

ARTÍCULO:

**A revision of the Scorpion fauna of Honduras, with description of a new species (Scorpiones: Buthidae, Diplocentridae)**

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**A REVISION OF THE SCORPION FAUNA OF HONDURAS, WITH THE DESCRIPTION OF A NEW SPECIES (SCORPIONES: BUTHIDAE, DIPLOCENTRIDAE)**

Rolando Teruel & Scott A. Stockwell

**Abstract**

The order Scorpiones is monographically revised for the first time for Honduras. Nine species belonging to two families and three genera are recorded. Previous records of *Centruroides nigrimanus* (Pocock, 1898) and *Centruroides limbatus* (Pocock, 1898) from Honduras are herein discarded because they appear to be based on misidentified specimens of *Centruroides gracilis* (Latreille, 1804); also, *Centruroides koesteri* Kraepelin, 1912 is recorded from this country for the first time. *Centruroides exilimanus* sp. n. is described from two localities in southern Honduras and the type localities of both *Centruroides schmidtii* Sissom, 1995 and *Didymocentrus nitidus* (Hirst, 1907) are emended. Detailed distributional maps and an identification key are given for each species.

**Key words:** Scorpiones, Buthidae, Diplocentridae, systematics, Honduras.

**Taxonomy:** *Centruroides exilimanus* sp. n.

**Revisión de los escorpiones de Honduras, con la descripción de una nueva especie (Scorpiones: Buthidae, Diplocentridae)**

**Resumen**

El orden Scorpiones es revisado monográficamente por primera vez para la República de Honduras. Se registran en total nueve especies pertenecientes a dos familias y tres géneros. Los registros previos de *Centruroides nigrimanus* (Pocock, 1898) y *Centruroides limbatus* (Pocock, 1898) para Honduras son descartados, pues aparentemente se basaron en especímenes de *Centruroides gracilis* (Latreille, 1804) erróneamente identificados; además, se registra por primera vez la presencia de *Centruroides koesteri* Kraepelin, 1912 en este país, se describe *Centruroides exilimanus* sp. n. de dos localidades del sur hondureño y se hacen enmiendas a las localidades tipo respectivas de *Centruroides schmidtii* Sissom, 1995 y *Didymocentrus nitidus* (Hirst, 1907). Se presentan mapas detallados de distribución y una clave para la identificación de cada especie.

**Palabras clave:** Scorpiones, Buthidae, Diplocentridae, sistemática, Honduras.

**Taxonomía:** *Centruroides exilimanus* sp. n.

**Introduction**

Honduras is one of the largest Central American countries, nevertheless, its scorpion fauna has never been studied in detail. The first scorpion formally mentioned from that country was *Centruroides nigrimanus*, when in its original description Pocock (1898) assigned with doubts to this species a juvenile specimen supposedly collected in Honduras. Shortly after, in his classic monograph on Central American scorpions (Pocock, 1902), the same author repeated this record transferring the species to the genus *Centruroides* Marx in Howard, 1890, and did not mention any other scorpion from Honduras (several other taxa were therein recorded from "British Honduras" but this territory is currently defined as Belize, a separate Central American country); this single record of *C. nigrimanus* was repeated after by Stahnke & Calos (1977) and Stahnke (1978).

Almost 70 years later, a second scorpion species was recorded from Honduras, when Wagner (1977) in his revision of *Centruroides* from Yucatan collaterally recorded *Centruroides gracilis* (Latreille, 1804) from La Ceiba; later Francke (1978) in his paper on Circum-Caribbean diplocentrids described *Didymocentrus krausi* on the basis of two juvenile females from the Gulf of Fonseca region of El Salvador and Honduras.

Nine years after Francke's paper, a single record of *Centruroides limbatus* (Pocock, 1898) from "Honduras" was published (Francke & Stockwell, 1987), but unfortunately these authors gave no material evidence supporting such a record. In the time lapsed between these two papers, only another brief mention of *C. gracilis* from Honduras was made, in a more general paper dealing with the life history of this species (Francke & Jones, 1982).

In 1988, Stockwell described six new species of *Diplocentrus* from Central America, including *D. coddingtoni*, *D. lourencoi* and *D. santiagoi* from a few specimens collected in northwestern Honduras. Almost ten years later, McWest (1997) described the adult male of *Diplocentrus lourencoi* and rectified the species' diagnosis.

Recently, Sissom (1995) described *Centruroides schmidti* from Lago Tickamaya in extreme northwestern Honduras and adjacent Guatemala (departamento Izabal); four years later, Armas (1999a) gave Patuca as a new Honduran record for this taxon.

When more general compilations on the Central American or global scorpion fauna began to be made, a time of controversies and species shuffling back and forth from one author to another started. The first complete list of the scorpions recorded from Honduras can be extracted from Kovařík's 1998 general book on the scorpions of the world, where he mentioned eight species overlooking Francke & Stockwell's 1987 record of *C. limbatus* and adding up *Centruroides margaritatus* (Gervais, 1841), even though he did not support such a record by any material evidence nor precise locality references inside this country.

In a recent checklist of the Central American scorpions, Armas & Maes (2000) summarized the literature records given up to 1998 and also listed eight species as occurring in Honduras. Nevertheless, in this list previous records of *C. nigrimanus* were overlooked and *C. limbatus* was stated to occur in the Caribbean lowlands of the country, but again no material evidence supporting such a record was presented, nor a single precise locality mention for this taxon was made. A year later, Armas & Maes (2001) made a brief emendation to this list, repeating as "new" Armas' 1999a record of *C. schmidti*, erroneously placing it in departamento Gracias a Dios.

Lastly, inside a large catalogue of the world scorpion fauna, Fet & Lowe (2000) gave another list of eight species, which also mentioned *C. limbatus* but then overlooked previous records of *C. margaritatus*. And again, no reliable specimens nor precise locality records were presented to support records of either *C. limbatus* or *C. nigrimanus* from Honduras.

Since significant scorpion material from Honduras and Central America has accumulated in collections (including those obtained during a 1990 field trip to this country carried out by the junior author and the collections made in the Río Plátano (1999) and Gulf of Fonseca (2000) regions by Michel Montoya, where a new species was discovered and useful information on the natural history and distribution of several taxa was obtained) and knowledge of the scorpion faunas of other neighboring countries of this region has also had a pop up in recent years, we decided to elaborate a monograph on Honduran scorpions which integrates the new findings to the previously available information in order to summarize the current knowledge of the Honduran scorpion fauna and clarify all controversial points left to date, a task which was badly needed.

## Materials and Methods

Most of the scorpions were collected by ultra-violet (UV) light detection at night. All specimens were preserved in 75% ethyl alcohol, were studied and all measurements and drawings were made using an MBS-9 dissecting stereomicroscope, provided with millimetric scale and grid eyepieces. As good original descriptions or redescriptions are available for all previously described species found during this study, only a thorough diagnosis is included; each diagnosis and synonymy covers only those features and literature references concealed with Honduran specimens and the species' original description, unless otherwise noted. Abbreviations of the collections where the specimens are deposited are: Seckenberg Museum, Frankfurt, Germany (**SM**), Zoologisches Institut und Zoologisches Museum, Hamburg University, Hamburg, Germany (**ZIZM**), National Museum of Natural History, Smithsonian Institution, Washington D.C., USA (**NMNH**, formerly **USNM**), Field Museum of Natural History, Chicago, Illinois, USA (**FMNH**), Muséum National d'Histoire Naturelle, Paris, France (**MNHN**), Michel Montoya personal collection, San José, COSTA RICA (**MM**) and senior author's personal collection (**RTO**).

## Systematics

### Family DIPLOCENTRIDAE Karsch, 1880

#### *Didymocentrus krausi* Francke, 1978

Fig. 1-2, 19, Table I

*Didymocentrus krausi* Francke, 1978: 20-22, 56, 63, 70, 74-76. Armas, 1996a: 29. Armas & Maes, 2000: 29.

TYPE DATA: Holotype juvenile (& **SM**); 200 m from La Unión, EL SALVADOR; 11 September 1951; A. Zilch. Not examined.

DIAGNOSIS: Adults of medium size (male 36 mm). Entire body dark yellowish brown, densely marbled with blackish brown giving a dark purplish appearance; legs and sternopectinal region light brown with subtle infuscation. In adult males, the chelae are very elongate (length/width 4.59) and have a strong inner concavity close to the fixed finger base; in adult females and juveniles the chelae are not elongate and have only traces of such concavity. Pedipalps, prosoma, tergites and metasoma mostly smooth and densely punctate; all other somites with finer and less dense punctations. Pectinal tooth count 11-13 in males, 9-11 in females. Modal tarsomere II spiniform setae formula 3/3:4/4:5/5:5/5.

