

**REDESCRIPTION OF THE SCORPION  
*CENTRUROIDES THORELLI* KRAEPELIN (BUTHIDAE)  
AND DESCRIPTION OF TWO NEW SPECIES**

**W. David Sissom:** Department of Biology & Geosciences, WTAMU Box 808, West Texas A & M University, Canyon, Texas 79016 USA

**ABSTRACT.** The Central American scorpion *Centruroides thorelli* Kraepelin 1891 is redescribed, based on examination of the type material and additional specimens now available. It is readily diagnosed by its smaller body size, mottled color pattern, the shape of the female pectinal basal piece, and the shape of the male telson and subaculear tubercle. Two new species related to *C. thorelli* are also described, one from the lowlands of Guatemala and the other from mountainous areas in southern Tamaulipas and northern San Luis Potosi in Mexico.

*Centruroides thorelli* was described on the basis of six specimens collected by Stoll in Guatemala (Kraepelin 1891). The species was accepted as valid by Pocock (1902), who mentioned several additional specimens in the British Museum, also originating from Guatemala. In Hoffmann's (1932) monograph on the scorpions of Mexico, a new series of specimens was reported from Chiapas, Mexico. The thorough description given by Hoffmann and study of the types of *C. thorelli* provided enough evidence to determine that his specimens are not referable to this species. Other researchers have also misidentified the species (Ocaranza 1926; Diaz Najera 1966); in particular, Moreno (1939, 1940) described two subspecies from Cuba, *C. t. cubensis* and *C. t. aguayoi*, which are now considered synonyms of *C. guanensis* Franganillo.

Francke & Stockwell (1987) studied specimens from Guatemala, Belize, and Costa Rica and suggested that at least two forms were present among their samples, but opted to place their Costa Rican specimens under *C. thorelli* by giving a very general description. The present study confirms their original suspicions by recognizing two distinct species, *C. thorelli* from high elevations in Belize and Guatemala and a new species from lowlands in Guatemala. The Costa Rican material, which was not available, awaits further study. A second new species is described from the central Mexican states of Tamaulipas and San Luis Potosí, representing a form that is widely separated geographically from other members of the complex. Whether this disjunction is real, or is the result of inadequate collecting in the intervening areas, remains to be seen.

*Centruroides thorelli* Kraepelin  
Figs. 1-9

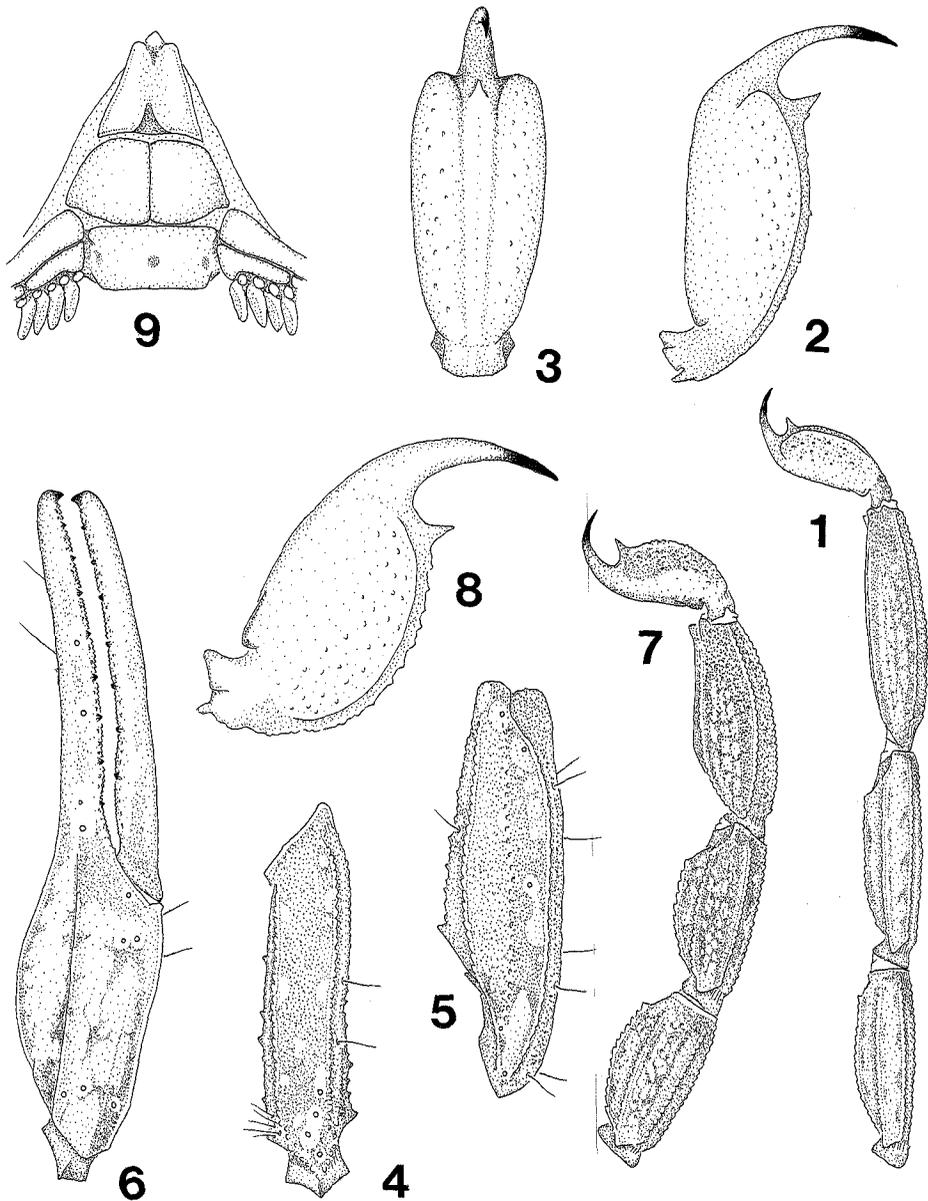
*Centruroides thorelli* Kraepelin 1891: 124; 1899: 89-90.  
*Centruroides thorelli* Pocock 1902: 22, pl. 5, figs. 2, 2a-c; *nec* Hoffmann 1932: 304-307, figs. 77, 78 (misidentification); 1938: 319 (misidentification); *nec* Ocaranza 1926: 77 (misidentification); *nec* Moreno 1939: 73-74 (misidentification); *nec* Diaz Najera 1966: 111, 113 (misidentification); 1975: 4, 18 (misidentification); Stahnke & Calos 1977: 112, 114 (part); Moritz & Fischer 1980: 324; Francke & Stockwell 1987: 17-18, figs. 48-56, 100 (part); *nec* Armas, et al. 1992a: 6 (misidentification); *nec* Armas 1992b: 131-132, fig. 4 (misidentification).

