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# A new species of *Diplocentrus* (Arachnida: Scorpiones) from Michoacan, Mexico

## Especie nueva de *Diplocentrus* (Arachnida: Scorpiones) de Michoacán, México

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**Abstract.** *Diplocentrus churumuco* sp. nov., from the Balsas River Basin in Michoacan, Mexico is described and clearly differentiated from its nearest relatives. The tarsomere II spine formula is 4/4:4/4:5/5:5/5. Pectinal tooth counts are 9-10 in males, and 7-8 in females.

Key words: Scorpion, Diplocentridae, *Diplocentrus*, new species, Michoacan, Mexico.

**Resumen.** Se describe *Diplocentrus churumuco* sp. nov., de la Depresión del Balsas en Michoacán, y se dan las diferencias diagnósticas con especies afines del género. La fórmula de espinas tarsales es 4/4:4/4:5/5:5/5; los machos tienen 9-10 dientes pectíneos y las hembras 7-8.

Palabras clave: Alacrán, Diplocentridae, *Diplocentrus*, especie nueva, Michoacán, México.

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### Introduction

The genus *Diplocentrus* Peters, 1861, presently has approximately 50 species, distributed from the southern U.S.A. (Arizona, New Mexico and Texas) south to Honduras (Sissom and Fet, 2000). It is by far most diverse in Mexico, with 45 species reported, including the five species that range across the northern border. The genus has been the subject of numerous studies by the senior author, primarily on taxonomy and on life histories necessary to understand ontogenetic variability (Francke 1975, 1977a, 1977b, 1978a, 1978b, 1981, 1982; Sissom and Francke 1998). Despite its diversity and widespread distribution in Mexico, the genus *Diplocentrus* remained unreported from Michoacan until recently; Hoffmann (1931), Díaz-Nájera (1965) and Beutelspacher (2000) reported other scorpion genera and species from that state, but no diplocentrids. The first report from Michoacan, of *Diplocentrus keyserlingi* Karsch, by Ponce and Beutelspacher (2001) is based on misidentified specimens from two separate localities (representing two unnamed taxa); *D. keyserlingi* is a species hitherto reported only in the state of Oaxaca. Subsequently, during his doctoral research, Ponce (2003, Ponce and Moreno 2003) collected a new species from the Balsas River Basin in the state of Michoacan, which is the subject of this contribution. Measurements and terminology follow previous usage (Francke 1975, 1977b). Abbreviations of depositories:

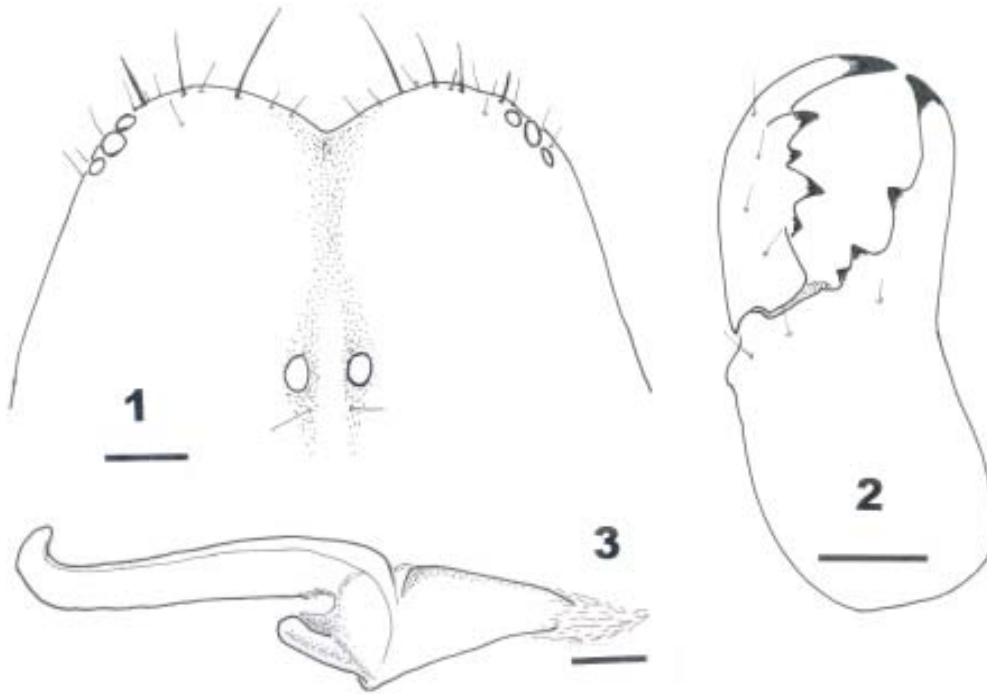
AMNH (American Museum of Natural History, New York), CAS (California Academy of Sciences, San Francisco), CEUM (Colección de Entomología, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán), CNAN (Colección Nacional de Arácnidos, Instituto de Biología, Universidad Nacional Autónoma de México, D. F.).