DISTRIBUTION: All along the Pacific coast and foothills of Central America, from La Unión in southeastern El Salvador through Guanacaste province in northwestern Costa Rica. In Honduras, it occurs only in the southern coastal areas of departamento Valle and undoubtedly also in coastal parts of departamento Choluteca (fig. 19)

REMARKS: The type series also includes a juvenile female paratype (**ZIZM**) from Amapala Island (departamento Valle), Honduras. Subsequently recorded from Nicaragua (Lourenço, 1983) and Costa Rica under the name *Didymocentrus concavimanus* Francke & Stockwell, 1987 (synonymized under *D. krausi* by Armas, 1996a). Sissom & Fet (2000: 334) wrongly stated that the paratype from Honduras was a juvenile male, but the original description (Francke, 1978: 22, 70) clearly sexed it as a juvenile female; the pectinal tooth count (9/9) given for this specimen in the original description is otherwise diagnostic for females.

The single male herein examined (fig. 1-2, Table I) is the first adult specimen known from Honduras; it has 10/10 pectinal teeth and tarsomere II spiniform setae formula 3/3:4/4:5/5:5/5, exactly matching other examined specimens from Nicaragua and Costa Rica.

MATERIAL EXAMINED: Departamento Valle: Jícaro Galán, Nacaome; 8 May 2000 (UV detection, in soil crevice); M. Montoya; 1% (**MM-S183**).

#### ***Diplocentrus coddingtoni* Stockwell, 1988**

Fig. 19

*Diplocentrus coddingtoni* Stockwell, 1988: 153, 163-167. Armas & Maes, 2000: 30.

TYPE DATA: Holotype ♀, 4♂♂ and 2 juvenile ♀♀ paratypes (**NMNH**); La Ceiba, departamento Atlántida, HONDURAS; 1920; W. L. Mann. Examined.

DIAGNOSIS: Adults of medium size (35-45 mm). Entire body brown, with variable dark brown marbling. Pedipalp chelae very elongate (length/depth 2.98), with prominent carinae and weak reticulate costate pattern in adult males; not elongate (length/depth 2.07-2.22), very weakly carinate and vestigially reticulate in adult females. Prosoma much longer than wide in both sexes, coarsely and minutely granular. Genital operculum with 2-3 pairs of setae. Pectinal tooth count 11 in males, 10-11 in females. Modal tarsomere II spiniform setae formula 4/4:4/5:5/5:5/5.

DISTRIBUTION: Only known from the type locality, in the Caribbean coast of north-central Honduras (fig. 19).

#### ***Diplocentrus lourencoi* Stockwell, 1988**

Fig. 19

*Diplocentrus lourencoi* Stockwell, 1988: 153, 161-163. McWest, 1997: 251-256. Armas & Maes, 2000: 30.

TYPE DATA: Holotype ♂ (**FMNH**); Río Santa Ana canyon (3500 ft.), San Pedro Sula, departamento Cortés, HONDURAS; 21 March 1923; K. Schmidt & L. Walters. Examined.

DIAGNOSIS: Adults of medium size (51-54 mm). Entire body dark orange to mahogany brown, with variable infuscation. Pedipalp chelae moderately elongate (length/depth 2.56), with moderate to prominent carinae and distinct reticulate costate pattern in adult males; less elongate (length/depth 2.26), more weakly carinate and

Table I

Measurements of an adult male *Didymocentrus krausi* from Honduras. All measurements in mm and given as length / width / height.

Character	Male
Prosoma	4.65 / 4.25
Mesosoma	6.90
Tergite VII	2.60 / 3.90
Sternum	1.70 / 1.40
Metasoma	19.70
Segment I	2.40 / 2.60
Segment II	2.65 / 2.45
Segment III	2.80 / 2.30
Segment IV	3.35 / 2.15
Segment V	4.35 / 2.05
Telson	4.15
Vesicle	3.05 / 2.10 / 1.65
Aculeus	1.10
Pedipalp	18.40
Femur	4.15 / 1.85
Patella	4.60 / 1.75
Chela	9.65
Hand	3.45 / 2.10 / 3.40
Movable Finger	6.20
Total length	31.25

vestigially reticulate in adult females. Pedipalps with stronger granulation in adult females than in adult males. Prosoma slightly longer than wide in adult males, wider than long in adult females. Adult male with deep posterolateral recesses in sternite VII. Genital operculum with 7-10 pairs of setae. Pectinal tooth count 9-10 in both sexes. Modal tarsomere II spiniform setae formula 4/5:5/5:5/5-6:5/5-6.

DISTRIBUTION: Known only from two nearby localities, in the mountains (3500-4500 ft.) of northwestern Honduras (fig. 19).

REMARKS: McWest (1997) described an adult male (a single specimen collected during the same field trip which yielded the holotype, but overlooked by Stockwell in the original description) and emended the diagnosis of this species. He also recorded an additional locality in Honduras: Mt. Camp (4500 ft.), west of San Pedro Sula (departamento Cortés).

#### ***Diplocentrus santiagoi* Stockwell, 1988**

Fig 19

*Diplocentrus santiagoi* Stockwell, 1988: 153, 167-170. Armas & Maes, 2000: 30.

TYPE DATA: Holotype ♂ (**AMNH**); Copán, departamento Copán, Honduras; 4 March 1939. Examined.

DIAGNOSIS (based on the adult female holotype, no other specimens known): Adults of moderately large size (female 60 mm). Entire body brown with variable dark brown marbling. Pedipalp chelae not elongate (length/depth 2.17), with weak carinae and weak reticulate pattern. Prosoma wider than long. Genital

operculum with seven pairs of setae. Pectinal tooth count 12/12. Modal tarsomere II spiniform setae formula 5/5:5/5 6/6:6/6.

DISTRIBUTION: Known only from the type locality, in mountainous western Honduras (fig. 19).

#### Family BUTHIDAE C. L. Koch, 1837

##### *Centruroides koesteri* Kraepelin, 1911

Fig. 5, 20. Table II

*Centruroides koesteri* Kraepelin, 1911: 70-72.

TYPE DATA: Holotype & (**ZIZM**); COSTA RICA; 10 June 1905; H. Köster. Not examined.

DIAGNOSIS: Adults of moderate size (male 63 mm, females 64-66 mm). Body light yellowish brown; tergites I-VII with two more or less distinct dark brown longitudinal bands; prosoma and legs with diffuse dark brown marbling; metasomal carinae underlined with dark brown; pedipalp fingers dark brown. Prosoma and tergites coriaceous, with several coarse granules interspersed. Metasoma coriaceous, with all carinae strongly serrate; telson with a spiniform subaculear tubercle directed toward the median portion of the aculeus; segments II-IV with two pairs of ventrolateral macrosetae. Pedipalp chela wider than patella and moderately robust in the adults; fingers with eight principal rows of granules, flanked internally and externally by several supernumerary granules. Sexual dimorphism is evident: adult males have moderately elongate pedipalp chelae and a slender metasoma, but adult females have more robust and oval chelae and non-elongate metasomal segments. Pectinal tooth count 24-25 in the single male available, and 21-23 (mode 22) in females.

DISTRIBUTION: All along the Pacific coast and foothills of Central America from Isla del Tigre in the Gulf of

Fonseca (departamento Valle, Honduras) through western Nicaragua to Guanacaste province in Costa Rica. It occurs very probably also in the Gulf of Fonseca region of extreme southeastern El Salvador. This is the first record of this species from Honduras, and its westernmost finding (fig. 20).

VARIATION: The three adult Honduran specimens of *C. koesteri* are slightly larger and more elongated than those we have examined from Nicaragua and Costa Rica.

The pedipalp fingers bear eight principal rows of granules in all examined specimens.

The pectinal tooth count (table II) in the examined females was 21-23 (mode 22), the single examined male had 24/25. Among specimens from Costa Rica, Francke (1978b) and Francke & Stockwell (1987) found 22-26 (mode 23) in males and 22-25 (mode 24) in females and 22-24 in unsexed juveniles. Even though the Honduran sample is small and thus sample error may occur, it seems that females from Honduran populations tend to have slightly lower counts than those from Costa Rica.

REMARKS: In Honduras, it seems to be a very rare arboreal scorpion: all four specimens from Isla del Tigre were collected with UV detection on the same large tree during three consecutive nights. On the soil around the tree was commonly found *Centruroides exilimanus* sp. n.

Armas & Maes (2001) placed *Centruroides mahnerti* Lourenço, 1983 as a junior synonym of *C. koesteri* without examination of the types; this synonymy is subjective and needs confirmation. Further, the description and figures given by Lourenço (1983) are also equally referable to juvenile specimens of *C. margaritatus* (which was also collected syntopically with the types of *C. mahnerti*, as recorded in the same paper).

**Fig. 1.** *Didymocentrus krausi*: adult male from Jícaro Galán, Honduras, dorsal view. **Fig. 2.** *Didymocentrus krausi*: adult male from Jícaro Galán, Honduras, ventral view. **Fig. 3.** *Didymocentrus nitidus*: adult female from Miranda, Nicaragua, dorsal view. **Fig. 4.** *Didymocentrus nitidus*: adult female from Miranda, Nicaragua, ventral view. **Fig. 5.** *Centruroides koesteri*: adult male (**5A**) and female (**5B**) from Isla del Tigre, Honduras. **Fig. 6.** *Centruroides schmidtii*: adult males (**6A**, **6B**) and adult female (**6C**) from Mocerón, Honduras. **Fig. 7.** *Centruroides gracilis* (brown morph): adult male (**7A**) and female (**7B**) from Sico, Honduras. **Fig. 8.** *Centruroides gracilis* (blackish morph): adult female from El Zapotal, Honduras. **Fig. 9.** *Centruroides margaritatus* (small morph): adult male (**9A**) and female (**9B**) from Soto Cano, Honduras. **Fig. 10.** *Centruroides margaritatus* (typical morph): adult male (**10A**) and female (**10B**) from Jícaro Galán, Honduras. **Fig. 11.** *Centruroides exilimanus* sp. n.: adult male holotype, dorsal view. **Fig. 12.** *Centruroides exilimanus* sp. n.: adult male holotype, ventral view.

