inframedian carinae 4/5:1/2:1/1:1/0; on ventrolateral carinae 4/4:4/4:4/4:4/4. Segment V: on dorsolateral carinae 5/5; lateral median carinae 9/9; ventrolateral carinae 5/5; ventromedian carinae with 5 “pairs” at variable distances from the keel proper.

**Telson:** Vesicle elongate and globose, smooth dorsally, ventrally slightly granulose, with sparse setation (6 in posterior edge of vesicle, 1 in position of subaculear tooth, 16 in total). Aculeus lacking basal microdenticles. Some small granules near position of subaculear tubercle (Fig 3).

**Chelicera:** Movable finger with a distinct serrula ventrally. Manus with one seta dorsally.

**Pedipalps:** Orthobothriotaxic, Type “C”. Intercarinal spaces densely, minutely granulose. Femur (Fig 4): retrodorsal carina strong, granulose; prodorsal and proventral carinae strong, granular; retroventral carina absent; retrolateral median carina notable by 3–4 prominent granules; ventral face with a basal cluster of

larger granules; prolateral face with some larger granules and 7–9 setae. Patella (Figs 5–6): prodorsal and proventral carinae strong granular; retrodorsal and retroventral weak-moderate, granulose; prolateral median carina notable by 8–10 prominent granules; retrolateral median carina very weak, granulose, distinguished by some granules.



**FIGURES 12–14.** *Vaejovis ocotensis* sp. n. Female holotype. Telotarsus III. 12 prolateral view, 13 ventral view, 14 retrolateral view. Scale line = 1 mm.

**Chela** (Figs 7–8): Surface shagreened to minutely granulose throughout, retrolateral face almost lustrous; manus and fingers long and slender. Dorsal marginal and prodorsal carinae very weak, granulose, distinguished by some basal granules; all other carinae totally absent. Trichobothria *ib-it* located at base of fixed finger. Both fixed fingers with primary denticle row divided into 6 subrows by 5 enlarged median denticles (MD), 6 inner denticles (ID) (Fig 10). Right movable finger with 7 subrows due to presence of a sixth, basal most MD (Fig 11), 6 ID (fifth from tip missing). Left movable finger with 6 subrows and 5 MD (basal most not differentiated by size), 7 ID (Fig 9).

**Legs:** Telotarsus III (Figs 12–14) ventromedian spinule row (leg left/right) with 12/13 spinules, plus 4 smaller basal spinules; terminating distally with one spinule only.

Measurements: Table 1.

**Intraspecific variation.** Male unknown. The two female paratypes (measurements in Table 1) each have pectinal tooth counts of 18–18. On both paratypes, the fixed finger dentition on all fingers is as in the holotype, with 6 subrows, 5 MD and 6 ID. The movable fingers on both paratypes have 6 subrows and 5 MD (missing the basalmost—as in Fig 9), and 7 ID.

The holotype has a single terminal spinule on both telotarsi III (Fig 13); the larger paratype has a single spinule on right telotarsus III, and a terminal pair on the left telotarsus III; the smaller paratype has paired terminal spinules on both telotarsi III.

Metasomal setal counts on the slightly larger paratype (see Table 1): on dorsolateral carinae 1/1:2/2:2/3:3/3; on lateral supramedian carinae 2/2:2/2:2/2:5/4; on lateral inframedian carinae 4/3:1/2:1/1:0/0; on

ventrolateral carinae 4/4:4/4:4/4:4/5; on ventral submedian carinae 3/3:3/3:4/5:4/5. On segment V: dorsolateral 6/7; lateral median 4/5; ventrolateral 5/5, ventral median 5/4 (four pairs and one single).

Metasomal setal counts on the smaller paratype: on dorsolateral carinae 1/0:2/2:3/2:4/3; on lateral supramedian carinae 2/2:3/2:3/3:5/4; on lateral inframedian carinae 4/4:1/1:1/1:0/0; on ventrolateral carinae 4/4:4/4:4/4:4/4; on ventral submedian carinae 3/3:5/5:4/4:4/4. On segment V: dorsolateral 7/6; lateral median 6/6; ventrolateral 6/6; ventral median 5 pairs.