*Rhopalurus testaceus thorelli* Meise 1934: 32, 34.

**Type data.**—Adult male lectotype, 1♂ paralectotype, 49 paralectotypes (designated by Francke & Stockwell 1986) from Guatemala, Stoll (leg.); housed in the Zoologisches Museum, Berlin (Cat. No. ZMB 7633); examined.

**Distribution.**—Known only from Guatemala.

**Comparative diagnosis.**—*Centruroides thorelli* has been a rather distinctive, but poorly understood, member of the genus. The original description (Kraepelin 1891) and the treatment by Pocock (1902) point out its uniqueness among *Centruroides* by being the only species with eight rows of denticles on the cutting edge of the chela fingers that has the dorsum mottled, rather than striped. In fact, most other cuticular surfaces are also mottled. Its small size (ca. 35-40 mm), low pectinal tooth counts (less than 17), and the bilobed telson in the male have also been cited in comparing it with other *Centruroides* (Pocock 1902). Unfortunately, subsequent researchers have used the name inappropriately because un-



Figures 1-9.—Morphology of *Centruroides thorelli* Kraepelin 1891. 1-6, Lectotype male. 1, Left lateral aspect of metasomal segments III-V and telson; 2, Telson, enlarged view of left lateral aspect; 3, Telson, ventral aspect; 4, Dorsal aspect of pedipalp femur; 5, Dorsal aspect of pedipalp patella; 6, External (lateral) aspect of pedipalp chela. 7-9, Paralectotype female. 7, Left lateral aspect of metasomal segments III-V and telson; 8, Telson, enlarged view of left lateral aspect; 9, Ventral aspect of sternum, genital opercula, and pectines.

described mottled forms exist in southern Mexico and Central America. Two of these are described below and compared to the true *C. thorelli*.

**Description of lectotype male.**—*Coloration:* Base color yellow to light yellow brown. Cara-

pace with anterior margin infuscate and distinct dusky marbling throughout. Tergites with dusky band along posterior margins; anterior portions of tergites with diffuse dusky markings; each tergite bearing a narrow yellow median longitudinal line. Metasomal segments I-IV light yellow; V

and telson slightly darker. Cheliceral manus with dusky marbling. Pedipalps and legs pale yellow, with faint to moderate dusky markings. Venter uniformly yellowish. *Prosoma*: Carapace moderately coarsely granular; anterior median furrow deep, rounded; posterior median furrow deep, narrow near ocular tubercle and broadening posteriorly; carapacial carinae inconspicuous, indicated by medium-sized rounded granules. *Mesosoma*: Median carina on tergites I–II moderate, granular; on III–VI stronger, granular to crenulate. Pretergites minutely granular; post-tergites with large, smooth patches anterolaterally; posterior third of each tergite moderately coarsely granular. Tergite VII with strong, granular median keel and two pairs of strong, irregularly crenulate lateral keels. *Pectines*: Basal piece about 2.4 times wider than long with straight posterior margin; pectinal tooth count 16–16. Sternites III–VI smooth; VII with submedian and lateral carinae moderate, crenulate. *Metasoma*: (Fig. 1). Segments I–IV: Dorsolateral carinae on I strong, serratocrenulate; on II–III moderate, crenulate; on IV strong, crenulate. Lateral supramedian carinae on I strong, serratocrenulate; on II–IV strong, crenulate. Lateral inframedian carinae on I strong, serratocrenulate; on II–IV absent. Ventrolateral carinae on I moderate, granular to irregularly crenulate; on II–IV strong, crenulate. Ventral submedian carinae on I weak to moderate, granular; on II–IV strong, irregularly crenulate. Segment V: Dorsolateral carina moderate and crenulate anteriorly, weak and granular posteriorly; lateromedian carina essentially obsolete; ventrolateral and ventromedian carinae moderate, feebly crenulate. Intercarinal spaces on all segments sparsely granular. *Telson*: (Figs. 2, 3). Vesicle distinctly bilobed ventrodistally; aculeus downwardly deflected at junction with vesicle. Subaculear tooth strong, spinoid; its point directed towards tip of aculeus. Ventral aspect of vesicle irregularly granular. *Pedipalps*: Orthobothriotaxia A (Vachon 1974); femur with alpha-configuration of dorsal trichobothria (Vachon 1975). Femur: (Fig. 4). Dorsointernal and dorsoexternal carinae strong, serratocrenulate; ventrointernal carina strong, serrate; ventroexternal carina moderate, granular anteriorly and strong, serrate posteriorly; internal and external intercarinal spaces with large coarse granules. Patella: (Fig. 5). Dorsointernal carina moderate, finely serratocrenulate; dorsomedian and dorsoexternal carinae weak, granular; external carina weak, more or less smooth; ventroexternal

