

## DESCRIPTION OF A NEW SPECIES OF TROGLOPHILE *PSEUDOUROCTONUS* (SCORPIONES: VAEJOVIDAE) FROM COAHUILA, MEXICO

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### ABSTRACT

*Pseudouroctonus savvasi*, n.sp., is described from specimens collected in two separate caves in the state of Coahuila, México, though it does not exhibit any marked troglomorphies. It is most closely related to *Pseudouroctonus apacheanus* (Gertsch and Soleglad), from which it is clearly differentiated by size, the number of teeth on the movable finger of the chelicerae, hemispermatophore morphology and pedipalp chela morphometrics.

### RESUMEN

Se describe *Pseudouroctonus savvasi*, n.sp., en base a ejemplares colectados en dos cuevas del estado de Coahuila, México. La nueva especie no presenta troglomorfismos y está emparentada con *Pseudouroctonus apacheanus* (Gertsch y Soleglad), de la cual es claramente separable por tamaño, el número de dientes en el dedo móvil de los quelíceros, la morfología del hemispermatóforo y morfometría de la quela de los pedipalpos.

### INTRODUCTION

The genus *Pseudouroctonus* Stahnke was originally proposed for *Vaejovis reddelli* Gertsch and Soleglad, a medium sized troglophile known from many caves in central Texas and from several caves in the neighboring states of Coahuila and Nuevo León in México. A second cave inhabiting species, *Pseudo-uroctonus sprousei* Francke and Savary, 2006, was recently described from a single specimen collected in Coahuila. In this paper, a third cave-dwelling species of *Pseudouroctonus* is described, from several specimens collected in two caves, also in Coahuila. In addition to these three cavernicolous species in the genus, *Pseudouroctonus apacheanus* (Gertsch and Soleglad) is fairly common in Arizona, New Mexico and Texas in the U.S.A., and

in northern Chihuahua, México; and its presence in northern Coahuila is expected.

The taxonomic history of the genus *Pseudouroctonus* Stahnke was reviewed recently by Francke and Savary (2006), and no further commentary is deemed necessary here; however see the “Comparisons” for a recapitulation of important relationships.

### METHODS

Nomenclature and mensuration follow Stahnke (1970), except for trichobothrial terminology after Vachon (1974), metasomal carinal terminology after Francke (1977), metasomal segments setation after Sissom (1993, and subsequent publications on Vaejovidae), and tarsal armature after McWest (in press). Hemispermatophore preparation follows Sissom, et al. (1990) and hemi-spermatophore mating plug terms after Stockwell (1989). Measurements were taken with an ocular micrometer calibrated at 10X and are given in millimeters; abbreviations are L=length, W=width, D=depth. Illustrations were prepared with a camera lucida mounted on a Nikon SMZ 800 stereoscope. Photography of the male chelae under ultraviolet light follows Volschenk (2005). All the specimens used in the description are deposited in the Colección Nacional de Arácnidos (CNAN) at the Instituto de Biología, Universidad Nacional Autónoma de México (IBUNAM). Two additional juvenile specimens were preserved in 96 % ethanol for molecular analyses and are deposited at the American Museum of Natural History (AMNH), New York.

## TAXONOMY

Family Vaejovidae Thorell, 1876  
Genus *Pseudouroctonus* Stahnke, 1972

*Pseudouroctonus savvasi*, new species  
Figs. 1-9

**Type data.**—Holotype male from Cueva de Casa Blanca (N 29° 22' 37.451" W 101° 02' 15"), Municipio de Ciudad Acuña, Coahuila, México, 20 February 2005 (Charley Savvas). Deposited in the Colección Nacional de Arácnidos (CNAN-T0289), IBUNAM. Five paratypes: one subadult male, two juvenile males and two juvenile females, same data as holotype (CNAN-T0290 to T0294)

**Distribution.**—Known from the type locality and from Cueva de la Azufrosa (N 28° 14' 12.552" W 100° 48' 01.692"), Municipio de Allende, Coahuila, México (Map 1).

**Diagnosis.**—Differs from all other *Pseudouroctonus* in having a single subdistal tooth on the dorsal edge of the movable finger of the chelicerae (Fig. 5); all other described species currently placed in that genus have two subdistal teeth (see "Comparisons").

**Description of the holotype** (Fig. 1).—Color. Medium brown, pedipalps and metasoma slightly darker, especially on the more heavily sclerotized carinae; chelicera, legs and opisthosomal venter yellow brown.