**Fig. 1.** *Didymocentrus krausi*: macho adulto de Jícaro Galán, Honduras, vista dorsal. **Fig. 2.** *Didymocentrus krausi*: macho adulto de Jícaro Galán, Honduras, vista ventral. **Fig. 3.** *Didymocentrus nitidus*: hembra adulta de Miranda, Nicaragua, vista dorsal. **Fig. 4.** *Didymocentrus nitidus*: hembra adulta de Miranda, Nicaragua, vista ventral. **Fig. 5.** *Centruroides koesteri*: macho (**5A**) y hembra (**5B**) adultos de Isla del Tigre, Honduras. **Fig. 6.** *Centruroides schmidtii*: machos (**6A**, **6B**) y hembra (**6C**) adultos de Mocerón, Honduras. **Fig. 7.** *Centruroides gracilis* (morfo pardo): macho (**7A**) y hembra (**7B**) adultos de Sico, Honduras. **Fig. 8.** *Centruroides gracilis* (morfo negruzco): hembra adulta de El Zapotal, Honduras. **Fig. 9.** *Centruroides margaritatus* (morfo pequeño): macho (**9A**) y hembra (**9B**) adultos de Soto Cano, Honduras. **Fig. 10.** *Centruroides margaritatus* (morfo típico): macho (**10A**) y hembra (**10B**) adultos de Jícaro Galán, Honduras. **Fig. 11.** *Centruroides exilimanus* sp. n.: macho adulto holotipo, vista dorsal. **Fig. 12.** *Centruroides exilimanus* sp. n.: macho adulto holotipo, vista ventral.



**Table II**  
Pectinal tooth count variation in two Honduran species of *Centruroides*. N = Number of examined pectines.

Species	Sex	N	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Media
<i>C. schmidti</i>	%%	22	1	-	8	13	-	-	-	-	-	-	-	-	-	-	14.50
	&&	22	-	3	15	4	-	-	-	-	-	-	-	-	-	-	14.04
<i>C. koesteri</i>	%%	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	24.50
	&&	6	-	-	-	-	-	-	-	-	-	1	4	1	-	-	22.00

**Table III**  
Measurements (in mm) of adult *Centruroides schmidti* herein examined from Honduras.  
N = Number of examined specimens, L = length, W = width, H = height.

Character		males (n=11)		females (n=8)		
		range	media	range	media	
Prosoma	L	2.65 – 3.75	2.97	2.60 – 3.50	3.17	
	W	2.50 – 3.50	2.84	2.85 – 3.65	3.31	
Mesosoma	L	6.25 – 10.00	7.34	8.00 – 10.70	9.46	
	Tergite VII	L	1.70 – 2.95	2.11	2.10 – 2.70	2.43
	W	2.15 – 3.25	2.47	2.85 – 3.95	3.47	
Metasoma	L	18.30 – 33.35	20.78	15.20 – 20.70	18.62	
	Segment I	L	2.35 – 4.25	2.89	1.90 – 2.65	2.34
	W	1.05 – 1.35	1.18	1.20 – 1.55	1.43	
	Segment II	L	2.75 – 5.40	3.58	2.30 – 3.15	2.84
	W	0.95 – 1.25	1.14	1.05 – 1.40	1.28	
	Segment III	L	3.15 – 6.00	3.99	2.55 – 3.50	3.16
	W	0.95 – 1.25	1.08	1.05 – 1.35	1.25	
	Segment IV	L	3.55 – 6.50	4.41	2.90 – 3.90	3.54
	W	0.95 – 1.25	1.06	1.00 – 1.35	1.22	
	Segment V	L	3.90 – 7.40	4.76	3.15 – 4.35	3.92
	W	0.95 – 1.20	1.04	1.05 – 1.35	1.22	
Telson	L	2.60 – 3.80	2.89	2.40 – 3.15	2.82	
	Vesicle	L	1.50 – 2.75	1.89	1.40 – 1.85	1.69
	W	0.75 – 1.15	0.86	0.75 – 1.00	0.90	
	H	0.80 – 1.20	1.00	0.80 – 1.10	1.00	
Pedipalp	L	9.95 – 15.55	11.66	9.50 – 13.05	11.74	
	Femur	L	2.60 – 4.00	3.02	2.35 – 3.25	2.93
	W	0.65 – 0.90	0.75	0.70 – 1.00	0.87	
	Patella	L	2.90 – 4.60	3.43	2.75 – 3.75	3.42
	W	1.00 – 1.50	1.16	1.05 – 1.45	1.31	
	Hand	L	1.50 – 2.50	1.84	1.40 – 1.90	1.65
	W	0.80 – 1.25	1.00	0.85 – 1.15	1.04	
	H	0.80 – 1.20	0.94	0.85 – 1.05	0.96	
	Movable Finger	L	2.95 – 4.45	3.37	3.00 – 4.25	3.74
Total	L	27.25 – 46.10	32.85	26.30 – 34.70	31.25	

The phylogenetic affinities of *C. koesteri* have never been discussed. Based upon the morphology and morphometrics of the metasoma, telson and pedipalps, this species shows clear affinities with a rather compact group of species widely distributed in south-central Mexico: *C. elegans* (Thorell, 1877), *C. limpidus* (Karsch, 1879), *C. meisei* Hoffmann, 1936, *C. infamatus* (C. L. Koch, 1845), *C. nigrovariatus* (Pocock, 1898), *C. baergi* Hoffmann, 1932 and their close relatives; in fact, it may well be considered as the southernmost element of this group.

MATERIAL EXAMINED: Departamento Valle: Isla del Tigre; 19-21 November 1990 (UV detection); S. A. Stockwell; 1%, 2&&, 1 juvenile & (NMNH, RTO).

### *Centruroides schmidti* Sissom, 1995

Fig. 6, 20. Table II, III

*Centruroides schmidti* Sissom, 1995: 94-96, 98. Armas, 1999a: 30. Armas & Maes, 2000: 27; 2001: 16. Fet & Lowe, 2000: 118.

TYPE DATA: Holotype ♀ (FMNH); Lake Tickamaya, departamento Cortés, HONDURAS; 26 April 1923 (found on bones of a crocodile skull); K. Schmidt & L. Walters. Not examined.

DIAGNOSIS: Adults of small size (males 27-46 mm, females 26-35 mm). Body light yellowish brown, densely marbled with dark brown all over the pedipalps, prosoma, tergites, legs and metasoma; metasomal

segment V and telson dark orange brown; venter yellow; pectines whitish. Prosoma and tergites finely and densely granular, with several coarse granules interspersed. Metasoma finely and densely granular, with all carinae finely serrate; telson with a large triangular subaculear tubercle directed toward the distal half of the aculeus; segments II-IV with two pairs of ventrolateral macrosetae. Pedipalp chela narrower than patella in the adults; fingers with eight principal rows of granules, flanked internally and externally by few supernumerary granules. Sexual dimorphism is evident: adult males have moderately elongate pedipalp chelae and exaggeratedly slender metasoma, but adult females have smaller and oval chelae and moderately elongate metasomal segments. Pectinal tooth count 12-15 in males (mode 15), and 13-15 (mode 14) in females.

**DISTRIBUTION:** All along the Caribbean and Pacific coast and lowlands of Central America, from Veracruz (a record of questionable accuracy) and Quintana-Roo in Mexico to Alajuela and Guanacaste provinces in Costa Rica (Armas, 1999a; Armas & Maes, 2000, 2001; Armas *et al.*, 2002). The Mocerón, Sico and Palacios specimens herein studied represent new locality records.

**VARIATION:** As shown in fig. 6 and table III, adult males varied greatly in size but adult females were less variable in this character, in both cases apparently because of differences in instar numbers to reach adulthood. Two males from Mocerón represent both the smallest (27.25 mm) and largest (46.10 mm) adult male size records for *C. schmidtii*, as Sissom (1995) and Armas (1996b) recorded total length 32-39 mm in two specimens (including the holotype); six additional adult males from Mexico (Armas, 1999a) and Costa Rica (Armas *et al.*, 2002) have been recorded but no measurements were published. The female from Sico also represents the smallest (26.30 mm) adult size record for this sex, as Sissom (1995) and Armas (1996b) recorded size range of 30-37 mm in four adult females; as mentioned above for males, 12 additional adult females from Mexico, Belize, Honduras (Armas, 1999a) and Costa Rica (Armas *et al.*, 2002) have been listed but no measurements were given.

The pedipalp fingers bear eight principal rows of granules in all examined specimens.

As shown in table II, the pectinal tooth count in the whole sample varied from 12-15 (mode 15) in males and 13-15 (mode 14) in females; specimens from Mocerón tend to have slightly higher counts than those from the remaining populations.