carina weak, smooth; ventrointernal carina moderate, irregularly serratocrenulate; internal face with weak basal tubercle and several large granules. Chela: (Fig. 6). Dorsomarginal, digital, and ventroexternal carinae weak, smooth; dorsointernal carina obsolete except for a few coarse distal granules; other carinae essentially obsolete. Fixed finger with eight oblique rows of granules (the two basal rows are virtually fused, separated only by a tiny gap), flanked by supernumerary granules. Fixed finger trichobothrium *db* positioned just proximal to *et*. Movable finger with short apical row of four granules followed by seven rows of oblique granules (actually eight rows with two basal rows fused); granular rows flanked by supernumerary granules.

*Morphometrics*: See Table 1.

*Measurements of lectotype male*: (in mm; L = length, W = width, D = depth). Total L, 36.80; carapace L, 3.55; mesosoma L, 8.90; metasoma L, 20.95; telson L, 3.40. Metasomal segments: I L/W, 3.10/1.65; II L/W, 3.85/1.60; III L/W, 4.25/1.55; IV L/W, 4.70/1.55; V L/W, 5.05/1.50. Telson: vesicle L/W/D, 2.45/1.30/1.20; aculeus L, 0.95. Pedipalps: femur L/W, 3.90/0.85; patella L/W, 4.05/1.20; chela L/W/D, 6.20/1.25/1.30; fixed finger L, 3.35; movable finger L, 3.90; palm (underhand) L, 2.50.

*Measurements of paralectotype female*: Total L, 38.55; carapace L, 4.30; mesosoma L, 11.60; metasoma L, 18.85; telson L, 3.80. Metasomal segments: I L/W, 2.90/2.30; II L/W, 3.55/2.20; III L/W, 3.65/2.05; IV L/W, 4.15/2.10; V L/W, 4.60/2.05. Telson: vesicle L/W/D, 2.50/1.65/1.45; aculeus L, 1.30. Pedipalps: femur L/W, 4.10/1.20; patella L/W, 4.35/1.60; chela L/W/D, 7.15/1.45/1.65; fixed finger L, 4.00; movable finger L, 4.65; palm (underhand) L, 2.75.

**Variation.**—Female morphology differs from that of the male as follows: the metasomal segments are proportionately shorter (Fig. 7, Table 1), but the body excluding the metasoma is larger; the telson vesicle is more bulbous; pectinal tooth counts are slightly lower (see below); and the metasoma is more granular. The telson is more evenly ovoid and is not distally bilobed (Fig. 8). The basal piece of the female pectine is either straight or slightly convex (Fig. 9), similar to that of the male.

Male pectinal tooth counts varied as follows: 3 combs with 17 teeth, 4 combs with 16 teeth, and 9 combs with 15 teeth; female counts varied as follows: 4 combs with 15 teeth, 9 combs with 14 teeth, and 2 combs with 13 teeth (one comb

Table 1.—Morphometric comparisons between *Centruroides thorelli* Kraepelin, *C. schmidti* new species and *C. rileyi* new species. Ratios are as follows: 1 = carapace length/metasoma V length; 2 = pedipalp femur length/width; 3 = pedipalp patella length/width; 4 = metasoma III length/width; 5 = metasoma V length/width; 6 = metasoma V length/depth; 7 = pedipalp chela width/pedipalp patella width; 8 = pectinal basal piece width/length.

Ratio	Males			Females		
	<i>thorelli</i> (n = 7)	<i>schmidti</i> (n = 1)	<i>rileyi</i> (n = 1)	<i>thorelli</i> (n = 8)	<i>schmidti</i> (n = 1)	<i>rileyi</i> (n = 3)
1 min	0.612	0.651	0.833	0.920	0.809	0.872
max	0.725			0.967		0.882
2 min	4.059	4.000	3.438	3.417	3.600	3.056
max	5.158			3.857		3.444
3 min	3.000	2.818	2.652	2.719	2.645	2.345
max	3.821			3.000		2.520
4 min	2.621	3.450	2.609	1.610	2.552	2.250
max	3.471			1.780		2.375
5 min	3.241	4.300	3.429	2.190	3.241	2.833
max	4.344			2.361		3.000
6 min	3.370	3.909	3.130	2.359	2.849	2.615
max	4.633			2.528		2.786
7 min	0.917	0.818	0.783	0.893	0.774	0.759
max	1.107			0.968		0.840
8 min	2.100	1.625	1.556	1.733	1.250	1.333
max	2.625			2.364		1.429

was damaged and its teeth could not be counted). In addition, there were eight unsexed first instar specimens; among these juveniles, there were 2 combs with 16 teeth, 5 combs with 15 teeth, and 9 combs with 14 teeth.

Color varied somewhat among the specimens examined, with some individuals being lighter in base color with less intense fuscosity. The differences may be due to preservation, although *Centruroides* spp. are known to exhibit considerable variation in these characters.