Carapace. Longer than wide. Median eyes on anterior 35%. Ocular tubercle low, without superciliary carinae. Median eyes slightly reduced in size relative

to its epigean congeners; 0.2 mm in diameter. Three lateral ocelli on right side, two on left. Anterior margin broadly bilobed, with 3 pairs of setae. Entire surface with dense, minute granulation, and with scattered small and medium granules.

Tergites. Anterior half shagreened; posterior half densely, minutely granular. I-VI without carinae, VII with four longitudinal, coarsely granular carinae.

Sternum. Pentagonal, with five pairs of stout, reddish macrosetae.

Genital operculum. Each side with 6 macrosetae. Genital papillae well developed.

Hemispermaphore. Lamelliform; hooks on distal half of the lamella on a strongly sclerotized ridge adnate to it (Figs. 2-3). Hemi-mating plug strongly sclerotized, with distal barb margin smooth (Fig. 4).

Pectines. Ten teeth on each comb. Six middle lamellae on each side. Fulcra each with approximately five reddish small setae.

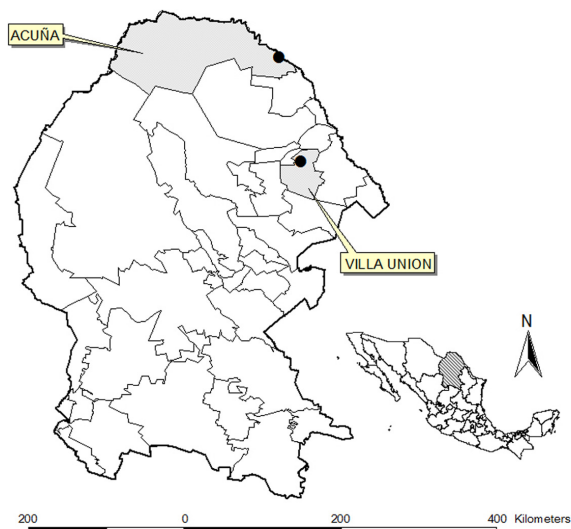
Sternites. Smooth except for scattered medium-sized granules along the sides. Stigmata about four times longer than wide. VII without submedian carinae; lateral carinae represented by row of few medium granules, with two stout reddish macrosetae on each one.

Metasoma. Dorsolateral carinae on I-V strong, coarsely granular. Lateral suprmedian carinae on I-IV strong, coarsely granular. Lateral infrmedian carinae on I strong, complete, coarsely granular; on II present on distal third to half, granular, tapering anteriorly; on III only a few medium-sized granules distally; on IV absent. Lateral median carinae on V present on basal two-thirds, moderately strong, coarsely granular. Ventrolateral carinae on I-V, ventral submedian carinae on I-IV and ventromedian carina on V strong, coarsely granular. Setation on I-IV: dorsolaterals 0,0,1,1; lateral suprmedian 0,1,1,1; lateral infrmedian 1,0,0,0; ventrolateral 2,2,2,2; ventral submedian 2,3,3,3. Setation on V: dorsolateral 2, lateromedian 1, ventrolateral 4, ventromedian 4. Intercarinal spaces shagreened to densely, minutely granular.

Telson. Slightly longer and wider than segment V; smooth to vestigially granular on ventrobasal region. Aculeus lacking basal microdenticles.

Chelicera. Fixed finger shorter than chela width; movable finger shorter than chela length. Chela with two macrosetae dorsally near finger articulation. Ventral edge of both fixed and movable fingers smooth; movable finger with distinct serrula.

Pedipalp femur. Dorsointernal, dorsoexternal and ventrointernal carinae strong, coarsely granular; ventroexternal carina obsolete; internomedian carina represented by few scattered granules on basal half; externomedian carina present on distal two-thirds, moderately strong, granular. Orthobothriotaxitic Type C.