### Description

*Diplocentrus churumuco* sp. nov. (Figures 1-7).

**Diagnosis.** Adult males 30-37 mm long, carapace 3.7-4.8 mm long. Yellow ochre, weakly to moderately infusate. Pedipalp femur shorter than carapace, with dorsal surface convex; tibia also shorter than carapace. Sternum with 6 pairs of setae. Metasomal segment I wider than long. Cheliceral fixed finger as long as chela width; movable finger subequal to chela length. Pectinal tooth count 9-10 in males (n=15), 7-8 in one known female. Modal tarsomere II spine formula 4/4:4/4:5/5:5/5.

**Description of the holotype.** Prosoma. Carapace yellow; moderately infusate, uniformly dusky submedially around median eyes, variegated on rest; areas around median and lateral eyes dark brown. Anterior margin smooth, shiny; median notch V-shaped, approximately seven times wider than deep (Fig. 1), moderately setose. Three pairs of subequal lateral eyes. Median eyes on anterior third of



**Figures 1-3.** *Diplocentrus churumuco*, new species from Michoacán, México. **1.** Anterior third of carapace. **2.** Dorsal aspect of left chelicera. **3.** Dorsal aspect of left hemispermatophore. Scale lines = 0.5 mm.

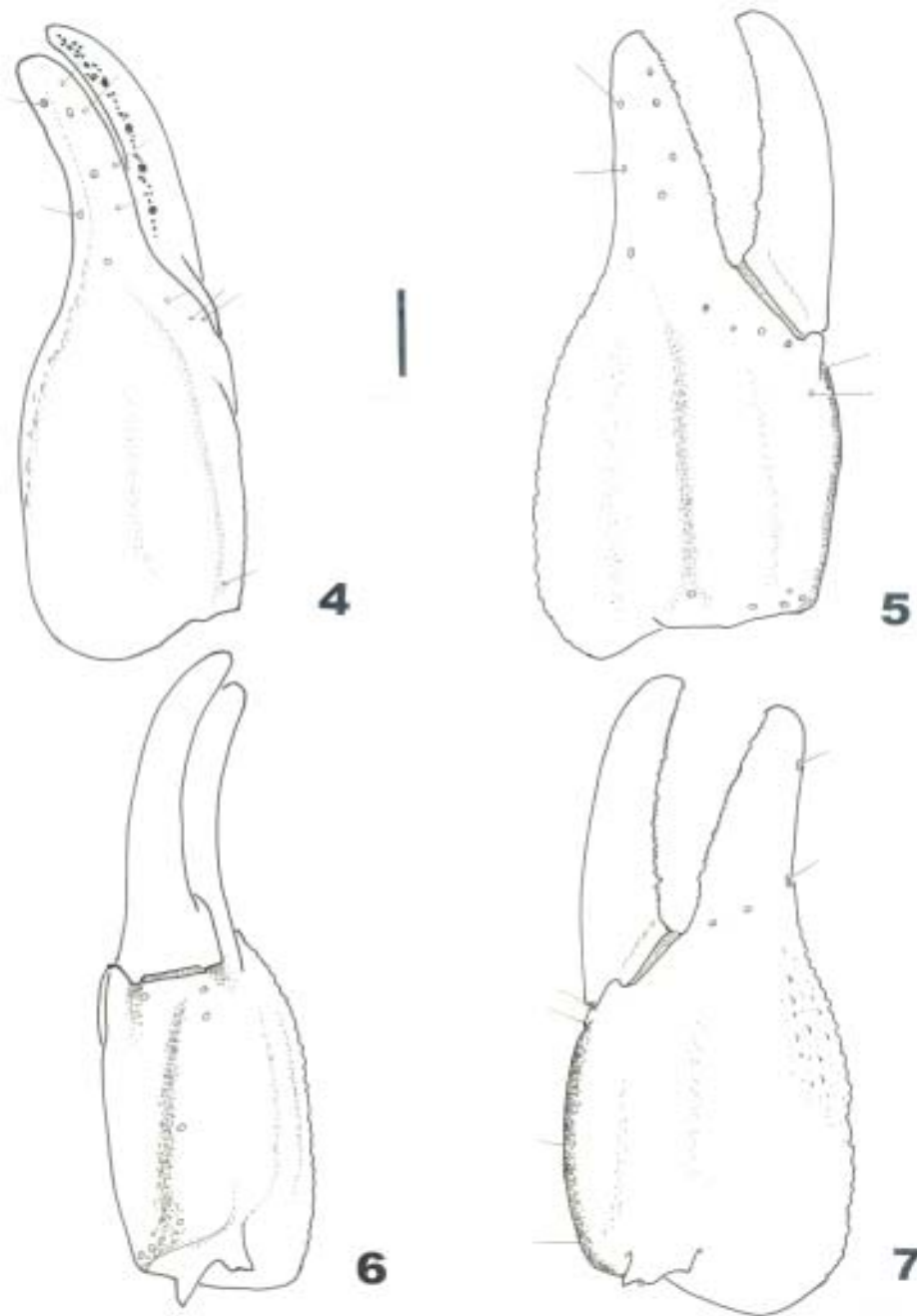
carapace; ocular tubercle low, flat medially. Carapacial surface smooth, lustrous. Venter cream to pale yellow; sternum with 6 pairs of setae (three pairs on anterior margin, one submedial, two posterolateral).