**REMARKS:** Armas (1999a) recorded this taxon from Patuca with no further indication about the exact location of this site, but latter Armas & Maes (2001) erroneously placed it in departamento Gracias a Dios. Patuca is located at 14°16'38"N - 85°55'44"W in departamento Olancho (Michel Montoya, pers. comm.). On the other hand, the type locality as given in the original description (Sissom, 1995) is only "lake Tickamaya,

Honduras", without additional information about its geographical position. After revision of very precise and updated maps of Honduras, lake Tickamaya was located at 15°33'07"N - 87°55'16"W in departamento Cortés, thus the type locality of *C. schmidtii* is herein emended to "Lake Tickamaya (15°33'07"N - 87°55'16"W), departamento Cortés, Honduras".

This is an arboreal scorpion, all specimens of *C. schmidtii* from Mocerón, Palacios and Sico were collected on trees and bushes at night with UV detection; on the soil around was found either *C. margaritatus* (in Mocerón) or *C. gracilis* (in Sico). In Honduras, this species ranges from sea level at Sico up to an altitude of 300 m in Patuca (Michel Montoya, pers. comm.).

This species belongs in the "*thorelii*" group of the genus (Sissom, 1995; Armas, 1996b, 1999a, 1999b; Armas *et al.*, 2002), and is its southernmost representative. As opposite to the other species of this group, *C. schmidtii* is very widely distributed, occurring in forests at low altitude areas ranging from sea level up to 775 m (Michel Montoya, pers. comm.), from southeastern Mexico (central Veracruz) through the Pacific slope of the Guanacaste volcanic range and the Pacific and Atlantic slopes of the Tilarán volcanic range in the Guanacaste and Alajuela provinces in northwestern Costa Rica (Armas *et al.*, 2002).

**MATERIAL EXAMINED:** Departamento Gracias a Dios: Mocerón Army Base; 10 October 1990 (UV detection, on branches of trees and bushes); S. A. Stockwell; 10%, 1♂, 1 juvenile & (NMNH, RTO). Palacios, Buena Vista, Batalla (15°56'28"N - 84°57'47"W, 5 m asl); 21 March 1999 (UV detection, on live fence posts); M. Montoya; 6♂♂, 2 juvenile && (MM-S171). Departamento Colón: Sico, Irióna, 500 m southwest of the village (15°48'05"N - 85°08'32"W, 15 m asl); 18-19 March 1999 (UV detection, on leaves of low bushes); M. Montoya; 1%, 1♂ (MM-S170).

### *Centruroides gracilis* (Latreille, 1804)

Fig. 7-8, 21. Table IV

*Scorpio gracilis* Latreille, 1804: 127.

*Centruroides gracilis*: Wagner, 1977: 46. Francke & Jones, 1982: 225. Kovařík, 1998: 107. Armas & Maes, 2000: 26. Fet & Lowe, 2000: 107.

*Centruroides nigrimanus* Pocock, 1898: 388 (in part, Honduras specimen only).

*Centruroides nigrimanus*: Pocock, 1902: 36 (in part, Honduras record only). Stahnke & Calos, 1977: 113 (in part, Honduras record only). Stahnke, 1978: 279 (in part, Honduras record only). Kovařík, 1998: 108 (in part, Honduras record only). Fet & Lowe, 2000: 114-115 (in part, Honduras record only).

*Centruroides limbatus*: Francke & Stockwell, 1987: 10-14 (in part, Honduras record only). Armas & Maes, 2000: 26 (in part, Honduras record only). Fet & Lowe, 2000: 111 (in part, Honduras record only).

**TYPE DATA:** "Amérique". Type(s) lost.

**DIAGNOSIS:** Adults of moderate to large size (males 76-90 mm, females 77-85 mm). Coloration variable, in

**Table IV**  
**Pectinal tooth count variation in three Honduran species of *Centruroides*. N = Number of examined pectines.**

Species	Sex	N	22	23	24	25	26	27	28	29	30	31	32	33	34	Media
<i>C. gracilis</i>	%%	12	-	-	1	1	2	2	2	4	-	-	-	-	-	27.25
	&&	15	-	-	-	3	9	1	2	-	-	-	-	-	-	26.13
<i>C. margaritatus</i>	%%	12	-	-	-	-	1	1	-	2	3	1	4	-	-	30.00
	&&	32	1	1	6	11	4	5	2	-	2	-	-	-	-	25.59
<i>C. exillimanus</i> sp. n.	%%	6	-	-	-	-	-	-	-	-	-	1	1	2	2	32.83
	&&	4	-	-	-	-	-	-	-	-	-	2	2	-	-	31.50

Honduras two different color patterns are found: 1) Entire body blackish, with pedipalp hands slightly reddish and pectines pale grayish (fig. 8); and 2) Entire body light to medium brown, with pedipalp fingers, prosoma, tergites I-VI, metasomal segment V and telson darker (sometimes a yellowish longitudinal stripe is present over tergites I-VII), legs and venter light brown (fig. 7). Prosoma and tergites coriaceous with coarser granulation interspersed. Metasoma coriaceous, with all carinae weakly to moderately serrate; telson with a large spiniform subaculear tubercle directed toward the apical portion of the aculeus; segments II-IV with two pairs of ventrolateral macrosetae. Pedipalp chela almost bare and wider than patella in the adults; fingers with nine (exceptionally 10) principal rows of granules, flanked internally and externally by numerous supernumerary granules. Sexual dimorphism is evident: adult males have robust and subquadrate pedipalp chelae and a very slender metasoma, but adult females have less robust and oval chelae and non-elongate metasomal segments. Pectinal tooth count 24-29 (mode 29) in males, 25-28 (mode 26) in females.

**DISTRIBUTION:** From southern USA through Central America and Antilles down to northern South America. In Honduras it occurs in the northwestern half from departamento Cortés through departamento Colón, mostly along the Caribbean side coast (fig. 21).

**VARIATION:** The brownish morph is predominant and has been found in each locality where the species has been collected. The blackish morph has been found only in El Zapotal (one adult female and all of its first instar litter) and Rancho Escondido (one adult female and one second instar male), in both cases together with the brownish morph. Different color morphs have been found living together also in Mexico (Hoffmann, 1932; Wagner, 1977), Panama (Lourenço & Méndez, 1984), Venezuela (González-Sponga, 1984, 1996) and Cuba (Teruel, 1997).

The pedipalp fingers bear nine principal rows of granules in all examined specimens, with the noteworthy exception of the adult female from El Zapotal, which has nine rows in the left movable finger, but 10 rows in the other three fingers.

The pectinal tooth count (table IV) in the examined sample was 24-29 (mode 29) in males and 25-28 (mode 26) in females. Among specimens from western

and eastern Cuba, respectively, Armas & Aymerich (1986) found 28-35 (mode 31) in males and 27-32 (mode 30) in females and Teruel (1997 [unpublished data]) found 29-36 (mode 32) in males and 27-32 (mode 29) in females. Among Mexican specimens, Hoffmann (1932) found 26-32 (mode 28) in males and 24-30 (mode 26) in females, Wagner (1977) recorded 27-38 (mode 34) in males and 24-31 (mode 28) in females and Armas (1992) found 32-34 (mode 32) in males and 28-34 (mode 29) in females. These data show that Honduran specimens consistently have the lowest pectinal tooth count amongst all studied populations of *C. gracilis*.

**REMARKS:** In Honduras, this species appears to be allopatric with *C. margaritatus* since they both have never been found together. The available material suggests that *C. gracilis* is restricted to the western half of the Caribbean coast and foothills, while *C. margaritatus* occurs all along the central axis of the country reaching the Caribbean coast farthest eastward, in La Mosquitia lowlands (fig. 21) and southward to the Gulf of Fonseca. Nevertheless, possible areas where both species could eventually live together may be found in several parts of departamento Yoro, as suggested from the above referred map. These two species have already been found to occur together only in urban or highly anthropized environments of Panama (Lourenço & Méndez, 1984), Colombia (Lourenço & Flórez, 1990a, 1990b) and Cuba (Teruel, 2002).

Is not clear if some Honduran populations of *C. gracilis* are natural or introduced, but probably the first case applies to most of the known records. At least western populations (those of departamento Cortés) seem to be natural occurrences as this species is naturally found in neighboring Guatemala.

An adult female carrying a litter of 37 first instars was found in middle March. Francke & Jones (1982) recorded another female with 20 young also from Honduras.

Previous records of *Centruroides nigrimanus* (Pocock, 1898) and *Centruroides limbatus* (Pocock, 1898) from Honduras, are all referable to *C. gracilis* (see discussion under General Remarks).