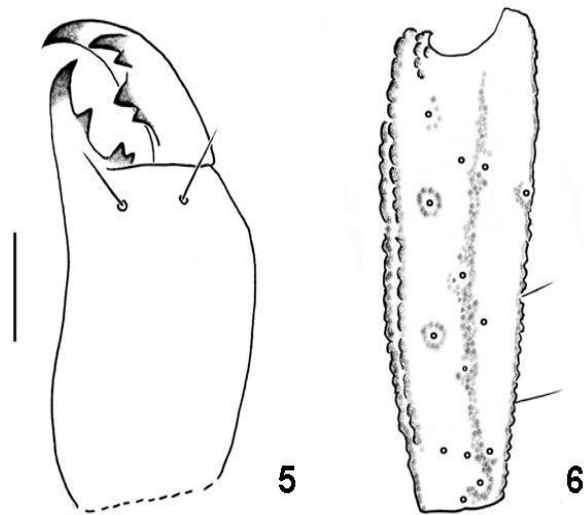


Map 1.—The state of Coahuila, Mexico, indicating the location of the caves where *Pseudouroctonus savvasi* has been collected.

Table 1.—Measurements (in millimeters) of adult specimens of *Pseudouroctonus* spp. L=length, W=width, D=depth

		<i>P. savvasi</i>		<i>P. apacheanus</i>		
		Male <sup>1</sup>	Female <sup>2</sup>	Male <sup>3</sup>	Female <sup>4</sup>	
Total	L	38.8	31.5	28.8	22.8	
Carapace	L	4.6	4.1	4.0	3.2	
	W	3.8	3.1	2.9	2.4	
Mesosoma	L	10.8	10.2	8.5	7.3	
Metasoma	L	23.4	17.2	16.3	12.3	
	I	L	2.4	1.7	1.6	1.2
	W	2.5	2.0	2.0	1.7	
	II	L	2.6	1.9	1.8	1.3
	W	2.5	1.9	1.9	1.6	
	III	L	2.8	2.0	2.0	1.5
	W	2.4	1.8	1.8	1.6	
	IV	L	3.4	2.6	2.6	1.9
	W	2.2	1.7	1.7	1.5	
	V	L	5.9	4.1	4.0	3.0
	W	2.1	1.6	1.7	1.4	
Telson	L	6.3	4.9	4.3	3.4	
	W	2.4	1.8	1.4	1.3	
Pedipalp	Femur	L	4.3	2.4	3.3	2.6
	W	1.5	1.2	1.1	1.0	
	D	1.0	0.8	0.8	0.7	
Patella	L	4.5	2.6	3.4	2.8	
	W	1.6	1.3	1.4	1.1	
	D	1.5	1.3	1.2	1.0	
Chela	L	8.9	7.1	6.3	5.0	
	W	2.7	2.4	2.2	1.7	
	D	2.5	2.0	1.9	1.3	

<sup>1</sup>Holotype male from Cueva de la Casa Blanca, Coahuila, Mexico.  
<sup>2</sup>Female from Cueva de la Azufrosa, Coahuila, Mexico.  
<sup>3</sup>Male from the Chiricahua Mountains, Cochise County, Arizona (type locality).  
<sup>4</sup>Female from The Davis Mountains, Jeff Davis County, Texas.



Figs. 5-6.—Holotype male of *Pseudouroctonus savvasi*, n.sp., 5, right chelicera dorsal aspect, 6, right pedipalp patella external view.

Dorsal face flat, with dense small and medium granulation. Internal face moderately granular.

Pedipalp patella. Internomedial carina represented by 3-4 granules only, decreasing in size distally. Dorsointernal, dorsoexternal, external, ventrointernal and ventroexternal carinae strong, coarsely granular. Orthobothriotaxia C (Fig. 6). Intercarinal spaces shagreened.

Pedipalp chela (Figs. 7-9). Digital and ventromedian carinae strong, scabrous to granular; other carinae moderately strong, granular. Fixed finger with six rows of granules and six inner accessory denticles; movable finger with seven rows of granules and seven inner accessory denticles. Orthobothriotaxia C.

Leg III tarsal armature. Basitarsus with a single superior macrosetae basally (Sb of McWest), lacking the distal superior macroseta (Sd of McWest). Telotarsus with four distal spinules (sd) and lacking macrosetae promedially (pm), retromedially (rm) and retrosubterminally (rsub).

**Measurements.**—See Table 1.

**Paratypical variability.**—The variation in size among the paratypes is presented in Table 2. The larger paratypes (not adult) are straw-colored, with the pedipalp chela fingers and the aculeus darker (medium brown); the smaller paratypes are pale, cream-colored, with the pedipalp chela fingers and the aculeus light brown. Among the three paratype males, four pectinal combs have 10 teeth and two combs have 11 teeth; among the two female paratypes the four pectinal combs have 9 teeth. Like the holotype, the 12 movable fingers of the chelicera of the six paratypes have a single subdistal tooth. Likewise, the metasomal setation of the six paratypes is the same as for the holotype, except for one specimen which shows asymmetry on the dorsolaterals on II, with 0 on one side and 1 on the other (0 on all others, including the holotype).