Mesosoma. Tergites ochreous, moderately infuscate; smooth, shiny. Median carina absent on tergites I-VII. Tergite VII: submedian and lateral carinae weak, present only on distal fourth, consisting of 3-4 low, smooth granules each. Venter cream to pale yellow; genital operculi with 3 pairs posterior setae; pectinal tooth count 10-10; sternites smooth, shiny; sternite VII moderately setose, submedian and lateral carinae weak to vestigial, present only on distal third, smooth.

Metasoma. Ochreous basally, darkening distally to medium brown on segment V and telson, keels weakly infuscate. Setation: ventrally decreasing from moderate on I to sparse on V; dorsally increasing from sparse on I to moderate on V. Ventral submedian carinae: on I and II moderately strong, crenulate; on III weak, feebly crenulated; on IV vestigial, smooth. Ventral lateral carinae: on I and II moderate, strongly crenulate; on III moderate to weak, weakly crenulate; on IV weak, almost smooth. Lateral inframedian carinae: on I and II complete, moderate, crenulated; on III vestigial basally, weak distally, almost smooth; on IV obsolete basally, vestigial and smooth distally. Lateral suprmedian carinae: on I and II moderate, on III weak, on IV vestigial, crenulated on all segments. Dorsolateral carinae: on I-III weak, crenulated; on IV vestigial, almost smooth. Intercarinal spaces smooth, shiny. Segment V longer than pedipalp femur. Ventral median, ventral

lateral and ventral transverse keels strong, with well-spaced, large subconical granules. Lateral median carinae obsolete. Dorsal lateral keels vestigial to obsolete, smooth. Anal subterminal keel strong, with 20 oblong granules; anal terminal keel weak to medium, granulose. Intercarinal spaces shiny, smooth except for anal crescent with 8 large subconical granules. Telson medium brown, moderately setose; vesicle ventrally with few granules basally. Chelicera (Fig. 2). Light yellow, feebly infuscate; teeth medium to dark brown. Fixed finger equal in length to chela width; movable finger slightly shorter than chela length, distal internal tooth considerably longer than distal external tooth.