**TABLE 1.** Measurements of the type series of *Vaejovis ocotensis* **sp. n.** (in mm; L=length, W=width, D=depth).

	Female Holotype	Female Paratype	Female Paratype
Total L	37.48	37.82	36.69
Carapace L	4.60	4.75	4.50
Mesosoma L	11.01	11.34	11.49
Metasoma L	16.77	16.53	15.70
Segment I L/W/D	2.33/2.43/2.06	2.20/2.60/2.20	2.00/2.36/2.15
Segment II L/W/D	2.56/2.26/2.03	2.53/2.50/2.10	2.35/2.30/2.05
Segment III L/W/D	2.73/2.16/2.03	2.70/2.46/2.15	2.55/2.30/2.00
Segment IV L/W/D	3.75/2.10/2.00	3.70/2.40/2.15	3.60/2.26/2.00
Segment V L/W/D	5.40/2.10/1.93	5.40/2.33/2.05	5.20/2.26/1.90
Telson L	5.10	5.20	5.00
Vesicle L/W/D	3.30/1.80/1.50	3.50/1.90/1.60	3.20/1.80/1.50
Pedipalp L	15.70	15.80	15.30
Femur L/W	4.00/1.20	4.05/1.06	3.90/1.20
Patella L/W	4.70/1.35	4.75/1.40	4.50/1.30
Chela L/W/D	7.00/1.35/1.50	7.00/1.43/1.60	6.90/1.40/1.50
Movable finger L	4.35	4.40	4.15
Fixed finger L	3.50	3.50	3.50
Pectinal tooth count	20/20	18/18	18/18

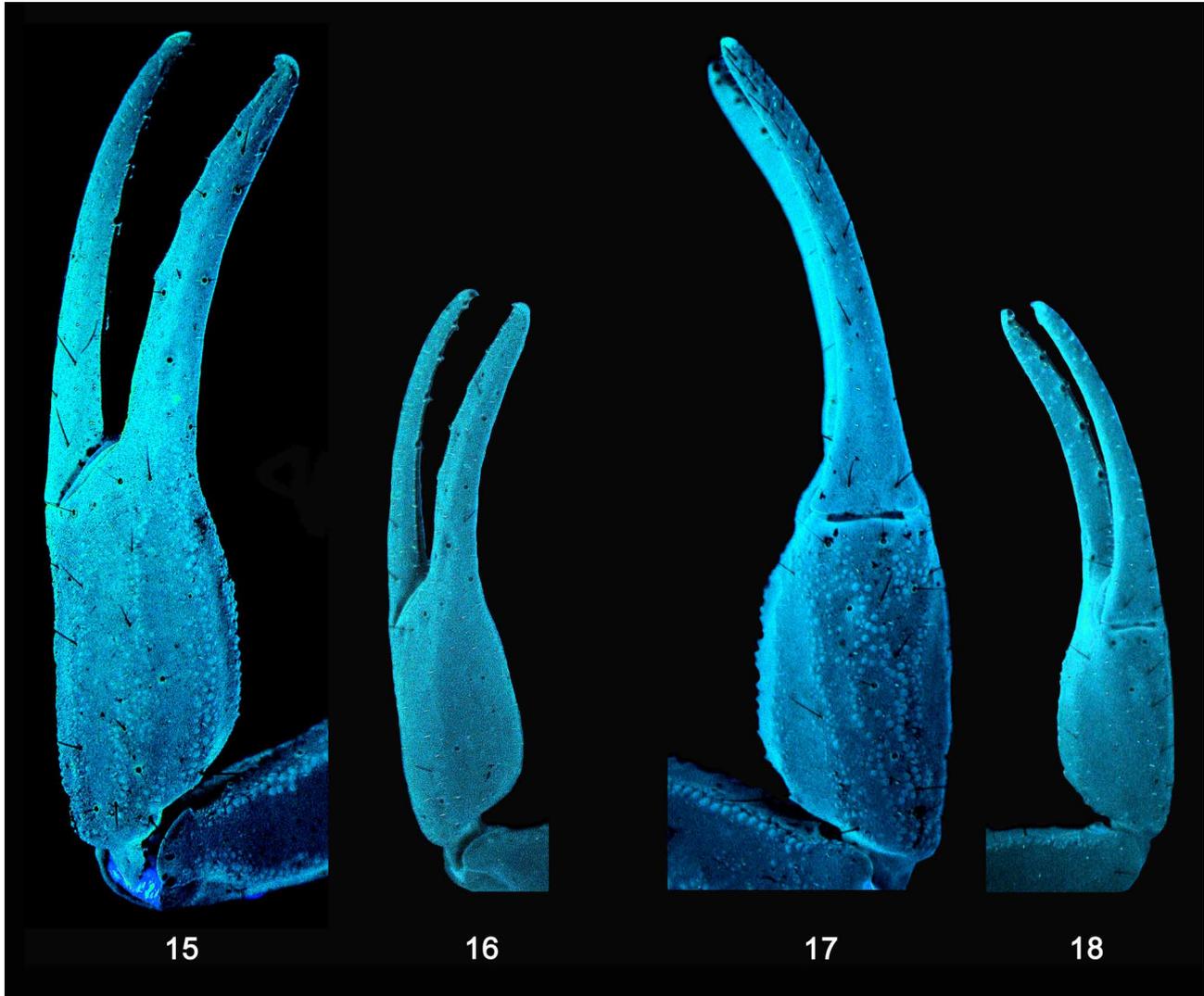
**Distribution.** Known only from the “El Ocote” region.