**Other specimens examined.**—An additional eight specimens belonging to this species were examined, all from Cueva de la Azufrosa (N 28° 10' W 100° 45'), Municipio de Allende, Coahuila, México, collected on 29 January 2006, as follows: 1 adult female, 1 subadult female, 2 juvenile males and 1 juvenile female (C. Savvas); 2 adult females (C. Savvas and J. Krejca); 1 subadult female (P. Sprouse). One adult female deposited at the AMNH, all others at CNAN-IBUNAM.

The two males have 10 teeth on each pectinal comb (n=4); the six females have 9 teeth on each pectinal comb (n=12). All specimens have a single subdistal tooth on the movable finger of the chelicerae (n=16).

**Etymology.**—This species is dedicated to Mr. Charley Savvas, a tireless caver who collected most of the known specimens.

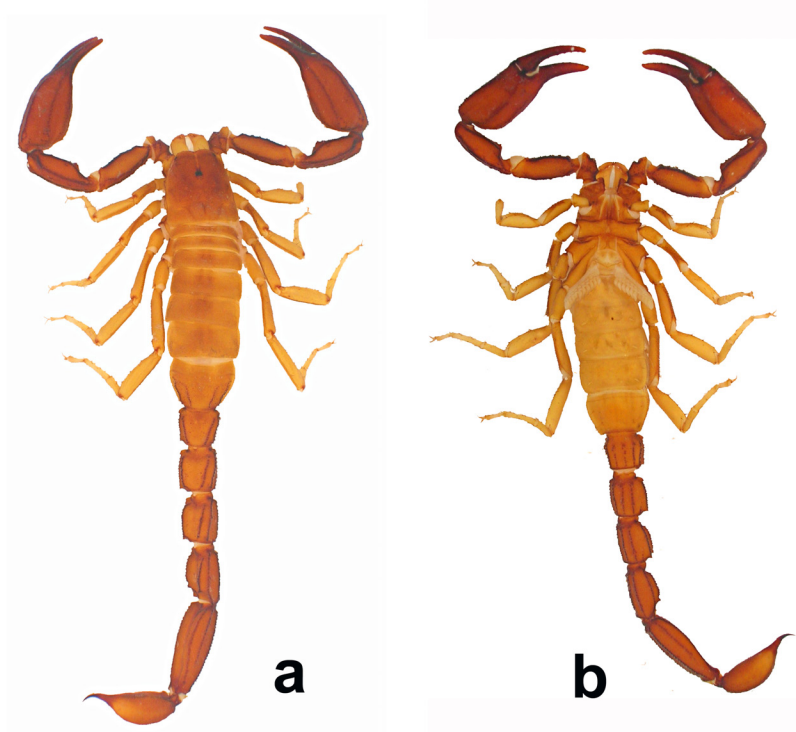
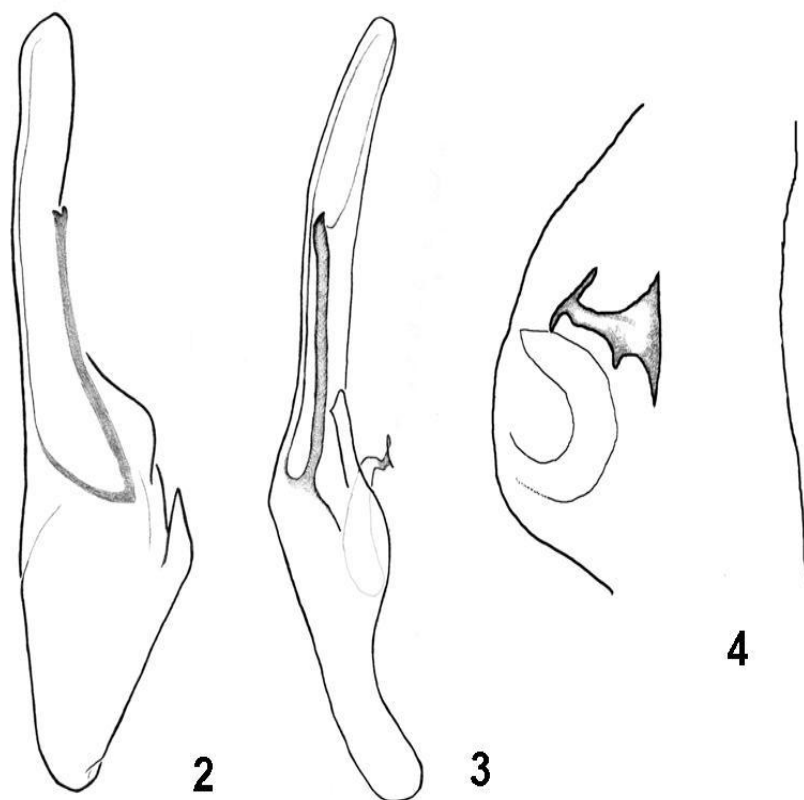