**Comments.**—Hoffmann's (1932) specimens of *C. thorelli* from Tuxtla Gutiérrez, Chiapas and Francke & Stockwell's (1987) specimens from Costa Rica are not referable to *C. thorelli*. The latter authors noted significant differences between their specimens and the type series but opted not to describe their form as new. These specimens were not available for study. Although Armas (1992) reported only a small juvenile from Quintana Roo, I have been able to examine a mature female collected recently; as Armas has suggested (pers. comm.), it does not appear to be referable to *C. thorelli*.

**Additional specimens examined.**—GUATEMALA: Chichivac, near Tecpan (P. J. W. Schmidt, Leon Mandel Guatemala Expedition), 1 Feb 1934, 1♂, 1♀, 8 first

instars (FMNH); Finca San Rafael, Sacatepequez, elev. 6900 ft., under bark (R. D. Mitchell), 24 June 1948, 1♂ (FMNH), 25 June 1948, 1♂, 1♀, 1 juv male (WDS), 29 June 1948, 2♂, 2♀ (FMNH).

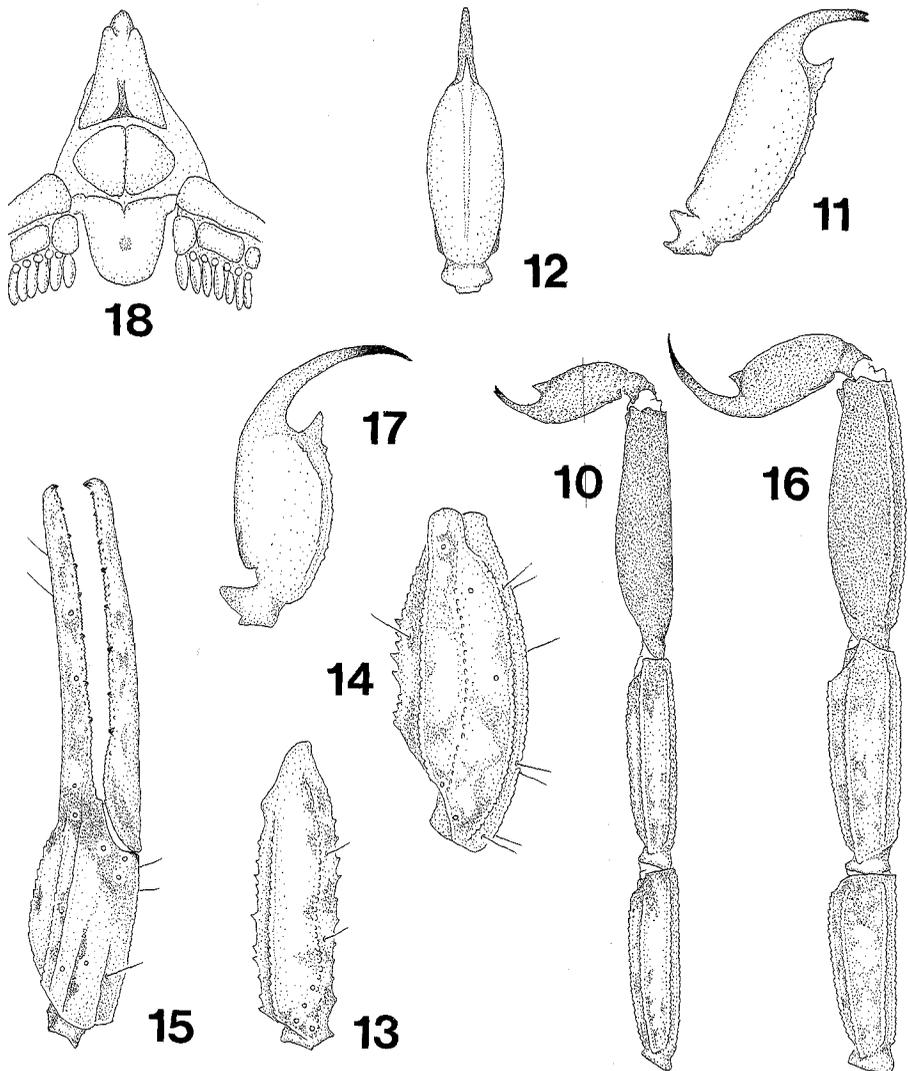
#### *Centruroides schmidti* new species (Figs. 10–18)

**Type data.**—Adult holotype male “found on bones of crocodile skull” at Lake Tickamaya, Honduras on 26 April 1923 by K. Schmidt and L. Walters (Capt. Field Mus. Exped.); permanently deposited in the Field Museum of Natural History, Chicago.

**Etymology.**—The specific epithet is a patronym honoring Dr. K. P. Schmidt, collector of the type specimens, for his many years of service to arthropod systematics at the Field Museum of Natural History.

**Distribution.**—Known only from Honduras and eastern Guatemala.

**Comparative diagnosis.**—*Centruroides schmidti* is similar to *C. thorelli*, but differs in the following characters: the mottling of the carapace, tergites, and legs is weaker; the distal segments of the metasoma and telson are much darker than the preceding segments; the male telson is not distally bilobed as in *C. thorelli*; the male sub-



Figures 10–18.—Morphology of *Centruroides schmidti* new species. 10–15, Holotype male. 10, Left lateral aspect of metasomal segments III–V and telson; 11, Telson, enlarged view of left lateral aspect; 12, Telson, ventral aspect; 13, dorsal aspect of pedipalp femur; 14, Dorsal aspect of pedipalp patella; 15, External (lateral) aspect of pedipalp chela. 16–18, Paratype female. 16, Left lateral aspect of metasomal segments III–V and telson; 17, Telson, enlarged view of left lateral aspect; 18, Ventral aspect of sternum, genital opercula, and pectines.

aculear tubercle arises from a crenulated mid-ventral carina and is angular, rather than a single spinoid tooth; metasomal segment V in the male is essentially acarinate, rather with the keels well developed; chela fixed finger trichobothrium *db* is slightly distal to *et* (rather than proximal to it); the basal piece of the female pectines is produced distally into a rounded lobe, rather than being straight or slightly convex; and there are several distinct morphometric differences (see Table 1).