**Comparisons.** *V. ocotensis* **sp. n.** resembles *Vaejovis curvidigitus* Sissom 1991, known from the states of Guerrero, Morelos and Oaxaca; *Vaejovis solegladi* Sissom 1991 from Oaxaca and Puebla, and *Vaejovis davidi* Soleglad & Fet 2005 known only from Puebla. However it differs as follows: in *V. curvidigitus* the first three metasomal segments are wider than long; segment V length/width ratio 1.67–1.85; ventral submedian metasomal carinae obsolete on I–II, often present, but faint on III–IV; pedipalp chela is more robust (length/width ratio 3.73–4.20 in females). In *V. ocotensis* **sp. n.** metasomal segments II and III are longer than wide; segment V length/width ratio 2.30–2.57; ventral submedian carinae granular, on I weak, on II–IV moderate; and the pedipalp chela is thinner (length/width ratio 4.90–5.20 in females).

In *V. solegladi* base color is yellow, without dusky markings on carapace and tergites, ventral submedian carinae on I–IV obsolete; metasomal segment V length/width ratio 1.90–2.02. *V. ocotensis* **sp. n.** base color dorsally medium brown, metasoma darkening distally to reddish brown, with variegated fuscidity throughout, gradually fainter toward metasoma; ventral submedian carinae on I–IV granular, weak to moderate, but always present; metasomal segment V length/width ratio 2.30–2.57.

*V. davidi* is bigger (Total length 44.8–45.6); base color is dark brown; metasomal segment I is longer than wide; the chelal movable finger is longer than carapace; posterior termination of dorsolateral carinae of metasomal segment IV not formed in conspicuous spine; all pedipalp chelal carinae present and irregularly granulose (Figs 15, 17). *V. ocotensis* **sp. n.** is smaller (Total length 36.7–37.8); base color is medium brown;

metasomal segment I is wider than long; the chelal movable finger is shorter than the carapace; dorsolateral carinae strong, serrate, ending distally in an enlarged, spinoid denticle; chelal carinae obsolete throughout (Figs 16, 18), except for prodorsal and dorsal marginal carinae, distinguished by some granules basally.



**FIGURES 15–18.** Aspect of left chela of *Vaejovis ocotensis* **sp. n.** and *V. davidi*. 15 retrodorsal view of chela of *V. davidi*, female adult of Textlaacoaya, [Municipio] Las Vigas, Veracruz, 16 retrodorsal view of *V. ocotensis* **sp. n.**, 17 ventral view of *V. davidi*, 18 ventral view of *V. ocotensis* **sp. n.**

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