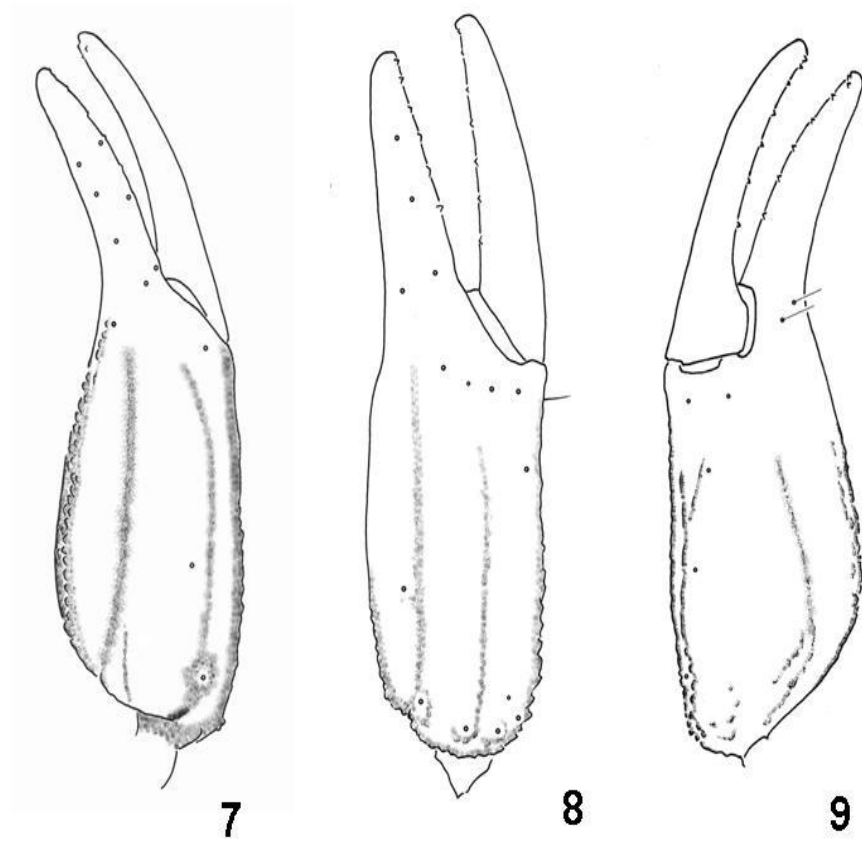
Fig. 1.—Dorsal (a) and ventral (b) habitus of the holotype male of *Pseudouroctonus savvasi*, n.sp.



Figs. 2-4.—Hemispermatophore from holotype of *Pseudouroctonus savvasi*, n.sp., 2, dorsal aspect, 3, mesal aspect, 4, detail of ventral view showing hemi-mating plug.

Table 2.—Selected measurements of type series of *Pseudouroctonus savvasi*, new species.

		Male Holotype	Male subadult	Male juvenile	Male juvenile	Female juvenile	Female juvenile
Carapace	L	4.7	3.5	3.5	2.7	2.7	2.9
	W	3.8	2.7	2.6	1.9	2.0	2.1
Femur	L	4.2	2.8	2.7	2.1	2.2	2.1
	W	1.4	1.1	1.1	0.8	0.8	0.9
Patella	L	4.5	3.2	3.0	2.4	2.4	2.5
	W	1.5	1.2	1.2	0.9	0.9	1.0
Chela	L	9.0	5.9	5.6	4.2	4.4	4.4
	W	2.9	1.8	1.8	1.2	1.1	1.4
	D	2.5	1.3	1.3	0.9	0.9	1.0
Fixed finger	L	3.3	2.3	2.2	1.7	1.7	1.7
Movable finger	L	4.5	3.1	3.1	2.2	2.2	2.2
Metasoma V	L	5.7	3.7	3.5	2.6	2.7	2.7
	W	2.2	1.5	1.5	1.2	1.2	1.2
Pectinal teeth	R	10	10	11	10	9	9



Figs. 7-9.—Trichobothrial pattern on the right pedipalp chela of holotype of *Pseudouroctonus savvasi*, n.sp., 7, dorsal aspect, 8, external aspect, 9, ventral aspect.