**Description of holotype male.**—*Coloration:* Base color light yellow brown above with faint to moderate dusky markings on dorsum, chelicerae, pedipalps, legs, and sternites. Coloration fairly uniform except as follows: coxosternal region light yellow, pectines very pale yellow, metasomal segment V and telson dark orange to reddish brown; cheliceral teeth and tip of aculeus dark reddish brown. *Prosoma:* Carapace moderately coarsely granular; anterior median furrow moderately deep; posterior median furrow shal-

low anteriorly, deeper posteriorly; carapacial carinae inconspicuous, indicated by lines of small granules. *Mesosoma*: Median carina on I–VI moderate, granular. Pretergites minutely granular, post-tergites moderately, coarsely granular throughout. Tergite VII with moderate, granular median keel and two pairs moderate, finely serrated lateral keels. Pectinal basal piece 1.8 times wider than long; posterior margin distinctly rounded; pectinal tooth count 15–15. Sternites III–VI essentially smooth, with some fine granulation on VI; VII with submedian and lateral carinae moderate, finely serrate. *Metasoma*: (Fig. 10). Segments I–IV: Dorsolateral carinae on I–II moderate, finely serrate; on III moderate, crenulate; on IV weak, smooth. Lateral suprmedian carinae on I–III moderate, finely serrate; on IV weak, smooth. Lateral inframedian carina on I moderate, serrate; on II–IV absent. Ventrolateral carinae on I–III moderate, finely serrate; on IV moderate, feebly granular. Ventral submedian carinae on I–III weak, finely serrate; on IV weak, feebly serrate. Intercarinal spaces shagreened. Segment V: Acarinate, intercarinal spaces shagreened. *Telson*: (Figs. 11, 12). Vesicle elongate oval in shape with gently rounded dorsal margin; ventral aspect with row of small granules leading to subaculear tubercle; subaculear tubercle narrow, but angular in lateral view, its point directed towards middle of aculeus. Ventral aspect of vesicle shagreened. *Pedipalps*: Orthobothriotaxia A (Vachon 1974); femur with alpha-configuration of dorsal trichobothria (Vachon 1975). Femur: (Fig. 13). Dorsointernal, dorsoexternal, and ventrointernal carinae strong, serrate; ventroexternal carina weak, smooth basally, crenulate distally; internal face with serrated keel flanked by accessory granules; dorsal face moderately granular. Patella: (Fig. 14). Ventrointernal carina strong, serrate; dorsointernal, dorsomedian, dorsoexternal, and ventroexternal carinae moderate, finely serrate; external carina moderate, feebly serrate. Inner face with seven larger, sharp, subconical granules. Chela: (Fig. 15). Dorsomarginal carina moderate, finely serrate; dorsal secondary carina moderate, granular to feebly crenulate; digital carina weak, smooth; external secondary carina weak, smooth; ventroexternal carina moderate, feebly granular; dorsointernal and ventrointernal carinae with relatively large, serrate granules. Fixed finger with eight oblique rows of granules, these flanked by supernumerary granules. Fixed finger trichobothrium *db* positioned just distal to *et*. Movable finger with short

row of four apical granules followed by eight oblique rows of granules; granular rows flanked by supernumerary granules.

**Morphometrics.**—See Table 1.

**Measurements of holotype male.**—(in mm, L = length, W = width, D = depth). Total L approximately 32 mm (tip of aculeus of telson broken, rendering total length an estimate); carapace L, 2.80; mesosoma L, 8.10; metasoma L, 17.20; telson L, ? *Metasomal segments*: I L/W, 2.50/1.15; II L/W, 3.05/1.05; III L/W, 3.45/1.00; IV L/W, 3.90/1.00; V L/W, 4.30/1.00. *Telson*: vesicle L/W/D, 1.75/0.80/0.85. *Pedipalps*: femur L/W, 2.80/0.70; patella L/W, 3.10/1.10; chela L/W/D, 4.70/0.90/0.95; fixed finger L, 2.85; movable finger L, 3.20; palm (underhand) L, 1.65.

**Measurements of paratype female.**—Total L, 37.35; carapace L, 3.80; mesosoma L, 11.20; metasoma L, 18.95; telson L, 3.40. *Metasomal segments*: I L/W, 2.90/1.55; II L/W, 3.45/1.45; III L/W, 3.70/1.45; IV L/W, 4.20/1.45; V L/W, 4.70/1.45. *Telson*: vesicle L/W/D, 1.90/1.10/1.25; aculeus L, 1.50. *Pedipalps*: femur L/W, 3.60/1.00; patella L/W, 4.10/1.55; chela L/W/D, 6.30/1.20/1.35; fixed finger L, 3.90; movable finger L, 4.50; palm (underhand) L, 2.10.