Pedipalp. Light to medium brown, feebly infuscate; carinae and fingers slightly darker. Orthobothriotaxia C (Vachon, 1974). Femoral dorsal face distinctly convex both longitudinally and transversely; dorsal internal and dorsal external carinae weak, represented by few granules basally, thus the dorsal surface merges smoothly and gradually with internal and external faces. Tibia with dorsal median keel moderately strong, smooth; ventral external keel weak to vestigial, smooth; all other carinae obsolete. Chela (Figs. 4-7) with fingers and distointernal area densely setose. Dorsal margin scabrous-granulose. Digital keel weak, smooth. Dorsal secondary keel vestigial to obsolete, smooth. External secondary keel obsolete. Ventral external carina obsolete. Ventral median keel very strong, smooth; directed toward midpoint of movable finger articulation. Ventral internal keel vestigial to obsolete. Intercarinal spaces weakly reticulate throughout.



**Figures 4-7.** *Diplocentrus churumuco*, new species from Michoacán, México. Right pedipalp chela. **4.** Dorsal. **5.** External. **6.** Ventral. **7.** Internal. Scale line = 1 mm.

Legs. Light yellow, smooth. Tarsomere II spine formula 4/4 4/4: 4/4 4/5: 5/5 5/5: 5/5 5/5.

Hemispermatothore (Fig. 3). Lamellate, weakly sclerotized, 4 mm long with distal lamella about two-thirds of the total length; 0.8 mm wide at capsular region; sperm duct simple, without teeth or spines.

Measurements of holotype (in mm; L=length, W=width, D=depth). Total L 35.4. Carapace L/W 4.6/4.5. Mesosoma L 11.3. Metasoma L 15.8 : I L/W 2.4/2.8, II L/W 2.8/2.5, III L/W 3.1/2.45, IV L/W 3.4/2.3, V L/W 4.1/1.95. Telson L 3.7: vesicle L/W/D 3.0/1.95/1.40. Chelicera L/W 1.45/

1.05: fixed finger L 1.05, movable finger L 1.30. Pedipalp L 14.7: femur L/W/D 3.5/1.7/1.5, tibia L/W 3.9/1.6, chela L/W/D 7.3/2.0/3.4, movable finger L 4.1.

Intraspecific variability. (1) Carapace length in adult males 3.7–4.9 mm ( $\bar{x}$ =4.25, n=15). (2) Pectinal tooth counts: males (n=15): 25 combs with 10 teeth, 4 combs with 9 teeth, one comb mutilated. The pectinal tooth count on the single known female is 7-8. (3) Setae on the genital operculi: 3 to 4 pairs. (4) Large granules on the anal crescent on metasomal segment V: 7 to 8. (5) Tarsomere II spine counts (n=16 as no sexual dimorphism is known in the genus for this character):

Leg I prolateral - 31 tarsi with 4 spines, 1 tarsus missing.  
Retrolateral - 30 tarsi with 4 spines, 1 with 5 spines, one missing.

Leg II prolateral – 1 tarsus with 3 spines, 31 tarsi with 4 spines.

Retrolateral – 27 tarsi with 4 spines, 5 tarsi with 5 spines.

Leg III prolateral – 31 tarsi with 5 spines, 1 missing.

Retrolateral – 31 tarsi with 5 spines, 1 missing.

Leg IV prolateral – 1 tarsus with 4 spines, 31 tarsi with 5 spines.

Retrolateral – 32 tarsi with 5 spines.

### Taxonomic summary

*Type series:* Holotype adult male from approx. 1 km W of Churumuco, 18° 38' 39" N –101° 40' 15" W, 300 msnm, Municipio Churumuco, Michoacán, México, 9 June 2001 (J. Ponce, *et al.*, U. V. Detection). Deposited in the Colección Nacional de Arácnidos (CNAN-TO190), Instituto de Biología, UNAM. Paratypes: 14 adult male and one subadult (?) female, same data as the holotype [AMNH: one male, CAS: one male, CEUM: one male, CNAN-TO192: 11 males and CNAN-TO191 one subadult (?) female].

*Etymology:* The specific name is a noun in apposition and refers to the town near the type locality.