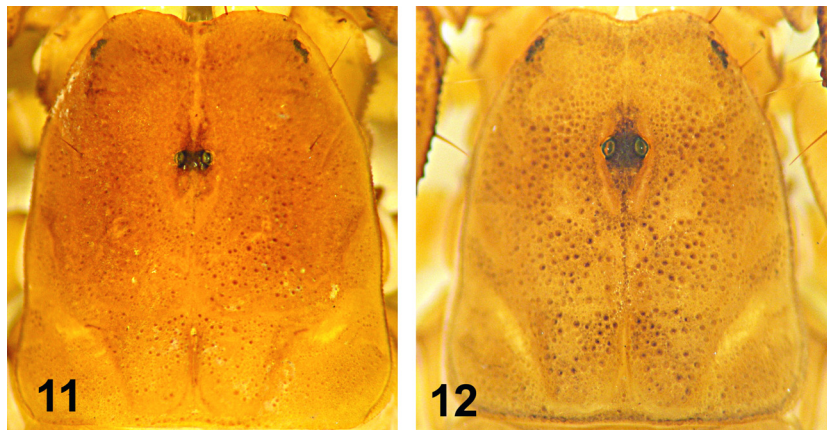
Fig. 10.—Adult holotype male of *Pseudouroctonus savvasi*, n.sp., and an adult male of *Pseudouroctonus apacheanus* showing the larger size of the former.

**Comparisons.**—The taxonomic history of the “uroctonoid” group of vaejovid scorpions was reviewed by Francke and Savary (2006). It currently contains three genera and 21 species: *Uroctonus* Thorell with 3 species, *Uroctonites* Williams and Savary with 4 species, and *Pseudouroctonus* Stahnke with 14 species. Of all the previously described species in this complex, only two have a single subdistal tooth on the movable finger of the chelicera; all others have two subdistal teeth. Those two species are currently placed in *Uroctonites*, namely *Uroctonites sequoia* (Gertsch and Soleglad) and *Uroctonites montereus* (Gertsch and Soleglad). These two