**Variation.**—Only the holotype male and paratype female were available for study. The female differs from the male in the following characters: the metasomal segments are not as elongate (Fig. 16), and metasoma V bears well developed crenulated ventrolateral and ventromedian carinae; the telson is slightly more globose (Fig. 17); and the basal piece of the pectines is produced distally into a large, rounded lobe (Fig. 18). Pectinal tooth counts in the male and female were similar: the male count was 15–15 and the female count 15–14.

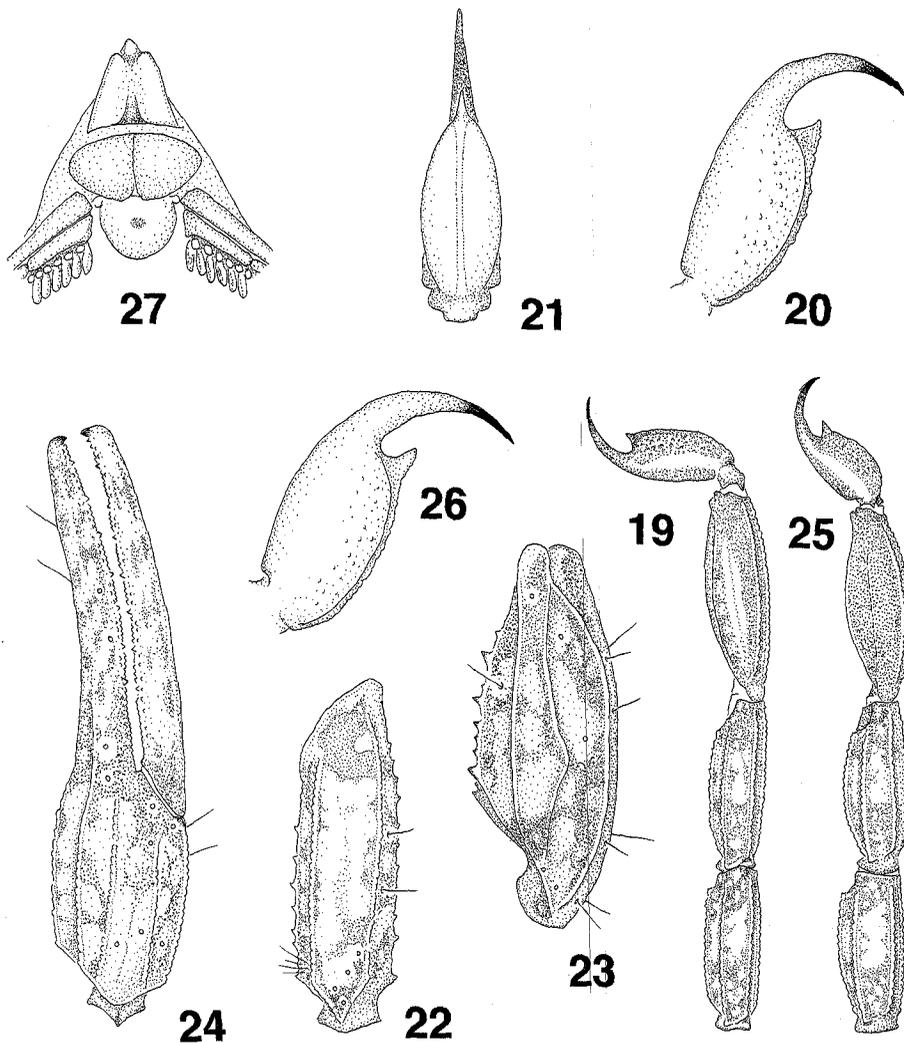
**Paratypes.**—GUATEMALA: *Escobas*, Izaabal, 27 November 1933 (K. P. & P. J. W. Schmidt, Leon Mandel Guatemala Exped.), 1♀ (FMNH).

***Centruroides rileyi* new species**

Figs. 19–27

**Type data.**—Adult holotype male and adult paratype female from Bocatoma (= 7 km SSE Gomez Farias), Tamaulipas, Mexico on 25–30 March 1978 by E. G. Riley; permanently deposited in the collection of the United States National Museum (Smithsonian), Washington, D. C.

**Etymology.**—The specific name is a patronym honoring Dr. Edward Riley of Texas A & M University, the collector of the holotype.



Figures 19–27.—Morphology of *Centruroides rileyi* new species. 19–24, Holotype male. 19, Left lateral aspect of metasomal segments III–V and telson; 20, Telson, enlarged view of left lateral aspect; 21, Telson, ventral aspect; 22, Dorsal aspect of pedipalp femur; 23, Dorsal aspect of pedipalp patella; 24, External (lateral) aspect of pedipalp chela. 25–27, Paratype female. 25, Left lateral aspect of metasomal segments III–V and telson; 26, Telson, enlarged view of left lateral aspect; 27, Ventral aspect of sternum, genital opercula, and pectines.

**Distribution.**—Known from several localities in southern Tamaulipas and northern San Luis Potosi, Mexico.

**Comparative diagnosis.**—*Centruroides rileyi* is most similar to *C. schmidti*, but is clearly related to *C. thorelli* as well. Unlike the other two species, sexual dimorphism in the length of the metasomal segments is not as pronounced; male segments are more slender but not noticeably longer than those of the female. Based on the material at hand, *C. rileyi* exhibits smaller body

size than either *C. thorelli* or *C. schmidti*. The shape of the subaculear tubercle is similar to that of *C. schmidti*, developed from a distinct ventromedian keel. Likewise the basal piece of the female pectines is produced distally into a rounded lobe, a feature seen in *C. schmidti* but not in *C. thorelli*. Among specimens available, female pectinal tooth counts were slightly lower than in *C. schmidti*, with a range of 11–13 (13–15 in *C. thorelli* and 14–15 in *C. schmidti*). Metasomal segment V in the male of *C. rileyi* bears distinct

(but weak) crenulate carinae; these carinae are developed in *C. thorelli*, but not in *C. schmidtii*. The dorsal carinae of the pedipalp chelae are moderately to strongly developed and distinctly crenulate, but are feeble and smooth to granular in *C. thorelli* and only the dorsal marginal carina is noticeably crenulate in *C. schmidtii*. Morphometric comparisons are provided in Table 1.