**MATERIAL EXAMINED:** Departamento Cortés: Barra Chamalecón; 27 June 1990; S. A. Stockwell; 1%, 1& (RTO). Departamento Olancho: Rancho Escondido; 3

August 1990; S. A. Stockwell; 1%, 2&&, 1 juvenile % (NMNH). Departamento Colón: Trujillo: Comando Camp.; 17 June 1991 (in tent); 1 juvenile % (NMNH); Comando Camp.; 17 June 1991 (on pineapple in street market); 1 juvenile %; Comando Camp.; 18 June 1991 (in tent); 1& (NMNH). Sico, Iriona, 500 m southwest of the village (15°48'05"N - 85°08'32"W, 15 m asl); 18 March 1999 (UV detection, on fence post barks); M. Montoya, 2 %%, 1 juvenile & (MM-S169). Sico, Iriona, 1 km northwest of the village (15°48'05"N - 85°08'32"W; 15 m asl); 17 March 1999 (UV detection, at base of fence post); M. Montoya; 1& (MM-S167). El Zapotal, Zapotales, Iriona, on Paulaya river southwest of Sico; 18 March 1999 (inside village school); M. Montoya; 1& with litter (MM-S168).

***Centruroides margaritatus* (Gervais, 1841)**

Fig. 9-10, 21. Table IV, VI

*Scorpio margaritatus* Gervais, 1841: 281-282.

*Centruroides margaritatus*: Kovařík, 1998: 108. Armas & Maes, 2000: 27.

TYPE DATA: Holotype & (MNHN); Puná island in the Gulf of Guyaquil, ECUADOR; Eydoux & Souleyet. Not examined.

DIAGNOSIS: Adults of moderate to large size (males 54-85 mm, females 52-81 mm). Body brown; pedipalp chelae, prosoma, tergites I-VII, metasomal segment V and telson dark reddish brown (rarely, a yellowish longitudinal stripe is present over tergites I-VII); pedipalp femur and patella, legs and venter yellowish brown; pectines light yellow. Prosoma and tergites densely and coarsely granular, with large spiniform granules interspersed. Metasoma coriaceous, with all carinae strongly denticulate; telson with a spiniform subaculear tubercle directed toward the apical portion of the aculeus in the smaller adults and to the basal part of the aculeus in large adults; segments II-IV with more than three (usually 4-6) pairs of ventrolateral macrosetae. Pedipalps densely hirsute, chela wider than patella and very robust in the adults; fingers with eight principal rows of granules, flanked internally and externally by numerous supernumerary granules. Sexual dimorphism is evident: adult males have very robust and inflate pedipalp chelae and a moderately slender metasoma, but adult females have less robust and less inflate chelae and non-elongate metasomal segments. Pectinal tooth count 26-32 (mode 32) in males, 22-30 (mode 25) in females.

DISTRIBUTION: From Pacific coastal states of Mexico through Central America down to north and western South America. In Honduras, it occurs in southern areas of departamento Copán, departamento Comayagua, departamento Yoro, departamento Valle and departamento Gracias a Dios (fig. 21).

VARIATION: There are two more or less distinct morphs of this species in Honduras: one characterized by its smaller adult size (50-65 mm), weaker mesosomal

granulation, lighter general coloration (frequently with a yellowish longitudinal stripe over tergites I-VII), less hirsute pedipalps and subaculear tubercle large and directed toward the apex of the aculeus (fig. 9), and another one showing the typical features: large adult size (65-90 mm), stronger mesosomal granulation, darker overall coloration, more hirsute pedipalps and subaculear tubercle small (even absent) and directed toward the base of the aculeus (fig. 10). The first one occurs mainly in the Comayagua valley, but the other is found in the other localities. These differences are always size-related and appear to be merely inter-population variations, since we have found similar differences when studying large samples from Mexico, Nicaragua and Costa Rica. Coincidentally, the small morph occurs only where no other scorpion species has been found so far, but where other smaller species of *Centruroides* live together with *C. margaritatus* (i.e., in Mocerón) then the large typical morph is the one found. It seems to point out a resource-segregation, maybe based on prey-size partition between the two congeneric species.

Among all Honduran samples, specimens from the southernmost population at Jícaro Galán have the most reduced subaculear tubercle (even vestigial in the larger males) and also the most reduced intercarinal granulation in the metasoma and pedipalps.

The pedipalp fingers bear eight principal rows of granules in all examined specimens.

The pectinal tooth count (table IV) in the whole examined sample was 26-32 (mode 32) in males and 22-30 (mode 25) in females, but was not uniformly distributed among separate samples: specimens from the southern population at Jícaro Galán had ranges 30-32 (mode 32, media 31.13) in males and 28-30 (mode 28 and 30, media 29.00) in females, but specimens from the remaining populations had ranges 26-29 (mode 29, media 27.25) in males and 22-27 (mode 25, media 25.11) in females; this bias suggests a north-south clinal variation of this character. Francke & Stockwell (1987) found 26-34 (mode 30) in males, 24-33 (mode 28) in females and 24-33 in unsexed juveniles from Costa Rica, Hoffmann (1932) found 27-30 (mode 28) in males and 25-29 (mode 27) in females from Mexico and Sissom & Lourenço (1987) recorded 29-35 (mode 31 and 32) in males and 27-30 (mode 29) in females from Colombia, Ecuador and Venezuela. According with these data, populations from north and central Honduras contain the lowest pectinal tooth count amongst all studied populations of *C. margaritatus* (resembling populations from Mexico), but southern Honduran populations are in turn more similar to those from Costa Rica and South America, showing higher counts.

REMARKS: This is the most common and widespread scorpion in Honduras. In departamento Gracias a Dios this species has been found inside houses. In the Comayagua valley, this is the only scorpion species found so far, but in Mocerón it lives sympatrically with *C. schmidti*.

**Table V**  
**Measurements of the adult male holotype of *Centruroides exilimanus* sp. n.** All measurements in mm and given as length / width / height.

Character	Holotype
Prosoma	9.3 / 9.0
Mesosoma	18.0
Tergite VII	6.0 / 8.4
Metasoma	62.0
Segment I	8.3 / 4.6
Segment II	9.9 / 4.3
Segment III	11.0 / 4.1
Segment IV	11.0 / 3.9
Segment V	12.0 / 3.7
Telson	9.8
Vesicle	5.1 / 3.2 / 2.7
Aculeus	4.7
Pedipalp	36.0
Femur	9.0 / 2.5
Patella	10.0 / 3.0
Chela	17.0
Hand	6.0 / 2.8 / 3.1
Movable Finger	11.0
Total length	89.3

**MATERIAL EXAMINED:** Departamento Copán: Ruinas de Copán; 24 October 1990 (UV detection); S. A. Stockwell; 3&& (NMNH, RTO). Departamento Comayagua: Soto Cano Air Base; 1 July 1990; S. A. Stockwell; 1& (NMNH); Soto Cano Air Base; August 1990; Heroux & Weideman; 1% (NMNH); Soto Cano Air Base; September 1990; S. A. Stockwell; 1%, 1& (RTO). Departamento Yoro: Camp. Las Delicias, near Olanchito; 20 July 1990; N. López & C. Lamer; 2 juvenile && (NMNH); La Rosa; 10 September 1990 (under bark); S. A. Stockwell; 3 juvenile && (NMNH). Departamento Gracias a Dios: Mocerón Army Base; 10 October 1990 (UV detection); S. A. Stockwell; 3&& (NMNH, RTO); Puerto Lempira; 25 April 1984; 1& (NMNH). Departamento Valle: Jícaro Galán, Nacaome; 7-8 May 2000 (UV detection, in crevices of dry soil); M. Montoya; 3%%, 2&&, 1 juvenile & (MM-S182).

### *Centruroides exilimanus* New Species

Fig. 11-18, 21. Table IV-VI

**TYPE DATA:** **Holotype** adult % (NMNH); Isla del Tigre, departamento Valle, Honduras; 19-21 November 1990 (UV detection, on the ground); S. A. Stockwell. Four **paratypes** listed under "Material Examined".