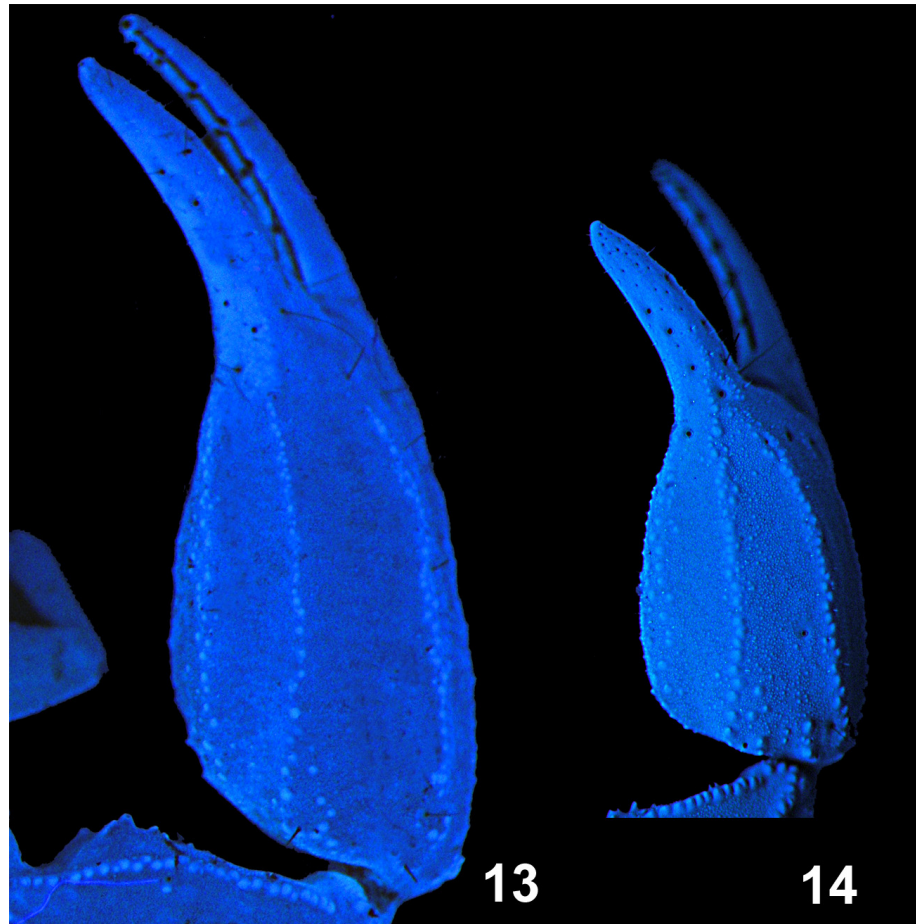
species were originally described as belonging to *Uroctonus* (see Gertsch and Soleglad, 1972), and were subsequently transferred to *Uroctonites* when that genus was created on the basis of distinctive telotarsal armature (Williams and Savary, 1991). In addition, Williams and Savary (1991) indicated that *Uroctonites* shows a reduction or loss of the sclerotized mating plug of the spermatophore (or a hemi-plug in the dissection of a hemispermatophore), and the lamellar hooks on the spermatophore are located basally. *Pseudouroctonus savvasi* has hair-like macrosetae on the telotarsi, rather than spiniform setae; has a strongly sclerotized mating plug (Fig. 4), and has elevated lamellar hooks that are adnate to the lamella (Figs. 2-3), and thus clearly does not belong in *Uroctonites*, despite sharing similar cheliceral dentition with two of the four species currently placed in that genus.

*Pseudouroctonus savvasi* appears most closely related to *P. apacheanus*, from which it differs, in addition to the number of subdistal teeth on the cheliceral movable finger, as follows: (a) in size (Table 1 and Fig. 10); (b) in the slight reduction of the size of the ocelli on the carapace (Figs. 11, 12); (c) on the hemispermatophores of *P. savvasi* the paired dorsal hooks are on a sclerotized ridge extending past the mid-point of the lamella, whereas on *P. apacheanus* the hooks are on the basal fifth to fourth of the lamella; (d) on adult males the ratio pedipalp chela L/carapace L in *P. savvasi* is approximately 2, whereas on *P. apacheanus* it is approximately 1.6; the ratio pedipalp chela L/chela W is 3.3 versus 2.8 (Figs. 13 and 14); and the underhand L/fixed finger length is 1.6 versus 1.3 [i.e., the chelae of *P. savvasi* are longer and narrower].

**Remarks.**—Although I did not receive any details of the scorpion collections at Cueva de la Azufrosa (Fig. 16), some interesting facts were gathered at



Figs. 11-12.—Dorsal view of carapace of *Pseudouroctonus savvasi*, n.sp. (11) and *Pseudouroctonus apacheanus* (12), indicating the slight ocellar reduction in the former.



Figs. 13-14.—Ultraviolet light photographs of the right pedipalp chela of *Pseudouroctonus savvas*, n.sp. (13) and *Pseudouroctonus apacheanus* (14), at the same magnification, showing size and morphometric differences.



Fig. 15.—Adult female *Pseudouroctonus savvasi*, n.sp. from Cueva de la Azufrosa, Coahuila, México (photo courtesy of Peter Sprouse).

Cueva de Casa Blanca, the type locality. First, Peter Sprouse wrote on 21 February 2005:

“We discovered a very interesting cave two days ago near Cd. Acuña, Coahuila. It has a hydrogen sulfide stream in it, and is very extensive. It also has scorpions, which appear to have only vestigial eyes ...”

Subsequently, Andy Gluesenkamp wrote on 23 February 2005:

“Charley and I saw a few individuals that escaped capture. All of them were small (1.2 cm) and very pale. All exuvia were collected under rock flakes. Most live individuals were collected either under rock flakes lying on guano; under rocks next to, or on small rock “islands” in, a small sulfurous stream below the main passage ... Charley collected one individual on a wall where it was eating a small *Ceuthophilus* [Orthoptera, Rhabdophoridae]. All specimens were found roughly 30-150m from the entrance.”

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