**Description of holotype male.**—*Coloration:* Base color yellow to light yellow brown. Carapace with distinct dusky marbling concentrated mostly in median area. Tergites with distinct, regular pattern of blackish spots. Metasomal segments I–IV light yellow, moderately infuscate; V and telson more heavily infuscate, appearing darker than preceding segments. Cheliceral manus with strong dusky marbling. Pedipalps and legs yellow, with distinct dusky markings. Venter uniformly yellowish anteriorly; sternites lightly infuscate. *Prosoma:* Carapace moderately coarsely granular; anterior median furrow moderately deep; posterior median furrow shallow anteriorly, deeper posteriorly; carapacial carinae weak, indicated by lines of small granules. *Mesosoma:* Median carina on tergites I–IV moderate, granular; on V–VI moderate, granular to crenulate. Pretergites minutely granular, posttergites with large, smooth patches anterolaterally; posterior third of each tergite moderately, coarsely granular. Tergite VII with moderate, granular median keel and two pairs strong, finely serrated lateral keels. Pectinal basal piece 1.6 times wider than long; posterior margin distinctly rounded; pectinal tooth count 14–14. Sternites III–VI essentially smooth; VII with submedian carinae weak, granular and lateral carinae moderate, finely serrate. *Metasoma:* (Fig. 19). Segments I–IV: Dorsolateral carinae on I–II strong, finely serrate; on III strong, irregularly crenulate; on IV moderate, crenulate. Lateral suprmedian carinae on I–III strong, finely serrate; on IV strong, feebly serrate. Lateral inframedian carina on I strong, finely serrate; on II–IV absent. Ventrolateral carinae on I–III strong, finely serrate; on IV strong, feebly serrate. Ventral submedian carinae moderate, feebly serrate; on IV weak, feebly serrate. Segment V: Dorsolateral carina moderate, feebly granular; lateromedian carina obsolete; ventrolateral and ventromedian carinae moderate, feebly serrate. All metasomal intercarinal spaces sparsely granular. *Telson:* (Fig. 20–21). Vesicle elongate oval in shape with aculeus moderately deflected downward; ventral aspect with median longitudinal row of small granules

leading to subaculear tubercle; subaculear tubercle narrow, but angular in lateral view, its point directed towards middle of aculeus. Ventral aspect of vesicle lightly granular. *Pedipalps:* Orthothriotaxia A (Vachon 1974); femur with alpha-configuration of dorsal trichobothria (Vachon 1975). Femur: (Fig. 22). All carinae strong, serrate; internal face with series of large serrate granules; dorsal face moderately granular. Patella: (Fig. 23). Dorsointernal carina moderate, serrate; dorsomedian and dorsoexternal carinae strong, serratocrenulate; external carina strong, feebly crenulate; ventroexternal carina moderate, crenulate; ventrointernal carina moderate, irregularly serrate. Inner face with eight to ten larger, sharp, subconical granules. Chela: (Fig. 24). Dorsomarginal carina strong, coarsely crenulate; dorsal secondary carina strong, finely serrate; digital and external secondary carinae moderate, finely crenulate; ventroexternal carina strong, finely crenulate; ventrointernal carina moderate with a few rounded granules; dorsointernal carina strong, coarsely serrate. Fixed finger with eight oblique rows of granules flanked by supernumerary granules. Fixed finger trichobothrium *db* positioned just distal to *et*. Movable finger with short apical row of four granules followed by eight oblique rows of granules; granular rows flanked by supernumerary granules.

**Morphometrics.**—See Table 1.

**Measurements of holotype male.**—(in mm; L = length, W = width, D = depth). Total L, 29.75; carapace L, 3.00; mesosoma L, 9.10; metasoma L, 15.15; telson L, 2.50. *Metasomal segments:* I L/W, 2.35/1.30; II L/W, 2.80/1.20; III L/W, 3.00/1.15; IV L/W, 3.40/1.05; V L/W, 3.60/1.05. *Telson:* vesicle L/W/D, 1.50/0.80/0.90; aculeus L, 1.00. *Pedipalps:* femur L/W, 2.75/0.80; patella L/W, 3.05/1.15; chela L/W/D, 4.75/0.90/1.05; fixed finger L, 2.85; movable finger L, 3.25; palm (underhand) L, 1.65.

**Measurements of female paratype.**—Total L, 29.85; carapace L, 3.15; mesosoma L, 9.40; metasoma L, 14.65; telson L, 2.65. *Metasomal segments:* I L/W, 2.25/1.40; II L/W, 2.65/1.25; III L/W, 2.85/1.20; IV L/W, 3.30/1.20; V L/W, 3.60/1.20. *Telson:* vesicle L/W/D, 1.45/0.85/0.95; aculeus L, 1.20. *Pedipalps:* femur L/W, 2.75/0.85; patella L/W, 3.15/1.25; chela L/W/D, 4.90/1.05/1.10; fixed finger L, 3.00; movable finger L, 3.45; palm (underhand) L, 1.60.