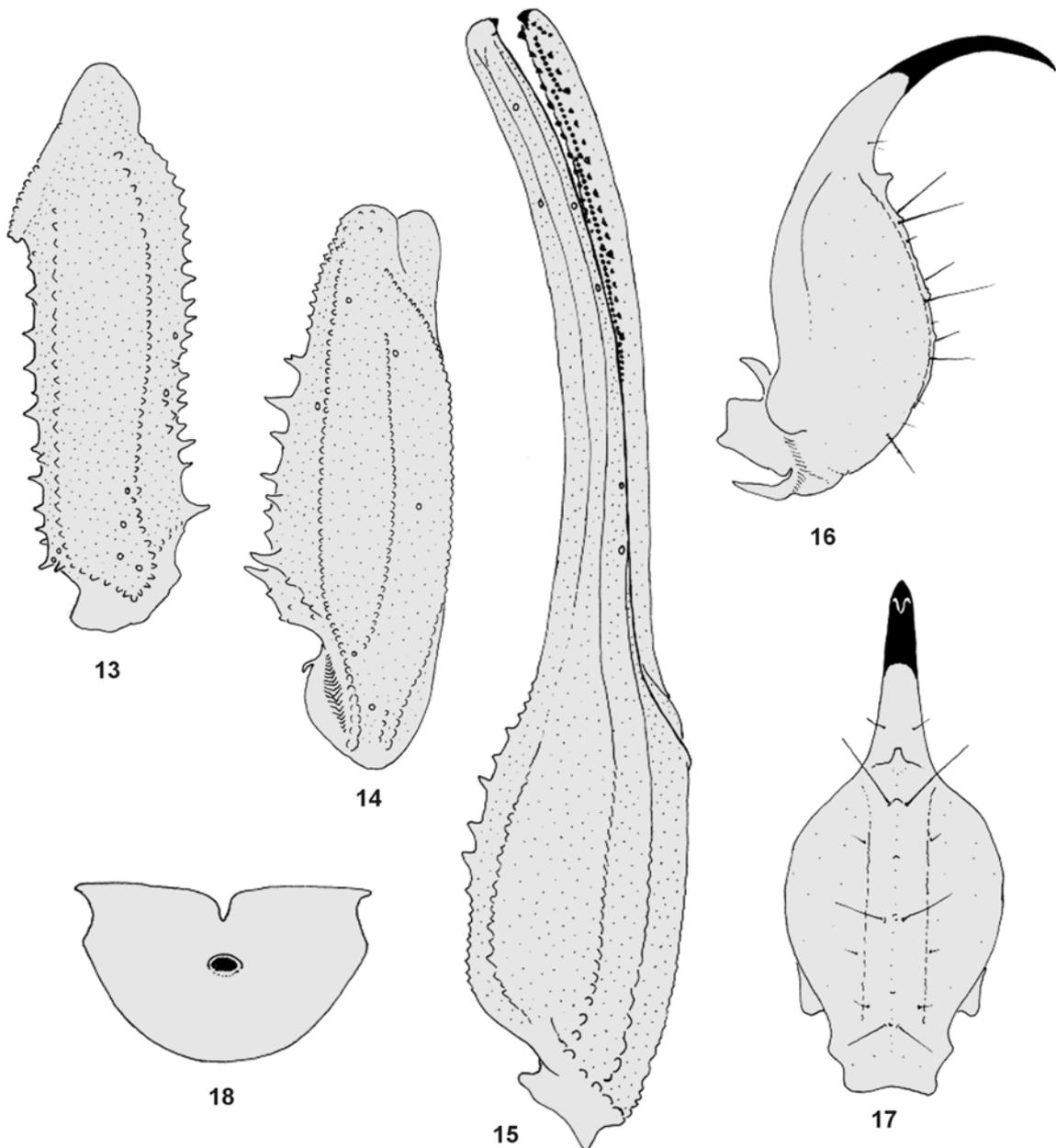
**ETYMOLOGY:** The name is a composite word combining the Latin words "*exilis*" (meaning "slender" or "feeble") and "*manus*" (meaning "hand"), and refers to the distinctly slender pedipalp chelae of this species.

**DIAGNOSIS** (based on the adult male holotype unless otherwise noted): Adults of large size (90 mm). Dark scorpions, with deep red pedipalps and yellow legs. Pedipalps very slender and elongate, with chelae very

attenuate (length/width ratio 6.07) and narrower than patella; pedipalps densely hirsute; fingers with eight principal rows of granules and a moderate basal lobe/notch combination; fixed finger with trichobothria *eb* and *esb* widely separated and located in the basal third of the finger. Metasoma with markedly parallel sides; two pairs of ventrolateral macrosetae on the segments II-IV; telson not elongate, evenly ovate and without lateral lobes at the base of the aculeus, which is very long and evenly curved; subaculear tubercle minute, spinoid and located very close to the base of the aculeus. Pectines with 31-34 teeth in males, 31-32 in females; basal plate with a deep discal pit in the female.

**DESCRIPTION** (based on the adult male holotype): Large scorpion (male 90 mm). Body dark yellowish brown, prosoma, tergites I-VI, metasomal segment V and telson very densely infuscate to uniformly dark reddish brown, tergites I-VI with traces of a yellowish median band; pedipalps uniformly deep reddish (lighter on femur and darker on chelae), with all carinae purplish brown and fingers of the same red color than manus; legs light yellowish brown, immaculate; venter light brown, pectines whitish; chelicerae very densely reticulated with blackish brown.

**Prosoma** coriaceous, with several coarse granules interspersed; anterior median, central median and posterior median carinae strong, granulose, other carinae indistinct; median eyes relatively small (their diameter similar to that of the larger lateral ocellum), separated by slightly more than one ocular diameter, four pairs of lateral ocelli: three larger arranged in a row and one much smaller and located above the median and posterior ones. **Tergites** densely granulose, with many large granules interspersed; I-VI with three longitudinal carinae (poorly defined in I-III), the median one being the strongest; VII with five long, serrate to denticulate carinae. **Metasoma** markedly parallel-sided, with all carinae strongly serrate, segments II-IV with two pairs of ventrolateral macrosetae; segment I with ten carinae, II-IV with eight, V with five, all finely serrate to crenulate, except the ventral submedian which are smooth to weakly serrate in I-II; intercarinal spaces coriaceous, with several small granules interspersed in the dorsal and dorsolateral surfaces of I-IV and several large but worn down granules; telson (fig. 16-17) evenly ovate, globose, vesicle smooth, with some traces of ventral granules and without lateral lobes at base of the aculeus, dorsal surface evenly convex but with a deep basal depression, subaculear tubercle minute, spinoid but truncate at the tip, aculeus very long and evenly curved. **Pedipalps** (fig. 13-15, tables V-VI) orthobothriotic A- $\alpha$ , with fixed finger trichobothria *eb* and *esb* widely separated and located in the basal third of the finger (right chela trichobothrium *esb* is abnormally smaller than that of the left chela); all segments very elongate and slender, internal and external surfaces with moderately dense hairy cover, femur (fig. 13) with all carinae strongly denticulate, ventroexternal and internal carinae set with many large, spinoid tubercles, intercar-



**Fig. 13-18.** *Centruroides exilimanus* sp. n. 13-17: adult male holotype: 13. right pedipalp femur, dorsal view (setation omitted). 14. right pedipalp patella, dorsal view (setation omitted). 15. right pedipalp chela, dorsal view (setation omitted). 16. telson, lateral view. 17. telson, dorsal view. 18. juvenile female paratype from San Simón: basal pectinal plate, ventral view.

**Fig. 13-18.** *Centruroides exilimanus* sp. n. 13-17: macho adulto holotipo: 13. fémur del pedipalpo derecho, vista dorsal (setación omitida). 14. patela del pedipalpo derecho, vista dorsal (setación omitida). 15. pinza del pedipalpo derecho, vista dorsal (setación omitida). 16. telson, vista lateral. 17. telson, vista dorsal. 18. hembra juvenil parotipo de San Simón: placa basal pectinal, vista ventral.

**Table VI**

**Morphometric comparison between adult males of two closely related Honduran species of *Centruroides***, based upon the following measurement ratios: 1) Pedipalp chela length/width, 2) Pedipalp chela width/height, 3) Pedipalp movable finger length/chela width, 4) Metasomal segment IV length/movable finger length, 5) Telson length/width, 6) Telson length/aculeus length. Ratios of *C. exilimanus* sp. n. taken from the holotype; those of *C. margaritatus* from Mexican, Honduran, Nicaraguan and Costa Rican specimens in RTO collection.

Species	1	2	3	4	5	6
<i>C. exilimanus</i> sp. n.	6.07	0.19	3.93	1.00	3.06	2.08
<i>C. margaritatus</i>	2.81-3.18	1.25-1.38	1.72-2.02	1.12-1.29	2.50-2.94	2.40-2.83

nal spaces coriaceous; patella (fig. 14) with all carinae strong, granulose, internal surface with many long, spiniform tubercles (even some are bifid), intercarinal spaces coriaceous; chelae (fig. 15) very slender and narrower than patella, with all carinae defined by large and worn down granules, intercarinal spaces coriaceous, internal surface with several spinoid granules and a dense group of moderate-sized granules at the base of the movable finger articulation; fingers very long and slender, both with eight primary rows of granules, each one flanked by inner and outer supernumerary granules, movable finger with a weak to moderate basal lobe, fixed finger with a weak to moderate basal notch. **Pectines** very long, with 32-31 teeth; basal plate short and narrow, with a deep anterior furrow. **Sternites** III-VI smooth, with vestiges of fine transversal wrinkles; stigmata long and slit-like, VII coriaceous, with four long, strong carinae smooth to weakly serrate. **Legs** very long and slender, all segments finely carinate; trochanter and femur granulose, all other segment smooth to coriaceous; telotarsi with ventral surface densely covered by fine setae roughly arranged in a "Y" shaped figure; claws short and well curved. **Chelicerae** with dentition typical of the genus, dorsal surface of manus smooth and shiny, with a transverse anterior ridge defining a downward slope distally.

**FEMALE:** The two available females are both immature, but two diagnostic features which are not age-correlated are evident: **1)** the pectinal basal plate (fig. 18) is much larger, its posterior margin is very convex and has a deep discal pit (a character previously unknown among the dark, large species of *Centruroides*), and **2)** the pectines are shorter, having only 31-32 teeth.

**DISTRIBUTION:** This species has been found so far only in extreme southern Honduras (fig. 21), but it very probably occurs also in bordering regions of El Salvador and Nicaragua.