### Remarks

Among the described species with relatively similar tarsomere II spine formulae, *D. churumuco* sp. nov. can be separated as follows:

*Diplocentrus montecristo* Armas and Martin-Frias, 2000, from Chiapas, known only from the adult male holotype (deposited at CNAN; examined), with a tarsomere II spine formula 4/3-4:4/4:5/5:5/5: (a) in size—carapace length of *D. montecristo* is 5.5 mm; approximately 30% longer than in *D. churumuco*; (b) in *D. montecristo* the pedipalps are overall proportionately longer [both femur and tibia longer than the carapace], whereas in *D. churumuco* the carapace is longer than either segment; and (c) in *D. montecristo* the pedipalp chela is proportionately longer and thinner [length/depth ratio 2.6], whereas in *D. churumuco* it is proportionately shorter and deeper [length/depth ratio 2.15 to 2.35 in extreme specimens sampled].

*Diplocentrus perezi* Sissom, 1991, from Los Tuxtlas, Veracruz, with a tarsomere II spine formula of 3-4/4:4/4:5/5:5/5, it differs as follows: (a) in color, as *D. perezi* is dark orange brown to dark brown, rather than yellow ochreous; (b) it is considerably smaller [carapace length of *D. perezi* male 7.6 mm versus 3.7 to 4.9 mm for *D. churumuco*]; (c) in pectinal tooth counts—*D. perezi* males 13-14 versus 9-10 in the new species, and females 11-12 in *D. perezi* versus 7-8 in *D. churumuco*.

*Diplocentrus maya* Francke, 1977, from Belize and Guatemala, with an identical tarsomere II spine formula of 4/4:4/4:5/5:5/5 in: (a) color, as *D. maya* is dark reddish

brown; (b) size, as carapace length in *D. maya* adults ranges from 6.2 to 6.8 mm; and (c) pectinal tooth counts which are higher in *D. maya* with 13 in males and 11-12 in females.

*Diplocentrus anophthalmus* Francke, 1977, from Yucatan, known only from three females with 7 pectinal teeth and very similar tarsomere formula at 4/4:4/4-5:5/5:5/5, in that this species is a troglobite that lacks median eyes and has reduced lateral eyes.

*Diplocentrus chiapasensis* Beutelspacher and Armas, 1998, known from one juvenile female from Chiapas, it differs: (a) in that the tarsomere II spine formula on legs II and III is 4/5:4/5 instead of the 4/4:5/5 found in *D. churumuco*; and (b) in the pectinal tooth count of 13-14 in the holotype female versus only 7-8 in the single female of the new taxon.

Geographically, the nearest neighbors of *D. churumuco* are *Diplocentrus gertschi* Sissom and Walker, 1992, to the north, and *Diplocentrus coylei* Fritts and Sissom, 1996, to the southeast. These taxa can be recognized as follows: *D. gertschi*, from Sonora, Sinaloa and Nayarit, has higher pectinal tooth counts of 13-15 in males and 9-12 in females; and a higher tarsomere II spine formula at 4/5:5/5-6:6/6:6/6. *Diplocentrus coylei*, from Guerrero, also has higher pectinal tooth counts at 14-16 in males and 11-13 in females, and a higher tarsomere II spine formula at 4/5:5/5:6/6:6/6.

Although *D. keyserlingi* occurs only in Oaxaca, it must be indicated that: (a) this is a much larger species, with carapace lengths of 6.0 to 6.5 mm (50% longer than in *D. churumuco*); (b) it is fusco-ferrugineous in color rather than yellow ochre as the new species; and (c) has a modal tarsomere II spine formula of 4/5:5/5:5/5:5/6, thus differing from the new species in four counts (or 50% of the spine rows: prolateral I, pro- and retrolateral II and retrolateral IV).

Finally, there are no outstanding differences between the hemispermatophore of *D. churumuco* and those of the other 12 species in the genus that have had this structure examined and illustrated, [*D. coddingtoni* Stockwell, 1988, *D. colwelli* Sissom, 1986, *D. gertschi*, *D. hoffmanni* Francke, 1977, *D. keyserlingi* (Karsch, 1880), *D. lourencoi* McWest, 1997, *D. ornatus* Stockwell, 1988, *D. peloncillensis* Francke, 1975, *D. rectimanus* Pocock, 1898, *D. spitzeri* Stahnke, 1970, *D. steeleae* Stockwell, 1988, and *D. williamsi* Sissom and Walcker, 1995), and a more thorough study (including measurements) is needed to establish its usefulness in the taxonomy of the genus *Diplocentrus* Peters.

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