**Variation.**—Only a single adult male is known; however, there are three adult female specimens and a juvenile. Females differ from the males

only slightly in metasomal morphometrics with the male metasoma being scarcely longer, but noticeably thinner (Fig. 25). There is also little difference in the shape of the telson (Fig. 26). Finally, the female pectinal basal piece is produced distally into a distinct, rounded lobe (Fig. 27). Female pectinal tooth counts were as follows: there were one comb with 11 teeth, four combs with 12 teeth, and one combs with 13 teeth.

**Paratypes.**—**MEXICO:** *San Luis Potosi*, 5 km N Tamazunchale off Hwy 85, 1 August 1987 (J. A. Nilsson), 1♀ (JAN). *Tamaulipas*, Gomez Farías, 16 March 1977 (R. Schmidt), 1♀ (FSCA).

ACKNOWLEDGMENTS

I am extremely grateful to Manfred Moritz of the Zoologisches Museum in Berlin for allowing me to examine the type series of *Centruroides thorelli*. Additional material used in the descriptions was made available through the courtesy of Dan Summers of the Field Museum of Natural History, Chicago (FMNH); Jan Nilsson of Northern Arizona University (JAN); Edward Riley of Texas A & M University; and Douglas Rossman of Louisiana State University, whose specimens are now deposited in the Florida State Collection of Arthropods (FSCA). Luis F. de Armas (Instituto de Ecología y Sistemática, Academia de Ciencias de Cuba) allowed me to examine his specimen from Quintana Roo as a loan arranged through Norm Platnick of the American Museum of Natural History, New York; I am grateful to them both for this courtesy. Lastly, page charges were paid by the Department of Biology & Geosciences of West Texas A & M University, and I am ever grateful for the support.

LITERATURE CITED

Armas, L. F. de. 1992. Scorpiones y solpugida (Arachnida) de los Reserva de la Biosfera de Sian Ka'an, Quintana Roo. Pp. 129-137 *In* Nararro L., D. & E. S. Morales (eds.), *Diversidad Biologica en la Reserva de la Biosfera de Sian Ka'an Quintana Roo*, Vol. II. Centro de Investigaciones de Quintana Roo, Chetumal.

Armas, L. F. de, D. Navarro L., & R. M. Medrano. 1992. Apuntes para el estudio de los alacranes (Arachnida: Scorpiones) de Quintana Roo. *Ava-Cient.* 3:3-7.

Díaz Nájera, A. 1966. Alacranes de la República Mexicana. Clave para identificar especies de *Centruroides* (Scorpionida, Buthidae). *Rev. Inst. Salubr. Enferm. Trop., México*, 26:109-129.

Díaz Nájera, A. 1975. Listas y datos de distribución geográfica de los alacranes de México (Scorpionida). *Rev. Inst. Salubr. Enferm. Trop., México*, 35:1-36.

Francke, O. F. & S. A. Stockwell. 1987. Scorpions (Arachnida) from Costa Rica. *Spec. Publ. Mus. Texas Tech Univ.*, 25:1-64.

Hoffmann, C. C. 1932. Los Scorpiones de México. Segunda parte. Buthidae. *An. Inst. Biol., México*, 2:243-361.

Hoffmann, C. C. 1938. Nuevas consideraciones acerca de los alacranes de México. *An. Inst. Biol., México*, 9:317-337.

Kraepelin, K. 1891. Revision der Skorpione. I. Die Familie der Androctonidae. *Jahrb. Hamburg Wiss. Anst.*, 8:1-144.

Meise, W. 1934. Scorpiones. *Nytt. Mag. Naturvidensk., Oslo*, 72:25-43.

Moreno, A. 1939. Contribución al estudio de los escorpionidos cubanos. II. Superfamilia Buthoidea. *Mem. Soc. Cubana Hist. Nat.*, 13:63-75.

Moreno, A. 1940. Scorpiologia cubana. *Rev. Univ. Havana, Cuba*, 26/27:91-113.

Moritz, M. & S.-C. Fischer. 1980. Die Typen der Arachniden-Sammlung des Zoologischen Museums Berlin. III. Scorpiones. *Mitt. Zool. Mus. Berlin.*, 56: 309-326.

Ocaranza, F. 1926. Estudio experimental acerca de la ponzona de los alacranes en Mexico. Cuarta Memoria - Alacran de Sonora (*Centruroides thorelli*) rata blanca. *Rev. Mexicana Biol.*, 6:77-80.

Pocock, R. 1902. Arachnida: Scorpiones, Pedipalpi, and Solifugae. Pp. 1-71 *In* *Biologia Centrali-Americana*, London.

Stahnke, H. L. & M. Calos. 1977. A key to the species of the genus *Centruroides* Marx (Scorpionida: Buthidae). *Ent. News*, 88:111-120.

Vachon, M. 1974. Étude des caractères utilisés pour classer les familles et les genres de Scorpions (Arachnides). *Bull. Mus. Natn. d'Hist. Nat. (Paris)*, ser. 3, 104:857-958.

Vachon, M. 1975. Sur l'utilisation de la trichobothriotaxie du bras des pédipalpes des scorpions (Arachnides) dans le classement des genres de la famille des Buthidae Simon. *C. R. Acad. Sci. (Paris)*, sér. D, 281:1597-1599.

*Manuscript received 15 February 1994, revised 9 May 1995.*