**VARIATION:** Juveniles have a distinct median yellow stripe over the tergites, the pedipalps are orange yellowish, the metasoma is light reddish brown (darker on the fifth segment) and the telson is pale yellowish gray; the legs and venter are pale yellow. The variegated pattern of the prosoma and tergites is much more evident also in juveniles. The pedipalp fingers bear eight principal rows of granules in all examined specimens. The pectinal tooth count variation is shown in table IV.

**REMARKS:** This species shows three unusual characters that serve to recognize it at first sight: **1)** adult male with pedipalp chela narrower than patella (fig. 10-11, table V), **2)** chela with trichobothria *eb* and *esb* widely separated and located in the basal third (fig. 11), not just at its base, and **3)** female with a deep discal pit in the basal pectinal plate (fig. 14). These features were previously unknown among all dark, large members of the genus *Centruroides*.

Its closest relative is *C. margaritatus*, from which it can be further distinguished by: **1)** adult males with very long and slender pedipalps (chelae higher than wide and narrower than patella), **2)** adult males with metasomal segments II-IV remarkably parallel-sided, **3)** metasomal segments II-IV with two pairs of ventrolateral macrosetae, **4)** adult males with telson not elongate, vesicle evenly oval and lacking lateral lobes at the base of the aculeus, which is long and evenly curved, **4)** females with a deep pit in the basal pectinal plate, **5)** pedipalps uniformly deep-reddish. Adult males of *C. margaritatus*, have relatively shorter pedipalps, very robust pedipalp chelae (wider than high and much wider than patella), the metasoma is posteriorly enlarged in each segment, there are always more than three pairs of ventrolateral macrosetae in metasomal segments II-IV, the telson is elongate and possesses a pair of strong lateral lobes at the base of the aculeus, which is shorter and strongly curved upward, the females have the basal pectinal plate smooth and the pedipalps have only the chelae deep red colored, the femur and patella being light yellowish brown. Also, adult males of *C. margaritatus* have the chelal carinae more strongly developed; for additional morphometric differences between both species see table VI.

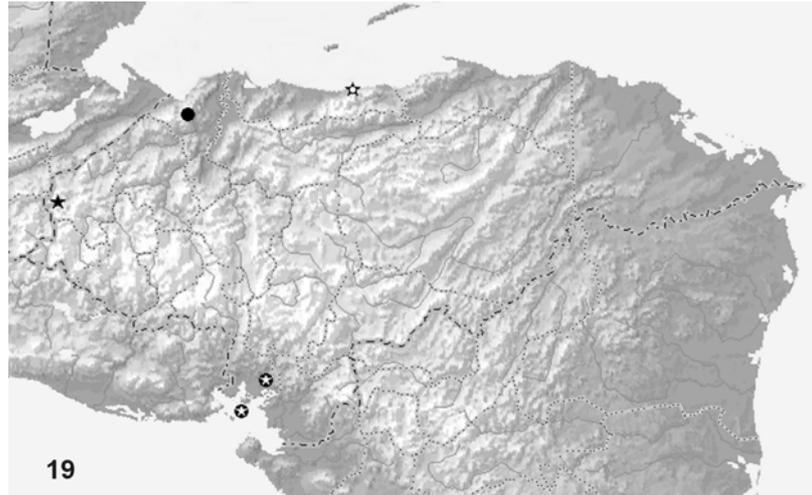
Juveniles of both species can easily be recognized by the shape and color of the pedipalps: more slender and pale immaculate in *C. exilimanus* **sp. n.**, shorter and densely mottled with dark brown in *C. margaritatus*; the telson is also very different in color: immaculate pale grayish in *C. exilimanus* **sp. n.**, densely variegated with dark brown in *C. margaritatus*. As stated before, juvenile females of both species can easily be recognized by the presence of a deep discal pit in *C. exilimanus* **sp. n.**, which is absent in *C. margaritatus*.

In the type locality, *C. exilimanus* **sp. n.** lives sympatrically with *C. koesteri*, but it occurs on the ground and is common, when the latter is strictly arboreal and rare. Also, it is very probable that *C. exilimanus* **sp. n.** may eventually be found living together with *C. margaritatus*, at least in the Gulf of Fonseca area.

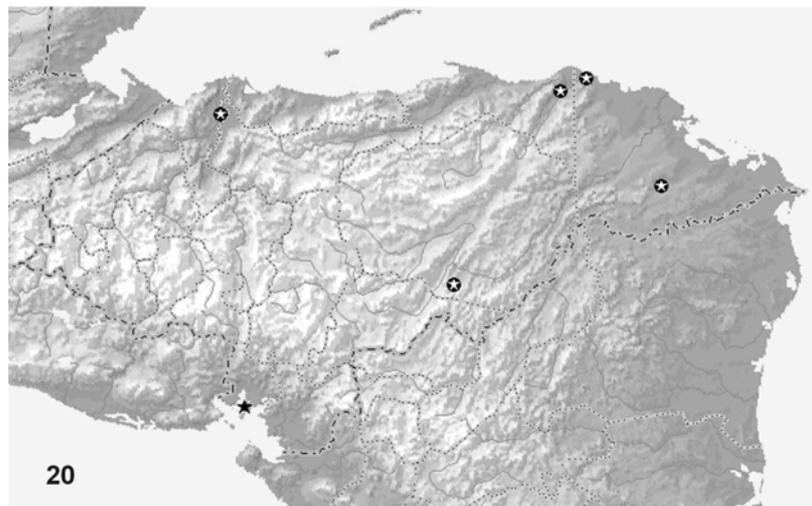
**MATERIAL EXAMINED:** Departamento Valle: Isla del Tigre; 19-21 November 1990 (UV detection, on the ground); S. A. Stockwell; 1 % holotype, 1 juvenile & paratype, 1 juvenile % and 1 juvenile & paratypes (NMNH, RTO). Departamento Lempira: San Simón; 1 August 1990; S. A. Stockwell; 1 juvenile & paratype (NMNH).

### General Remarks

Apart from the nine species herein recorded or confirmed from Honduras, there are at least two other scorpions which very probably occur in parts of this country. *Didymocentrus nitidus* (Hirst, 1907) was described from "San Ramón, Río Wanks (375 feet), 185

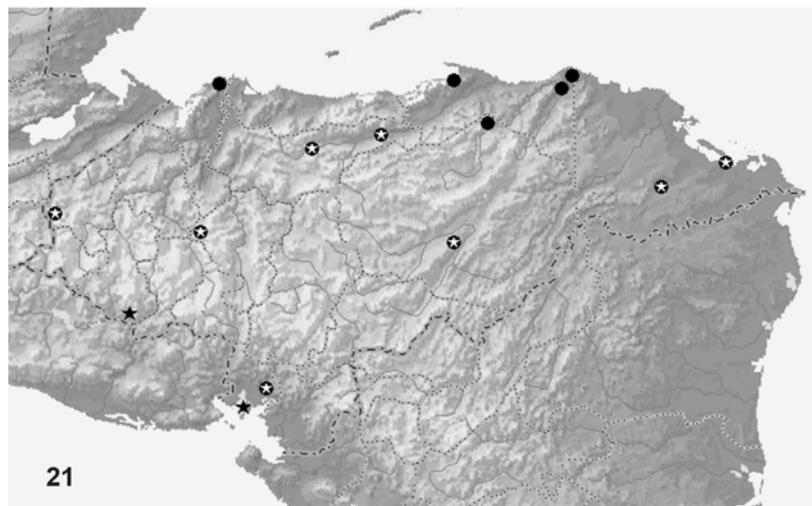


**Fig. 19.** Known distribution of *Didymocentrus krausi* (k), *Diplocentrus coddingtoni* (l), *Diplocentrus lourencoi* ( ) and *Diplocentrus santiagooi* (i) in Honduras.



**Fig. 19.** Distribución conocida de *Diplocentrus coddingtoni* (l), *Diplocentrus lourencoi* ( ), *Diplocentrus santiagooi* (i) y *Didymocentrus krausi* (k) en Honduras.

**Fig. 20.** Known distribution of *Centruroides koesteri* (i) and *Centruroides schmidtii* (k) in Honduras.



**Fig. 20.** Distribución conocida de *Centruroides koesteri* (i) y *Centruroides schmidtii* (k) en Honduras.

**Fig. 21.** Known distribution of *Centruroides gracilis* ( ), *Centruroides margaritatus* (k) and *Centruroides exilimanus sp. n.* (i) in Honduras.

**Fig. 21.** Distribución conocida de *Centruroides exilimanus sp. n.* (i), *Centruroides gracilis* ( ) y *Centruroides margaritatus* (k) en Honduras.

miles above Cape Gracias, Nicaragua". According to Michel Montoya (pers. comm.), the precise data of this locality are: San Ramón (14°40'49"N - 84°42'15"W), Río Wangki (also named Río Coco and Río Segovia), above San Carlos, municipio Waspán, Región Autónoma del Atlántico Norte (RAAN), NICARAGUA. As this locality is placed just at the Nicaragua-Honduras border, *D. nitidus* will very probably be found also in the southeastern part of the adjacent Honduran departamento Gracias a Dios, as it was already suggested by Armas & Maes (2000: 30); in view of this possibility, an adult female from M. Montoya personal collection (**MM-S196**: NICARAGUA: Raan: Bonanza: Miranda, 14°00'47"N - 84°31'35"W, 118 m asl; under dry bract of *Bactris gasipae* in plantation, UV detection; 18 November 2000; M. Montoya) is illustrated in fig. 2. A second species, *Centruroides thorelii* (Kraepelin, 1891) was very recently recorded from Cerro de Montecristo, El Salvador (Armas, 1999a; Armas & Maes, 2001); this mountain is located in the Trifinio region at the Guatemala-El Salvador-Honduras border junction, so this species is very likely to occur in this last country, as Armas (1999a: 30) had already suggested. Because of these reasons, both *D. nitidus* and *C. thorelii* have been included in the key to the Honduran species.

Recent records of *C. nigrimanus* from Honduras (Stahnke & Calos, 1977; Stahnke, 1978; Kovařík, 1998; Fet & Lowe, 2000) appear to be based upon two old ones given by Pocock (1898, 1902). The single specimen examined by Pocock was a juvenile (sex originally not specified, but stated to be a male by Fet & Lowe, 2000), a fact that makes such identification unreliable. In fact, Pocock himself (1898: 388) was not absolutely sure about its identity as he wrote that this supposedly Honduran specimen was just "... apparently the same species..." he was describing therein from Oaxaca. On the other hand, *C. nigrimanus* has been confirmed to be endemic from Oaxaca in south-central Mexico (Hoffmann, 1932, 1938; Fet & Lowe, 2000) and most Honduran specimens of *C. gracilis* (especially juveniles) strongly resemble *C. nigrimanus* in color pattern. Because of these reasons, it is our opinion that the referred record from Honduras should be discarded as based upon a misidentified juvenile of *C. gracilis*.

Also, there are records of *Centruroides limbatus* (Pocock, 1898) allegedly from Honduras (Francke & Stockwell, 1987; Armas & Maes, 2000; Fet & Lowe, 2000), but the presence of this species here is highly questionable because no voucher specimens have ever been mentioned, nor a single precise locality has been given for this taxon inside Honduras. Further, the currently available material clearly shows that this species occurs naturally only in Costa Rica, southern Nicaragua and extreme western Panama (Montoya & Armas [in press]; R. Teruel & M. Montoya [unpub-

hed data]), and apparently does not reach the Nicaragua-Honduras boundary. As already stated in the discussion of *C. gracilis*, our study of several hundred specimens of this species from Mexico, Cuba, Venezuela and USA has revealed that Honduran specimens do not differ from those referred above and only tend to be somewhat lighter in general color, a condition already advertised by Sissom & Lourenço (1987) in their redescription of this taxon. On the other hand, careful comparison of these Honduran material specimen-to-specimen with large samples (representing all developmental instars) of *C. limbatus* from Costa Rica, Nicaragua and Panama confirmed that these two species are certainly different in morphologic and morphometric features, but not at all so when color pattern was analyzed: each one has well-defined blackish and reddish colored morphs (including intermediate conditions), which are very similar each other and may easily lead to misidentifications if such specimens are not studied carefully enough. Taking this particular resemblance into account, coupled with the facts that: **1**) not a single specimen nor a precise locality for *C. limbatus* have ever been presented to support records of this species from Honduras, and **2**) the presumed Honduran distribution of *C. limbatus* (the Caribbean lowlands) also matches well that of *C. gracilis* as confirmed here, we have therefore decided to exclude *C. limbatus* from the present list and regard all its previous records from Honduras as misidentifications based upon specimens of *C. gracilis*.

The two genera of Diplocentridae appear to have a strictly allopatric distribution: *Diplocentrus* (the most diverse diplocentrid genus) seems to be restricted to the northwestern quarter of Honduras (from Copán through La Ceiba), while *Didymocentrus* occurs all along the southeastern quarter (from the Gulf of Fonseca to possibly Cabo Gracias a Dios). This family will probably prove to be more diverse in Honduras than currently known, as suggested from a comparison with the much more diverse diplocentrid fauna of neighboring Mexico-Guatemala region. Unfortunately, diplocentrids are burrowing scorpions which spend most of their life in deep retreats, thus being very seldom collected and scarce in museum collections (particularly adult specimens), a fact that makes difficult such exhaustive studies.

On the other hand, the family Buthidae contains but a single genus in Honduras, even though it is the most diverse scorpion genus in the country, with five or probably six species. Up to date, *Centruroides exilimanus* **sp. n.** has been found only in Honduras but the two known populations are located very close to the adjoining Nicaragua-El Salvador-Guatemala borders, so it is very likely to occur also in these countries.

**Key to the scorpion species confirmed or potentially present in Honduras:**

As other recent keys for Neotropical scorpions, this one will work generally best if adult specimens are examined as juvenile specimens may differ greatly from adults in most important diagnostic features such as color pattern, morphometric and tegumentary microsculpture (i.e., granulation and carinal development).

- 1 Pedipalps with trichobothrial pattern C; sternum pentagonal ..... **(Diplocentridae) 2**
- Pedipalps with trichobothrial pattern A; sternum triangular ..... **(Buthidae: *Centruroides*) 6**
- 2 Pedipalps, prosoma, tergites and metasoma densely punctate; pedipalp chelal carinae: external secondary more developed than digital ..... **(*Didymocentrus*) 3**
- Pedipalps, prosoma, tergites and metasoma not punctate; pedipalp chelal carinae: digital more developed than external secondary ..... **(*Diplocentrus*) 4**
- 3 Modal tarsomere II spiniform setae formula 3/3 : 4/4 : 5/5 : 5/5. Distribution: coast and foothills of the Pacific watershed ..... ***D. krausi***
- Modal tarsomere II spiniform setae formula 4/4 : 5/5 : 6/6 : 6/6. Potential distribution: coast and foothills of the Caribbean watershed ..... ***D. nitidus***
- 4 Pectinal tooth count 12/12; adults of moderately large size (60 mm); modal tarsomere II spiniform setae formula 5/5 : 5/5 : 6/6 : 6/6. Distribution: extreme western mountains (Cordillera de Tilarán, departamento Copán) ..... ***D. santiagoi***
- Pectinal tooth count 9-11; adults of moderate size (35-54 mm); modal tarsomere II spiniform setae formula different from above ..... **5**
- 5 Adults of smaller size (35-45 mm); prosoma much longer than wide in both sexes; genital operculum with 2-3 pairs of setae; adult male without posterolateral recesses in tergite VII and with pedipalp chelae length/depth ratio 2.98. Distribution: north-central coast (departamento Atlántida) ..... ***D. coddingtoni***
- Adults of larger size (51-54 mm); prosoma slightly longer than wide in male, wider than long in female; genital operculum with 7-10 pairs of setae; adult male with deep posterolateral recesses in tergite VII and with pedipalp chelae length/depth ratio 2.56. Distribution: northwestern mountains (Cordillera del Merendón, departamento Cortés) ..... ***D. lourencoi***
- 6 Adults of small to moderate size (30-70 mm); prosoma and tergites I-VI yellow with variable dark variegate pattern ..... **7**
- Adults of moderate to large size (54-90 mm); prosoma and tergites I-VI dark brown ..... **9**
- 7 Adults of moderate size (60-70 mm), with pedipalp chelae robust and much wider than patella, fixed finger with a moderate to strong basal lobe; color yellow with two longitudinal rows of dark brown spots over the tergites, pedipalp fingers blackish brown, metasomal segment V and telson yellow; pectines with 21-25 teeth ..... ***C. koesteri***
- Adults of small size (30-50 mm), with pedipalp chelae very slender and narrower than patella, fixed finger without basal lobe; color pale yellow, densely speckled with blackish brown all over, metasomal segment V and telson infusate to dark orange brown; pectines with 13-17 teeth ..... **8**
- 8 Pedipalp fixed finger with trichobothrium *db* proximal to *et*; metasomal segment V and telson infusate; adult male metasomal segment V angular and with well developed carinae; adult male telson with two strong lateral lobes at the base of the aculeus; adult female with basal pectinal plate narrow, with straight to slightly convex posterior margin ..... ***C. thorelii***
- Pedipalp fixed finger with trichobothrium *db* distal to *et*; metasomal segment V and telson dark orange brown; adult male metasomal segment V cylindrical and without carinae; adult male telson without lateral lobes at the base of the aculeus; adult female with basal pectinal plate long, with strongly convex posterior margin ..... ***C. schmidti***

- 9 Pedipalp fingers with nine primary rows of granules; pedipalps practically bare ..... *C. gracilis*
- Pedipalp fingers with eight primary rows of granules; pedipalps densely hirsute ..... 10
- 10 Metasomal segments II-IV with four or more pairs of ventrolateral macrosetae; adult male pedipalps moderately slender, chelae very robust and globose, much wider than patella; adult male telson elongate, with two strong basal lobes at the base of the aculeus; females with basal pectinal plate smooth, without discal pit ..... *C. margaritatus*
- Metasomal segments II-IV with two pairs of ventrolateral macrosetae; adult male pedipalps very slender, chelae very slender and elongate, narrower than patella; adult male telson ovate, without basal lobes at base of aculeus; female basal pectinal plate with a deep discal pit ..... *C. exilimanus* sp. n.

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